Analyst Attention and Investment Efficiency of SMEs: Evidence from the Role of Financial Constraint

Ni Liu[1,†], Xinyi Sun[2,a,*,†], and Jinghan Zhou[3,†]

[1] Shenzhen College of International Education, Shenzhen 518000, China
[2] RDFZ Chaoyang Branch School, Beijing 100000, China
[3] The High School Affiliated to Renmin University of China, Beijing 100000, China
a. sunxinyi@rdfzcygj.cn
*corresponding author
[†]These authors contributed equally.

Abstract: The context of this paper is to explore the impact that financial analysts have had on major companies and the magnitude of that impact based on data from 2011-2019. This paper used a step-by-step approach of making models and analyzing data tables to apply theory and analysis to draw conclusions. It also involves extensive reading and extracting of literature and data sources. The main finding of this paper is that financial analysts do help the success and growth of a business to a great extent. It is one of the essential aspects and elements. It is even more necessary for those companies that have financial constraints. The impact is even greater for small and medium-sized companies than for large companies. Finally, policy advice and investor advice is a very good part of the analyst process for small and medium-sized businesses that have a clear position. It makes the whole business more likely to succeed with fewer detours.

Keywords: analyst attention, investment efficiency, SMEs

1.   Introduction

For a business, whether large or small, the efficiency of investment needs to be maximized and the risks and costs need to be minimized. This is not an easy thing to achieve. The financial analyst plays a very important role in this division.

Generally speaking, two broad classifications of financial analysts, namely, on is the buy-side financial analysts, and the another one is the sell-side financial analysts. The first corresponding function is to work for organizations that have money to invest - referred to as "institutional investors". Institutional investors include mutual funds, pension funds, hedge funds; insurance companies, hospitals, universities. Buyer analysts can help their bosses decide how to spend their money, whether it's investing in a company's stock or other securities, buying income for a real estate company, or distributing market funds. In addition, they found that financial analysts working in a buyer's market struggled to have the final say on how their bosses and customers spend. However, the trends they found and the predictions they made were very valuable in making decisions. The second function is to assist companies in pricing and selling their investment products. Perhaps the most prestigious and highest-paid analysts in a large investment bank or securities firm are sellers' analysts. In this role, analysts compile stock and bond profiles and use quantitative analysis to predict their performance in

the market [1]. These analysts can also decide on a company-by-company basis whether some intercompany transactions (IPO, M&A) are feasible [2].

In summary, although there are many studies on data and market context assets in financial markets, there is very little literature on the impact of analyst behavior on firms. This paper uses microdata from financial surveys of firms over the years to conduct an in-depth study of this issue. Also, this paper considers the impact of financial analysts' behavior on firms of different sizes. This paper provides a new perspective to explain the current situation that analysts' attention and research reports' attention reduces the financing constraints faced by firms. Thus, the research in this paper is an important addition and refinement to the existing literature and will be followed by an in-depth analysis using an econometric model.

The central question to be answered and discussed in this article is how the analyst focus in the financial sector affects small and medium sized enterprises. This question will be broken down into four more detailed questions to facilitate a more logical and rigorous resolution of the issue. The first is whether analyst focus affects SMEs. This establishes the basis for the question's existence. Secondly, the analyst is concerned with how much this behaviour actually affects SMEs. This makes the question more relevant and meaningful. Thirdly, when talk about SMEs, this implies that there must be large enterprises. Then analysts look at whether this behaviour has a different impact on large and small firms. This also have another name—a heterogeneous impact. Finally, this paper will go deeper into this question. This paper will consider why analysts' attention affects the investment efficiency of SMEs by means of a mechanistic analysis. After each of these four questions has been answered through study reflection, the central question will also be answered.

The purpose of this article is to quantify the impact of an abstract behaviour on a firm through the development of models and theories of behavioural economics and many authoritative databases. Firstly, second part have designed an experiment through which will develop a model. The data used in this experiment will be presented in the data source to demonstrate its reliability. This is followed by the set-up of the model introduction. Finally descriptive statistical results and textual analysis will be produced. Second section will discuss the textual analysis and estimation results around the results and conclusions, as well as the economic implications and insights. Final of this part will perform robustness tests and mechanism tests on the results to show how the variable 'analyst attention' affects the dependent variable 'SME development'. The end of the paper will review the background of the study, give the research content and main findings of the paper and make policy recommendations.

1.1. Literature Review

Prior reseach concentrate on the function of analyst attention in many other fields, like in the stock market, labor market. The study suggests that analyst plays an important role in decreasing the extent of information asymmetry between investors and the firm [3]. They act as a 'Middleman' that gets information from the investment market and organizes the messages and then gives the feedback to the firm. Moreover, as analysts can get and deal with the information acquisition usefully, it is necessary for companies to get help from analysts when they want to maximize the firm's value, in order to invest new capital more efficiently [4].

Or more broadly speaking, their job responsibilities are to analyze current and past financial data, observe the current financial situation, judge development trends, and compile reports on the above-mentioned data to provide relevant information to a wider range of enterprises. Advisory management team is responsible for formulating long-term business plans, based on which budgets and improvement plans are proposed, various investment opportunities are explored, financial models are established, and financial forecasts are made; and initiatives and policies that may promote financial development are formulated [5].

There is a plenty domestic literature on the impact of financial analysts' behavior on firms, which focuses on the following aspects. First, many research contexts include interest rate marketization, being efficient investment and capital allocation-a financial study based on a natural experiment in which the People's Bank of China removed the upper and lower limits on lending rates [6]. Secondly, there are data on Shanghai and Shenzhen A-share firms provided by the CSMAR database.

2. Research Design

2.1. Data Source

In this article, we are choosing the China Stock Market & Accounting Research (CSMAR) Database offers data this is database that on the China stock markets and the financial statements of China's listed companies [7]. Because it utilizes the professional standards of world-class databases as the University of Chicago CRSP, Standard & Poor's Compustat, New York Stock Exchange TAQ, I/B/E/S, Thomson, etc., it can also be utilized for academic research needs. We chose it for our databases in this article since it is an economic and financial database that was created in conjunction with China's genuine national conditions [8].

There are few requirements for us to choose the samples we need. First, we chose the samples that range between 2011 and 2019. And the sample we chose are without the samples of companies in financial industry. Also, removed the samples that companies are ST and *ST, and eliminate those sales with values of variables that were missing. In addition, the influence of extreme values in the data, we are using the Winsorize method to reduce the tail of the main continuous variables by 1%. Last by not least, we only keep the small and medium enterprises starting with the ticker symbol 002.

2.2. Model Specification

In model (2), $Invest_{it-1}$ is the current investment scale of the enterprise, $Size_{it-1}$ is the enterprise scale, Lev_{it-1} is the capital structure, $Growth_{it-1}$ is the growth rate of main business revenue, $LnAge_{it-1}$ is the enterprise Age, Ret_{it-1} is the stock return rate, CFO_{it-1} is the net cash flow of operating activities, and the fixed effect of the industry at the same time is examined.

$$y_i = \alpha_0 + \alpha_1 \times AnalystAttention_i + x_i' \beta + \varepsilon_i \tag{1}$$

$$\begin{aligned} Invest_{it} = & \beta_0 + \beta_1 Invest_{it-1} + \beta_2 Size_{it-1} + \beta_3 Lev_{it-1} + \beta_4 Growth_{it-1} \\ & + \beta_5 LnAge_{it-1} + \beta_6 Ret_{it-1} + \beta_7 CFO_{it-1} + \sum \beta_i Industry + \sum \beta_j Year \\ & + \varepsilon_{it} \end{aligned} \tag{2}$$

The optimal investment scale of businesses in the current era is determined using model (2) in this study. The optimal investment scale is then subtracted from the actual investment scale, and the residual fraction (absolute value) shows the inefficiency of business investments. When the residual is more than 0, it implies overinvestment; when it is less than 0, it suggests underinvestment. In particular, the absolute value of the residual measures the level of wasteful investment made by the firm.

The Inefficient investment and SA index are dependent variables, the inefficient invest represents the level of inefficient investment. In the model (2) we can see that it took absolute value of residuals so the value is bigger, the investment efficiency will be lesser. And SA index is another main dependent variable we used in this study. It is tools for us to measure the financing constraint. And here is the specific calculation method is as follows: SA=0.737×Asset+0.043×Asset^2-0.040×Age,

where Asset is the natural logarithm of the total assets (in million yuan) of the enterprise [8]; Age is the time when an enterprise goes public. The value of SA is negative, which is taken as the absolute value in this study. The larger the value is, the more serious the financing constraint of enterprises will be.

Analyst Attention and report attention are two core explanatory variables in this study, those variables are used to expected cause, and it explains the results. First, the analyst attention indicates how many analysts (teams) cover the company over the course of a year. (Note: A team count is 1 and the number of team members is not listed separately.) And second is report attention, which is indicators to show how much research have followed the company each year. Referring to the existing literature, the following control variables (please see in Table 1) are used in this paper [10-13].

Table 1: Variables' definition.

Variables	Definition
Asset	Total asset at year-end
Debt	Total debt at year-end
Age	The length of time a company is listed
Top 1	Share proportion of the largest shareholder (%)
SOE	State-owned enterprises =1; otherwise, 0
Foreign	Foreign enterprises =1; otherwise, 0
Board Size	Total number of directors on the board of each sample firm which is inclusive of the CEO and Chairman for each accounting year
No. of Independent Director	Number of independent directors
Salary	Executive compensation
ROA, %	return on assets

2.3. Summary Statistics

Summary Statistics are shown in Table 2. For the inefficient investment, it has mean of 2.0865 that indicates the level of inefficient investment, when the value gets larger, the lower the investment efficiency company get. And when SA index is negative, which is taken as an absolute value in this study. And when SA index has larger value, the financing constraints will be more serious of the enterprise, such as more 3.758, the maximum of SA index in given data. And for the Report Attention, which in average have 15.6688 research reports have tracked and analyzed the company within a year.

Table 2: Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Inefficient investment	6938	2.0865	4.5695	.0007	37.1062
SA index	6938	3.3284	.1621	2.8651	3.758
Analyst Attention	6938	7.7563	9.1876	0	41
Report Attention	6938	15.6688	21.325	0	101
Age	6938	5.5608	3.4629	0	15
Asset, in million	6938	5369.6322	11192.275	186.5798	254594.73
Debt, in million	6938	2675.2101	7795.1756	36.2757	209922.34
top1	6938	33.9522	14.3361	4.15	86.49
state-owned enterprises	6938	.149	.3561	0	1
Foreign=1	6938	.0552	.2284	0	1
Board Size	6938	8.3821	1.4477	5	15
No. of Independent Director	6938	3.0902	.4492	2	5
Salary, in million	6938	3.4904	3.1783	.1577	24.1108
ROA	6938	.0445	.0675	-.3281	.2342

3.   Empirical Results

3.1.   Benchmark Regression

The result of benchmark regression represents (shown in Table 3) that analyst attention significantly impacts inefficient investments in businesses. From the first column, 'Analyst Attention' has a coefficient of about -0.2316, which shows that inefficient investment of small and medium-sized enterprises would suffer a great impact when the quantity of 'Analyst Attention' rises by 1%. To avoid the influence on data by missing variables, the control variable has been added in the second column. As a result, when the 'Analyst Attention' has increased by 1%, the inefficient investment of companies is reduced by about 0.0928 units, also the result is outstanding. Similarly, when 'Report Attention' inclines for about 1%, the inefficient investment will decrease by 0.1837 units before adding control variables and reduce by 0.0811 after adding them. The above results show that analyst attention can correct the level of inefficient investment in enterprises to some extent. Moreover, as analyst concerns can alleviate the problem of information asymmetry, which is an important factor that cause inefficient investment. Where there is an investment opportunity in the firm, the management will give priority to internal financing, however when the internal financing is failure, they will choose to pass on investment information to external investors. Nevertheless, due to information asymmetry, external investors cannot truly estimate the value of investment projects, resulting in insufficient investment.

Table 3: Benchmark regression.

	(1)	(2)	(3)	(4)
VARIABLES	Inefficient Investment	Inefficient Investment	Inefficient Investment	Inefficient Investment
Ln Analyst Attention	-0.2316***	-0.0928***		
	(0.0541)	(0.0070)		
Ln Report Attention			-0.1837***	-0.0811***
			(0.0433)	(0.0065)
Age		0.1161**		0.1186**
		(0.0507)		(0.0510)
Age-sq		-0.0037		-0.0039
		(0.0043)		(0.0043)
Ln asset		-0.0100		-0.0068
		(0.1961)		(0.1966)
Ln debt		0.2448**		0.2457**
		(0.1222)		(0.1222)
top1		0.0040		0.0039
		(0.0041)		(0.0041)
SOE=1		-0.2747		-0.2773
		(0.1753)		(0.1755)
Foreign=1		-0.2057		-0.2085
		(0.2202)		(0.2201)
Board Size		-0.1352**		-0.1352**
		(0.0603)		(0.0603)
No. of Independent Director		0.2238		0.2236
		(0.1743)		(0.1743)
Ln salary		-0.2761**		-0.2742**
		(0.1089)		(0.1088)

Table 3: (continued).

ROA		-7.1585***		-7.1030***
		(1.7816)		(1.7827)
Constant	0.6693**	0.7149	0.6234**	0.5957
	(0.2771)	(2.3810)	(0.2726)	(2.4013)
Observations	6,938	6,938	6,938	6,938
R-squared	0.0316	0.0542	0.0315	0.0543
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Industry Effect	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes

3.2. Heterogeneity Analysis

By using the heterogeneity analysis, whether the impact of analyst attention on large enterprises and small and medium-sized enterprises is heterogeneous can be shown. Dummy, which means that can be used both in qualitative data and categorical data. By separating the values to 0 and 1. In this case, if there are 'n' distinct definitions, there can be n-1 amounts of dummy variables. In table 4, dummy has been defined as if total assets below the 50th quantile for the year are 1 for those that are small and medium-sized enterprises, otherwise for large scale companies they are represented by 0.

$$y_i = \alpha_0 + \alpha_1 \times Variable_i + \alpha_2 \times Variable_i \times Dummy + \alpha_3 \times Dummy + x_i^{'}\beta + \varepsilon_i \quad (3)$$

As shown by this formula, $\alpha_1 \times 'Analyst attention'$ means the 'Analyst attention' and their coefficients. $\alpha_2 \times 'Analyst attention' \times Dummy$ is an interaction item that 'Analyst attention' and dummy variables. $\alpha_3 \times Dummy$ is just the value of dummy itself. Thus, if α_2 is outstanding, the core 'Analyst attention' has heterogeneous effects to the dependent variable. The effect of a unit of attention variable on the dependent variable of a large enterprise is α_1. If α2 is significantly, then the effect of one unit of change in the attention variable on the small business dependent variable is: $\alpha_1 + \alpha_2$ as Dummy is equal to 1, and the influence of the attention variable on the dependent variable is heterogeneous in scale; If α_2 is not significantly, then the influence of the focus variable on the dependent variable of large and small enterprises is no different and does not have heterogeneity.

As the estimation results shown in Table 4, when Analyst Attention increases by 1%, the 'Inefficient Investment' of medium-sized and small-sized companies will be reduced by 0.3015 units with a highly significant impact. After adding controls, the value of decrease turns to 0.155 units but is also highly significantly influenced. On the other hand, for the large-scale firms, the 'Inefficient Investment' only reduce by 0.2349 units affected by 1% of 'Analyst Attention' before adding the control variable; and reduced by 0.0931 units after adding it. Both values have been highly

significantly influenced. The interaction term coefficient is negative, indicating that analysts' attention has a greater effect on the correction of inefficient investment in SMEs.

Furthermore, when 'Report Attention' increased about by 1%, the 'Inefficient Investment' decreased by 0.2441 units, but only reduced by about 0.1859 units in large-scale companies. What's more, both are highly significantly affected. After enhancing the control variable, the 'Inefficient Investment' turns to cut down by 0.1342 units in the medium and small-scale of enterprises. However, only minus 0.0817 units in large firms. The interaction terms of research report attention and dumb variables are also negative thus analysts' attention has a greater effect on the correction of inefficient investment in SMEs.

Table 4: Heterogeneity analysis.

	(1)	(2)	(3)	(4)
VARIABLES	Inefficient Investment	Inefficient Investment	Inefficient Investment	Inefficient Investment
Ln Analyst Attention	-0.2349***	-0.0931***		
	(0.0563)	(0.0013)		
Dummy	-0.1807	0.2533	-0.1704	0.2523
	(0.4768)	(0.4792)	(0.4788)	(0.4810)
Ln Report Attention			-0.1859***	-0.0817
			(0.0450)	(0.0576)
Dummy # Ln Analyst Attention	-0.0666***	-0.0619***		
	(0.0099)	(0.0088)		
Dummy # Ln Report Attention			-0.0582***	-0.0525***
			(0.0073)	(0.0056)
Observations	6,938	6,938	6,938	6,938
R-squared	0.0317	0.0543	0.0316	0.0544
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Control	No	Yes	No	Yes
Industry Effect	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes

3.3. Robustness Test

The conclusions of this paper were found to be robust using the panel FE estimation method.

Combining the results of Tables 4 and 5, the estimated results for this article are unusually robust. The results consistently show that analysts' attention has a great effect on correcting the inefficient investment of small and medium-sized enterprises.

Table 5: Panel FE regression for robustness test.

	(1)	(2)	(3)	(4)
	Panel FE	Panel FE	Panel FE	Panel FE
VARIABLES	Inefficient Investment	Inefficient Investment	Inefficient Investment	Inefficient Investment
Ln Analyst Attention	-0.2272***	-0.0903***		
	(0.0667)	(0.0011)		
Ln Report Attention			-0.1815***	-0.0799***
			(0.0534)	(0.0080)
Observations	6,938	6,938	6,938	6,938
Number of id	929	929	929	929
Data	Balanced	Balanced	Balanced	Balanced
Control	No	Yes	No	Yes
Industry Effect	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes

3.4. Mechanism Test

Mechanism analysis (Table 6) found that analyst attention and research report attention reduce the financing constraints faced by enterprises.

When 'Analyst Attention' rises by 1% the 'SA index' has decreased by 0.0184 units and reduced by 0.0025 units after adding the control variable. These values are highly significant at this level. Also, as the increases in 'Report Attention' by 1%, there will be 0.0166 units reduced in the 'SA index' and about 0.0021 units after putting the control variable in the analysis. The correlation coefficient is significant.

With the decrease in the 'SA index', which means that the enterprises are easier to get finance. On the other hand, it also indicates that, with more analyst attention, medium and small-sized companies are more likely to get financial support.

Table 6: Mechanism test.

	(1)	(2)	(3)	(4)
VARIABLES	SA index	SA index	SA index	SA index
Ln Analyst Attention	-0.0184***	-0.0025***		
	(0.0016)	(0.0007)		
Ln Report Attention			-0.0166***	-0.0021***
			(0.0012)	(0.0006)
Observations	6,938	6,938	6,938	6,938
R-squared	0.3085	0.8775	0.3126	0.8775
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Control	No	Yes	No	Yes
Industry Effect	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes

4. Conclusion

The governance role of analysts has been well documented in antecedent studies. Since they can produce financial models and financial forecasts, they can also formulate plans and policies that may improve financial growth. This passage studied the influence of analyst attention on the efficiency of investment, by using Shanghai and Shenzhen A-share enterprise data from 2011 to 2019. Due to the studies, indicate that analyst attention has played a vitally important role.

From the data that have been collected, analyst attention can partially correct the level of inefficient investment in enterprises to some extent. Furthermore, the result has been verified by the panel FE estimation method for the robustness test. Using heterogeneity analysis indicates that analyst attention has a greater effect on the correction of inefficient investment in medium and small-size companies instead of large-scale one. Mechanism analysis found that analyst attention and research report attention reduce the financing constraints faced by enterprises.

In this case, it is necessary to pay special attention to these companies that are facing financing restriction and contribute more analyst attention when formulating policies.

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