Environmental Uncertainty, Accounting Conservatism and Investment Efficiency: Evidence from China

Nan Hui[a], Won-Sun Oh[b]

[a]Department of Business Administration, Incheon National University, South Korea and College of Accounting, Shandong Technology and Business University, China
[b]Department of Business Administration, Incheon National University, South Korea

Abstract

Purpose - The purpose of this study is to explore the impact of the application of accounting conservatism on the investment efficiency of listed companies in China under the background of the current rising environmental uncertainty.
Design/methodology/approach - This study collected 14,934 observations of A-share listed companies in Shanghai and Shenzhen from 2013 to 2020, and analyzed the data by means of moderating effect test and multiple regression analysis.
Findings - The results show that environmental uncertainty deteriorates the company's investment efficiency. The higher the level of environmental uncertainty, the more prone to over-investment and under-investment. Accounting conservatism plays moderating role between environmental uncertainty and investment efficiency. Among them, the moderating effect of conditional conservatism is to alleviate under-investment of the company under high financing constraints and the over-investment, while it intensifies the under-investment under low financing constraints. The moderating effect of unconditional conservatism is to alleviate the under-investment.
Research implications or Originality - This study finds out the internal mechanism of accounting conservatism affecting investment efficiency, which not only helps to understand about the value of accounting conservatism standards, but also helps to improve the investment efficiency of listed companies.

Keywords: Conditional Conservatism, Environmental Uncertainty, Over-investment, Unconditional Conservatism, Under-investment
JEL Classifications: M41, MG30

Ⅰ. Introduction

Recently the unstable factors of the international political situation have gradually increased, the competition between China and the United States, the European Union in the field of trade has become more and more intense, and the political frictions and intensification of contradictions has brought more uncertainty to China's economic development prospects. At the end of 2019, the outbreak of COVID-19 further exacerbated the uncertainty of the macro environment, which has brought great difficulties to the formulation and implementation of economic policies, resulting in the increase of economic policy uncertainty.

Affected by the macro environment and policies, the uncertainty from the external environment about the operation of company is also increasing, which makes the risks faced by managers in decision-making significantly increase. As the basis of managers' decision-making, the quality of accounting information plays an important role in the effectiveness of decision-making.

As an information recognition attribute, a large number of studies have shown that accounting conservatism helps to alleviate the information barriers between managers and the outside world, and strengthen the supervision to managers by the board of directors and shareholders (for example, Watts 2003; Ewert and Wagenhofer 2012). However, some scholars believe that the application of accounting conservatism leads to the underestimation of net assets and accounting profits, can not objectively and truly reflect economic business, and reduces the decision-making usefulness of accounting information (for example, Kabir and Laswad 2014). It is precisely because of the above differences in understanding the economic consequences of accounting conservatism that accounting conservatism has been controversial. However, China's accounting standards clearly stipulate in the requirements for the quality of accounting information that enterprises should be cautious in accounting recognition, measurement and reporting of transactions or events, and should not overestimate assets or income, or underestimate liabilities or expenses. It can be seen that China's accounting standard setting institutions have fully recognized the necessity of accounting conservatism. Accounting conservatism is a cautious response to the uncertain environment in which the company is located. Its role is to transform the uncertain economic information caused by the external environment into definite and measurable accounting elements.

Starting from the company's environmental uncertainty, this paper explores the relationship between uncertainty and the company's investment efficiency, and the moderating effect of accounting conservatism on them. The innovation of this paper is: by summarizing the influencing factors of inefficient investment, this paper deeply analyzes the mechanism of accounting conservatism affecting investment efficiency, and studies the moderating effect of unconditional conservatism and conditional conservatism between environmental uncertainty and investment efficiency.

II. Theoretical Basis and Literature Review

1. Environmental Uncertainty and Investment Efficiency of Company

Environmental uncertainty is an external factor that needs to be fully considered when companies make investment decisions and strategic choices. Niu and Zhao (2012) showed that it is difficult for decision-makers to obtain complete and sufficient information and make effective decisions under high environmental uncertainty. Therefore, in the case of high environmental uncertainty, strategic decision-making is more complex, managers are difficult to conduct a comprehensive analysis about the company and make rapid and effective decisions, at this time information is more important. Feng (2014) pointed out that it is difficult for managers to accurately judge the external situation under high environmental uncertainty, which is easy to cause decision deviation.

Efficient investment generally means that when the company does not have capital constraints, it can invest in all projects with NPV (net present value) greater than 0. When the

company needs to choose among multiple projects with NPV greater than 0, it will choose the project with the largest NPV, and the project with NPV less than 0 will not be selected. However, due to principal-agent conflict, information asymmetry and managers' irrational behavior, managers' investment behavior on behalf of the company usually deviates from the best investment decision, resulting in inefficient investment behavior. At present, the phenomenon of inefficient investment is very common. Inefficient investment can be divided into over-investment and under-investment. Over-investment refers to that the manager sacrifices the overall interests of the company for the sake of personal interests, not only invest total funds in the projects with NPV greater than 0, but also choose to invest in the projects with NPV less than 0. Under-investment includes two situations. One is that due to financing constraints, managers have to give up projects with NPV greater than 0. The other is that in order to avoid the adverse impact of investment failure on themselves, managers actively give up projects with NPV greater than 0. Specifically:

On the one hand, the increase of environmental uncertainty increases the cost of external financing. Especially for the companies with high debt ratio, the risk brought by the increase of uncertainty makes potential investors more cautious when making investment decisions than in the past, requiring higher return on investment, and higher financing costs will lead to under-investment for the company due to financing constraints. Meanwhile, with the increase of uncertainty, it will be more difficult for managers to evaluate the discounted value of the future income of investment projects, forcing managers to invest more carefully, giving up high-risk projects and reducing investment motivation. Amihud and Lev (1981) believed that due to the different risk preference of shareholders and managers, when the investment project reaches the expected goal, the managers can not obtain all the income related to the investment project risk. However, after the investment failure, the managers have to bear personal professional risk, resulting in the mismatch between risk and income. Therefore, when the uncertainty increases, managers tend to reduce investment.

On the other hand, the higher the environmental uncertainty, the greater the degree of information asymmetry, which makes it difficult for shareholders or the board of directors to effectively supervise the managers' behavior. The separation of ownership and management leads to the emergence of agency cost. In order to maximize their own interests, managers are more likely to make opportunistic behavior in the case of insufficient shareholder's supervision, and use free cash flow for investment projects with negative NPV, which leads to over-investment. Jensen (1986) believed that on the basis of asymmetric information, managers may seek for in-service self-interest by controlling more resources, so as to invest in projects with negative NPV. When the company is faced with high uncertainty, managers can attribute the decline of performance to the drastic changes of the external economic environment and the uncertainty of economic policies. While the high uncertainty worsens the degree of information asymmetry, it will increase the difficulty of shareholders' evaluation about investment projects and the supervision to managers. Therefore, in the face of a high degree of environmental uncertainty, in order to meet the "self-interest", managers have the motivation to over-invest.

We propose that the increase of environmental uncertainty aggravates over-investment and under-investment. Our first hypothesis is as follows.

H1: Environmental uncertainty is positively correlated with inefficient investment.

2. Reasons for Inefficient Investment

This paper attempts to distinguish the inefficient investment according to the two direct factors
that affect the inefficient investment, that is, the degree of financing constraints of the company and managers' characteristics.

2.1. Financing Constraints

Financing constraint is one of the main reasons for under-investment. As early as 1957, through data analysis, Meyer and Kuh (1957) showed that under the imperfect capital market conditions, the company's investment is constrained by internal cash flow, and pointed out the impact of financing constraints on the company's investment. The higher the degree of financing constraints, the greater the difficulty of financing, the higher the cost of financing, so the amount of funds used for investment is limited, which is prone to under-investment. On the contrary, the lower the degree of financing constraints, the smaller the difficulty of financing, the more free cash flow the company can use, and the more likely it is to over invest. Zhang and Zheng (2012) believed that there is a negative correlation between financing constraints and investment efficiency, because financing constraints are easy to cause under-investment, which leads to the decline of investment efficiency. Pan et al. (2016) also supported the view that financing constraints reduce investment efficiency, because financing constraints lead to under-investment. However, for over-invested companies, the improvement of degree of financing constraints will reduce the free cash flow used by company for investment, then alleviate over-investment. Li et al. (2018) believed that in case of over-investment, financing constraints promote the improvement of investment efficiency, while in case of under-investment, financing constraints inhibit the improvement of investment efficiency. From the above research results, it can be seen that the deterioration effect of financing constraints on inefficient investment is reflected in that financing constraints will lead to under-investment.

2.2. Managers' Characteristics

At present, a large number of literature have studied the relationship between managers and investment efficiency of company from the perspective of behavioral finance (Ahmed and Scott 2002; Pikulina et al. 2017; Zhang et al. 2020). Reflected in managers' investment decision-making, radical and conservative investment styles will be formed. The radical investment style stems from managers' over-confidence. On the contrary, the conservative investment style stems from the lack of self-confidence. Over-confidence refers to the belief that the accuracy of one's cognition is higher than that reflected by the facts. Psychology and behavioral finance research believe that over-confidence is a common psychological deviation, and it is more obvious in the company's management. Roll (1986) first introduced this psychological concept into the research field of financial accounting and found that over-confident managers tend to overestimate the expected return of the target company, then pay too high purchase price for the target company, which will damage the value of their own company. Malmendier and Tate (2008) tested the relationship between managers' over-confidence and the company's investment distortion behavior. They pointed out that when the cash flow is sufficient, the over-confident managers' over-investment behavior increases significantly. It can be seen that

the investment style of over-confident managers is often more radical, which is easy to lead to over-investment .

Contrary to over-confident managers, the investment style of managers who lack self-confidence is more conservative, which is easy to lead to under-investment. Even if they have sufficient cash flow, they will not invest at will. From an objective point of view, managers who lack self-confidence usually underestimate the expected return of the project and make analysis errors, resulting in the abandonment of investment projects with net present value greater than 0. From a subjective point of view, they pay more attention to investment risks and have low tolerance for risks. Therefore, for some high-risk investment projects, they will choose to give up even if the future income is large. Hirshleifer and Thakor (1992) proposed that based on their own reputation, in order to avoid the adverse impact of investment failure of high-risk projects on their personal reputation, conservative managers are more willing to invest in low-risk projects, which will have an impact on the investment decision of new projects. Bertrand and Mullainathan (2003) proposed that if managers are conservative and inert, this feature will make them unwilling to change the current situation. When the investment decision is about whether to invest in new projects, it is easy to under-invest.

3. Differences in the Economic Consequences of Conditional Conservatism and Unconditional Conservatism

According to the research results of Ball and Shivakumar (2006), accounting conservatism can be divided into unconditional conservatism and conditional conservatism. Unconditional conservatism is also called balance sheet conservatism or news-unrelated conservatism. When assets or liabilities are recognized, accounting methods are selected to accelerate the recognition of expenses or delay the recognition of income, then the net asset value is lower than the market value. Conditional conservatism is also called income statement conservatism or news-related conservatism. The confirmation of bad news in financial reports is more timely or requires more strict verifiability than good news. Both unconditional conservatism and conditional conservatism are caused by uncertainty, which will underestimate the book value of owner's equity to a certain extent. However, there are essential differences between the two. The core difference lies in the relationship with new news. Unconditional conservatism uses historical news at the beginning of asset generation, which has nothing to do with new news. Conditional conservatism uses new news that affects the future expected value of assets.

As a means of dealing with uncertainty, accounting conservatism can have an impact on inefficient investment. The research on the relationship between accounting conservatism and investment efficiency originated from Watts (2003). He believed that managers are often motivated to hide adverse investment projects in order to protect their own interests, and accounting conservatism can enable shareholders and the board of directors to find the signal of negative investment return as soon as possible and take measures .

The main difference between conditional conservatism and unconditional conservatism is that conditional conservatism, as post conservatism, on the one hand, alleviates the agency problem and information asymmetry between shareholders and managers, and can timely intervene in managers' behaviors that damage shareholders' interests, and restrain managers' over-investment behavior caused by self-interest motivation or irrational behaviors. On the other hand, conditional conservatism will lead to the decline of accounting earnings. If this causal relationship can not be correctly identified by potential investors of the company, it will mislead

potential investors' investment decisions. Therefore, potential investors will reduce investment or even give up investment, which will aggravate the financing constraints of the company and under-investment. Meantime, conditional conservatism will also make managers' invest- ment strategies more conservative, which will exacerbate the under-investment caused by managers. Ishida and Ito (2014) empirically found that conditional conservatism can force managers to recognize the losses caused by investment projects in time, then make conservative decisions on project investment.

Unconditional conservatism originates from the requirements of accounting standards and systems. The selection of some accounting policies is a mandatory regulation of the law or market regulatory agencies on listed companies, and does not change with the external environment. Therefore, unconditional conservatism can not respond to market changes in a timely manner, sometimes it can not accurately reflect the company's operating conditions because of the lag. Therefore, in China, unconditional conservatism can not timely correct managers' behavior deviating from shareholders' interests. Its economic significance is mainly reflected in aggravating financing constraints. With the rise of the level of unconditional con- servatism, accounting earnings and net assets decline. Investors who can not identify the level of unconditional conservatism will choose to reduce investment or even give up investment, resulting in the occurrence of financing constraints or aggravating the degree of financing con- straints, which worsens under-investment and alleviates over-investment. However, uncondi- tional conservatism has limited effect on over-investment caused by managers.

4. Moderating Role of Accounting Conservatism

The analysis of the moderating role of accounting conservatism needs to meet two pre- conditions: On the one hand, it is studied from two aspects: unconditional conservatism and conditional conservatism, because they have different characteristics and action mechanism; On the other hand, the samples are grouped according to the reasons of inefficient investment to investigate the moderating effect of accounting conservatism under specific samples. The reason for this treatment is that different types of samples are used to regress the model, the conclusions on the moderating role of accounting conservatism may be different. For example, for the samples with high financing constraints, the moderating effect of conditional con- servatism may be to inhibit under-investment, while for the samples with low financing con- straints, the moderating effect of conditional conservatism may be to aggravate un- der-investment. Most of the existing literatures ignore the above two premises, resulting in very different research conclusions.

Due to the imperfection of China's capital market and investors' immaturity, Chinese potential investors lack sufficient cognition about accounting conservatism, they can not correctly eval- uate the level of accounting conservatism, and can not fully understand the impact of account- ing conservatism on financial statements, which hinders the role of accounting conservatism. Accounting conservatism leads to lower accounting earnings and assets. For potential investors who "don't know the truth", most of them only get the surface signal indicating low accounting earnings and assets. This "bad news" easily makes them more cautious about whether to invest or not. If they choose not to invest or invest less, the financing constraints of the company will worsen, which will further aggravate the under-investment. Hu et al. (2014) studied the relationship between accounting conservatism and the company's information environment us- ing the data of 43 countries. It was found that the higher the accounting conservatism, the

better the information environment. It further explained that in the company with asymmetric information, the shareholders' demand for accounting conservatism is stronger. At this time, the rise of environmental uncertainty becomes a signal, which makes potential investors who "don't know the truth" begin to pay attention to accounting conservatism. Further, they will understand the impact of the existence of accounting conservatism on the financial statements and find the negative effect of accounting conservatism on accounting earnings and assets, they will correct their judgment on the company, reevaluate the company and make new investment decisions. To sum up, from the perspective of financing constraints, the moderating effect of accounting conservatism is to alleviate under-investment and aggravate over-investment.

From the perspective of managers' characteristics, the moderating effect is different due to the different characteristics of unconditional conservatism and conditional conservatism. As ex ante conservatism, unconditional conservatism is independent to external news and can not make timely feedback to market changes. This limitation determines that unconditional conservatism lacks restrictive effect on managers. At this time, the moderating effect of unconditional conservatism is not obvious . Due to the characteristics of ex post conservatism, the moderating effect of conditional conservatism can not only improve the quality of accounting information through the asymmetric recognition of external good news and bad news, thus reduce financing costs and alleviate financing constraints, then alleviate under-investment and aggravate over-investment, but also can timelily find and correct radical managers' over-investment behavior. For conditional conservatism, there are two opposite moderating effects on over-investment. Zhang and Wang (2013) found that the improvement of unconditional conservatism inherent in the accounting system can better alleviate the company's financing constraints than conditional conservatism. Zhou and Xia (2015) proposed that compared with conditional conservatism, unconditional conservatism has a more significant positive impact on financing efficiency. According to the research results of the above scholars, compared with unconditional conservatism, the effect of conditional conservatism on financing constraints is not obvious, and the deterioration effect of over-investment caused by the mitigation of financing constraints is not significant. Therefore, this paper mainly considers the inhibitory effect of conditional conservatism on over-investment caused by the restriction on radical managers. In conclusion, the moderating effect of conditional conservatism is to alleviate under-investment and inhibit over-investment.

Based on the above analysis, on the one hand, radical managers will over invest, on the contrary, conservative managers are easy to lead to under-investment. On the other hand, compared with managers' characteristics, financing constraints are the prerequisite to affect the investment efficiency of companies. Whether the manager is radical or conservative, his investment decision will be restricted by the amount of investable cash flow. In the case of high financing constraints, managers do not have enough funds for investment and the company's inefficient investment is characterized by under-investment; In the case of low financing constraints, capital is no longer an obstacle to investment and the company's inefficient investment is characterized by over-investment. Conservative managers will be cautious about alternative investment projects, resulting in under-investment.

Affected by managers' characteristics and financing constraints, inefficient investment can be divided into four situations:

① Scenario A：Under-investment caused by radical managers and high financing constraints
② Scenario B：Under-investment caused by conservative managers and high financing con-

straints

③ Scenario C : Over-investment caused by radical managers and low financing constraints
④ Scenario D : Under-investment caused by conservative managers and low financing con-
straints

Table 1. Scenarios of Inefiicient Investment

Types of Mamagers \ Financing Constraints	High	Low
Radical	Scenario A Under-Investment	Scenario C Over-Investment
Conservative	Scenario B Under-Investment	Scenario D Under-Investment

Based on above discussions, we set the following hypotheses.

H2a: For scenario A and scenario B, the moderating effect of both unconditional con-
servatism and conditional conservatism is to inhibit the deterioration of under-invest-
ment caused by environmental uncertainty

H2b: For scenario C, the moderating effect of conditional conservatism is to inhibit the
deterioration of over-investment caused by environmental uncertainty. However, the
moderating effect of unconditional conservatism is not obvious.

H2c: For scenario D, the moderating effect of conditional conservatism is to exacerbate
the deterioration of under-investment caused by environmental uncertainty.
However, the moderating effect of unconditional conservatism is not obvious.

Ⅲ. **Research Design and Variables**

1. Test Models

1.1. Environmental Uncertainty and Inefficient Investment

In order to test hypothesis H1, the following regression model is established:

$$IEINV_{i,t} = \beta_{10} + \beta_{11}EU_{i,t-1} + \beta_{1j}\sum Control\,Variable_j + \sum Year \qquad (1)$$
$$+ \sum INDUSTRY + \epsilon_{1i,t}.$$

In model (1), EU stands for the degree of environmental uncertainty, $IEINV$ is the level
of inefficient investment. Various control variables included in the model (1) to control the
effect of other factors on corporate investment behavior. Those are corporate size ($SIZE$),
operating cash flow ($CASH$), return on assets (ROA), investment opportunity ($TOBINQ$), asset
liability ratio (LEV), size of board of directors ($BSIZE$), company's listing years (AGE), agency
costs (AC), share proportion of the largest shareholder (FH). The measurement of above varia-
bles are discussed below. In model (1), we used the β_{11} to test whether hypothesis H1 is

true. We interpret a significantly positive β_{11} as indicating an increase in environmental uncertainty increased corporate investment inefficiency.

1.2. Moderating role of Accounting Conservatism

In order to test hypothesis H2a, H2b and H2c, the following regression models are established:

$$
\begin{aligned}
UNDINV_{i,t} = {} & \beta_{20} + \beta_{21}EU_{i,t-1} + \beta_{22}CNopac_{i,t-1} + \beta_{23}EU_{i,t-1} \times CNopac_{i,t-1} \quad \text{(2a)} \\
& + \beta_{2j}\sum Control\,Variable_j + \sum Year + \sum INDUSTRY + \epsilon_{2i,t}.
\end{aligned}
$$

$$
\begin{aligned}
UNDINV_{i,t} = {} & \beta_{30} + \beta_{31}EU_{i,t-1} + \beta_{32}Cscore_{i,t-1} + \beta_{33}EU_{i,t-1} \times Cscore_{i,t-1} \quad \text{(2b)} \\
& + \beta_{3j}\sum Control\,Variable_j + \sum Year + \sum INDUSTRY + \epsilon_{3i,t}.
\end{aligned}
$$

$$
\begin{aligned}
OVRINV_{i,t} = {} & \beta_{40} + \beta_{41}EU_{i,t-1} + \beta_{42}CNopac_{i,t-1} + \beta_{43}EU_{i,t-1} \times CNopac_{i,t-1} \quad \text{(3a)} \\
& + \beta_{4j}\sum Control\,Variable_j + \sum Year + \sum INDUSTRY + \epsilon_{4i,t}.
\end{aligned}
$$

$$
\begin{aligned}
OVRINV_{i,t} = {} & \beta_{50} + \beta_{51}EU_{i,t-1} + \beta_{52}Cscore_{i,t-1} + \beta_{53}EU_{i,t-1} \times Cscore_{i,t-1} \quad \text{(3b)} \\
& + \beta_{5j}\sum Control\,Variable_j + \sum Year + \sum INDUSTRY + \epsilon_{5i,t}.
\end{aligned}
$$

In models (2a)-(3b), the dependent variables *UNDINV* and *OVERINV* are measures of corporate investment inefficiency. Each variable refers to under-investment and over-investment respectively. *CNopac* is unconditional conservatism and *Cscore* is conditional conservatism. Control variables are same as in model (1). We use model (2a) and (2b) to tests the hypothesis H2a and H2c, and models (3a) and (3b) are for H2b. In each model above, estimated coefficients of the product terms are matter of interest. In model (2a), *EU×CNopac* is used to verify whether the unconditional conservatism has a moderating effect and in model (2b) *EU×Cscore* is used to test the moderating effect of conditional conservatism. If $\beta_{23}(\beta_{33})$ is significantly different to zero, we can interpret it as indicating that the unconditional(conditional) conservatism moderates the impact of environmental uncertainty on inefficient investment(under-investment). Similarly, in model (3a) and (3b), *EU×CNopac* (*EU×Cscore*) is used to verify whether unconditional (conditional) conservatism has a moderating effect on the corporate over-investment.

2. Definition and Measurement of Variables

2.1. Environmental Uncertainty

This paper uses the volatility of main business income as the proxy variable of environmental uncertainty. The change of main business income comes partly from the impact of external environment and policies, and partly from the growth of the company itself. Therefore, in order to accurately measure environmental uncertainty, we should first eliminate the part of stable growth of the company. Referring to Ghosh and Olsen (2009) and Shen et al. (2012), for the operating revenue of each company for five consecutive years, the ordinary least square (OLS) method is used to estimate the following models :

$$SALE = \alpha_0 + \alpha_1 \, YEAR + \epsilon \qquad (4)$$

In model 4, *SALE* is the company's main business income, and *YEAR* is the annual variable. Assuming that the current year is year t, if the data of the current year is taken, *YEAR* = 5, if the data of year t-1 is taken, *YEAR* = 4, and so on. If the data of year t-4 is taken, *YEAR* = 1. Take the data of the current year and the past four years as samples, use the above model for regression, take the residual obtained from the regression results as the fluctuation of the company's main business income due to environmental uncertainty, calculate the standard deviation of the residuals in the past five years, divide it by the mean value of the fluctuation of main business income in the past five years, so as to obtain the company's environmental uncertainty index without industry adjustment. Since the operation fluctuation of the company may be affected by the overall industry, the median of the environmental uncertainty of all companies in the same industry without industry adjustment is used as the uncertainty index of the industry, and the environmental uncertainty of the company without industry adjustment is divided by uncertainty index of the industry, then the final environmental uncertainty index is obtained.

2.2. Accounting Conservatism

2.2.1. Conditional Conservatism

Model (5) is an econometric equation of conditional conservatism, which was proposed by Basu in 1997.

$$\frac{EPS_{i,t}}{P_{i,t-1}} = \beta_0 + \beta_1 RET_{i,t} + \beta_2 DR_{i,t} + \beta_3 RET_{i,t} \times DR_{i,t} + \epsilon_{i,t} \qquad (5)$$

In the above model, $EPS_{i,t}$ is the earnings per share of company i in t year. $P_{i,t-1}$ is the price per share of company i at the beginning of the year. $RET_{i,t}$ is the stock return rate of company i in year t. To avoid the impact of financial statement disclosure, the company's return data from May of this year to April of the next year is used. $DR_{i,t}$ is a dummy variable, when $RET_{i,t} \langle 0$, the value is 1, otherwise it is 0. $\varepsilon_{i,t}$ represents the random error term. β_1 refers to the timeliness of "good news", β_3 refers to the increment of timeliness of "bad news" relative to "good news", and $\beta_1 + \beta_3$ refers to the timeliness of "bad news". The model of $RET_{i,t}$ is as follows:

$$RET_{i,t} = [\prod_{m=1}^{12} (1 + R_{i,m}) - 1] - [\prod_{m=1}^{12} (1 + MR_m) - 1] \qquad (6)$$

In model (6), $R_{i,m}$ is the monthly stock return of company i in consideration of cash dividend reinvestment in month m, and MR_m is the comprehensive monthly market return of company in consideration of cash dividend reinvestment calculated by weighted average method of circulating market value ot the month.

Considering the company's individual characteristics and in order to better measure the response of accounting earnings to "good news" and "bad news", Khan and Watts (2009) add the following two linear equations to the model (5).

$$Gscore = \beta_1 = \mu_1 + \mu_2 Size_{i,t} + \mu_3 M/B_{i,t} + \mu_4 Lev_{i,t} \tag{7}$$

$$Cscore = \beta_3 = \lambda_1 + \lambda_2 Size_{i,t} + \lambda_3 M/B_{i,t} + \lambda_4 Lev_{i,t} \tag{8}$$

In model (7) and (8), *Size* refers to company size, *M/B* is market value to book value and *Lev* is leverage of the company.

Substituting model (7) and model (8) into model (5), the following model is obtained:

$$\frac{EPS_{i,t}}{P_{i,t-1}} = \beta_0 + (\mu_1 + \mu_2 Size_{i,t} + \mu_3 M/B_{i,t} + \mu_4 Lev_{i,t}) \times RET_{i,t} + \beta_2 DR_{i,t} \tag{9}$$
$$+ (\lambda_1 + \lambda_2 Size_{i,t} + \lambda_3 M/B_{i,t} + \lambda_4 Lev_{i,t}) \times RET_{i,t} \times DR_{i,t} + \epsilon_{i,t}$$

By substituting the coefficients μ_1, μ_2, μ_3, μ_4 and λ_1, λ_2, λ_3, λ_4 obtained from model (9) into model (7) and model (8), the annual *GScore* and *CScore* of each company can be obtained. *CScore* reflects the company's tendency to confirm "bad" news relative to "good" news. The larger the value is, the more timely the company reflects "bad" news and the higher the level of company's conditional conservatism is.

2.2.2. Unconditional Conservatism

Drawing on the research results of Givoly and Hayn (2000), Pae et al. (2005) and considering the continuity of the sample, this paper takes the opposite number of the ratio of non accrual items (*NOPAC*) of each year divided by total assets at the end of the previous year to test the unconditional conservatism. The equation is as follows:

$$CNopac_{i,t} = -NOPAC_{i,t}/TA_{i,t-1} \tag{10}$$

Among them, $TA_{i,t-1}$ is the total assets at the end of t-1. t is the cumulative period, and the negative value of the ratio is used to conform to the direction of the change of conservatism, that is, the greater the value, the higher the level of conservatism. *NOPAC* is a non accrual item, and the calculation formula is as follows:

$$NOPAC = Total\ Accruals - Operating\ Accruals\ Total\ Accruals - Operating\ Accruals \tag{11}$$

Where, *Total Accruals* = Net Profit + Depreciation − Cash Flow From Operations.
Operating Accruals = ΔAccounts Receivable + ΔInventory + ΔPrepayment
+ ΔAccounts Payable - ΔTax Payable.

2.3. Investment Efficiency

This paper uses Richardson's (2006) investment expectation model as the quantitative method of inefficient investment. The advantage of this model is that it can calculate the expected investment scale of the company in the current year. The result of actual investment minus expected investment is inefficient investment. Meanwhile, inefficient investment can be divided into over-investment and under-investment.

The data of the cash flow statement is used and the company's annual total investment (*INVT*)

of the current year is divided into new investment (*INVN*) and maintenance investment (*INVM*):

$$INVT = CPFFIL + CPFA - CRFFIL - CRFD \qquad (12)$$
$$INVM = DF + AI + AL$$
$$INVN = INVT - INVM$$

Where,
CPFFIL = cash paid for construction of fixed assets, intangible assets and other long-term assets
CPFA = cash paid for acquiring subsidiaries and other business units
CRFFIL = cash received from disposal of fixed assets, intangible assets and other long term assets
CRFD = cash received from disposal of subsidiaries and other business units
DF = depreciation of fixed assets
AI = amortization of intangible assets
AL = amortization of long term deferred expenses

The new investment (*INVN*) of the company in each year consists of two parts, namely, the new investment under normal asset loss and unexpected new investment. The investment efficiency model in this paper is as follows:

$$INVN_{i,t} = \beta_0 + \beta_1 INVN_{i,t-1} + \beta_2 CASH_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 RET_{i,t-1} \qquad (13)$$
$$+ \beta_5 SIZE_{i,t-1} + \beta_6 TOBINQ_{i,t-1} + \beta_7 AGE_{i,t-1} + \epsilon_{i,t}$$

In Model (13), $VN_{i,t}$ is the total new investment of the company in the current year and it is expressed by the ratio of the newly increased investment in year t to the total assets at the beginning of the year. $RET_{i,t-1}$ represents the company's stock yield for the year as in (6).

The residual of Model (13) is obtained by subtracting the expected new investment from the actual new investment, that is, the unexpected new investment, which represents the inefficient investment value of company i in year t. If the residual is positive, it means over-investment, and it is indicated by *OVRINV*. If the residual is negative, it means that the investment is insufficient, and it is indicated by *UNDINV*. The absolute value of *OVRINV* and *UNDINV* is used to express the overall investment efficiency of the company. The larger the absolute value is, the lower the investment efficiency of the company is.

2.4. Control Variables

Various control variables are included in model (1)-(3b) to control factors other than environmental uncertainty and accounting conservatism affecting corporate investment inefficiency. The control variables are measure as follows: *SIZE* is natural logarithm of a company's total assets; *CASH* is net operating cash flow/ total assets; *ROA* is net profit/ average total assets; *TOBINQ* is (market value of equity + book value of liabilities) / book value of total assets; *LEV* is total liabilities / total assets; *BSIZE* is natural logarithm of the number of directors; *AC* is administrative expenses / sales revenue; *AGE* is natural logarithm of listing years; *FH* is number of shares held by the largest shareholder / total number of shares.

The description of each variable used in this study is summarized in Table 2.

Table 2. Variable Description

Variable Type	Variable Name	Variable Code	Variable Description
Dependent Variable	Inefficient Investment	ABSINV	absolute value of residuals in Richardson(2006) Model
	Over-Investment	OVRINV	regression residuals greater than 0 in Richardson(2006) Model
	Under-Investment	UNDINV	absolute value of regression residuals less than 0 in Richardson(2006) Model
Independent Variable	Economic Uncertainty	EU	According to Ghosh and Olsen (2009) and Shen Huihui (2012), the results are obtained
	Unconditional Conservatism	CNopac	According to Givoly and Hayn (2000) and Pae et al. (2005), the results are obtained
	Conditional Conservatism	Csocre	According to Basu(1997) and Khan and Watts (2009), the results are obtained
Control Variable	Corporate Size	SIZE	natural logarithm of a company's total assets
	Operating Cash Flow	CASH	net operating cash flow / total assets
	Return on Asset	ROA	net profit / average total assets
	Investment Opportunity	TOBINQ	(market value of equity + book value of liabilities) / book value of total assets
	Asset Liability Ratio	LEV	total liabilities / total assets
	Board Size	BSIZE	natural logarithm of the number of directors
	Agency Cost	AC	administrative expenses / sales revenue
	Listed Years	AGE	natural logarithm of listing years
	Share Proportion of the Largest Shareholder	FH	number of shares held by the largest shareholder / total number of shares

3. Sample Selection and Data Sources

Since the new Chinese leader took office in 2013, a series of reform measures have been implemented. In order to meet the needs of timeliness, this paper takes the data of A-share listed companies in Shanghai and Shenzhen from 2013 to 2020 as a sample. According to the research needs, the following observations are excluded from sample:

(1) Included in the financial industry
(2) ST and *ST listed companies. (ST means that the company has suffered continuous losses in recent two years; *ST means that the company has suffered continuous losses in recent three years and has delisting risk.)
(3) Companies with IPO(Initial Public Offering) in that year.
(4) Missing financial and accounting data
(5) Companies whose main business income is less than 0.
(6) In order to control the influence of outliers, continuous variables are winsorized at top and bottom 1% of the distribution.

After applying the above sample selection criteria, we get 14,934 observations during period 2013-2020. All data used in this study is collected from CSMAR(Chinese Stock Market and Accounting

Research) database of Guo Tai An company of China.

In order to test the moderating effect of accounting conservatism, samples need to be distinguished according to financing constraints and managers' characteristics. The methods are as follows:

Based on the research results of Fazzari et al. (1988), Hadlock and Pierce (2010), the financing constraints are grouped according to the asset size of the company in the current year. According to the order of total assets in the current year from high to low, the top 33% of the sample companies are defined as the low financing constraint group, and the last 33% of the sample companies are defined as the high financing constraint group.

This paper uses managers' personal characteristics to determine managers' "radical" degree. Specifically, drawing on the practices of Pan Ailing, Liu Wenkai and Wang Xue (2018), this paper mainly focuses on managers' personal characteristics in five aspects: gender, age, education, major and dual, as shown in table 3. Finally, sum the scores of each index.

Table 3. Calculation Index of Manager's Aggresiveness

Index	Definition
Gender	If the manager is male, take 1, otherwise take 0
Age	If the manager's age is less than the average of the sample, take 1, otherwise take 0
Education	If the manager has master degree or above, take 1, otherwise take 0
Major	If the manager's major is non operation and management, take 1, otherwise take 0
Dual	If the manager concurrently serve as the chairman, take 1, otherwise take 0

According to the measurement method of managers' characteristics introduced above, the score representing the degree of managers' radicalization is calculated. According to the order of scores in the current year from high to low, the top 33% of sample companies are defined as the radical group, and the last 33% of sample companies are defined as the conservative group.

Finally, cross combine the two groups of financing constraints with the two groups of managers' characteristics and take the intersection to obtain four groups of samples corresponding to the four quadrants in Table 1, which are:

scenario A: High Financing Constraint + Radical
scenario B: High Financing Constraint + Conservative
scenario C: Low Financing Constraint + Radical
scenario D: Low Financing Constraint + Conservative.

After screening and processing by the above methods, 14,934 sample data of inefficient investment are obtained, including 5638 over-investment samples and 9,296 under-investment samples.

Ⅳ. Research Design and Variables

1. Descriptive Statistics

Table 4 shows the descriptive statistics of relevant variables about inefficient investment.

Table 4. Descriptive Statistics of Major Variables

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ABSINV	14,934	.0367	.0234	.0434	.0005	.2644
OVRINV	5,638	.0484	.0239	.0675	.0003	.3848
UNDINV	9,296	.0305	.0231	.0277	.0006	.1506
EU	14,934	1.3179	.9698	1.2065	.1312	7.0193
SIZE	14,934	22.48505	22.3166	1.2645	20.0695	26.0998
CASH	14,934	.1598	.1329	.1071	.0181	.5415
ROA	14,934	.0336	.0306	.0550	-.2242	.1916
TOBINQ	14,934	2.0303	1.5998	1.2744	.8691	7.7600
LEV	14,934	.4552	.4519	.2021	.0656	.8821
BSIZE	14,934	2.1431	2.1972	.2000	1.6094	2.708
AC	14,934	.0895	.0726	.0711	.0082	.4312
AGE	14,934	2.5042	2.5649	.5032	1.6094	3.2958
FH	14,934	.3398	.3182	.1477	.0841	.7418

The total number of samples of inefficient investment is 14,934, the mean value is 0.0367, the minimum value is 0.0005, the maximum value is 0.2644, and the standard deviation is 0.0434. After the overall sample of inefficient investment is divided into over-investment and under-investment, statistics are carried out respectively, in which the result of under-investment is taken as the absolute value to facilitate analysis. The sample number of over-investment is 5,638 and the sample number of under-investment is 9,296.

2. Correlation Analysis

Table 5 is Pearson correlation analysis table, showing the correlation between main independent variables, control variables and inefficient investment.

Among them, environmental uncertainty is positively correlated with inefficient investment, which is significant at the level of 1%, indicating that the greater the environmental uncertainty, the greater the inefficient investment. The correlation coefficient between environmental uncertainty and conditional conservatism (CScore) is 0.048, and the correlation coefficient with unconditional conservatism(CNopac) is 0.074. Both are significant at the level of 1%, indicating that the greater the environmental uncertainty, the greater the operation risk of the company, the greater the demand for accounting conservatism, and the higher the level of accounting conservatism. The correlation coefficient between conditional conservatism and inefficient investment is -0.008, which is not significant. The correlation coefficient between unconditional conservatism and inefficient investment is 0.031, which is significant at the level of 1%.

Table 5　Correlation Matrix

	ABSINV	CNopac	Cscore	EU	SIZE	CASH	ROA	TOBINQ	LEV	BSIZE	AC	AGE	FH
ABSINV	1												
CNopac	.031[#]	1											
Cscore	-.008	.032[#]	1										
EU	.096[#]	.074[#]	.048[#]	1									
SIZE	-.162[#]	.034[#]	-.454[#]	-.058[#]	1								
CASH	.037[#]	-.015	-.082[#]	-.011	-.146[#]	1							
ROA	.012	-.100[#]	-.311[#]	-.064[#]	.046[#]	.213[#]	1						

TOBINQ	.246#	-.027#	.022#	.048#	-.506#	.218#	.170#	1					
LEV	-.089#	.075#	.249#	.040#	.482#	-.265#	-.309#	-.434#	1				
BSIZE	-.057#	-.013	-.154#	-.059#	.250#	-.038#	.024#	-.163#	.152#	1			
AC	.129#	-.015	.020&	.085#	-.384#	.112#	-.124#	.386#	-.299#	-.111#	1		
AGE	-.116#	-.012	.003	.065#	.255#	-.030#	-.037#	-.148#	.273#	.133#	-.120#	1	
FH	-.026#	-.013	-.184#	-.001	.258#	.019&	.112#	-.105#	.115#	.049#	-.184#	.048#	1

Notes: # $p<0.01$, & $p<0.05$

3. Analysis of Empirical Results

3.1. The Relationship between Environmental Uncertainty and Inefficient Investment

Table 6 is the regression results of model 1, showing the relationship between environmental uncertainty and inefficient investment. The impact of environmental uncertainty on inefficient investment is significantly positively correlated at the level of 1%. The higher the environmental uncertainty, the greater the inefficient investment, indicating that the company makes more decisions of inefficient investment under the condition of high environmental uncertainty. After dividing inefficient investment into over-investment and under-investment, it is found that environmental uncertainty is positively correlated with over-investment and under-investment at the level of 1%, indicating that with the increase of environmental uncertainty, both over-investment and under-investment will become more serious. This result is consistent with the theoretical expectation, and the hypothesis H1 is confirmed.

3.2. Analysis on the Moderating Role of Accounting Conservatism

3.2.1. Moderating Role of Unconditional Conservatism (Under-investment)

Table 7 shows the regression results of model (2a). Panel A of Table 7 uses the samples after the combination of scenario A and scenario B to investigate the moderating effect of unconditional conservatism. There is a significant positive correlation between environmental uncertainty and under-investment at the level of 1%, which is consistent with the previous research conclusions. The regression coefficient of unconditional conservatism to under-investment is 0.4474, which is significant at the level of 1%, indicating that unconditional conservatism exacerbates under-investment. To the product term of environmental uncertainty and unconditional conservatism, the coefficient is -0.0252, which is significant at the level of 1%, indicating that unconditional conservatism has a moderating effect, which inhibits the aggravation of environmental uncertainty on under-investment and improves investment efficiency. Panel B of Table 7 uses the sample corresponding to scenario D. The coefficient of the product term of environmental

Table 6. Environmental Uncertainty and Inefficient Investment

Model (1)	(1)	(2)	(3)
Dependent Variable	ABSINV	OVRINV	UNDINV
Constant	0.0789***	0.1744***	0.0375***
	(6.77)	(6.15)	(4.59)

EU	0.0019***	0.0022***	0.0021***
	(6.03)	(2.69)	(9.35)
SIZE	-0.0016***	-0.0072***	0.0003
	(-3.23)	(-5.80)	(0.82)
CASH	0.0117***	0.0397***	0.0018
	(2.98)	(3.88)	(0.65)
ROA	-0.0062	0.0115	-0.0451***
	(-0.83)	(0.57)	(-8.22)
TOBINQ	0.0075***	0.0131***	0.0063***
	(18.74)	(12.16)	(22.50)
LEV	0.0062**	0.0146**	0.0032
	(2.22)	(2.13)	(1.61)
BSIZE	-0.0049**	-0.0005	-0.0052***
	(-2.19)	(-0.09)	(-3.29)
AC	0.0138**	0.0354**	0.0017
	(2.02)	(1.98)	(0.36)
AGE	-0.0071***	-0.0089***	-0.0070***
	(-7.32)	(-3.72)	(-10.45)
FH	0.0001	0.0149*	-0.0018
	(0.03)	(1.92)	(-0.81)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
F	68.81	47.34	57.67
adj. R^2	0.1030	0.1262	0.1871
Observations	14,934	5,638	9,296

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.10$

uncertainty and unconditional conservatism is 0.0048, which is not significant, indicating that the moderating effect of unconditional conservatism is not obvious.

3.2.2. Moderating Role of Conditional Conservatism(Under-investment)

Table 8 shows the regression results of model (2b). Panel A of Table 8 uses the samples after the combination of scenario A and scenario B to investigate the moderating effect of conditional conservatism. Environmental uncertainty and under-investment, conditional conservatism and under-investment are significantly positively correlated at the level of 1%, indicating that both environmental uncertainty and conditional conservatism exacerbate under-investment. The product term of environmental uncertainty and conditional conservatism is significantly negatively correlated with under-investment at the level of 1%, indicating that conditional conservatism has a moderating effect, and this effect inhibits the aggravating effect of environmental uncertainty on under-investment. Panel B of Table 8 uses the sample corresponding to scenario D. From the coefficient of the product term of this column, it can be seen that conditional conservatism plays a moderating role, and this role exacerbates under-investment.

Table 7. Moderating Effect of Unconditional Conservatism (Under-Investment)

Model (2a)	Panel A (Scenario A + Scenario B)	Panel B (Scenario D)
Dependent Variable	UNDINV	UNDINV
Constant	-0.2494***	0.2534**
	(-6.12)	(2.28)
EU	0.0151***	0.0107**
	(4.24)	(2.53)
CNopac	0.4474***	0.2046*
	(4.19)	(1.82)
EU×CNopc	-0.0252***	0.0048
	(-3.61)	(0.04)
SIZE	0.0100*	-0.0086**
	(1.84)	(-2.19)
CASH	-0.0296**	0.0072
	(-2.44)	(0.50)
ROA	-0.0334*	-0.0045
	(-2.03)	(-0.14)
TOBINQ	0.0082***	0.0086***
	(7.31)	(3.54)
LEV	0.0563***	0.0206***
	(4.20)	(3.49)
BSIZE	-0.0206**	-0.0055
	(-2.12)	(-0.64)
AC	0.0237*	0.0345
	(1.94)	(0.81)
AGE	-0.0422***	-0.0176***
	(-3.86)	(-3.48)
FH	-0.0340***	-0.0110*
	(-3.14)	(-1.66)
Industry	Yes	Yes
Year	Yes	Yes
F	11.69	3.83
adj. R^2	0.214	0.098
Observations	4,471	2,147

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.10$

3.2.3. Moderating Role of Accounting Conservatism(Over-investment)

Table 9 shows the regression results of models (3a) and (3b). The sample corresponding to scenario C is used to study the moderating effect of accounting conservatism on over-investment when environmental uncertainty increases. Panel A is the regression result with unconditional conservatism as the independent variable. Among them, there is a significant positive correlation between environmental uncertainty and over-investment at the level of 5%, indicating that the rise of environmental uncertainty will aggravate over-investment.

Table 8. Moderating Effect of Conditional Conservatism (Under-Investment)

Model (2b)	Panel A (Scenario A + Scenario B)	Panel B (Scenario D)
Dependent Variable	UNDINV	UNDINV
Constant	-0.1372***	0.2636***
	(-4.26)	(3.01)
EU	0.0070***	0.0031***
	(3.28)	(2.68)
Cscore	0.0696***	0.0227**
	(5.52)	2.09)
EU×Cscore	-0.0162***	0.0033*
	(-3.15)	(1.93)
SIZE	0.0116**	-0.0101***
	(2.38)	(-2.90)
CASH	-0.0228**	-0.0004
	(-2.18)	(-0.03)
ROA	-0.0389**	0.0212**
	(-1.99)	(2.05)
TOBINQ	0.0079***	0.0085***
	(8.14)	(9.10)
LEV	0.0428***	0.0218**
	(2.79)	(2.56)
BSIZE	-0.0197**	0.0115*
	(-2.31)	(1.92)
AC	0.0165	0.0443
	(0.82)	(1.33)
AGE	-0.0385***	-0.0122***
	(-3.13)	(-3.19)
FH	-0.0337*	-0.0149**
	(-2.37)	(-2.35)
Industry	Yes	Yes
Year	Yes	Yes
F	14.80	5.34
adj. R^2	0.224	0.113
Observations	4,471	2,147

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.10$

The regression coefficient of unconditional conservatism to over-investment is -3.7912, which is not significant, indicating that unconditional conservatism can inhibit over-investment, but the effect is not obvious. To the product term of environmental uncertainty and unconditional conservatism, unconditional conservatism has a positive moderating effect on over-investment, but it is not significant. Panel B is the regression result with conditional conservatism as the independent variable. The regression coefficient of conditional conservatism to over-investment is -0.7423, which is significant at the level of 5%, indicating that conditional conservatism can inhibit over-investment. The coefficient of the product term of environmental uncertainty and conditional conservatism is -0.2079, which is significant at the level of 10%, indicating that conditional conservatism can moderate the over-investment caused by environmental uncertainty and inhibit the over-investment.

Table 9. Moderating Effect of Accounting Conservatism (Over-Investment)

	Panel A : model (3a) Unconditional Conservatism	Panel B : model (3b) Conditional Conservatism
Dependent Variable	OVRINV	OVRINV
Constant	2.3093**	1.1525***
	(2.09)	(3.90)
EU	0.2173**	0.5525***
	(3.06)	(6.10)
CNopac	−3.7912	−
	(−0.94)	−
EU×CNopac	0.0583	−
	(0.03)	−
Cscore	−	−0.7423**
	−	(−3.25)
EU×Cscore	−	−0.2079*
	−	(−1.89)
SIZE	0.1112**	0.2091***
	(3.26)	(5.17)
CASH	0.2418***	0.3392*
	(4.45)	(1.96)
ROA	0.1294*	0.3679*
	(1.78)	(2.07)
TOBINQ	0.3167***	0.2309***
	(4.85)	(3.54)
LEV	−0.0469	−0.1835**
	(−0.30)	(−2.95)
BSIZE	−0.1948	−0.1614
	(−1.42)	(−1.30)
AC	0.4694**	0.2034**
	(3.10)	(2.49)
AGE	0.2398	0.1822
	(1.44)	(1.08)
FH	−0.6522***	−0.5893***
	(−3.44)	(−2.95)
Industry	Yes	Yes
Year	Yes	Yes
F	1.58	1.40
adj. R^2	0.509	0.432
Observations	1,182	1,182

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.10$

According to the regression results in table 7, table 8, table 9 and the above analysis, hypotheses H2a, H2b and H2c are all confirmed.

3.3. Robustness Test

This paper tests the robustness by replacing three variables: environmental uncertainty, conditional conservatism and unconditional conservatism.

The volatility of stock return can be used to measure the company's environmental uncertainty. This method uses the weekly stock return $R_{i,\tau}$ of the company i in week τ to regress the weekly industry return and the weekly market return, and decomposes the return of the company i in week τ. the regression model is as follows:

$$R_{i.\tau} = \alpha_0 + \alpha_1 R_{ind,\tau} + \alpha_2 R_{mkt,\tau} + \epsilon_{i,\tau}$$

Among them, only the sample companies with the number of annual weekly income records greater than 30 are retained, and the standard deviation of the residual obtained by regression is used as the variable to measure uncertainty, that is:

$$UC_{i,t} = \sigma_{i,t} = \sqrt{\epsilon_{i,t}^2}$$

The larger the $UC_{i,t}$, the higher the environmental uncertainty faced by the company.

In order to test the robustness of unconditional conservatism, the model is as follows:

$$REVNUE_{i.t} = \alpha_0 + \alpha_1 \text{EXP}_{i,t-1} + \alpha_2 \text{EXP}_{i,t} + \alpha_1 \text{EXP}_{i,t+1} + \epsilon_{i,t}$$

$EXP_{i,t}$ represents the cost expenditure of company i in t year, which is equal to the income minus the profit after deducting non-recurring gains. α_1 is set as a proxy variable of unconditional conservatism based on the perspective of "income-expense" matching. The greater the value, the higher the tendency to recognize costs in advance during accounting treatment, and the more conservative the accounting treatment is.

The proxy variable for the robustness test of conditional conservatism is:

$$CstdEBIT_{i,t} = \frac{stdEBIT_i}{TA_{i,t}}$$

CstdEBITi,t is the standard deviation of earnings before interest and tax (EBIT) of company i during the sample period, and TAi,t is the total assets of company i in year t.

The above three alternative variables are substituted into model 1, model 2a, 2b and model 3a, 3b. The regression results show that the hypothesis is still valid, and the corresponding coefficients are still significant. Due to the constraints about the length of paper, the results are untabulated here.

V. Conclusion

Taking Shanghai and Shenzhen A-share listed companies from 2013 to 2020 as the research object, this paper focuses on the moderating effect of accounting conservatism on the relationship between environmental uncertainty and investment efficiency. The results are summarized as follows.

First, environmental uncertainty has a significant impact on investment efficiency. The higher the uncertainty, the more serious the company's inefficient investment. On the one hand, un-

certainty makes it more difficult for shareholders to supervise managers and aggravates over-investment; On the other hand, uncertainty leads to serious financing constraints for small and medium-sized companies and managers' avoidance to risks, aggravating under-investment.

Second, the direct causes of inefficient investment are financing constraints and managers' characteristics. Accounting conservatism plays a moderating role between environmental uncertainty and inefficient investment by affecting these two factors. Therefore, the moderating effect of accounting conservatism will be different for companies with different degree of financing constraints and different managers' characteristics, that is, the research on the moderating role of accounting conservatism must be carried out under specific framework and samples, which is the reason why previous relevant studies have not reached a consistent conclusion.

Third, after dividing the research samples into four groups according to the degree of financing constraints and the degree of managers' radicalization, we find that between environmental uncertainty and inefficient investment, the moderating effect of unconditional conservatism is to inhibit the aggravation of environmental uncertainty on under-investment under high financing constraints. One of the moderating effects of conditional conservatism is the inhibition of under-investment under high financing constraints and the aggravation of under-investment under low financing constraints, and the other is the inhibition of over-investment.

This paper brings environmental uncertainty and accounting conservatism into the research framework of investment efficiency, which provides a meaningful explanation for exploring how to improve investment efficiency, enhance value of company and analyze the economic consequences of accounting conservatism.

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