Volume 5 Nomor 1 2023 : page 128-139
p-ISSN: 2686-262X e-ISSN : 2685-9300
DOI : 10.24256

Comparison of CAPM Results With The Beta Reward Approach in The Trade, Services, and Investment Sector at The Kompas 100 Index in Indonesia

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Abstract

This study aims to compare the estimated yield between the CAPM model and the Beta Reward approach in calculating. Beta shares in Trade companies, Services, and Investments that are incorporated in the Kompas100 index in Indonesia. The Data used is the closing price of the company's shares during the study period from January 2010 to December 2019. In this study, there are 4 four companies that are consistent. The results showed that the Beta Reward method has R-squared, RMSE, and MAE is better at predicting company stock returns compared to the CAPM method. These findings indicate a systematic relationship between Beta reward with stock return in Indonesia.

Keywords: Sector Trade, Services, and Investment Kompas100, CAPM Approach, Beta Reward Approach.

INTRODUCTION

The Sharpe-Lintner Capital Asset Pricing Model (CAPM) model is one such method often used in the financial world to predict the company's cost of capital. However, many empirical studies have demonstrated the validity of this model questioned, especially after the research conducted by Fama and French in 1992. Studies conducted in 2004 also show that empirical problems are associated with the CAPM have reduced the application of the model in financial practice. As uncertainty increases regarding the dependability of the CAPM, alternative models' multi-factors such as Fama and French's three factors which were introduced in 1993 have is receiving increasing recognition in empirical research.

Although Fama and French's three-factor model has received more attention in financial research, this model still has two main issues. First, size and the book-to-market factor used in making this model is based solely on specific empirical evidence, resulting in a model that lacks basis strong theoretical in asset price theory. Second, the use of models in financial practice hampered by the requirement to be able to rely on three-factor sensitivity estimates and Accurate premium.

Because the CAPM and the three-factor model both have certain limitations, there is growth need a more efficient way to estimate the expected return in finance. This is where the

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beta reward approach proves to be profitable. Due to a lack of the Sharpe-Lintner (CAPM) capital asset pricing model and model three factors, there is a growing demand for more robust methods for Estimate the expected return in finance. To solve this problem, the current paper introduces the beta approach bounty. This approach proposes replacement of estimated beta CAPM with estimated beta rewards on the security market line to improve the accuracy of expected return estimates.

It is important to consider the effect of size and the current book-to-market effect estimate the expected return. As Fama and French research from 1992 have shown substantial evidence of this effect, this paper incorporates it directly into beta bounty estimates via portfolio implementation. The effectiveness of this approach was further evaluated using US stock data and compared with the CAPM and Fama-France three-factor models.

According to the test results, the beta reward approach received strong support, surpassing CAPM and the Fama-French three-factor model in out-of-sample testing with data US stock. The results highlight the CAPM inadequate performance. In robustness checks, inclusion of size and book-to-market effects directly to in beta prize estimates through the portfolio consistently yields the same performance superior compared to the other two models. This study uses dataSectorKompas100 Trade, Service, and Investment on the Exchange Indonesia Securities from 2010 to 2019. The sample was selected based on those criteria the company is consistently listed in Kompas 100 during the specified period.

This study uses returns which are represented as an uppercase R and the realized return is represented as a lower-case r. This paper prepared by explaining the CAPM approach and the beta reward approach, meanwhile the results section describes which model is more explicable in returns stock.

RESEARCH METHODS

The research period from January 2010 to December 2019 uses data in the form monthly closing share price of the company Sector Trade, Service, and Investment which consistently included in the Kompas100 index. Stock price Sector Trade, Service, and The Kompas100 investment used in the research was obtained from data sources secondary in the form of a monthly report on the company's stock price, especially focusing on price closing. While the monthly composite stock price index (IHSG), and annual reports issued by the Indonesia Stock Exchange. Research data collection was also carried out by conducting literature studies by studying books, articles, journals, and other readings related to research.

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Data Stationarity Test

Researchers use data in the form of closing stock prices from companies that consistently enter intoCompass100during the study period from January 2010 to December

Depends Variable	Market Premium	$Market\ Premium = (R_m - R_f)$
	Market Expectations	$Exp\ Market = E(R_m) - R_f$
	Developer Market	$Dev\ Market = R_m - E(R_m)$

2019. Stock pricesCompass100in this study is secondary data in the form of monthly company stock price reports (*closing Price*), the monthly composite stock price index (IHSG), and the annual report issued by the Indonesia Stock Exchange. Research data collection was also carried out by conducting library research by studying books, articles, journals, and other readings related to research.

Table 1.
CAPM Operational Variables and Beta Rewards

Depends Variable	Company Shares (4 selected shares)	Closing share price

Source: processed from various sources

Test Data

Data Stationarity Test

$$y_t = b_t\alpha - b_{12}z_t + c_{11}y_{t-1} + c_{12}z_{t-1} + \varepsilon_{yt} \quad (3.1)$$

$$z_t = b_{20} - b_{21}y_t + c_{21}y_{t-1} + c_{22}z_{t-1} + \varepsilon_{zt} \quad (3.2)$$

Data analysis technique

Determining individual monthly stock return (Ri)

$$R_i = \frac{P_t - P_{t-1}}{P_{t-1}} \quad (3.3)$$

Determining market return (RMt)

$$R_{mt} = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}} \quad (3.4)$$

Determine the expected return E(R_i) from each stock

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$$E(R_i) = \frac{\sum_{1=1}^{n} R_i}{N} \quad \text{3.5)}$$

Determine the risk-free return using the average SBI rate. Determine the stock beta in measuring the systematic risk of individual stocks and use the ei variance to measure the unsystematic risk of each stock. While alpha is used in calculating the variance ei.

$$\sigma_{ei}^2 = \frac{1}{n}\sum_{i=1}^{n}(R_i - (a_i + \beta_i . R_{mt}))^2 \quad (3.6)$$

$$ERB_i = \frac{E(R_i) - R_f}{\beta_i} \quad (3.7)$$

$$\beta_{rj} = log\left(\frac{r_j - r_f}{r_m - r_f}\right) \quad (3.8$$

The model that best suits investors depend on the size of the risk they take use to determine their average risk beta. While this alternative model has different average risk betas definition, they all share a market line Same security as CAPM. This means that the shape of the lines remains the same in all models, despite differences in mean risk beta calculation.

All

$$E[R_i] = r_f + \beta_{gi}\ [E(R_m) - r_f], \text{ for all } i \le N \quad (3.9)$$

To redefine the beta increments, the models were rearranged with the following models:

$$\beta_{rj} = log\left(\frac{r_j - r_f}{r_m - r_f}\right) \quad (3.10)$$

$$R_j - r_f = \beta_{rj}\ [E(R_m) + r_f] + \beta_j\ [R_m - E(R_m)] + \varepsilon j \quad (3.11)$$

$$R_i - R_{ft} = a_i + \beta_i\ (R_m - R_{ft}) + r_f \quad (3.12)$$

In the financial world, a risk premium is seen as compensation for taking risk. Therefore, the ratio that represents the level of risk is referred to as Reward Beta, which one denoted by the symbol ri. Therefore, the Beta Rewards approach to estimating expected returns involving right-hand side estimation is as follows: To determine the Beta Reward (symbolized by &rj), researchers must consider the portfolio average sample return (Rj), market proxies (Rm), and free risk rate (Rf) within a certain estimation period. By leveraging values with these, researchers can calculate estimates for Reward Beta. Before this test can be performed, a version of the market model that is compatible with the Reward Beta approach is required.

RESULTS AND DISCUSSION

From the descriptive results in the formation of CAPM and model variables *Reward Beta*, there are 4 variables used, namely among others *dev-market*, *market expectation*, *market-*

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premium, and *Ri*. To mean *dev market* the result is -0.0024 with a standard deviation of 0.0162. Whereas for *market expectation* the results obtained mean of 0.0004 and a standard deviation of 0.0033. Then for mean *market premium* shows a few -0.0019 with a standard deviation of 0.0169. The mean for Ri is -0.0016 and the standard deviation is 0.0399.

Table 2
Establishment of CAPM Variable Descriptive Statistics and Reward Beta

Variable	Mean	Standard Deviation
Developer Market	-0,0024	0,0162
Market Expectations	0,0004	0,0033
Market Risk Premium	-0,0019	0,0169
Ri	-0,0016	0,0399

Source: Processed data

The concept of stationarity is very important in obtaining estimates and avoidance inaccurate long numbers of wrong regression results. Prior to estimation, unit root tests are common done to determine whether the data is stationary at that level. this test serves as initial determinants to establish non-false relationships between variables.

Table 3

Independent Variable Unit Root Test Results (*Phillips-Perron test statistic*)

Variable	Level	
	t-stat	Information
Market Risk Premium	-10.5708***	stationary
Market Expectation	-7.7856***	stationary
Dev Market	-10.7077***	stationary

Source: Processed data

The results of the unit root test in table 3 above, that variable *market premium* stationary at the level showing significance at 1% with a value of -10.57085. Then test the unit root of the variable *market expectation* shows that variable *market expectation* has been

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stationary at the level with significance at 1% with a value of -7.785619. While variables *dev market* from the unit root test mentioned above, it shows that it is stationary at a level with a significance of 1% with a value of -10.70778. Individually the companies selected in the data analysis show all companies are stationary at a significance level of 1%.

Table 4

Independent Variable Unit Root Test Results (Phillips-Perron test statistics) SectorTrade, Service, and Investment

	Shares	t-stat	Information
Sector Trade, Service, and Investments Compass100	AKRA	-11.2096***	stationary
	BMTR	-11.3615***	stationary
	MNCN	-11.3654***	stationary
	UNTR	-11.1748***	stationary

Source: Processed data

Based on the table above, it can be concluded that of the 4 issuers used by Sector Trade, Service, dan Investment, shows a stationary result at the level with a significance of 1%.

Table 5

CAPM Model Autocorrelation Test Results Sector Trade, Service, dan Investment

Issuer	CAPM	Reward Beta	Information
AKRA	0.3589 > 0.05	0.4338 > 0.05	Not Autocorrelation
BMTR	0.4878 > 0.05	0.2255 > 0.05	Not Autocorrelation
MNCN	0.9738 > 0.05	0.6857 > 0.05	Not Autocorrelation
UNTR	0.7184 > 0.05	0.7205 > 0.05	Not Autocorrelation

Source: Processed data

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Sector *Trade, Service and Investment* which consists of 4 issuers showing results greater than 0.05 on AKRA, BMTR, MNCN and UNTR issuers, so it can be concluded that all issuers in the *Trade, Service, and Investment* there is no autocorrelation because the results are more than 0.05.

Table 6

Heteroscedasticity Test Results of the CAPM Model and the Beta Reward Model Sector Trade, Service, and Investment

Issuer	**CAPM**	Reward Beta	**Information**
AKRA	0.1592 > 0.05	0.3289 > 0.05	**No**Heteroscedasticity
BMTR	0.6994 > 0.05	0.1102 > 0.05	**No**Heteroscedasticity
MNCN	0.1302 > 0.05	0.3113 > 0.05	**No**Heteroscedasticity
UNTR	0.7187 > 0.05	0.9062 > 0.05	**No**Heteroscedasticity

Source: Processed data

Based on the results of table 6 above both the CAPM and Reward Beta results are greater than 0.05 for AKRA, BMTR MNCN and UNTR issuers, so it can be concluded that all issuers in the *Trade, Service, and Investment* there is no heteroscedasticity because the result is more than 0.05.

Table 7

Comparison of R-squared CAPM Modeling Results and R-squared Beta Sector Reward Models Trade, Service, dan Investment

No	Shares	CAPM	Model Reward Beta	**R-squared approaches** =1
		R-squared	R-squared	Results
1	AKRA	0.3038***	0.3127***	Model Reward Beta
2	BMTR	0.1296***	0.1391***	Model Reward Beta

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3	MNCN	0.1909***	0.2179***	Model Reward Beta
4	UNTR	0.1971***	0.1972***	Model Reward Beta

Source: Data processed

Based on the table above for AKRA shares, the R-squared value for the CAPM method is 0.3038***, lower than the R-squared value for the Beta Reward Model, which is 0.3127***. Therefore, the Beta Reward Model method is better at explaining *return* shares for AKRA shares. Then for BMTR, the results show the R-squared CAPM value of 0.1296 *** and 0.1391 *** for the R-squared value of the Beta Reward Model. So, the Beta Reward Model is the best at explaining *return* shares on BMTR.

Furthermore, the R-squared value on MNCN shares shows a result of R squared CAPM 0.1909*** which is smaller than the Beta Reward Model which is 0.2179***. It can be concluded that the Beta Reward Model method is the best in explaining *return* MNCN shares. Then for issuers UNTR shows the results of the R-squared CAPM, namely 0.1971 *** with a Beta Reward Model value of 0.1972 ***. Based on this, the Beta Reward Model method is the best in explaining *return* shares in UNTR shares.

Table 8

Comparative Modeling Results RMSE Model CAPM Model and RMSE Reward Model Mining Sector Beta

No	Shares	CAPM	Model Reward Beta	**RMSE Approaching = 0**
		RMSE	RMSE	Results
1	AKRA	0.0372***	0.03699***	Model Reward Beta
2	BMTR	0.0570***	0.05673***	Model Reward Beta
3	MNCN	0.0568***	0.05586***	Model Reward Beta
4	UNTR	0.0311***	0.03114***	Model Reward Beta

Source: Processed data

Based on the table above for AKRA shares, the RMSE value for the CAPM method is 0.037223*** higher than the RMSE Model Reward Beta value, which is 0.03699***. There

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for the Beta Reward Model method is better at predicting *return* shares for AKRA shares. Then for the BMTR, the CAPM RMSE results show 0.0570 *** and 0.0567 *** for the RMSE Model Reward Beta value. So the Beta Reward Model is the best method because the method is the strongest in predicting and accurate.

Furthermore, the R-squared value on MNCN shares shows a CAPM RMSE result of 0.056819*** which is greater than the Beta Reward Model, which is 0.05586***. It can be concluded that the Beta Reward Model method is the best in predicting *return* MNCN shares. Then for the UNTR mitten, the CAPM RMSE results are 0.0311 *** with a Beta Reward Model value of 0.0311 ***. Based on this, the Beta Reward Model method is the best in predicting *return* shares on UNTR shares, because it has the lowest value so that the prediction is more accurate.

Table 8

Comparison of Modeling Results of the CAPM MAE Model and the Trade, Service and Investment Sector MAE Reward Model

No	Shares	CAPM	Model Reward Beta	**MAE approaches = 0**
		THERE IS	THERE IS	Results
1	AKRA	0.0294***	0.0292***	Model Reward Beta
2	BMTR	0.0455***	0.0454***	Model Reward Beta
3	MNCN	0.0447***	0.0434***	Model Reward Beta
4	UNTR	0.0236***	0.0237***	CAPM

Source: Processed data

Based on the table above for AKRA shares, the MAE value for the CAPM method is 0.0294*** higher than the MAE Model Reward Beta value, which is 0.0292***. There for the Beta Reward Model method is better because the resulting error rate is lower than the CAPM method. Then for BMTR, it shows the MAE CAPM value of 0.0455 *** and 0.0454 *** for the MAE Model Reward Beta value. So the Beta Reward Model is the best and most appropriate method with a lower error rate.

Furthermore, the R-squared value on MNCN shares shows a result of MAE CAPM

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0.0447*** which is greater than the Reward Beta Model which is 0.0434***. It can be concluded that the Beta Reward Model method is the best and the best in predicting *return* MNCN shares with lower error. Then for UNTR issuers, the MAE CAPM results were 0.023687 *** with a Model Reward Beta value of 0.0237 ***. Based on this, the CAPM method is the best, because it has the lowest value and the smaller the error rate.

From 4 sector stocks *trade*, *service* and *investment* consisting of AKRA, BMTR, MNCN and UNTR, from the results of the R-squared test with the Beta Reward Model, all stocks show numbers close to 1 and are significant. These results mean that all of these stocks have the same model in explaining *return* its shares well, namely by modeling the Beta Reward Model.

While the test results for both RMSE CAPM and RMSE Model Reward Beta, all stocks show quite significant numbers or close to 0 for the Model Reward Beta model. These results mean that all these stocks have the same model which has a high level of accuracy, namely the Beta Reward Model modeling.

Based on the test results for both the MAE CAPM and the MAE Model Reward Beta, all stocks show quite significant numbers or close to 0 for the Model Reward Beta model. However, only one issuer, UNTR test results showed a higher CAPM, so the error rate was lower. Regarding the testing process described above, with data from January 2010 - December 2019, it can be seen that the model *Reward Beta* superior compared to the CAPM model and has the same direction.

CONCLUSION

The results of the comparison of the CAPM modeling and the Reward Beta Approach of the KOMPAS100 index companies in the manufacturing sector were consistent during the 2010-2019 research period. Based on the results of the R-squared test, the 4 companies as a whole show that the Reward Beta model is better than the CAPM in estimating stock returns during the study period. The estimation results using the Reward Beta approach are better than CAPM, for several reasons, including a). The Reward Beta approach is better at explaining stock returns, b). The Reward Beta approach is stronger than CAPM because of the influence of other variables outside the small model, and c). The Reward Beta approach model is better at predicting with a high degree of accuracy and low error.

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