

ARBITRATION PRICING THEORY AS AN ANALYSIS TOOL IN EFFICIENT GROUPING OF STOCK

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Abstract: *The aims of this study are: (1) To be able to find out which stocks are efficient and inefficient using APT to avoid investment mistakes. (2) So that investors can understand APT to help investors determine the best investment decisions. The population of this research is 27 Business Indices for the 2019-2021 period. The sampling technique used was purposive sampling. The sample used in this study is the company's stock returns and consistently listed on the 27 Business Index for the 2019-2021 period. This study uses monthly closing stock price data, Business 27 Index data and SBI data, macro variable data consisting of inflation, the Rp/USD exchange rate, SBI interest rates, and the IHSG. The results showed that there were 9 efficiency stocks out of 16 stocks in the CAPM model, namely ADRO, ASII, BBCA, BBNI, BBRI, BMRI, INTP, PWON and TLKM.*

Keywords: *APT, Inflation, Exchange Rate, IHSG, SBI*

Introduction

National income or GDP is closely related to investment. Investment in the form of increased capital investment will have a positive impact on the production process in an increasingly high business, then it will also have an impact on improving the economy in Indonesia, such as building factories, infrastructure, improving the quality of Health and Education and automatically opening up the many jobs needed to realize development goals.

Investment in the capital market is a means of business funding or as a means for companies to obtain funds from the investor community or investors. A facility for the public to invest in financial instruments such as stocks, bonds, mutual funds and other capital market instruments. The benefits of stock investment obtained is a gain. The more developed a company from time to time, will be followed by an increase in the company's stock price. Investment also has risks, where the losses experienced by investors always haunt investors. Investments with a high level of risk have a high profit potential. Stocks are one of today's profitable investment alternatives that can be done properly and correctly. By buying shares, you become one of the owners of the issuer company.

Investment decision is an action taken by an investor in allocating a number of funds in the form of investment, with the expectation of profit in the long term. The company's investment decision is very important for the company's survival because investment decisions concern the funds to be used for investment, the type of investment to be made, the return on investment, and the investment risks that may arise. Investment decisions have a long-term time dimension, so the decisions taken must be considered carefully because they have long-term consequences as well. The third basis for investment decisions, namely the relationship between risk and expected return, is a unidirectional and linear relationship. This means that the greater the risk of an asset, the greater the expected return on the asset and vice versa.

For that we need an analysis that can provide information about the return and risk that will be accepted later. In investing in the capital market, especially portfolios, in addition to

calculating the expected return, an investor must also pay attention to the risks that must be borne. APT (Arbitrage Pricing Theory) is a balance model that is often used to determine the relevant risk to an asset, as well as the expected risk and return relationship (Indra, 2018).

Return and risk are two things that cannot be separated, and have a positive relationship, where if the rate of return is low, the level of risk is also low, and vice versa. The ability to estimate the rate of return of a stock is very important for investors.

The study of Arbitrage Pricing Theory (APT) is a follow-up to the study of the Capital Asset Pricing Model (CAPM). APT is a study in which an asset and market price, as well as a decision that seeks to examine and explain how an asset and market price and investment decisions are feasible to implement. The APT theory was put forward by Stephen A. Ross in 1976 (Irham, 2012).

Investors have the desire to benefit from both dividends and capital gains, therefore an investor will buy stocks that have good liquidity, in Indonesia itself there is an index consisting of companies that meet the criteria as a company with the highest market capitalization, Index Bisnis 27 is an index that measures the price performance of 27 stocks selected by the Indonesian Business Index Committee. The BISNIS-27 index was launched and managed in collaboration with the media company PT Jurnalindo Aksara Graphic (publisher of the Bisnis Indonesia daily newspaper). The IDX and Bisnis Indonesia carry out regular monitoring and will later evaluate the replacement of stocks that meet the criteria for the business-27 index. This activity is carried out every 6 months, namely at the beginning of May and November, due to good criteria in classifying shares that can enter the 27 selected stocks, investors make Business-27 a reference for investing in the capital market.

This research is considered important to carry out because the results of this research are expected to help the public to invest in the capital market with preferred stocks and efficient stocks. The results of this study also help investors to analyze returns and risks to choose efficient stocks using the Arbitrage Pricing Theory method as a basis for making investment decisions.

The question of this paper is how much is the return and risk of each stock listed on the Bisnis-27 Index for the 2019-2021 period using the Arbitrage Pricing Theory and which stocks are efficient and inefficient according to Arbitrage Pricing calculations.

The scheme of this research can be described with a scheme like the following:

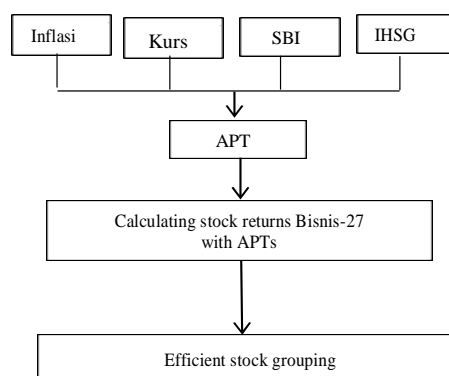


Figure 1 : Arbitrage Pricing Theory in Grouping Efficient Stocks in the 27 Business Index (2019-2021)

Literature Review

Investor Decision

Investment decisions are choices made in collecting income from an asset to gain future profits (Novianggie & Asandimitra, 2020). Investment decisions are decisions that lead to providing solutions to the problem of the size of the investment to be made and the selection of the type of investment based on thinking about the maximum possible return with the smallest possible risk (Sari & Subardjo, 2020). Errors in making investment decisions will have an impact on the risks that must be borne by the company and then affect the value of the company.

The purpose of investment decisions made by the company is to obtain a high level of profit with a certain level of risk (Sari & Subardjo, 2020). High profits with manageable risks are expected to increase the value of the company. This means that when investing, the company is able to generate profits by using the company's resources efficiently. Then the company will gain the trust of potential investors to buy shares in the company. So that the higher the profit earned by the company, the higher the value of the company. Investment decisions made by the company are expected to provide a positive signal about the company's growth in the future.

Arbitrage Pricing Theory (APT)

In 1976, arbitrage pricing theory was developed by Stephen Ross. APT is the principle of the law of the one price or one price, which states that if securities have the same characteristics, they can also be priced at the same price (Harif et al., 2018). The aim of arbitrage is to take advantage of price differences of the same asset or security.

In this APT theory, there are many industry-specific and macroeconomic factors that affect the safety of returns. Therefore, the challenge for investors is to determine the macroeconomic factors that affect stocks, the expected rate of return, and how each stock responds to these factors. Stock price trends that are influenced by macroeconomic variables can be interpreted as a factor in APT to see the impact and causality between stock returns and macroeconomic variables (Tyas et al., 2014).

Stock returns

According to (Legiman et al., 2015) argues that stock return is the result obtained from investment. Stock return is one of the factors that motivates investors to invest and is also a reward for investors' courage to bear the risk of investing (Nastiti, 2019). Stock return is one of the things that motivates investors when investing in stocks. Stock return is a yield obtained by investors from the capital invested in the stock market (Kusmayadi et al., 2018). Stock returns are obtained by comparing the difference between the stock price and the closing price in the previous period. The difference in share prices is obtained by subtracting the closing price of the current stock with the closing price of the previous period. The results of the calculation of stock returns can be positive and negative (Caesar et al., 2021).

The higher the value of the company's stock return, the better the company's image and can attract investors to invest in the company (Januardin et al., 2020). There are two types of stock returns, namely realized returns and expected returns (Sudirman, 2015).

Business Stock Index-27

A stock index is a statistical measure that reflects the overall price movement of a group of stocks that are selected based on certain criteria and methodologies and are evaluated periodically.

The IDX actively continues to innovate in developing and providing stock indexes that can be used by all capital market players, whether in collaboration with other parties or not. The index book "IDX Stock Index Handbook" contains a concise and concise description of the indices provided by the IDX. One of them is the Business Index 27. The Business Index

27 is an index that measures the price performance of 27 stocks selected by the Indonesian Business Index Committee. The BISNIS-27 index was launched and managed in collaboration with the media company PT Jurnalindo Aksara Graphic.

Method

This study uses quantitative analysis of stock price data for Business Index 27 companies, market returns for Business Index 27, inflation, the Rp/dollar exchange rate, SBI interest rates and the IHSG. The object of research in this study are stocks listed in the 27 Business Index during the 2019-2021 period. Variables are anything in any form that is determined by the researcher to be studied in order to obtain information from it, then conclusions are drawn (Sugiyono, 2009). Based on these criteria, the samples to be used in this study are presented in the following table:

Table 1: List of Shares that are consistently included in the 27 Business Index shares for the 2019-2021 Period

No	Company name	Code
1	Adaro Energy Tbk.	ADRO
2	Astra International Tbk.	ASII
3	Bank Central Asia Tbk.	BBCA
4	Bank Negara Indonesia (Persero) Tbk.	BBNI
5	Bank Rakyat Indonesia (Persero) Tbk.	BBRI
6	Bank Mandiri (Persero) Tbk.	BMRI
7	Charoen Pokphand Indonesia Tbk	CPIN
8	Indofood CBP Sukses Makmur Tbk.	ICBP
9	Indah Kiat Pulp & Paper Tbk.	INKP
10	Indocement Tunggul Prakarsa Tbk.	INTP
11	Kalbe Farma Tbk.	KLBF
12	Bukit Asam Tbk.	PTBA
13	Pakuwon Jati Tbk.	PWON
14	Semen Indonesia (Persero) Tbk.	SMGR
15	Telkom Indonesia (Persero) Tbk.	TLKM
16	United Tractors Tbk.	UNTR

Source: www.idx.co.id (processed according to data)

The data used in this research will be processed using Microsoft Excel and SPSS 22. In this writing, the data used in this research technique is secondary data. Secondary data is a source that does not directly provide data to data collectors, for example other people or through documents (Sugiyono, 2008). The secondary data used in this study are:

The data of the companies included in the business-27 stock index were obtained from statistical data published by the Indonesia Stock Exchange. Stock price data, business-27 stock index obtained statistical data published by the Indonesia Stock Exchange. Data on macroeconomic variables such as inflation rates, SBI interest rates, exchange rates and the IHSG were obtained from statistical data published by BI and BPS.

Data analysis method

To calculate the expected return with the APT model described in the previous chapter, the formula regarding the expected return with three factors that will be used in this study can be shown by the following formula (Andri, 2010) :

$$E(R_i) = R_f + \beta_{Inflasi} \lambda_{Inflasi} + \beta_{Birate} \lambda_{Birate} + \beta_{Kurs} \lambda_{Kurs} + \beta_{IHSG} \lambda_{IHSG}$$

Where:

- E(R_i) : Return expectations on securities i
- R_f : Risk free interest rate (SBI)
- β_{Inflasi} : Sensitivity of stock returns to inflation.

- β_{Kurs} : Sensitivity of stock returns to exchange rates Rp/USD.
- β_{SBI} : Sensitivity of stock returns to SBI interest rates.
- β_{IHSG} : Sensitivity of stock returns to IHSG.
- λ Inflasi : Inflation risk premium $[E(F_{Inflasi}) - R_f]$
- λ Kurs : Exchange risk premium Rp/USD $[E(F_{Kurs}) - R_f]$
- λ SBI : Interest rate risk premium SBI $[E(F_{SBI}) - R_f]$
- λ IHSG : Risk premium IHSG $[E(F_{IHSG}) - R_f]$

The variables related to the APT formula above are :

1. Actual Return of Selected 27 Business Shares (R_i)

The actual return on the APT model is the same as the actual return on the CAPM model, so the actual return on the APT model is also calculated using the same formula, namely (Hartono, 2013) :

$$R_i = \frac{P_{i,t} - (P_{i,t-1})}{P_{i,t-1}}$$

Where:

- R_i , = actual return on selected JII stocks
- P_i , = price on time t
- $P_i - 1$ = prices for earlier times

2. Risk Free Asset Return

The risk-free return on assets (R_f) used in the APT model is obtained from the SBI interest rate for one month divided by twelve months (Andri, 2010)

$$R_f = \frac{SBI_t}{12}$$

3. Calculating Beta (β)

In contrast to beta CAPM which is the sensitivity of stock return i (R_i) to market return (R_m) while beta in APT is the sensitivity of stock return i (R_i) to a factor (Bodie et al., 2014)

$$\beta = \frac{Co(R_i, F)}{\sigma^2 F}$$

4. Surprise factor (F)

Surprise is the difference between the actual value and the expected value of a factor. In the APT, the factors that affect the return of a stock are more than one. These factors are obtained from empirical research that has been done (Husnan, 2009).

This study uses the three-factor APT model and uses the same factors as those used by (Laia & Saerang, 2015), namely the inflation rate, SBI, Rupiah Exchange Rate and IHSG against the Dollar. And to calculate the expected value of macro variables, we will use the Exponential Smoothing method.

Result and Discussion

Expected Value and Surprise Macroeconomic Factors

The macroeconomic factors used for the APT model in this study are inflation surprises (CPI), exchange rate surprises (Rp/USD), SBI interest rate surprises, and the Jakarta Composite Index (IHSG) surprise which are obtained from the difference between the actual value of macro factors and the expected value of macro factors. The expected value of macro

factors is obtained by using the Exponential Smoothing method which is calculated using SPSS 22 software, in SPSS there are four standard Exponential Smoothing methods, namely Simple Exponential Smoothing, Double Exponential Smoothing Holt, Double Exponential Smoothing Brown, and Damped Trend Exponential Smoothing. To determine which method is the best in calculating the expected value of macro factors, it will be seen from the smallest MAPE and MAE values contained in the SPSS output in the table below.

Table 2 : MAPE and MAD Expected Value Macro Factors

Metode	Inflation		Kurs		SBI Interest Rate		IHSG	
	MAPE%	MAE	MAPE%	MAE	MAPE%	MAE	MAPE%	MAE
Exponential Smoothing								
Simple	8,251	0,002	0,188	0,018	1,539	0,001	0,391	0,034
Holt	8,629	0,002	0,168	0,016	2,447	0,001	0,392	0,034
Brown	9,103	0,002	0,191	0,018	2,153	0,001	0,391	0,034
Damped Trend	7,713	0,002	0,168	0,016	2,373	0,001	0,382	0,033

Source: Results of data processing with SPSS 22

Table 2 above shows the smallest MAPE and MAE values for the exchange rate and the IHSG is the Damped Trend Exponential Smoothing method, for inflation and SBI the smallest MAPE and MAE values are the Simple Exponential Smoothing method.

Inflation

The inflation value used for the APT model is the inflation surprise, which is obtained from the difference between the actual inflation value and the expected inflation value. The development of the actual inflation rate, the expected inflation rate and the inflation surprise can be seen in the table below.

Table 3: Actual Inflation, Expected Inflation, and Surprise Inflation for the January 2019-December 2021 Period

Year	Month	Actual Inflation	Expected Inflation	Inflation Surprise
2019	Jan	0,0282	0,0282	0
	Feb	0,0257	0,0282	-0,0025
	Mar	0,0248	0,0257	-0,0009
	Apr	0,0283	0,0248	0,0035
	May	0,0332	0,0283	0,0049
	Jun	0,0328	0,0332	-0,0004
	Jul	0,0332	0,0328	0,0004
	Aug	0,0349	0,0332	0,0017
	Sep	0,0339	0,0349	-0,001
	Oct	0,0313	0,0339	-0,0026
	Nov	0,03	0,0313	-0,0013
	Dec	0,0272	0,03	-0,0028
2020	Jan	0,0268	0,0272	-0,0004
	Feb	0,0298	0,0268	0,003
	Mar	0,0296	0,0298	-0,0002
	Apr	0,0267	0,0296	-0,0029
	May	0,0219	0,0267	-0,0048
	Jun	0,0196	0,0219	-0,0023
	Jul	0,0154	0,0196	-0,0042
	Aug	0,0132	0,0154	-0,0022
	Sep	0,0142	0,0132	0,001
	Oct	0,0144	0,0142	0,0002
	Nov	0,0159	0,0144	0,0015
	Dec	0,0168	0,0159	0,0009
2021	Jan	0,0155	0,0168	-0,0013
	Feb	0,0138	0,0155	-0,0017
	Mar	0,0137	0,0138	-1E-04
	Apr	0,0142	0,0137	0,0005
	May	0,0168	0,0142	0,0026
	Jun	0,0133	0,0168	-0,0035
	Jul	0,0152	0,0133	0,0019

Aug	0,0159	0,0152	0,0007
Sep	0,016	0,0159	1E-04
Oct	0,0166	0,016	0,0006
Nov	0,0175	0,0166	0,0009
Dec	0,0187	0,0175	0,0012
Rata-Rata (F)	0,0220	0,0223	-0,00026

Source: Results of data processing with SPSS 22

Exchange rate (Rp/USD)

The exchange rate used for the APT model is the exchange rate surprise obtained from the difference between the actual exchange rate and the expected exchange rate. The development of actual exchange rates, expected exchange rates and exchange rate surprises can be seen in the table below.

Table 4 : Actual Exchange Rate, Expected Exchange Rate, and Exchange Rate Surprise for January 2019-December 2021 Period

Year	Month	Actual Exchang	Expected Exchang	Exchange Surprise
2019	Jan	9,5511	9,5618	-0,0107
	Feb	9,5635	9,5621	0,0014
	Mar	9,5642	9,5625	0,0017
	Apr	9,5659	9,5628	0,0031
	May	9,5557	9,5631	-0,0074
	Jun	9,5477	9,5635	-0,0158
	Jul	9,5596	9,5638	-0,0042
	Aug	9,5603	9,5641	-0,0038
	Sep	9,5491	9,5644	-0,0153
	Oct	9,5539	9,5648	-0,0109
	Nov	9,5382	9,5651	-0,0269
	Dec	9,5215	9,5654	-0,0439
2020	Jan	9,5708	9,5657	0,0051
	Feb	9,6989	9,5660	0,1329
	Mar	9,6041	9,5664	0,0377
	Apr	9,5871	9,5668	0,0203
	May	9,5596	9,5671	-0,0075
	Jun	9,5840	9,5675	0,0165
	Jul	9,5860	9,5678	0,0182
	Aug	9,6051	9,5681	0,0370
	Sep	9,5901	9,5685	0,0216
	Oct	9,5532	9,5688	-0,0156
	Nov	9,5497	9,5692	-0,0195
	Dec	9,5482	9,5695	-0,0213
2021	Jan	9,5638	9,5698	-0,0060
	Feb	9,5833	9,5701	0,0132
	Mar	9,5778	9,5705	0,0073
	Apr	9,5663	9,5708	-0,0045
	May	9,5816	9,5711	0,0105
	Jun	9,5791	9,5714	0,0077
	Jul	9,5656	9,5718	-0,0062
	Aug	9,5687	9,5721	-0,0034
	Sep	9,5585	9,5724	-0,0139
	Oct	9,5694	9,5727	-0,0033
	Nov	9,5645	9,5731	-0,0086
	Dec	9,5736	9,5734	0,0002
Rata-Rata (F)	9,5700	9,5676	0,0024	

Source: Results of data processing with SPSS 22

SBI Interest Rate

The SBI interest rate used for the APT model is the SBI surprise value obtained from the difference between the actual SBI value and the expected SBI value. The development of the actual SBI value, the expected SBI value and the SBI surprise value can be seen in the table below.

Table 5: Actual SBI, Expected SBI, and Surprise SBI for January 2019-December 2021

Year	Month	SBI	SBIF	Surprise SBI
2019	Jan	0,0600	0,0600	0,0000
	Feb	0,0600	0,0600	0,0000
	Mar	0,0600	0,0600	0,0000
	Apr	0,0600	0,0600	0,0000
	May	0,0600	0,0600	0,0000
	Jun	0,0600	0,0600	0,0000
	Jul	0,0575	0,0600	-0,0025
	Aug	0,0550	0,0575	-0,0025
	Sep	0,0525	0,0550	-0,0025
	Oct	0,0500	0,0525	-0,0025
	Nov	0,0500	0,0500	0,0000
	Dec	0,0500	0,0500	0,0000
2020	Jan	0,0500	0,0500	0,0000
	Feb	0,0475	0,0500	-0,0025
	Mar	0,0450	0,0475	-0,0025
	Apr	0,0450	0,0450	0,0000
	May	0,0450	0,0450	0,0000
	Jun	0,0425	0,0450	-0,0025
	Jul	0,0400	0,0425	-0,0025
	Aug	0,0400	0,0400	0,0000
	Sep	0,0400	0,0400	0,0000
	Oct	0,0400	0,0400	0,0000
	Nov	0,0375	0,0400	-0,0025
	Dec	0,0375	0,0375	0,0000
2021	Jan	0,0375	0,0375	0,0000
	Feb	0,0350	0,0375	-0,0025
	Mar	0,0350	0,0350	0,0000
	Apr	0,0350	0,0350	0,0000
	May	0,0350	0,0350	0,0000
	Jun	0,0350	0,0350	0,0000
	Jul	0,0350	0,0350	0,0000
	Aug	0,0350	0,0350	0,0000
	Sep	0,0350	0,0350	0,0000
	Oct	0,0350	0,0350	0,0000
	Nov	0,0350	0,0350	0,0000
	Dec	0,0350	0,0350	0,0000
Rata-Rata (F)		0,0447	0,0453	-0,0007

Source: Results of data processing with SPSS 22

Composite Stock Price Index (IHSG)

The IHSG value used for the APT model is the IHSG surprise obtained from the difference between the actual value of the IHSG and the expected value of the IHSG. The expected value of the IHSG was calculated using the Damped Trend Exponential Smoothing method using SPSS 22 software. The development of the actual IHSG value, the expected IHSG value and the IHSG surprise can be seen in the table below.

Table 6 : Actual IHSG, Expected IHSG, and IHSG Surprise Period January 2019-December 2021

Year	Month	Actual IHSG	Expected IHSG	Surprise IHSG
2019	Jan	8,7920	8,7925	-0,0005
	Feb	8,7848	8,7919	-0,0071
	Mar	8,7935	8,7838	0,0097
	Apr	8,7462	8,7946	-0,0484
	May	8,7243	8,7396	-0,0153
	Jun	8,7111	8,7200	-0,0089
	Jul	8,6971	8,7087	-0,0116
	Aug	8,6907	8,6948	-0,0041
	Sep	8,6988	8,6894	0,0094

	Oct	8,6971	8,6998	-0,0027
	Nov	8,7390	8,6971	0,0419
	Dec	8,6763	8,7450	-0,0687
	Jan	8,6960	8,6684	0,0276
	Feb	8,6327	8,6973	-0,0646
	Mar	8,5425	8,6241	-0,0816
	Apr	8,4909	8,5280	-0,0371
	May	8,5638	8,4813	0,0825
2020	Jun	8,5467	8,5730	-0,0263
	Jul	8,4981	8,5461	-0,0480
	Aug	8,4667	8,4908	-0,0241
	Sep	8,4588	8,4610	-0,0022
	Oct	8,4204	8,4569	-0,0365
	Nov	8,6039	8,4147	0,1892
	Dec	8,6895	8,6292	0,0603
	Jan	8,7482	8,7063	0,0419
	Feb	8,7015	8,7588	-0,0573
	Mar	8,7369	8,6962	0,0407
	Apr	8,7273	8,7408	-0,0135
	May	8,7528	8,7268	0,0260
2021	Jun	8,7626	8,7562	0,0064
	Jul	8,7576	8,7646	-0,0070
	Aug	8,7338	8,7571	-0,0233
	Sep	8,7727	8,7303	0,0424
	Oct	8,7747	8,7777	-0,0030
	Nov	8,7708	8,7759	-0,0051
	Dec	8,7846	8,7703	0,0143
	Rata-Rata (F)	8,6773	8,6775	-0,0001

Source: Results of data processing with SPSS 22

APT Systematic Risk

The APT method has a systematic risk that is different from the CAPM method, in the APT method systematic risk is obtained from the sensitivity of stock returns to a factor. The factors used in this research are inflation, exchange rate, SBI, and IHSG. Beta APT Business Index 27 shares for 2019-2021 are presented in table 7 – table 10.

Table 7 : Systematic Risk (Beta) of Inflation

No	Code	Covarian Ri,Rfi	σ^2F	Beta(β)
1	ADRO	0,0002511	0,0002	1,527325
2	ASII	-0,0006345	0,0002	-3,8592
3	BBCA	-0,0000548	0,0002	-0,33309
4	BBNI	-0,0024460	0,0002	-14,8779
5	BBRI	-0,0015455	0,0002	-9,40087
6	BMRI	-0,0011983	0,0002	-7,28898
7	CPIN	-0,0016004	0,0002	-9,73481
8	ICBP	-0,0002653	0,0002	-1,61384
9	INKP	0,0003043	0,0002	1,850687
10	INTP	0,0000267	0,0002	0,162404
11	KLBF	0,0003124	0,0002	1,900043
12	PTBA	-0,0016573	0,0002	-10,0808
13	PWON	-0,0009808	0,0002	-5,96555
14	SMGR	-0,0018459	0,0002	-11,2282
15	TLKM	0,0011877	0,0002	7,224272
16	UNTR	-0,0002008	0,0002	-1,22125

Source: PT. Indonesia Stock Exchange, Data Processed by Author

Based on the calculations presented in table 7, there are 5 stocks, namely ADRO, INKP, INTP, KLBF, and TLKM, which have positive beta inflation, this indicates that an increase in inflation will result in an increase in the three stocks. While the other 11 stocks have negative

beta stocks, this shows that the returns on these stocks move in the opposite direction to the increase in inflation, which means that an increase in inflation will result in a decrease in the returns on these stocks.

Table 8 : Systematic Risk (Beta) Exchange

No	Code	Covarian Ri,Rfk	σ^2F	Beta(β)
1	ADRO	-0,01459025	0,027142	-0,53754
2	ASII	-0,03369648	0,027142	-1,24147
3	BBCA	-0,02928244	0,027142	-1,07884
4	BBNI	-0,06856254	0,027142	-2,52602
5	BBRI	-0,05215218	0,027142	-1,92142
6	BMRI	-0,05593442	0,027142	-2,06077
7	CPIN	-0,02077875	0,027142	-0,76554
8	ICBP	-0,00592566	0,027142	-0,21832
9	INKP	-0,02947105	0,027142	-1,08579
10	INTP	-0,02600643	0,027142	-0,95814
11	KLBF	0,00571030	0,027142	0,210383
12	PTBA	-0,00966563	0,027142	-0,35611
13	PWON	-0,05039547	0,027142	-1,8567
14	SMGR	-0,03826681	0,027142	-1,40985
15	TLKM	-0,02030317	0,027142	-0,74802
16	UNTR	0,00468869	0,027142	0,172744

Source: PT. Indonesia Stock Exchange, Data Processed by Author

Table 8 shows that only the beta exchange rates for 2 stocks, namely KLBF and UNTR, have positive values. This indicates that an increase in the value of the rupiah exchange rate against the dollar or a depreciation (weakening) in the value of the rupiah will result in an increase in KLBF and UNTR stock returns. Meanwhile, the other 14 stocks have negative beta rates. This indicates that an increase in the value of the rupiah exchange rate against the dollar or a depreciation (weakening) in the value of the rupiah will result in a decrease in these stock returns or in other words a decrease in the value of the rupiah against the dollar or an appreciation (strengthening) in the value of the rupiah will result in an increase in the return on these stocks.

Table 9 : Systematic Risk (Beta) of SBI

No	Code	Covarian Ri,RFs	σ^2F	Beta(β)
1	ADRO	0,00080	0,00005	17,82012
2	ASII	0,00032	0,00005	7,15184
3	BBCA	0,00038	0,00005	8,44318
4	BBNI	0,00106	0,00005	23,52031
5	BBRI	0,00103	0,00005	22,80210
6	BMRI	0,00096	0,00005	21,25225
7	CPIN	-0,00096	0,00005	-21,35521
8	ICBP	-0,00050	0,00005	-11,10971
9	INKP	-0,00134	0,00005	-29,79505
10	INTP	0,00066	0,00005	14,57294
11	KLBF	-0,00084	0,00005	-18,55530
12	PTBA	0,00012	0,00005	2,72788
13	PWON	0,00104	0,00005	22,98738
14	SMGR	0,00009	0,00005	1,91075
15	TLKM	0,00044	0,00005	9,68644
16	UNTR	-0,00077	0,00005	-17,15390

Source: PT. Indonesia Stock Exchange, Data Processed by Author

Table 8 also shows SBI betas for 5 stocks, namely CPIN, ICBP, INKP, KLBF and UNTR, which have negative betas. This indicates that an increase in SBI interest rates will result in a decrease in stock returns. Meanwhile, 11 other stocks have positive beta SBI. This indicates that an increase in SBI interest rates will result in an increase in stock returns.

Table 10 : Systematic Risk (Beta) IHSG

No	Code	Covarian Ri,RFih	σ^2F	Beta(β)
1	ADRO	-0,00041	0,08385	-0,00483
2	ASII	0,04706	0,08385	0,56126
3	BBCA	0,04456	0,08385	0,53142
4	BBNI	0,05874	0,08385	0,70053
5	BBRI	0,02668	0,08385	0,31820
6	BMRI	0,04228	0,08385	0,50428
7	CPIN	-0,00403	0,08385	-0,04808
8	ICBP	-0,00561	0,08385	-0,06689
9	INKP	0,04752	0,08385	0,56677
10	INTP	0,01558	0,08385	0,18581
11	KLBF	-0,01422	0,08385	-0,16963
12	PTBA	0,05956	0,08385	0,71038
13	PWON	0,02861	0,08385	0,34117
14	SMGR	0,00321	0,08385	0,03827
15	TLKM	-0,00642	0,08385	-0,07652
16	UNTR	0,00904	0,08385	0,10777

Source: PT. Indonesia Stock Exchange, Data Processed by Author

Table 10 shows that the Bisnis 27 Index shares have positive betas, namely ASII, BBCA, BBNI, BBRI, BMRI, INKP, INTP, PTBA, PWON, SMGR AND UNTR. which means an increase in the IHSG will result in an increase in the stock return of the Bisnis 27 Index.

Expected Return Using the APT Method

The APT method also requires a risk-free return (R_f), the risk-free return used in the APT method is also the same as that used in the CAPM method, namely the SBI rate.

Table 11 : Expected Return APT

Code	Ri	Rf	β_{inf}	β_{Exc}	β_{sbi}	β_{IHSG}	E(Finf)	E(FExc)	E(FSBI)	E(FIHSG)	E(Ri) APT
ADRO	0,0210	0,0037	1,5273	-0,5375	17,8201	-0,0048	-0,0003	0,0024	-0,0007	-0,0001	-0,0803
ASII	-0,0070	0,0037	-3,8592	-1,2415	7,1518	0,5613	-0,0003	0,0024	-0,0007	-0,0001	-0,0130
BBCA	0,0100	0,0037	-0,3331	-1,0788	8,4432	0,5314	-0,0003	0,0024	-0,0007	-0,0001	-0,0328
BBNI	0,0031	0,0037	-14,8779	-2,5260	23,5203	0,7005	-0,0003	0,0024	-0,0007	-0,0001	-0,0401
BBRI	0,0055	0,0037	-9,4009	-1,9214	22,8021	0,3182	-0,0003	0,0024	-0,0007	-0,0001	-0,0581
BMRI	0,0049	0,0037	-7,2890	-2,0608	21,2522	0,5043	-0,0003	0,0024	-0,0007	-0,0001	-0,0602
CPIN	-0,0002	0,0037	-9,7348	-0,7655	-21,3552	-0,0481	-0,0003	0,0024	-0,0007	-0,0001	0,1380
ICBP	-0,0039	0,0037	-1,6138	-0,2183	-11,1097	-0,0669	-0,0003	0,0024	-0,0007	-0,0001	0,0598
INKP	-0,0028	0,0037	1,8507	-1,0858	-29,7951	0,5668	-0,0003	0,0024	-0,0007	-0,0001	0,1272
INTP	-0,0102	0,0037	0,1624	-0,9581	14,5729	0,1858	-0,0003	0,0024	-0,0007	-0,0001	-0,0607
KLBF	0,0031	0,0037	1,9000	0,2104	-18,5553	-0,1696	-0,0003	0,0024	-0,0007	-0,0001	0,0785
PTBA	-0,0063	0,0037	-10,0808	-0,3561	2,7279	0,7104	-0,0003	0,0024	-0,0007	-0,0001	0,0296
PWON	-0,0040	0,0037	-5,9655	-1,8567	22,9874	0,3412	-0,0003	0,0024	-0,0007	-0,0001	-0,0728
SMGR	-0,0108	0,0037	-11,2282	-1,4098	1,9108	0,0383	-0,0003	0,0024	-0,0007	-0,0001	0,0418
TLKM	0,0044	0,0037	7,2243	-0,7480	9,6864	-0,0765	-0,0003	0,0024	-0,0007	-0,0001	-0,0665
UNTR	0,0019	0,0037	-1,2213	0,1727	-17,1539	0,1078	-0,0003	0,0024	-0,0007	-0,0001	0,0837

Source: PT. Indonesia Stock Exchange, Data Processed by Author

From table 11 above, it shows that there are nine stocks whose expected return ($E(R_i)$) is negative based on calculations using the APT method, namely ADRO, ASII, BBCA, BBNI, BBRI, BMRI, INTP, PWON and TLKM stocks. shows that these stocks are overvalued stocks because the value of $E(R_i)$ is lower than the value of both R_i and R_f . Meanwhile, CPIN, ICBP, INKP, KLBF, PTBA, SMGR and UNTR shares are undervalued stocks because the $E(R_i)$ value is higher than the R_i or R_f values.

Apart from that, it can also be seen that the stock with the lowest expected return is Adaro Energy Tbk. (ADRO) which is -0.0803 or -8.03%. Meanwhile, the stock with the highest expected return is Charoen Pokphand Indonesia Tbk (CPIN) which is 0.1380 or 13.80%.

Classification of Efficient Stocks and Investment Decisions with APT

Efficient stocks are stocks with individual returns greater than the expected rate of return $[(R_i) > E(R_i)]$. Inefficient stocks are stocks with individual returns that are smaller than the expected rate of return $[(R_i) < E(R_i)]$.

Table 12 : List of Efficient and Inefficient Shares with APT

Code	Ri	ERi	Stock Evaluation
ADRO	0,02101	-0,08031	Efisien /Good
ASII	-0,00703	-0,01297	Efisien /Good
BBCA	0,01004	-0,03283	Efisien /Good
BBNI	0,00307	-0,04015	Efisien /Good
BBRI	0,00552	-0,05814	Efisien /Good
BMRI	0,00488	-0,06024	Efisien /Good
CPIN	-0,00022	0,13802	Not Efisien /Not Good
ICBP	-0,00392	0,05976	Not Efisien /Not Good
INKP	-0,00285	0,12718	Not Efisien /Not Good
INTP	-0,01022	-0,06070	Efisien /Good
KLBF	0,00306	0,07845	Not Efisien /Not Good
PTBA	-0,00625	0,02959	Not Efisien /Not Good
PWON	-0,00396	-0,07282	Efisien /Good
SMGR	-0,01077	0,04178	Not k Efisien /Not Good
TLKM	0,00436	-0,06654	Efisien /Good
UNTR	0,00195	0,08368	Not Efisien /Not Good

Source: PT. Indonesia Stock Exchange, Data Processed by Author

Based on table 12, there are 9 efficient company shares and 7 inefficient company shares. The criteria for determining investment decisions are choosing efficient stocks, stocks that have individual returns greater than the expected rate of return $(R_i > ER_i)$ while eliminating inefficient stocks, namely stocks that have individual returns smaller than the expected rate of return $(R_i < ER_i)$.

Investment decisions made on efficient/good stocks are considering buying these shares, and investment decisions made on inefficient/not good stocks are considering selling these shares.

Conclusion

The results of the study show that there are 9 efficient stocks in the APT model, namely ADRO, ASII, BBCA, BBNI, BBRI, BMRI, INTP, PWON and TLKM.

Based on the research that has been done, the suggestions that can be given by researchers are:

1. For Investors and Potential Investors This research is expected to be used as a reference and additional information for investors and potential investors who will invest in stocks. It is very important for investors to invest their excess funds in efficient stocks so that the risks to be faced can be minimized properly, so that the investor's goal of getting the expected return can be achieved.
2. For Further Research Research using the APT method is expected to be used as a reference for further research with different samples and research periods and adding other variables, so that developments regarding the capital market, especially stock investment, can always be known.

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