Analysis of CAPM and SAPM Models in Predicting Return of Islamic Stock (Case Study of Islamic Stocks in the Jakarta Islamic Index) for the 2017-2021 Period

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Abstract:
In the investment world there are rational and irrational investors, rational investors use mature calculation steps in investment decisions and predict stock returns so that this is the forerunner of the emergence of CAPM, while irrational investors only follow their own instincts, psychology and investor proxies in predicting and making investment decisions without careful consideration, so SAPM emerged. Basically, the CAPM and SAPM models are no different, the only difference is the beta, beta SAPM uses beta modification, namely beta investor sentiment. This study uses a quantitative descriptive approach to describe which is more accurate between CAPM and SAPM in predicting expected returns, namely by using the Mean Absolute Deviation (MAD) test. The results of this study can be concluded that the CAPM model is more accurate than the SAPM model.

Keyword : SAPM, CAPM, Islamic Stock

Introduction

Capital markets, both conventional capital markets and Islamic capital markets trade several types of securities that have different levels of risk. Stocks are one of the securities among other securities that have a high level of risk. High risk is reflected in the uncertainty of the return that will be received by investors in the future. This is in line with the definition of investment according to Sharpe in Tandelilin[1], that investment is a commitment of funds with a certain amount to get an uncertain return in the future.

In the investment world there is a term rational investors and irrational investors, the term rational investor was first introduced by Miller and Modigliani.[2] Previously, only one type of investor was known, namely the normal investor.[3] [4] Miller and Modigliani used the term irrational investor to refer to the type of investors that Snyder and Eiteman termed as normal investors. According to Statman,[5] irrational investors are actually no different from normal investors. In subsequent developments, the theory of irrational investors is more developed. Rubinstein,[6] for example, distinguishes market rationality from individual rationality, and introduces the terms maximally rational market and minimally rational market.

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[1] Tandelilin, Eduardus. 2010. *Portofolio dan Investasi Teori dan Aplikasi*, Edisi pertama, Yogyakarta: Penerbit Kanisius

[2] Miller, Merton & Franco Modigliani. 1961. *Dividen Policy, Growth and the Valuation of Shares.* Journal of Business, 34 (4)

[3] Snyder, Howard, TW. (1957). *How To Take A Loss and Like It*. Financial Analysts Journal, 13 (2)

[4] Eiteman, Wilford J. 1957. *Yield on Common Stock Investments.* Financial Analysts Journal, 13 (1)

[5] Statman, Meir. 2005. *Normal Investors, Then and Now.* Financial Analysts Journal, 61 (2):

[6] Rubinstein, Mark. 2001. *Rational Market: Yes Or No? The Affirmative Case.* Financial Analyst Journal, 57 (3):

According to Statman,[7] rational investors are those who only pay attention to the link between risk and expected return. While irrational investors (normal investors) pay more attention than that, their behavior is also influenced by cognitive biases and emotions. So that rational investors commonly use analytical models to predict expected stock returns, there are two models that are often used by rational investors, namely the Capital Assets Pricing Model (CAPM) and Arbitrage Pricing Theory (APT). CAPM introduced by Sharpe[8] is a model to determine the price of an asset in equilibrium. In equilibrium the level of profit required by investors for a stock will be influenced by the risk of the stock.[9] In this case, the risk taken into account is the systematic risk represented by beta, because unsystematic risk can be eliminated by diversification.

Synder[10] formulate that rational investors only make transactions and only buy information if the action can increase the expected benefits. In contrast, overconfident investors underestimate the expected benefits by trading as much as possible and are too speculative. They unrealistically believe in how high the return will be and how accurately it can be predicted. They also spend too much resources to obtain investment information.[11]

Many models of overconfident investors have been developed, including (De Long et al.[12]; Benos[13]; Kyle & Wang[14];Caballé & Sákovics.[15] This model explains that irrational investors have a strong belief in their own judgment and firmly distrust others.

In its development, the behavior of irrational investors has become a spotlight so that many researchers analyze this behavior because irrational investors do not rely on the CAPM or APT model to predict the expected return, they rely on psychology and proxies of how they analyze stocks both to sell or buy only based on their own instincts. This psychology and proxy is called investor sentiment.

Basu et al[16] have shown that the addition of sentiment variables to business cycle indicators improves the performance of active portfolios and the results are statistically significant, Wang,[17] Simon and Wiggins[18] show that market sentiment can predict returns using positions held by large traders in the futures market, as proxies and sentiment. They also found that they are useful for predicting future returns in the next period.

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[7] Statman, Meir. 2005. *Normal Investors, Then and Now.* Financial Analysts Journal, 61 (2):

[8] Sharpe, WF., and Cooper, G.M. 1972. "*Risk – Return Class of New York Stock Exchange Common Stocks 1931-1967",* Financial Analysts Journal.

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[11] Odean, Terrance. 1998. *Volume, Volatility, Price and Profit When All Trades Are Above Average*. Journal of Finance, 53 (6)

[12] De Long, J. Bradford, Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann ,1991. *The Survival of Noise Traders in Financial Markets.* Journal of Business, 64 (1)

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[16] Basu, D., C.-H. Hung, R. Oomen, and A. Stremme. 2006. *When to Pick the Losers: Do Sentiment* Indicators Improve *Dynamic Asset Allocation?"* In EFA 2006 Zurich Meetings Paper.

[17] Wang, C. 2001. *Investor sentiment and return predictability in agricultural futures markets".* Journal of Futures Markets 21 (10)

[18] Simon, D. P., and R. A. *Wiggins*. 2001. *S&P futures returns and contrary sentiment indicators".* Journal of Futures Markets 21 (5)

The proxy for investor sentiment used is market liquidity[19] which is measured through stock turnover, which is calculated by dividing the trading volume per month by the number of shares listed on the exchange in that month, then the value is summed to obtain the annual liquidity value.

With the emergence of behavioral psychology and investor psychology, more and more people realize that investor sentiment plays an important role in asset pricing. However, people lack real-time measures of investor sentiment for assets that are important in asset price movements. Gewei Yei[20] developed the Sentiment Asset Pricing Model (SAPM) as an algorithm package for assets. SAPM calculates investors' real-time forecasts for asset prices from a large sample of asset option data. It then calculates the asset price for a future date from the sentiment forecast. The algorithm is implemented as a Web charting application that displays future dates, asset prices, rates of return, and detailed forecasts for asset prices in real-time. SAPM extends the legacy asset pricing model with real-time empirical investor sentiment.

Lawrence et al[21] have shown how stock prices change by modifying the components of the existing dividend discount model with investor sentiment as a component. Boido and Fasano[22] revealed that investor sentiment affects the expected growth rate and the expected discount rate. It is possible to evaluate the future performance of the company with individual beliefs. The model used is to combine the CAPM model and investor sentiment by modifying beta as an investor beta function.

In this study, a group of stocks included in the Jakarta Islamic Index (JII) count was chosen which is relatively new, but from year to year the Islamic stock index in the Jakarta Islamic Index (JII) group shows a value that continues to rise. Given that the IDX also applies economic criteria, in addition to sharia criteria, in determining the stocks included in the JII category, it can be said that the stocks included in the JII category are superior stocks that meet sharia criteria.

Literature Review

Capital Asset Pricing Model (CAPM) and Sentiment Asset Pricing Model (SAPM)

As explained earlier that for rational investors, it is considered necessary to calculate and analyze portfolios so it is common to use CAPM and APT models. Before understanding about SAPM, it is necessary to review CAPM earlier because the SAPM model is a modification of the CAPM model. CAPM is a standard form of general equilibrium relationship for asset returns developed separately by Sharpe,[23] so this model is often called the Sharpe-Lintner-Mossin form of CAPM. Definition of CAPM (Jack Clark Francis): "The theory of risk assessment and asset returns based on beta coefficients (indices of risk that cannot be diversified)"[24]

The most important thing about the Capital Assets Pricing Model is the statement of the relationship between the expected risk premium of individual assets and their systematic

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[19] Baker, M., and J. C. Stein. 2004. *Market liquidity as a sentiment indicator".* Journal of Financial Markets 7 (3)

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risk. Jack Treynor, William Sharpe and John Lintner around the 1960s formulated the CAPM as follows:

Rj - Rf = (Rm - Rf)*bj ..... (1a)

Which is also often written as:

Rj = Rf + (Rm - Rf)..... (1b)

The formulation above says that the expected rate of return of a stock (Rj) is equal to the level of risk (Rf) plus a risk premium [(Rm-Rf)*bj]. The greater the risk of the stock (b), the higher the expected risk of the stock and thus the higher the expected rate of return. To estimate the magnitude of the beta coefficient, the market model is used with the equation can be written as follows:

$$R_i = \alpha_i + \beta_i R_M + e_i$$

Ri = return of security i
RM = market index return
αi = intercept
βi = slope
εi = random residual error

The market model can be estimated by regressing the return of the security to be valued on the return of the market index. The regression will produce the values: αi (a measure of security i's return that is unrelated to the market return) αi (the expected increase in return on security i for every 1% increase in market return). For irrational investors, the selection of portfolios is based on psychology, proxies and the investor's own instincts, without regard to calculation analysis. This irrational nature is the sentiment of investors to predict future stock price returns. Sentiment Asset Pricing Model (SAPM) is a modification of the Capital Asset Pricing Model (CAPM). Lawrence et al[25] have shown how stock prices change by modifying the components of the existing dividend discount model with investor sentiment as a component. In this context, stock prices are governed not only by company fundamentals, but also by investor sentiment.

Boido and Fasano[26] determined that investor sentiment affects the expected growth rate and the expected discount rate. It is possible to evaluate the future performance of the company with individual beliefs. The model used is to combine the CAPM model and investor sentiment by modifying beta as an investor beta function. If the sentiment of the company is high it will be considered less risky and the modified beta value will be lower, thus reducing the expected return (vice versa). The form of the modified beta model from CAPM to SAMP can be expressed as follows:

$$\mathbb{E}r^s = r_F + \beta^s \mathbb{E}(r_M - r_F)$$

Investors who think the future performance of the company is relevant will wait for a higher growth rate than investors who believe that the company is in certain failure. The firm's growth rate is modified from g (the growth rate in the simple Gordon and Shapiro model) to gs, where gs is a function of the growth rate g and investor sentiment. For

[25] Lawrence, E. R., G. McCabe, and A. J. Prakash. 2007. *Answering _nancial anomalies: Sentiment-based stock pricing".* The Journal of Behavioral Finance 8 (3)

[26] Boido. C, Fasano. A, 2015, *CAPM With Sentiment, The Efficeient Market Hypotesis Speiced Up With Sentiment,* Journal of SRRN

companies where the return expected by investors is greater than the growth rate of the company and its constant growth, the modified Gordon equation for determining the stock price is:

$$P_0 = \frac{d_1}{r_s - g_s}$$

For investors with strong sentiment towards the future performance of the company, the predicted discount rate will be low, while the expected growth rate will increase, thus making the value of the stock higher (as perceived by the investor). Similarly, a stock is undervalued by investors when investor sentiment is very low towards the future performance of the company. If the market price is higher than what the investor's sentiment is expecting with weak sentiment, then he should sell his shares. And if the market price is lower than what the investor with high sentiment realizes, then he should buy it. Tirole[27] Hong and Stein [28] assert that the stock market is affected by price bubbles when it is difficult to make an estimate of the fundamental value of a stock even if investors are considered rational.

Risk

Risk is the possible difference between the actual return received and the expected return. The greater the possible difference, the greater the investment risk (Tendelilin: 2010). The amount of investment risk is measured by the standard deviation of the expected return. The standard deviation is the square root of the variance, which shows how much the random variable spreads between its mean; the greater the spread, the greater the variance or standard deviation of the investment.

Stock Return

Return is one of the factors that motivates investors to invest and is also a reward for the courage of investors to bear the risk of their investment (Tendelilin 2010: 102). To estimate the return of a security as a single asset (stand-alone risk), investors must take into account every possibility of realizing a certain level of return, or better known as the probability of occurrence.

Islamic Stocks and Jakarta Islamic Index (JII)

Sharia shares can be interpreted as proof of ownership of the issuer of an issuer or public company, and does not include shares that have special rights. A certificate showing proof of ownership of a company issued by an issuer whose business activities and management do not conflict with sharia principles. Sharia stocks are shares of companies (issuers) whose operations are in accordance with Islamic sharia principles.

Research Conceptual Framework

Based on the background of the problem, problem formulation, research objectives, research benefits and theoretical studies and empirical reviews that have been described in front, a research conceptual model can be formulated as follows:

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[27] Tirole, J. 1982. *On the possibility of speculation under rational expectations". Econo- metrica:* Journal of the Econometric Society..

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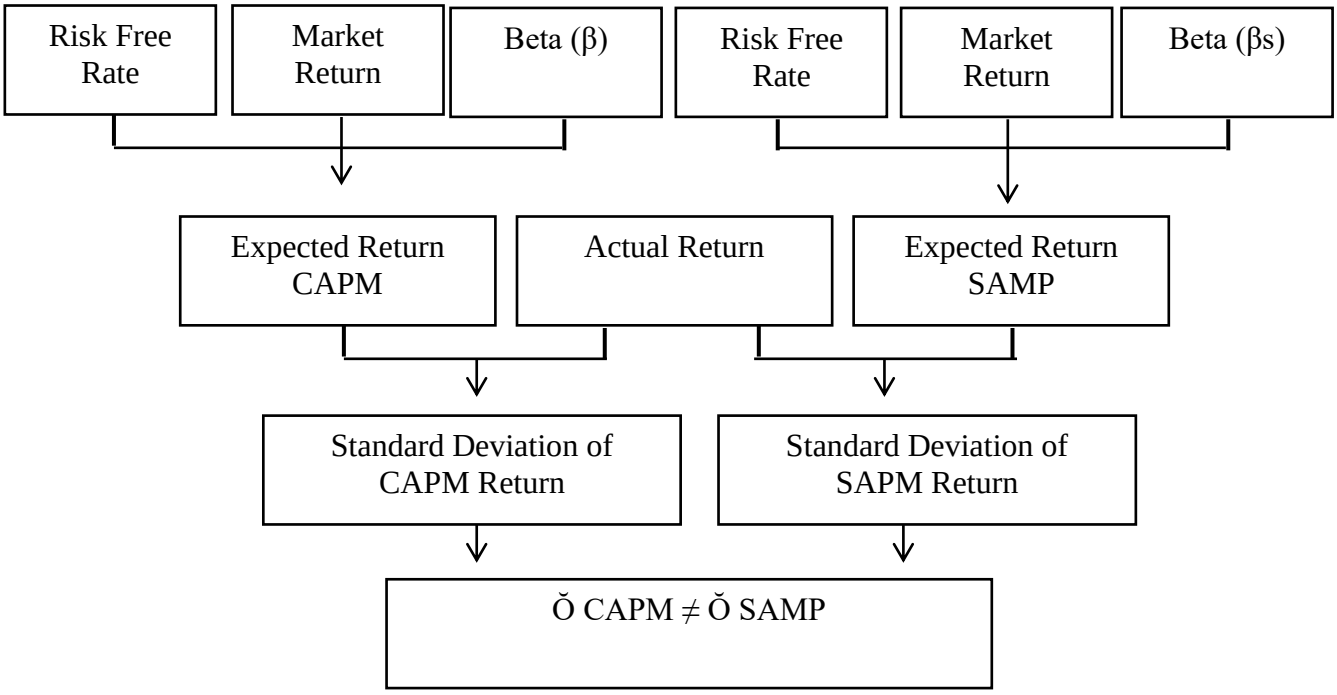

Hypothesis

The hypotheses in this study are as follows:

Ho: The CAPM model in predicting Islamic stock returns is not more accurate than the SAMP model.

H1 : The CAPM model in predicting Islamic stock returns is more accurate than the SAMP model.

Research Methodology

Data Collection Method

The data used is monthly secondary data from 2017 to 2021 in the form of stock prices of Jakarta Islamic Index 30 companies, the Jakarta Islamic Index composite stock price index (JCI).The population used in this study are all stocks listed on the Jakarta Islamic Index. While determining the sample in this study using purposive sampling method. The population in this study was 30 issuers, 11 issuers that met the requirements and were used in the Jakarta Islamic Index research. The following is a list of sample companies for the JII:

No	Corporate Name	Code
1	PT Astra Agro Lestari Tbk	AALI
2	PT Aneka Tambang Tbk	ANTM
3	PT Global Mediacom Tbk	BMTR
4	PT International Nickel Indonesia Tbk	INCO
5	PT Indocement Tunggal Prakarsa Tbk	INTP
6	PT Kalbe Farma Tbk	KLBF

7	PT Tambang Batubara Bukit Asam Tbk	PTBA
8	PT Semen Gresik Tbk	SMGR
9	PT Timah Tbk	TINS
10	PT Telekomunikasi Indonesia Tbk	TLKM
11	PT Unilever Indonesia Tbk	UNVR

Definition of Operational Variable

NO	Variables	Definition	Scale	Measurement
1	Stock Return (Ri) (Ri)	The returns that investors have received from transactions in the form of capital gains. The result of the difference between the share price (i) in the period (t) minus the share price (I) before the period (t) and then the result is divided by the share price (I) before the period (t)	Ratio	Ri = Pt-Pt -1 / Pt-1
2	Market Returns (Rm)	Return yang diperoleh dari perbandingan indeks saham yang aktif diperdagangkan. Hasil selisih dari Indeks Harga Composite Stock in the period (t) minus the Composite Stock Price Index before the period (t) divided by the Pre-period Composite Stock Price Index (t)	Ratio	Rm = IHSGt – IHSG -1 / IHSG - 1
3	Risk-Free Asset Returns (Rf)	The returns obtained by investors without bearing the risks represented by the interest rate of Bank Indonesia Certificates. Risk-free assets derived from interest rates for one month divided by 12.	Ratio	Rf = SBIt / 12

SAPM Model Variables

The SAPM model is a modification of the CAPM model and investor sentiment by modifying the beta as a beta of the investor function.

No	**Variable**	**Definition**
1	Investor Sentiment	The investor sentiment proxy used is market liquidity which is measured through stock turnover which is calculated by dividing the trading volume per month by the number of shares listed on

the exchange in that month, then the value is added up to obtain the annual liquidity value.

Data Analysis Technique

The analysis method in this research is descriptive comparative with a quantitative approach. The first step is to describe the research variables with descriptive statistics. Second, using inferential statistics to draw conclusions on the analysis that has been done. The inferential statistics used are comparative analysis, which compares the accuracy level of CAPM with SAMP in predicting stock returns. The accuracy level of the two models is measured by MAD (Mean Absolute Deviation) and compared with the independent T-test statistical tool. In detail, the data analysis in this study consists of several stages, including the following:

1) Collecting data related to the CAPM Model :
   a. Calculate beta by regressing actual stock returns with market returns for the 2017-2021 period.
   b. Form a CAPM equilibrium model based on beta, risk-free assets and market returns.
   c. Calculate the expected return in 2017-2021 based on the CAPM model.
2) Collect data related to the SAPM Model:
   a. Calculating beta by regressing actual stock returns with market returns for the 2017-2021 period.
   b. Form a CAPM equilibrium model based on sentiment beta, risk-free assets and market returns.
   c. Calculate the expected return in 2017-2021 based on the SAPM model.
3) Calculate the mean absolute deviation (MAD) of each CAPM and SAPM model to see the level of accuracy of forecasting company stock returns
4) Draw conclusions whether there is a difference in accuracy between CAPM and SAPM in forecasting stock returns based on the results of an independent sample t-test on the MAD of each model.

Research Results and Discussion

The sample is 11 out of 30 issuers on the Jakarta Islamic Index (JII). The description of this study includes the average stock return of sample companies from 2012 to 2016. Average market return (RM) from 2017 to 2021, average risk-free asset return (RF) from 2017 to 2021. As for SAPM, the company's stock trading volume is added from 2017 to 2021, the entire amount of stock trading volume listed in the JII from 2017 to 2021.

T-test between CAPM and SAPM

Two-sample t test with equal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
CAPM	11	.0163698	.0076543	.0253863	-.0006849	.0334246
SAPM	11	-.0361558	.0524997	.174122	-.1531325	.0808209
combined	22	-.009893	.0265149	.1243657	-.0650337	.0452477
diff		.0525256	.0530548		-.0581447	.163196

diff = mean(CAPM) - mean(SAPM) t = 0.9900
Ho: diff = 0 degrees of freedom = 20

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.8330 Pr(|T| > |t|) = 0.3340 Pr(T > t) = 0.1670

Based on the T value table in the expected return difference test between CAPM and SAPM, it can be seen that there is a significant difference because the t value of 0.9900 is greater than 0.05.

Accuracy Measurement of CAPM and SAPM Models

Average absolute deviation or MAD (Mean Absolute Deviation) is the sum of forecast errors regardless of their algebraic sign divided by the amount of data observed (Herjanto, 2010). According to Gaspersz (2004), MAD can be used as an indicator in measuring forecasting accuracy. The accuracy of the two models (CAPM and SAPM) in forecasting stock returns can be measured by the average absolute deviation or MAD (Mean Absolute Deviation). MAD calculates the average of the absolute value of the difference between the stock's actual return and its expected return. According to Premananto and Madyan (2004), the smaller the MAD, it indicates that the expected return does not deviate much from the actual return so that the level of accuracy can be said to be high. The formula for calculating the average absolute deviation (Mean Absolute Deviation) is:

$$MAD = \frac{\Sigma \left| Ri - E(Ri) \right|}{n}$$

MAD: Average absolute deviation for CAPM or APT models
E(Ri) : Expected return of stock i with CAPM or APT model
Ri : The actual return of stock i
N : Number of data

The expected stock return is calculated using the CAPM and SAPM models. then this expected return is entered into the MAD formula. The following is the MAD value of each model:

Mean Absoolut Deviastian

NO	Corporate	MAD CAPM	MAD SAPM
1	AALI	0,038168	0,055076
2	ANTM	0,042657	0,037581
3	BMTR	0,01922	0,023272
4	INCO	0,001305	0,00402
5	INTP	-0,00121	0,05826
6	KLBF	-0,018087	-0,47069
7	PTBA	-0,009916	0,048447
8	SMGR	0,00025	0,045392
9	TINS	0,035791	0,004289
10	TLKM	-0,008449	-0,31299
11	UNVR	0,012537	0,041828
	Average	0,010206	-0,04232

This study aims to compare the accuracy of the CAPM and SAPM models in predicting the stock returns of companies listed on the JII for the 2017-2021 period using MAD (Mean Absolute Deviation). MAD is a tool used to measure how large the average absolute error produced by a model is, in other words MAD is used to measure the accuracy of a model. The smaller the MAD value of a model, the more accurate the model is in forecasting the dependent variable. The results of the discussion above show that the MAD CAPM and MAD SAPM values are different where the CAPM model is more accurate than the SAPM model.

From the explanation above, it can be concluded that in predicting Islamic stock returns, the approach with the CAPM model which is usually used by rational investors is better than using the SAPM model approach which focuses on proxies and investor sentiment that usually arises from irrational investors.

Conclusion

Based on the results of the analysis and discussion that has been stated, the following conclusions can be drawn:

1. Statistically there is a significant difference in accuracy between the Capital Asset Pricing Model (CAPM) and the Sentiment Asset Pricing Model (SAPM) in predicting Sharia stock returns in the Jakarta Islamic Index (JII).
2. The CAPM model is more accurate than the SAPM model in predicting Islamic stock returns.

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