Environmental Uncertainty, Analyst Forecasts and Investments Efficiency

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Abstract: This article analyzes the impact of analyst forecast accuracy on corporate investment efficiency by using data from listed companies in Shanghai and Shenzhen from 2012 to 2021. Additionally, the study examines the moderating effect of external environmental uncertainty on the relationship. The research reveals that analyst forecast accuracy can significantly enhance corporate investment efficiency. Moreover, the impact of analyst forecast accuracy on corporate investment efficiency is more significant in situations where the external environment uncertainty is higher. The study provides both theoretical and empirical support for improving the impact of analyst forecasting on corporate investment.

1. Introduction

The investment activities of an enterprise are a series of economic activities carried out for the purpose of obtaining income or value appreciation in the foreseeable future period, which is an important part of the financial management of the enterprise and is of great significance to the operation and development of the enterprise. Investment efficiency is an important criterion for evaluating the size of value created by investment activities, management performance, internal control and corporate governance. It has been researched that corporate investment efficiency will be affected by the quality of accounting information, internal control system, non-financial information, bank-corporate relationship, management independence, etc.[1,2,3,4], corporate investment behavior will be affected by the agency cost and information asymmetry and other factors, and the internal governance factors[5] and the external information environment[6] together determine the company's investment behavior. It has been pointed out in the literature that analysts, as the medium of information communication between enterprises and investors, can effectively reduce the degree of information asymmetry inside and outside the company[7,8,9], so does the accuracy of analysts' surplus forecasts affect the efficiency of corporate investment?

By taking A-share listed companies in Shanghai and Shenzhen in 2012-2021 as the research object, this paper examines the impact of analyst forecast accuracy on corporate investment efficiency and further analyzes the moderating effect of uncertainty in the external environment on the relationship between the two, and finds that analyst forecast accuracy can significantly improve corporate investment efficiency, and this relationship changes with the changes in the external environment'. When the uncertainty of the external environment is higher, the impact of analysts'

forecast accuracy on corporate investment efficiency is more significant, and the results of the study provide theoretical and empirical support for further improving the impact of analysts' forecasts on corporate investment.

2. Theoretical Analysis and Research Hypothesis

2.1. Analyst Forecasts and Corporate Investment Efficiency

Principal-agent theory and existing studies show that information asymmetry and agency conflict are important factors affecting the investment efficiency of the company, information asymmetry leads to the management is prone to adverse selection and moral hazard problems; agency conflict causes the interests of the principal-agent parties to diverge so that the agent's decision-making deviates from the goal of maximizing the value of the enterprise[10]. In the context of separation of powers, the information asymmetry between the two agents is the fundamental cause of agency conflict, the capital market is essentially an information market, and the quality of information determines the effective utilization of resources. Therefore, information asymmetry can seriously impact the capital market, and the key to improving investment efficiency lies in realizing the effective dissemination and use of information through reasonable institutional arrangements. As an important participant in the capital market with information content and investment value, analysts are important information intermediaries in the capital market, capable of increasing the quantity and quality of information supply, improving the information environment of the company[11,12] supervising and restraining the behavior of management, alleviating agency conflicts, and playing the dual roles of information intermediary and external supervision in the capital market[13,14]. Based on the above discussion, we propose Hypothesis 1: The higher the accuracy of analysts' forecasts, the higher corporate investment efficiency.

2.2. The moderating role of environmental uncertainty

Environmental uncertainty refers to the portion of environmental factor information that cannot be accurately estimated when a firm decides without access to sufficient environmental factor information. This unestimated environmental information may increase the risk of implementing the firm's strategy. Higher environmental uncertainty increases the difficulty of predicting and monitoring the behavior of management, increases the difficulty of evaluating the return on investment of the project by outside shareholders, and the infringement of the interests of small and medium-sized investors by large shareholders is serious[15,16], and the infringement will occur when the private benefits resulting from the infringement are greater than the costs of the infringement[17]. This indicates that the level of environmental uncertainty will play a role in the effect of analyst forecast accuracy on corporate investment efficiency, based on the above discussion, we propose hypothesis 2: the effect of analyst forecast accuracy on corporate investment efficiency is more significant when environmental uncertainty is higher.

3. Research design

3.1. Sample and data

This article selects A-share listed companies in Shanghai and Shenzhen from 2012 to 2021 as the research sample, and the related financial data, analysts' forecast data, and stock price data are all from the CSMAR database, from which all financial and insurance companies, as well as all companies missing key data or subject to special treatment (ST and ST*) are excluded, and finally,

8748 samples are obtained. To exclude the effect of sample outliers, the article shrinks the relevant indicators to be analyzed by 1%.

3.2. Variable definition and model construction

The explanatory variable in this paper, Inveffi, is the efficiency of business investment and the explanatory variable, Accuracy, is analyst forecast accuracy. Table 1 provides detailed definitions of the variables.

Table 1: Definition of variables.

variant		define
Inveffi	Enterprise investment efficiency	Estimating the level of investment based on the Richardson model[18,19] using the absolute value of the residuals as the firm's investment efficiency
Accuracy	Analyst Forecast Accuracy	-1*|Actual EPS - Forecast EPS|/Stock price at end of the year
EU	Environmental uncertainty	Industry-adjusted environmental uncertainty[20]
Age	Number of years listed	（Natural logarithm of (year - year company went public)
Size	Company size	Natural logarithm of total assets of the company
CF	cash flows	Total cash flow of the enterprise
Big4	The Four Auditors	If a company is audited by a Big 4 accounting firm, the dummy variable is set to 1; otherwise, it is set to 0
Inst	institutional investor	Percentage of shares held by institutional investors
Analyst	Analyst Tracking	ln(1 + analysts issuing at least 1 EPS forecast during the year)
Lev	financial leverage	(Net profit + income tax expense + finance costs) / (Net profit + income tax expense)
top	shareholding concentration	shareholding concentration
Dual	two jobs in one	One chairman and one general manager
BM	Book-to-market ratio	Carrying value of equity/market value of equity
Industry	sector	Industry dummy variables
Year	particular year	Annual dummy variables

4. Empirical analysis

4.1. Descriptive Statistics

In this paper, descriptive statistics were done for all the dependent and independent variables including sample size, mean, standard deviation, minimum, lower quartile (25%), median, upper quartile (75%), and maximum. The results show that Inveffi has a mean of 0.031 and an upper quartile of 0.038, which suggests that firms are overinvesting in the majority of cases. Regarding analyst forecast accuracy, Accuracy has a mean of -0.039 and a lower quartile of -0.046, indicating that the accuracy of analysts' earnings forecasts is still relatively high for most companies. All of these figures are consistent with the results of existing studies.

4.2. Correlation analysis

This paper also did a Spearman correlation coefficient test for all dependent and independent variables. The results show that the correlation coefficient between Accuracy and Inveffi is positive at a 1% level of significance with a coefficient of 0.055, none of the correlation coefficients

between the variables exceeds 0.5 and most of the variables are significantly correlated, which indicates that there is not much problem of covariance between the variables.

4.3. Analysis of empirical results

To prove Hypothesis 1, we obtain empirical results from the regression of model (1) as shown in column (1) of Table 2. The table column (1) reports the results of the multiple regression between analyst forecast accuracy and firm investment efficiency. From column (1) of the table, it can be seen that analyst forecast accuracy is significantly and positively correlated with firms' investment efficiency at the 1% level, which indicates that when all other conditions remain unchanged, the higher the accuracy of analysts' forecast reports, the higher the efficiency of firms' investment; thus, it can be proved that hypothesis (1) is valid.

To prove Hypothesis 2, we obtain empirical results from the regression of model (2) as shown in column (2) of Table 2. Table column (2) reports the results of the multiple regression of the effect of environmental uncertainty on the relationship between analysts' forecast accuracy and firms' investment efficiency. As can be seen from column (2) of the table, the coefficient of Accuracy*EU is 0.0147, which is significantly positively correlated at the 10% level. It indicates that when other conditions remain constant, the higher the environmental uncertainty, the more significant the degree of improvement of analysts' forecast accuracy on corporate investment efficiency; thus, hypothesis 2 can be proved to be valid.

Table 2: Regression results.

variables	Inveffi(1)	Inveffi(2)
Accuracy	0.0233***(3.49)	0.0300***(4.62)
EU		0.0061***(9.80)
Accuracy*EU		0.0147*(1.78)
Age	-0.0037***(-3.75)	-0.0047***(-4.85)
Size	-0.0012**(-2.00)	-0.0008(-1.29)
CF	0.0115*(1.85)	0.0194***(3.11)
Big4	-0.0031**(-2.31)	-0.0017(-1.30)
Inst	0.0002***(4.60)	0.0002***(3.68)
Analyst	-0.0000(-0.58)	0.0000(0.09)
Lev	0.0003(0.13)	-0.0007(-0.25)
top	-0.0001***(-3.11)	-0.0001***(-3.31)
Dual	0.0009(0.78)	0.0010(0.84)
BM	-0.0028(-1.10)	-0.0025(-0.96)
R-squared	0.068	0.101
Year and Industry FE	YES	YES

Robust t-statistics in parentheses*** p<0.01, ** p<0.05, * p<0.1

4.4. Robustness Tests

To ensure that the findings are robust and reliable, this paper conducts robustness tests through the following two methods. To save space, the results of the robustness tests are not reported. (i) For the explanatory variables, analyst forecast divergence is chosen as a proxy for analyst forecast accuracy, and the above test is repeated, and the empirical conclusions remain unchanged; (ii) For the research model, the fixed-effects model is chosen in the previous paper to carry out the empirical analysis, and the mixed regression model with year dummy and industry dummy is used

to repeat the above test, and the results are still the same as in the previous paper. Therefore, we believe that the empirical findings of this paper are robust and reliable.

5. Conclusions of the study

Analysts as internal and external information communication mediums, through surplus forecasts, and securities ratings, so that investors who do not have professional knowledge can make correct investment decisions according to their situation and help enterprises to improve their investment efficiency, this paper takes the A-share listed companies in Shanghai and Shenzhen in 2012-2021 as the research object, to test the impact of analysts' forecasting accuracy on the enterprise's investment efficiency, and further analyze the moderating effect of uncertainty in the external environment on the relationship between the two, the study finds that analysts' forecasting accuracy can significantly improve enterprise investment efficiency, and this relationship increases with the external environment. This paper examines the impact of analysts' forecast accuracy on corporate investment efficiency and further analyzes the moderating effect of uncertainty in the external environment on the relationship between the two. It is found that analysts' forecast accuracy can significantly improve corporate investment efficiency, and this relationship changes with the changes in the external environment, and when the uncertainty in the external environment is higher, the impact of analysts' forecast accuracy on corporate investment efficiency is more significant.

This paper studies the investment efficiency of enterprises in China from the perspective of analysts' forecasting, and the conclusions of the study have a certain degree of theoretical and practical value for objectively evaluating the role of analysts and clarifying analysts' market functions. It is crucial for enterprises to proactively disclose information so that they can use analysts to create a favorable investment environment to improve their investment efficiency.

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