

Meta-Analysis of Forecast Analysis on Stock Price

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Research article

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Abstract: Analysts' views on economic risk can be an important part of an investor's investment decision-making process. Several researchers have conducted research on analyst forecasts and stock prices. However, we need to look at the consistency of the results of previous studies in order to draw general conclusions. This must be done to prove whether analyst forecasts affect stock prices. The consistency of results in this study was determined using a meta-analysis method. This method is supported by the CMA (Comprehensive Meta-Analysis) software. Meta-analysis provides an estimate of the effect size to measure the relationship between the independent variable (analyst forecast) and the dependent (stock price). The heterogeneity test results show that I-squared is > 50 percent, which means high heterogeneity. The correlation analysis results show a p-value of 0.004, meaning that analyst forecast studies on stock prices are heterogeneous. Heterogeneity refers to differences in data within each study or between major studies. The results in this study are heterogeneous, caused by high sampling error when the research location for each sample is different due to differences in economic conditions. Therefore, analyst forecasts have an effect on stock prices.

Keywords: meta-analysis; analyst forecast; stock price.

1. Introduction

Analysts' opinions can affect the stock price. When analysts give their assessment of economic risk (conditions in which a country's economy changes rapidly and negatively affects profits and business goals), it can affect the stock price. Stock prices increase or decrease based on market supply and demand. The market needs analysts' risk assessments to evaluate future cash flows to reduce investment risk (Lui, D., Markov, S. & Tamayo, 2012). A continuous increase in the stock price indicates that the company has good management capabilities. On the other hand, a decrease in stock price indicates that the management is not able to make a return on investment, so investors choose to sell their shares to avoid losses, and because the company becomes cheaper, the opportunity for acquisition increases (Hunjra, 2014).

Analysts' forecasts are an important source of information for investors (Sancetta Giuseppe; Renzi Antonio; Orlando, 2012). Investors need to look for market information such as stock prices and fundamental information such as company sales, earnings, and business conditions (Suzuki, Sakaji, Izumi, & Ishikawa, 2022). If analysts are biased in what they forecast, the information can be misused by certain parties. Unbiased analyst forecasts can be useful to investors in making an investment decision (Kim, J.-B., Li, L., & Zhang, 2017). The information in analysts' forecasts is intended to provide investors with an overview of the quality of the information that is reported by the company. Research by Lambert, D.; Matolcsy, ZP; Wyatt, A.; and Faff (2009) shows that analyst forecasts are informative and valuable. Not

only are they considered an important research topic, but analyst forecasts are often used to represent information quality, investor confidence, and projected growth rates.

This paper provides a summary of research on analyst forecasts and stock prices from 1988 to 2022. The relationship between analyst forecasts and stock prices has been studied in developed capital markets around the world (Yahaya, 2021). In Italy, the research of Sannetta Giuseppe, Renzi Antonio, and Orlando (2012) discusses the dispersion between analyst forecasts and stock prices. His research uses a sample from 2002–2007 and a regression model to test the hypothesis. The results show that dispersion has a positive effect on stock returns and a negative effect on stock prices. In New Zealand, a study by Cicone and Etebari (2007) evaluated analysts' earnings forecasts for companies in New Zealand to determine whether there were similarities with analysts' earnings forecasts for companies in the United States. The results show that New Zealand firms are, on average, unbiased. In addition, firms with optimistic forecasts have lower stock returns than firms with pessimistic forecasts. Investors are optimistic when they bid high stock prices, but firms with poor performance take advantage of the opportunity by reducing the quality of information.

Meta-analysis is a statistical method for estimating the mean and variation of effects by combining two or more empirical studies that address the same topic (Field & Gillett, 2010). Meta-analysis has advantages over other methods because it is more subjective. Meta-analysis can produce an "effect size" because it requires many samples and is a quantitative approach (Mansyur & Iskandar, 2017). Based on this background, the purpose of this study is to determine if there is an influence between the analysts' forecasts and the stock price.

2. Literature Review and Hypothesis Development

2.1 Signalling Theory

Signaling theory is a theoretical framework used to explain analysts' forecasts and stock prices. This theory was first formulated by (Spence, 1973). Based on his research, he explained that the sender, who is the owner of the information, signals to the receiver of the benefits, which are the investors, about the condition of the firm. The results of (Nguyen, N.H., and Wang, 2013) show that investors respond positively to stock dividend announcements because they send good signals to the market. Signaling theory is basically concerned with reducing information asymmetry between two parties (Spence, 2002). For example, managers of young companies participating in an initial public offering (IPO) appoint several executives to send messages about the legitimacy of the company to potential investors (Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, 2011).

2.2 Effect of Analyst Forecast and Stock Price

The stock price is determined by supply and demand, so it is normal for the stock price to increase or decrease. Analysts' forecasts provide information about what will happen in the future. One of them is information about stock prices. Before making an investment, investors can use the information provided by analysts' forecasts. If the analysts' forecasts provide good information about the company's economic conditions, investors will be interested in investing, which leads to an increase in the stock price. On the other hand, if the analyst's forecast reflects a recession in the company, investors will sell their shares, and the stock price will decrease.

The relationship between analyst forecasts and stock prices is supported by research (Yahaya, 2021), which shows that institutional trading and analyst forecasts have an impact on the stock market. The results of the research belonging to (Niederhoffer & Regan, 2018)

show that the stock price is highly dependent on changes in earnings, both absolute and relative to analyst forecasts (Suzuki et al., 2022). The results show that there is a strong and significant relationship between the forecast error and the subsequent movement of the stock price (Renfro, 2015). Based on some of the above empirical evidence, researchers propose the following hypothesis to be tested using the meta-analysis method:

Ha: Analyst forecast accuracy affects stock price

3. Research Methods

The objects of this study are scientific journals that have been published on the topic of "Analyst Forecasts and Stock Price". In this study, the data collection technique was carried out by combining two keywords to find relevant academic journals. The keywords used are "analyst forecast and stock price". The relevant academic journals are obtained from various sources. These sources include Connected Paper, Google Scholar, and JSTOR.

The population of this study is the scientific journals that are related to the analysts' forecasts and stock prices. Researchers used the purposive sampling method for sampling. Sampling was done with the following criteria: (1) scientific and scholarly journals that discuss analysts' forecasts and stock prices; (2) scientific and scholarly journals that contain statistical information such as regression tables. The sample for this study consists of academic journals related to analysts' forecasts and stock prices from 1988 to 2022. Initially, the sample consisted of 21 academic journals, but when the researchers read and observed that 10 journals could not be used because they did not provide statistical information in the form of regression tables. Table 1 provides an overview of the sample used in the meta-analysis.

This study uses the meta-analysis method with Comprehensive Meta-Analysis 3.7 software to test the correlation of previous research results. Meta-analysis is a statistical method that allows researchers to overcome the narrative weaknesses of previous research (Ahmed, Kamran & Chalmers, Keryn & Khlif, 2013). Meta-analysis uses a number of quantitative approaches and formulas to summarize the results of several studies (Çoğaltay, Nazım & Karadağ, 2015). The meta-analysis technique requires the calculation of effect size in order to measure the relationship between the independent (Analyst Forecast) and dependent (Stock Price) variables (Ahmed, Kamran & Chalmers, Keryn & Khlif, 2013).

This study uses an effect size based on Fisher's z-transformation of the correlation coefficient (r). Effect size is a quantitative measure used to determine the relationship between variables (Shelby & Vaske, 2008). The larger the effect size, the stronger the relationship. Effect size calculations depend on the statistics (t-statistics, z-statistics, standard errors, or p-values) reported in the main multivariate analysis of the research. When the t-statistic is reported, r is calculated as a function of the t-value and the degrees of freedom (Opore, Houque, & van Zijl, 2021). The following formula was used to determine the effect size:

$$ESr = \sqrt{\frac{t^2}{(t^2 + df)}}$$

Keterangan:

ESr = Effect size that uses a t-statistic

t = T-statistic

df = Degrees of freedom from sample size minus the independent variable

Tabel 1. Research Data Summary

The author	Journal	Sample Period	Sample Size	Sample Location	VI	Df	t	ESr
(Kirk, Marcus and Stice, Derrald and Stice, 2022)	SSRN	1990-2022	6,613	Amerika Serikat	2	6,611	1.901	0.023
(Yahaya, 2021)	IJAAF	2002-2007	134	Nigeria	5	129	7.02	0.526
(Cheong, Chee Seng & Zurbruegg, 2016)	JCAE	2008-2013	3,684	Perancis, German, Britania Raya, Brazil, South Africa, Turkey	4	3,680	0.2617	0.004
(Hou, T. C.-T., Hung, W., & Gao, 2014)	SAGE	1992-2009	711	Australia	5	706	0.0361	0.001
(Sancetta Giuseppe ; Renzi Antonio; Orlando, 2012)	CUBR	2003-2007	50	Belgia, Finlandia, Perancis, German, Ireland, Italia, Luksemburg, Belanda, dan Spanyol.	1	49	0.859	0.122
(Hwang, Chuan-Yang and Li, Yuan and Tong, 2011)	SSRN	1988-2005	155	Singapore	3	152	0.523	0.042
(Dechow, P.M., Hutton, A.P. and Sloan, 2000)	CAAA	1981-1990	7,169	New York	6	7,163	-0.161	0.002

The author	Journal	Sample Period	Sample Size	Sample Location	VI	Df	t	ESr
(Park, C.W., Stice, 2000)	SPRING ER	1988-1994	15,446	Amerika Serikat, New York	5	15,441	2.879	0.023
(Forbes, W. and Skerratt, 1992)	JBFA	1985-1986	3,600	Britania Raya	6	3,594	-0.32	0.005
(Abarbanell, 1991)	JAE	1981-1984	100	New York	2	98	0.133	0.013
(Biddle, G. C., & Ricks, 1988)	JAR	1973-1980	279	New York	3	276	-5.878	0.334

Source: Data processed (2022)

4. Results and Discussion

The results of this study used heterogeneity tests and correlation analysis using CMA 3.7 software. The heterogeneity test is used to determine whether there are differences in population, sample, and location between previous studies. Correlation analysis is used to test significance, and the significance level used is 5% or 0.05. The p-value result with a significance level of less than 0.05 is declared significant, while the result greater than 0.05 is declared insignificant. The results of the heterogeneity test and the correlation analysis are shown in the following table:

4.1 Heterogeneity Test

Tabel 2. Results of Heterogeneity Test

Model	Heterogeneity			
	Q-value	df (Q)	P-Value	I-Squared
Random	76,388	10	0,000	86,909

Source: Data processed (2022)

Table 2 shows the results of the heterogeneity test from the Comprehensive Meta-Analysis 3.7 software. In performing the test, we used a random model rather than a fixed model based on I-squared. I-squared indicates the percentage of variance between studies that is due to high heterogeneity. The results of the random model calculation show that the I-squared of 86.9% is greater than 50%, so it is said that the heterogeneity is high. In addition, the p-value result of 0.000 is less than 0.05, which means that the p-value is significant, and the study is heterogeneous. Heterogeneous research results lead to high sampling errors.

4.2 Correlation Analysis

Tabel 3. Correlation Analysis Results

Model	No	Effect Size and 95% interval			Test of null (2-Tail)	
		Author Name	Correlation	Lower limit	Upper limit	Z-Value P-Value
	1	(Kirk et al., 2022)	0.023	-0.001	0.047	1.87 0.061
	2	(Yahaya, 2021)	0.526	0.391	0.639	6.691 0.000
	3	(Cheong et al., 2016)	0.004	-0.028	0.037	0.261 0.794
	4	(Hou et al., 2014)	0.001	-0.073	0.075	0.027 0.979
	5	(Sancetta et al., 2012)	0.122	-0.162	0.387	0.841 0.401
	6	(Hwang et al., 2011)	0.042	-0.116	0.198	0.518 0.604
	7	(Dechow et al., 2000)	0.002	-0.021	0.025	0.169 0.866
	8	(Park et al., 2000)	0.023	0.007	0.039	2.859 0.004
	9	(Forbes et a., 1992)	0.005	-0.028	0.038	0.300 0.764
	10	(Abarnabel, 1991)	0.013	-0.184	0.209	0.128 0.898
	11	(Biddle et al., 1988)	0.334	0.225	0.434	5.770 0.000
	Random		0.055	0.018	0.092	2.882 0.004

Source: Data processed (2022)

Table 3 presents the results of the correlation analysis calculation to test the significance of this study. The table shows that the 95% CI (Confidence Interval) ranges from 0.018 to 0.092, and the effect size for all studies is 0.055. The effect size results show that analysis forecast accuracy have a positive effect on stock prices. In determining the significance of using the calculation with the Test of null (z and p test). The z-value result is 2.882, and the p-value of 0.004 is less than 0.05, which means significant. From these results, it can be concluded that H_a is accepted, which means that analyst forecast accuracy affects the stock price.

In Table 3, the calculation results are based on 11 research journals that discuss the topic of "Analyst Forecasts and Stock Price". The accuracy of analysts' forecasts is enough to affect stock prices because any information provided by analysts affects investors' investment decisions. Therefore, the disclosure of information must be done accurately and with the right method. This is supported by the research of (Adabenege Yahaya, 2021), which contributes to the current discussion on analyst forecasts on stock prices.

This study uses the meta-analysis method, and the results show that the relationship between analysts' forecast accuracy and stock price is heterogeneous. The heterogeneity in this study is caused by high sampling error, where the locations used in the research sample have different economic conditions. Based on the 11 samples used, 8 of them took research locations in the European Union and the rest took locations from Asia. The difference in economic conditions between the regions in Europe and Asia affects the research between analysts' forecasts on stock prices. In the European Union, economic growth is influenced by rising interest rates and inflation (Saragih, 2022), while in Asia, economic growth is influenced by rising exports (Asian Development Bank, 2022). Therefore, analysts must consider the economic conditions of the country in order to make accurate forecasts that investors can trust when making investment decisions.

5. Conclusion

The purpose of this paper is to explain the effect of analyst forecast accuracy on stock prices. This paper uses signaling theory, and the results of the meta-analysis show that analyst

forecast accuracy has an effect on determining the stock price. Analyst forecast accuracy is used to represent the quality of information and investor confidence. Accurate forecast results affect the stock price; the higher the demand in the market, the higher the stock price. In addition, economic conditions, economic growth, inflation, and interest rates also affect stock price performance. Investors look at forecasts as a reference or consideration when making investment decisions. When demand is high, the stock price also rises, benefiting investors. Therefore, analysts' forecasts can influence investors. Based on these results, the suggestion for future researchers on the topic of analyst forecasts and stock prices is to conduct extensive research on meta-analysis by adding other variables, such as stock returns, to determine the effect of analyst forecasts on stock returns in their research. In this way, knowledge about the effect of analysts' forecasts can be expanded.

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