Analysis of the Accuracy Level of the Balance Model in Stock Investment Prediction in the LQ45 Index

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Abstract

Objective –This study examines how the goal of an investor is to establish an optimal investment risk structure which maximizes profits by incurring fewer losses at a certain level of market risk. This research aims to determine the accuracy of the CAPM and APT models in predicting stock returns, as measured using Mean Absolute Deviation (MAD).

Design/Methodology –The methods employed is a quantitative approach. The population for this study includes companies included in the LQ45 index during the 2020-2022 period consisting of monthly observations spanning from January to December. A purposive sampling technique was used to select 30 sample companies. The reason for using the LQ-45 index is because this index is an index in which there are 45 issuers. Apart from that, the shares included in the LQ-45 calculation are considered to reflect the movement of actively traded shares which will influence market conditions, consisting of shares with high liquidity and market capability, as well as growth prospects and fairly stable financial conditions.

Results –The MAD calculation shows that the APT model is more accurate than the CAPM model. The choice of model use can be adjusted to the preferences of each investor. CAPM is a forecasting model that only uses market return factors, making it suitable for investors who want to predict stock returns easily and simply. On the other hand, APT can be used by investors who want to know in detail what macro factors influence changes in stock prices.

Research Limitations/Implications – Increasing the length of time that researchers spend doing their research is recommended in order to improve the accuracy of their forecasts about future stock returns.

Novelty/Originality –This instrument is highly beneficial for investors who are looking for a clear and effective technique to anticipate the returns on their stock investments. Investors who want a detailed grasp of the precise macroeconomic issues that affect swings in stock prices may find that applying the Arbitrage Pricing Theory (APT) is useful.

Keywords: Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory Model (APT), Expected Return, Mean Absolute Deviation (MAD), Return

1. Introduction

The capital market catalyzes economic growth by facilitating an enterprises access to the necessary finances for their operational activities. It is a crucial element of the global economy since it offers financial resources to the business sector to enable growth and expansion. The necessary money can be acquired through executing securities transactions involving the purchase and sale of financial instruments on the capital market. Typically, the capital market encompasses assets such as stocks, bonds, mutual funds, and other derivative products. Shares are one of the tradable instruments in the capital market (Kapoh Y, 2020). Investment refers to allocating a specific quantity of dollars or resources in the now to attain a specific level of financial gain in

the future (Hidayat & Hartono, 2022). Shares are a type of financial instrument that is traded on the capital market as part of the long-term investment process (Hutasoit & Hutabarat, 2022). Among the several indexes available to share investors in Indonesia, the LQ45 index measures how well an individual companies' shares have done on the capital market.

Every six months, the Indonesian Stock Exchange (BEI) releases a report detailing the LQ45 index, which is an evaluation of all firms listed on the stock market. Security trading on the Indonesian Stock Exchange includes the LQ45 index, a stock index. To augment the Composite Stock Price Index (IHSG), the LQ45 Index was established. A smaller subset of the IDX, comprised of 45 stocks chosen for reasons such as high market capitalization and high liquidity, makes up the LQ45 Index rather than the more generalized Composite Stock Price Index (IHSG). Investment decision decisions are based more on considering the company's fundamental aspects in the form of issuers that perform well or that can provide attractive dividends. For this reason, the investment choice falls on shares classified in the LQ 45 group (Manoppo, 2007).

This reference comes from a 2021 research by (Suwarno et al., 2021). One way to indirectly measure the impact of non-economic events on capital market stock prices is via the LQ-45 index. Investment cannot be separated from non-economic macro factors. This factor can influence performance indirectly and is difficult to predict. Although it is not directly related to the dynamics that occur in the capital market, the influence of the non-economic environment cannot be separated from stock exchange activities which trigger fluctuations in stock prices and trading volume (Munawar, 2019; Putu & Nursasmito, 2013). Companies trading on the Indonesian Stock Exchange phenomena (Kusumayanti & Suarjaya, 2018).

The LQ-45 index, a part of the BEI, is used in this study to accurately portray the whole market. Traders and investors, among others, have found this report to be an invaluable tool for making educated decisions (Munawar, 2019). Pramanaswari & Yasa (2018) use this report as a standard when deciding which companies to evaluate. The two factors investors consider are the level of return and the risk involved. Maximizing earnings while avoiding losses is the ultimate goal of investors. In the stock market, having an accurate and reliable model for asset valuation is crucial. This is why several models, including the Arbitrage Pricing Theory (APT) and the Capital Asset Pricing Model (CAPM), are used as basic frameworks for projecting stock prices in the stock market (Zhang & Li, 2012).

The Capital Asset Pricing Model (CAPM) and the Asset Pricing Theory (APT) models employ the assumption that prices are flat and that overpriced or undervalued stocks do not exist when attempting to assess the value of an asset (Li, 2023a). The Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) are two well-known models that provide light on how capital market return, risk, and asset value interact. A linear relationship is one approach to graphically depict the two models' positive correlation between return and risk (Leković & Stanišić, 2018).

Both the APT and the CAPM can be employed to calculate the anticipated stock investment. The CAPM was initially proposed by William Sharpe, John Litner, and Jan Mossin in 1964. The CAPM uses the stock's beta coefficient to calculate investment estimates. The CAPM was formulated in 1952 by William Sharpe, Jan Mossin, and John Lintner, a dozen years subsequent to Harry Markowitz's initial publication of the contemporary portfolio theory. In 1976, Stephen Ross created the APT. The APT method accounts for non-market economic factors when calculating expected returns. Not only do market volatility and mean impact the expected return estimated in (APT), but so do several macroeconomic factors including the stock's beta coefficient. Because it considers non-market variables, the APT model is more accurate than the CAPM when estimating future returns (Kisman & M, 2015).

The APT approach used in determining asset prices tries to explain that apart from market factors, there are also non-market factors that cause share prices to move together Putra et al. (2023). The APT model uses more risk-measuring variables to determine the relationship between risk and return (Kisman & M, 2015). The APT model is based on the law of one price (The Law of One Price) where the same asset cannot be sold at different prices to gain arbitrage profits (buying a low-priced asset, at the same time selling at a higher price to gain profit without risk (Muhammad & Maulana, 2019). Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) have been used by several researchers to use analysis to forecast projected returns. (Indra, 2018; Lento et al., 2019; Susanti et al., 2021; Triastuti & Norita, 2015; Yunita et al., 2020) all found that CAPM outperformed ATP when it came to forecasting stock returns. Similarly, CAPM outperforms APT in terms of reliability (Afzal & Haiying, 2020).

Kisman & M (2015) and Laia & Saerang (2015) Proves that when it comes to predicting stock returns, Arbitrage Pricing Theory (APT) is far better than the Capital Asset Pricing Model (CAPM). The prior studies' findings are often at odds to develop the APT model, which is to address the limitations of the CAPM model.

Raza et al. (2011) conducted data an analysis on 70 organizations listed on the NASDAQ stock exchange between 1994 and 2005. The results showed that APT produced much higher profitability estimates than CAPM (Iqbal & Haider, 2005). For the most desirable portfolios traded on the Bombay Stock Exchange and the National Stock Exchange of India, the APT model outperformed other profit forecasting models. The APT model outperformed the CAPM in terms of accuracy, according to the researchers' comparison. They continued by stating that, as compared to Arbitrage Pricing Theory (APT), the Capital Asset Pricing Model (CAPM) provides less insight into how to generate profits (Harshita et al., 2015).

Dash & Rishika (2011) found that the APT model exhibits insufficient efficacy relative to the CAPM model in the Indian stock market. The findings of the investigation carried out by (Balatif et al., 2021; Hartoyo, 2016; Wahyuni & Kaharti, 2020) show that calculation of expected returns in both the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) is essentially the same, with no notable distinctions. Consequently, this gives rise to a deficiency that researchers must tackle to close the current disparity in the research. The financial asset pricing model (CAPM) and arbitrage pricing theory (APT) have posed difficulties for economists for many years. These two models are employed to comprehend the correlation between return, risk, and asset pricing in the capital market (Leković & Stanišić, 2018). Investors face two primary challenges, specifically the magnitude of return and the magnitude of risk. As the expected return increases, so does the level of risk (Sindhuarta et al., 2023). The two most commonly utilized models are the capital asset pricing model (CAPM) and the arbitrage pricing theory (APT) model.

The first Capital Asset Pricing Model (CAPM) is a mathematical model that forecasts the anticipated return of a portfolio by taking into account the extra return from the market portfolio and the risk-free rate as relevant factors. APT makes use of a multifactor model that is composed of a number of different components. Arbitrage Pricing Theory (APT) does not provide a description for the particular risk component, but the Capital Asset Pricing Model (CAPM) specifies the market portfolio as the measure of relative risk. To review the precision of the LQ 45 stock scale model, the researchers will conduct an analysis of the differences in accuracy that present themselves between the two models. This is in order to analyze different economic factors and their influence on stock returns, with the majority of them concluding that the Arbitrage Pricing Theory (APT) is much superior to the Capital Asset Pricing Model (CAPM). In addition, the findings of the investigation carried out by (Balatif et al., 2021; Hartoyo, 2016; Wahyuni & Kaharti, 2020) show that the calculation of expected returns in both the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) is essentially the same, with no notable distinctions. Consequently, this

gives rise to a deficiency that researchers must tackle in order to close the current disparity in research. Thus, it is necessary for it to be reviewed as to which method is more accurate. Based on the explanation above, the question is is whether there are any differences between the accuracy of CAPM and APT models when it comes to estimating the expected returns.

The purpose of this research is to predict stock investment using the APT and CAPM models and to find LQ45 stocks that should be chosen, to find out the level of accuracy of the CAPM and APT models in predicting stock investment, and to find out whether there is a significant difference in the Mean Absolute Deviation (MAD) of the CAPM model and APT. The remaining of this paper is structured into five sections. The first section is the research background. The second section explains the main theory and hypothesis development regarding about CAPM and APT. The third section covers data collection and data analysis. The fourth section present the result and discussion. The last section synthesized the result and discussion, drawing conclusion, implication and also limitations.

2. Literature Review, Theoretical Framework, and Hypothesis Development

2.1 Capital Asset Pricing Model (CAPM)

This section defines the CAPM which is a theoretical framework based on the principles of fundamental financial analysis. According to this particular financial school of thinking, it is posited that assets characterized by an equivalent level of systemic risk should, in principle, generate identical anticipated returns. The Capital Asset Pricing Model (CAPM) encompasses the notions of systematic and unsystematic risk, building upon Markowitz's portfolio theory (Altay & Çalgıcı, 2019). The Capital Asset Pricing Model (CAPM) is a quantitative model utilized to determine the value of a capital asset by considering its specific attributes and the level of risk associated with it (Adnyana, 2020). The CAPM assumes that investors are individuals who plan their investments for a certain period and identify them as long-term investors. It assumes the absence of taxes or transaction expenses, as well as the availability of publicly tradable assets. Furthermore, investors are presumed to have the ability to borrow or lend assets. This extends beyond risk-free fixed interest rates. Under this premise, every investor bears an equal level of risk in their portfolio. The CAPM formula is:

$$\boldsymbol{E}\,(\,\boldsymbol{Ri}\,) = \boldsymbol{Rf} + \boldsymbol{\beta i}\,[\,\boldsymbol{E}\,(\,\boldsymbol{Rm}\,) - \boldsymbol{Rf}\,]$$

Where:
E(Ri) = Expected return of asset i
E(Rm) = Market portfolio expected return
Rf = Risk-free interest rate (SBSN)
[E(Rm - Rf)] = Market risk premium
Bi = Risk of asset i

2.2 Arbitrage Pricing Theory (APT)

The Arbitrage Pricing Theory offers analysts and investors significant flexibility when selecting the parameters that might be utilized in the model. The selection of the criteria utilized varies based on the analyst's discretion. Ross established the Arbitrage Pricing Theory (APT) in 1976, based on the premise that investment opportunities with identical attributes cannot be supplied at different prices. The APT model is predicated on the notion that the anticipated yield of a stock (or investment) will be impacted by many risk variables. The risk factors encompass the macroeconomic indicators of a nation, including inflation, interest rates, currency rates, and GDP (Palupi et al., 2017):

$$\mathbf{R\_i = E(R\_i\,) + b\,i1\,F\,1 + b\,i2\,f\,2 + \cdots + b\,in\,F\,n + e\,i}$$

Where:
Ri = Actual rate of return on security i.
E(Ri) = Expected return for security i.
f = Deviation of the systematic factor F from the expected value.
e i = Random error.
b i = Sensitivity of security i to factor i.

2.3 Similarity in Accuracy between the CAPM and APT Models in Predicting Stock Returns

CAPM is used to measure the risk of an inefficient portfolio within the capital market, which is denoted as β (beta). According to the Arbitrage Pricing Theory (APT) is determined by the anticipated return on the asset at the start of the time period, as well as the unforeseen occurrence of risk factors within that period, together with specific risks associated with the company. Hartoyo (2016) showed that the average difference test shows that the differences are not significant. (Balatif et al., 2021) showed that CAPM and APT are comparably accurate in predicting the future stock returns of Indonesian manufacturing companies. Wahyuni & Kaharti (2020) The CAPM and APT have identical approaches for predicting telecommunication industry stock returns. Susanti et al. (2021), The findings of the independent sample t-test indicate that the null hypothesis (H0) is rejected. This indicates that there is a statistically significant difference in accuracy between the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) when it comes to estimating the returns on LQ 45 stocks. Taking into account the findings of prior studies, the hypothesis that was developed for this investigation is as follows:

H1. There is no disparity in the precision between the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) when it comes to forecasting stock returns

H2. The accuracy in projecting stock returns differs significantly between the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT)

3. Research Method

3.1 Population and Sample

The population for this study consists of monthly share price data recorded on the LQ 45 from 2020 to 2022. The research sample was comprised of stocks that have maintained a steady listing on the LQ45 index from 2020 to 2022, totaling 30 companies. The collected data consists of monthly observations spanning from January to December. The research employed purposive sampling, a strategy used to choose samples based on specific criteria and considerations because not all samples have criteria that match the criteria being studied, decidec on by determining considerations or criteria that must be met by the samples used in this research. In this case, the sample criteria used was the returns of companies that are consistently included in the LQ 45 index in the 2020-2022 period. The table below shows the LQ45 companies from 2020-2022 that are included in the sample criteria, namely companies that are consistently included in the LQ45 list.

Table 1. LQ45 companies from 2020-2022 that are included in the sample criteria

No.	Code	Name of Stock	Period					
			2020		2021		2022	
1	ACES	Ace Hardware Indonesia Tbk.	√	√	√	√	x	x
2	ADRO	Adaro Energy Tbk.	√	√	√	√	√	√
3	AKRA	AKR Corporindo Tbk.	√	√	√	√	x	x
4	ANTM	Aneka Tambang Tbk.	√	√	√	√	√	√
5	ASII	Astra International Tbk.	√	√	√	√	√	√
6	BBCA	Bank Central Asia Tbk.	√	√	√	√	√	√

7	BBNI	Bank Negara Indonesia (Persero) Tbk.	√	√	√	√	√	√
8	BBRI	Bank Rakyat Indonesia (Persero) Tbk.	√	√	√	√	√	√
9	BBTN	Bank Tabungan Negara (Persero) Tbk.	√	√	√	√	√	√
10	BMRI	Bank Mandiri (Persero) Tbk.	√	√	√	√	√	√
11	BRPT	Barito Pacific Tbk.	√	x	x	√	√	√
12	BSDE	Bumi Serpong Damai Tbk.	√	√	√	√	x	x
13	BTPS	Bank BTPN Syariah Tbk.	√	√	√	x	x	x
14	CPIN	Charoen Pokphand Indonesia Tbk	√	√	√	√	√	√
15	CTRA	Ciputra Development Tbk.	√	√	√	x	x	x
16	ERAA	Erajaya Swasembada Tbk.	√	√	√	√	√	√
17	EXCL	XL Axiata Tbk.	√	√	√	√	√	√
18	GGRM	Gudang Garam Tbk.	√	√	√	√	√	x
19	HMSP	H.M. Sampoerna Tbk.	√	√	√	√	√	√
20	ICBP	Indofood CBP Sukses Makmur Tbk.	√	√	√	√	√	√
21	INCO	Vale Indonesia Tbk.	√	√	√	√	√	√
22	INDF	Indofood Sukses Makmur Tbk.	√	√	√	√	√	√
23	INKP	Indah Kiat Pulp & Paper Tbk.	√	√	√	√	√	√
24	INTP	Indocement Tunggal Prakarsa Tbk.	√	√	√	√	√	√
25	ITMG	Indo Tambangraya Megah Tbk.	√	√	√	√	√	√
26	JPFA	Japfa Comfeed Indonesia Tbk.	√	√	√	√	√	√
27	JSMR	Jasa Marga (Persero) Tbk.	√	√	√	√	x	x
28	KLBF	Kalbe Farma Tbk.	√	√	√	√	√	√
29	LPPF	Matahari Department Store Tbk.	√	x	x	x	x	x
30	MNCN	Media Nusantara Citra Tbk.	√	√	√	√	√	√
31	PGAS	Perusahaan Gas Negara Tbk.	√	√	√	√	√	√
32	PTBA	Bukit Asam Tbk.	√	√	√	√	√	√
33	PTPP	PP (Persero) Tbk.	√	√	√	√	√	x
34	PWON	Pakuwon Jati Tbk.	√	√	√	√	x	x
35	SCMA	Surya Citra Media Tbk.	√	√	x	x	x	x
36	SMGR	Semen Indonesia (Persero) Tbk.	√	√	√	√	√	√
37	SRIL	Sri Rejeki Isman Tbk.	√	√	x	x	x	x
38	TBIG	Tower Bersama Infrastructure Tbk.	√	√	√	√	√	√
39	TKIM	Pabrik Kertas Tjiwi Kimia Tbk.	√	√	√	√	√	x
40	TLKM	Telekomunikasi Indonesia (Persero) Tbk.	√	√	√	√	√	√
41	TOWR	Sarana Menara Nusantara Tbk.	√	√	√	√	√	√
42	UNTR	United Tractors Tbk.	√	√	√	√	√	√
43	UNVR	Unilever Indonesia Tbk.	√	√	√	√	√	√
44	WIKA	Wijaya Karya (Persero) Tbk.	√	√	√	√	√	√
45	WSKT	Waskita Karya (Persero) Tbk.	√	x	x	x	√	x
46	MDKA	Merdeka Copper Gold Tbk.	x	√	√	√	√	√
47	MIKA	Mitra Keluarga Karyasehat Tbk.	x	√	√	√	√	√

48	SMRA	Summarecon Agung Tbk.	x	√	√	x	x	x
49	MEDC	Medco Energi Internasional Tbk.	x	x	√	√	√	√
50	TPIA	Chandra Asri Petrochemical Tbk.	x	x	√	√	√	√
51	BUKA	Bukalapak.com Tbk.	x	x	x	√	√	√
52	TINS	Timah Tbk.	x	x	x	√	√	√
53	AMRT	Sumber Alfaria Trijaya Tbk.	x	x	x	x	√	√
54	BFIN	BFI Finance Indonesia Tbk.	x	x	x	x	√	√
55	EMTK	Elang Mahkota Teknologi Tbk.	x	x	x	x	√	√
56	HRUM	Harum Energy Tbk.	x	x	x	x	√	√
57	ARTO	Bank Jago Tbk.	x	x	x	x	x	√
58	BRIS	Bank Syariah Indonesia Tbk.	x	x	x	x	x	√
59	INDY	Indika Energy Tbk.	x	x	x	x	x	√
60	GOTO	GoTo Gojek Tokopedia Tbk.	x	x	x	x	x	√

Note:
x: not included in LQ45 or delisted in that period
√: registered LQ45 in that period

Table 2. LQ45 companies are consistently registered in the 2020-2022 period

No.	Code	Name of Stock	Period					
			2020		2021		2022	
1	ADRO	Adaro Energy Tbk.	√	√	√	√	√	√
2	ANTM	Aneka Tambang Tbk.	√	√	√	√	√	√
3	ASII	Astra International Tbk.	√	√	√	√	√	√
4	BBCA	Bank Central Asia Tbk.	√	√	√	√	√	√
5	BBNI	Bank Negara Indonesia (Persero) Tbk.	√	√	√	√	√	√
6	BBRI	Bank Rakyat Indonesia (Persero) Tbk.	√	√	√	√	√	√
7	BBTN	Bank Tabungan Negara (Persero) Tbk.	√	√	√	√	√	√
8	BMRI	Bank Mandiri (Persero) Tbk.	√	√	√	√	√	√
9	CPIN	Charoen Pokphand Indonesia Tbk	√	√	√	√	√	√
10	ERAA	Erajaya Swasembada Tbk.	√	√	√	√	√	√
11	EXCL	XL Axiata Tbk.	√	√	√	√	√	√
12	HMSP	H.M. Sampoerna Tbk.	√	√	√	√	√	√
13	ICBP	Indofood CBP Sukses Makmur Tbk.	√	√	√	√	√	√
14	INCO	Vale Indonesia Tbk.	√	√	√	√	√	√
15	INDF	Indofood Sukses Makmur Tbk.	√	√	√	√	√	√
16	INKP	Indah Kiat Pulp & Paper Tbk.	√	√	√	√	√	√
17	INTP	Indocement Tunggal Prakarsa Tbk.	√	√	√	√	√	√
18	ITMG	Indo Tambangraya Megah Tbk.	√	√	√	√	√	√
19	JPFA	Japfa Comfeed Indonesia Tbk.	√	√	√	√	√	√
20	KLBF	Kalbe Farma Tbk.	√	√	√	√	√	√
21	MNCN	Media Nusantara Citra Tbk.	√	√	√	√	√	√
22	PGAS	Perusahaan Gas Negara Tbk.	√	√	√	√	√	√
23	PTBA	Bukit Asam Tbk.	√	√	√	√	√	√
24	SMGR	Semen Indonesia (Persero) Tbk.	√	√	√	√	√	√
25	TBIG	Tower Bersama Infrastructure Tbk.	√	√	√	√	√	√

26	TLKM	Telekomunikasi Indonesia (Persero) Tbk.	√	√	√	√	√	√
27	TOWR	Sarana Menara Nusantara Tbk.	√	√	√	√	√	√
28	UNTR	United Tractors Tbk.	√	√	√	√	√	√
29	UNVR	Unilever Indonesia Tbk.	√	√	√	√	√	√
30	WIKA	Wijaya Karya (Persero) Tbk.	√	√	√	√	√	√

3.2 Operational Definition of Variables

In this research, the conceptual definition of variables is as follows:

3.2.1. Capital Asset Pricing Model (CAPM)

The CAPM model can be measured using the formula:

$$\boldsymbol{E\ (\ Ri\ ) = Rf + \beta i\ [E\ (Rm) - Rf]}$$

Where:
E(Ri) i= expected return iof asset ii
E(Rm) i= Market portfolio expected return
Rf i= Risk-free interest rate (SBSN)
[E (Rm i- iRf)] i= Market risk premium
Bi = Risk of asset i

The variables related to the CAPM formula above are:

1. Actual returns $$Ri = \frac{P_t - P_{t-1}}{P_{t-1}}$$

2. Expected Return $$E(Ri) = \frac{\sum_{i=1}^{n} R_i}{n}$$

3. Risk-free Return (Rf) $$Rf = \frac{SBI_t}{12}$$

4. Return Market (Rm) $$Rm = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$$

   Where:
   Rm = Market return
   IHSGt = IHSG at the end of period t
   IHSGt-1 = IHSG in the previous period

5. Beta
   The amount of risk of a stock is determined by beta (β). Beta shows the relationship (movement) between the stock and the market (stock as a whole).

3.3 Arbitrage Pricing Theory (APT)

The APT model can be calculated using the following formula:

$$\mathbf{Ri = E(Ri) + \beta 1F1 + \beta 2F2 + \ldots + \beta kFk}$$

Where:
E(Ri) = Expected return from security i.
Ri = Actual return of security i.
βk = Level of sensitivity of stock return I to a factor.
Fk = Surprise value of a factor that influences stock returns.

The variables related to the APT formula above are:

1. Inflation
   Inflation is the tendency for overall product prices to increase.

$$Finflation = \frac{Inflationt - Inflationt - 1}{Inflasi_{t-1}}$$

2. SBI
   The BI Rate is an official interest rate that represents the monetary policy position established by Bank Indonesia and communicated to the general public.

$$FSBI = \frac{SBI_t - SBI_{t-1}}{SBI_{t-1}}$$

3. Exchange Rates
   The exchange rate is an international payment that requires the exchange of one country's currency into another country's currency which can be done in various ways.

$$Fkurs = \frac{Exchange\ Rate_t - Exchange\ Rate_{t-1}}{Exchange\ Rate_{t-1}}$$

4. Results and Discussion

4.1 Capital Asset Pricing Model (CAPM)

4.1.1 Return CAPM

This study utilized monthly closing price data for LQ 45 shares from 2020 to 2022. Investors who trade will focus more on short-term buying and selling, while investors who invest will buy shares and hold them for a longer period of time. For investment, we looked at the company's fundamentals and also the company's profitability. Daily stock trading is known to be high risk, so investors must be extra careful not to lose their money. To minimize the possibility of such losses. Daily stock trading or day trading is usually done by investors who want to get results quickly. The way daily stock trading works is that shares are bought today and sold on the same day. Daily stock trading is done because the administration costs are quite cheap and there is profits from daily stock trading on the same day. However, you must remember that the level of profit obtained is not as much as when investing in shares for a longer period of time such as monthly stock trading. (Ariel, 1984) suggests that investors should anticipate prior purchases early in the calendar month and postpone planned sales until after the middle of the month to gain the high profits that will be obtained at the beginning of the calendar month.

The Covid-19 pandemic has affected all stock markets around the world, and impact has forced the markets into an unprecedented environment (Airinen, 2021). Research by Khan et al. (2020) found that in the early stages of the pandemic, the stock market reacted very weakly to the pandemic, and even showed better performance compared to normal periods.

Table 3 reveals that there are a total of 10 companies with negative stock returns. Nevertheless, investors reacted favorably as the highest stock return was observed in Indo Tambangraya Megah Tbk. (ITMG), with a return of 0.0503. For comparison, the company HM Sampoerna Tbk. (HMSP) had the lowest return of -0.0214.

Table 3. Average LQ45 Stock Return for the 2020-2022 Period

No	Code	Ri	No	Code	Ri
1	ADRO	0.0402	16	INKP	0.0170
2	ANTM	0.0452	17	INTP	-0.0099
3	ASII	0.0024	18	ITMG	0.0503
4	BBCA	0.0099	19	JPFA	0.0038

5	BBNI	0.0164	20	KLBF	0.0128
6	BBRI	0.0072	21	MNCN	-0.0151
7	BBTN	0.0075	22	PGAS	0.0135
8	BMRI	0.0131	23	PTBA	0.0196
9	CPIN	-0.0014	24	SMGR	-0.0101
10	ERAA	0.0158	25	TBIG	0.0269
11	EXCL	-0.0019	26	TLKM	0.0023
12	HMSP	-0.0214	27	TOWR	0.0129
13	ICBP	-0.0011	28	UNTR	0.0140
14	INCO	0.0321	29	UNVR	-0.0120
15	INDF	-0.0021	30	WIKA	-0.0106

4.1.2 Return Market CAPM

The research utilizes the Composite Stock Price Index (IHSG) as the market index, specifically relying on monthly closing price data from 2020 to 2022. Table 4 illustrates the volatility of market returns, which exhibit a downward trend, indicating the presence of risk. Despite seeing negative returns on several occasions, the JCI is still considered favorable due to its positive average value of 0.0052.

Table 4.
IHSG Market Returns

Date	IHSG Closing Price	IHSG (Rm)
01/01/2020	5,940	
02/01/2020	5,453	-0.0820
03/01/2020	4,539	-0.1676
04/01/2020	4,716	0.0391
05/01/2020	4.754	0,0079
06/01/2020	4.905	0,0319
07/01/2020	5.150	0,0498
08/01/2020	5.238	0,0173
09/01/2020	4.870	-0,0703
10/01/2020	5.128	0,0530
11/01/2020	5.612	0,0944
12/01/2020	5.979	0,0653
01/01/2021	5.862	-0,0195
02/01/2021	6.242	0,0647
03/01/2021	5.986	-0,0411
04/01/2021	5.996	0,0017
05/01/2021	5.947	-0,0080
06/01/2021	5.985	0,0064
07/01/2021	6.070	0,0141
08/01/2021	6.150	0,0132
09/01/2021	6.287	0,0222
10/01/2021	6.591	0,0484
11/01/2021	6.534	-0,0087
12/01/2021	6.581	0,0073

01/01/2022	6.631	0,0075
02/01/2022	6.888	0,0388
03/01/2022	7.071	0,0266
04/01/2022	7.229	0,0223
05/01/2022	7.149	-0,0111
06/01/2022	6.912	-0,0332
07/01/2022	6.951	0,0057
08/01/2022	7.179	0,0327
09/01/2022	7.041	-0,0192
10/01/2022	7.099	0,0083
11/01/2022	7,081	-0.0025
12/01/2022	6,851	-0.0326
Average		**0.0052**

4.1.3 Beta CAPM

Based on research calculations, every company has a positive beta. Thus, higher market returns will translate into higher stock returns. The beta value of each company's shares will be explained in Table 5.

Table 5. CAPM Beta

No.	Code	BETA	No.	Code	BETA
1	ADRO	0.9418	16	INKP	1.6295
2	ANTM	2.6633	17	INTP	1.6295
3	ASII	1.4453	18	ITMG	1.5758
4	BBCA	0.9414	19	JPFA	1.2533
5	BBNI	2,1865	20	KLBF	0.3547
6	BBRI	1.4990	21	MNCN	1.8309
7	BBTN	2.8433	22	PGAS	2.7412
8	BMRI	1.5260	23	PTBA	0.7388
9	CPIN	0.6270	24	SMGR	1.3260
10	ERAA	1.5937	25	TBIG	0.6761
11	EXCL	1.3945	26	TLKM	1.0531
12	HMSP	0.9741	27	TOWR	0.8871
13	ICBP	-0.0221	28	UNTR	0.7815
14	INCO	1.6665	29	UNVR	0.0860
15	INDF	0.2652	30	WIKA	2.4357

4.1.3 Expected Return CAPM

In order to proceed, it is important to calculate the mean Expected Return of shares utilising the Capital Asset Pricing Model (CAPM) approach. Based on the findings shown in Table 6, it can be observed that PT Wijaya Karya (Persero) Tbk (WIKA.JK) exhibits the greatest Expected Return value of 0.0280. Conversely, PT Aneka Tambang Tbk (ANTM.JK) has the lowest Expected Return value of -0.0613.

Table 6. Expected Return Capital Asset Pricing Model (CAPM)

No	Code	E (Ri)	No	Code	E (Ri)
1	ADRO	0.0073	16	INKP	-0.0022
2	ANTM	-0.0613	17	INTP	0.0148
3	ASII	0.0065	18	ITMG	-0.0207
4	BBCA	0.0055	19	JPFA	0.0056

5	BBNI	-0.0080	20	KLBF	0.0101
6	BBRI	0.0042	21	MNCN	0.0221
7	BBTN	0.0011	22	PGAS	-0.0092
8	BMRI	0.0011	23	PTBA	0.0090
9	CPIN	0.0027	24	SMGR	0.0102
10	ERAA	-0.0011	25	TBIG	0.0122
11	EXCL	0.0080	26	TLKM	0.0054
12	HMSP	0.0045	27	TOWR	0.0061
13	ICBP	-0.0012	28	UNTR	0.0072
14	INCO	-0.0127	29	UNVR	-0.0105
15	INDF	-0.0127	30	WIKA	0.0280

4.2 Arbitrage Pricing Theory (APT)

4.2.1 Beta APT

APT approach obtains risk systematically from the sensitivity of the stock prices, this APT model carries a different kind of systematic risk than the CAPM does when it comes to the macroeconomic factors, along with the results obtained.

1. Based on beta calculations sixteen businesses have beta values that are in the negative. This observation suggesting that an increase in inflation might lead to a decrease in the return on investments in stocks. Furthermore, it is worth noting that there exist 14 enterprises exhibiting positive beta coefficients, implying that a surge in inflation is likely to result in an upturn in the worth of these 14 stocks. PT Media Nusantara Citra Tbk. (MNCN.JK) had a negative inflation beta coefficient of -0.3409, whilst PT Bukit Asam Tbk. (PTBA.JK) demonstrated the greatest inflation beta coefficient, which amounting to 0.4992. PT Media Nusantara Citra Tbk had the lowest inflation beta value among the companies examined.
2. The results of SBI's beta calculations show that there are 1 out of 4 businesses that have beta values that are negative. This finding suggests that there is a negative correlation between stock returns and SBI, indicating that a rise in SBI is likely to result in a decrease in stock returns. The firm with the lowest SBI beta value identified was PT Telekomunikasi Indonesia (Persero) Tbk. (TLKM.JK), with a value of -1.8728. Conversely, the greatest SBI beta value was seen in PT HM Sampoerna Tbk. (HMSP.JK), which recorded a value of 1.9980.

According to the beta exchange rate statistics, 16 companies exhibited negative beta values. This indicates that a depreciation in the Rupiah exchange rate against the dollar will result in a reduction of stock returns. At now, there exist a total of 14 businesses exhibiting positive beta values, signifying that the depreciation of the Rupiah against the Dollar is likely to result in increased stock returns. The beta coefficient of PT XL Axiata Tbk is the lowest among the companies under consideration. The beta coefficient for EXCL.tbk was determined to be -1.6907, whilst the PT Tower Bersama Infrastructure Tbk. (TBIG.JK) had the greatest beta coefficient value of 1.5843.

Table 7.
Beta APT

	Binflation	**BSBI**	**Bexchange**		**Binflation**	**BSBI**	**Bexchange**
ADRO	0.1704	0.1605	-1.3658	INKP. JK	0.0153	-0.0068	-0.8851
ANTM	0.0579	0.0866	-0.3093	INTP. JK	-0.0911	1.5391	-0.7260
ASII	0.0224	-0.1039	0.7886	ITMG. JK	-0.0839	-1.5311	0.6660
BBCA	-0.1406	0.0085	-0.2865	JPFA. JK	-0.1580	-1.1848	1.0182
BBNI	0.1167	-0.0525	0.1822	KLBF.JK	-0.0942	0.3211	-0.8281

BBRI	0.0686	-0.5705	-0.4216	MNCN.JK	-0.3409	0.1514	0.2916
BBTN	-0.1278	1.8270	-0.5841	PGAS.JK	-0.1882	-1.5208	0.9114
BMRI	0.0444	-0.0596	0.1261	PTBA.JK	0.4992	-0.9821	-0.9840
CPIN	0.0116	0.2390	1.3948	SMGR. JK	-0.0905	1.6309	-0.1670
ERAA	0.1910	0.3330	0.3499	TBIG. JK	-0.0809	0.6318	1.5843
EXCL.tbk	-0.0273	-1.5024	-1.6907	TLKM. JK	0.0323	-1.8728	1.3194
HMSP.JK	-0.0768	1.9980	-0.6252	TOWR. JK	0.0106	-1.6172	-0.9703
ICBP.JK	0.2775	0.4607	0.4531	UNTR.JK	-0.2633	0.8854	-1.0851
INCO.JK	-0.2301	-0.7535	-0.2907	UNVR. JK	-0.1998	1.1316	0.3881
INDF.JK	-0.2624	-0.9910	-0.2661	WIKA.JK	0.4407	0.2714	0.6560

4.2.2 Expected Return using the APT Model

Based on the data in Table 8, PT Unilever Tbk (UNVR) has the highest overall value with an Expected Return of 0.4576. Conversely, PT Aneka Tambang Tbk (ANTAM) has the lowest projected return value of -1.2025 among all companies.

Table 8. Expected Return APT

	APT		**APT**
ADRO	0.0818	INKP. JK	-0.0031
ANTM	0.0008	INTP. JK	0.0001
ASII	0.0034	ITMG. JK	-0.0054
BBCA	-0.0052	JPFA. JK	-0.0049
BBNI	0.0039	KLBF. JK	-0.0049
BBRI	-0.0018	MNCN.JK	-0.0082
BBTN	0.0007	PGAS.JK	-0.0075
BMRI	0.0016	PTBA.JK	0.0070
CPIN	0.0068	SMGR. JK	0.0027
ERAA	0.0082	TBIG. JK	0.0063
EXCL.tbk	-0.0131	TLKM. JK	-0.0007
HMSP. JK	0.0026	TOWR. JK	-0.0095
ICBP. JK	0.0116	UNTR.JK	-0.0088
INCO. JK	-0.0107	UNVR. JK	-0.0001
INDF.JK	-0.0124	WIKA.JK	0.0165

4.2.3 Comparison of CAPM and APT Models

According to the information provided in Table 9, the Mean Absolute Deviation (MAD) value for The Capital Asset Pricing Model (CAPM) has a higher value than the Mean Absolute Deviation (MAD) for the Arbitrage Pricing Theory (APT), specifically 0.0087 compared to 0.0083. Hence, it can be inferred that the APT model is superior to the CAPM model in assessing the suitability of investing in LQ45 shares.

Table 9. MAD CAPM and MAD APT

Code	**MAD**	
	CAPM	**APT**
ADRO	0.0365	-0.0007
ANTM	0.0759	0.0448
ASII	-0.0008	0.0007
BBCA	0.0072	0.0126
BBNI	0.0204	0.0144

BBRI	0.0051	0.0081
BBTN	0.0069	0.0071
BMRI	0.0125	0.0123
CPIN	-0.0028	-0.0048
ERAA	0.0164	0.0117
EXCL	-0.0060	0.0046
HMSP	-0.0237	-0.0227
ICBP	-0.0005	-0.0069
INCO	0.0385	0.0375
INDF	0.0042	0.0041
INKP	0.0180	0.0185
INTP	-0.0173	-0.0100
ITMG	0.0607	0.0530
JPFA	0.0010	0.0063
KLBF	0.0077	0.0152
MNCN	-0.0261	-0.0109
PGAS	0.0181	0.0172
PTBA	0.0151	0.0161
SMGR	-0.0152	-0.0114
TBIG	0.0207	0.0237
TLKM	-0.0004	0.0027
TOWR	0.0099	0.0177
UNTR	0.0105	0.0184
UNVR	-0.0068	-0.0120
WIKA	-0.0246	-0.0189
E(Ri)	**0.0087**	**0.0083**

4.3 Hyppthesis Testing

In order to continue, it is imperative to compare the two Mean Absolute Deviation (MAD) values utilising the Independent Sample t-test in SPSS 25. Before proceeding, it is imperative to conduct a normality test to ascertain the appropriateness of the data for research purposes.

Table 10. One-Sample Kolmogorov-Smirnov Test

		MAD_CAPM	**MAD_APT**
N		19	21
Normal Parameters[a,b]	Mean	-4,3145	-4,466
	Std. Deviation	1,00156	.98964
Most Extreme Differences	Absolute	.120	.175
	Positive	.120	.124
	Negative	-.099	-.175
Test Statistic		.120	.175
Asymp. Sig. (2-tailed)[c]		.200[d]	.093

Table 10 provides information regarding the Asymp value. The p-value (2-tailed) follows a normal distribution as it exceeds the threshold of 0.05 (0.200 > 0.05

and 0.093 > 0.05). Given the normal distribution of the data, it is possible to conduct a t test.

Table 11. Independent Test Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval Of the Difference	
						Significance		Mean	Std. Error		
		F	Sig.	t	df	One-Sided p	Two-Sided p	Difference	Difference	Lower	Upper
MAD_CAPM_APT	Equal variances assumed	.013	.911	.481	38	.317	.634	.151459	.315137	-.486503	.789421
	Equal variances not assumed			.480	37506	.317	.634	.151459	.315331	-.487171	.790089

The results of the t-test sample's autonomous computing are presented in Table 11. Table 10's data analysis reveals that the Sig value is 0.911, surpassing the threshold value of a = 0.05, as indicated by the Levene's Test. Given the lack of noticeable influence, it is necessary to embrace the alternative hypothesis is accepted (H1). Subsequently, a t-test was conducted under the assumption of unequal variances. Therefore, the independent sample t-test does not assume equal variance based on thefindings. Given how the estimated t-value is smaller than the t-table value of 0.481, which is less than 2.05183, and the Sig value is greater than the significance threshold of 0.911, which is larger than 0.05, we can conclude that H1 is accepted. Given that both the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) make use of the assumption of non-uniform variances while forecasting the returns of LQ45 stocks, it may be inferred that there is minimal or negligible disparity in their level of precision. Therefore, the independent sample t-test does not assume equal variance based on its findings. Given that the estimated t-value is smaller than the t-table value of 0.481, which is less than 2.05183, and the Sig value exceeds the significance threshold of 0.911, which is greater than 0.05, we can conclude that H1 is accepted. Upon comparing the accuracy of the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) in predicting the return of LQ45 stocks, no substantial disparity is observed.

By comparing the two models' predictions of stock returns, we found that the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) are equally effective. CAPM and APT are the main theories used in modern portfolio theory in capital markets. CAPM and APT both express the relationship between expected return and risk and focus on how to price risk fairly. Both can be applied to capital budgeting, investment performance analysis, and the valuation of securities. Although CAPM and APT show the relationship between expected profit and risk in a linear form, they fundamentally have different modeling viewpoints. The Markowitz mean-variance model is the basis of the CAPM, which is the result of market equilibrium based on mean-variance preferences. The CAPM focuses on maximizing profits based on risk control or avoiding risk as much as possible based on profit control. In general, the CAPM examines how assets are valued when all investors make comparable investments and the market eventually adjusts to equilibrium.

APT is based on the theory of equilibrium without arbitrage, relying on a multifactor model, deriving returns from shares, and using the concept of arbitrage to describe the formation of equilibrium. To generate risk-free profits, investors create as large of a position as possible through arbitrage portfolios when there are arbitrage opportunities in the market. As this situation continues to develop, the supply and

demand among securities changes. The APT model focuses on how assets are valued when there is no risk-free arbitrage in the final market and it reaches equilibrium. From non-equilibrium to equilibrium conditions, from the presence of arbitrage opportunities to an equilibrium process without arbitrage, the CAPM relies on a large number of investors to make small adjustments to their positions. In contrast, APT theoretically requires only one arbitrage to maintain a market without arbitrage states because it is a risk-free arbitrage opportunity. So, it can be said that both models are quite effective at predicting stock returns depending on the investor's wishes whether they wish to use CAPM based on mean-variance preferences or APT which focuses on how assets are valued when there is no risk-free arbitrage (Li, 2023).

Many factors can make investing in an asset risky. Some of these factors may be macroeconomic or company-specific. These factors are very relevant and important for determining the price of an asset and should be included. In the CAPM model, the expected return on an asset is a linear function of market risk, while in the APT model, the expected return on an asset is a linear function of various unknown risk factors (Leković & Stanišić, 2018). This is what makes the APT model more reliable. APT brings more macroeconomic factors into consideration when predicting the return while CAPM just one macroeconomic factor into consideration, the excess market premium Julianto (2013).

We call each of these models "capital asset pricing models". They are both examples of what are called "capital asset pricing theories." This means that each investor's needs and preferences may be taken into account when deciding which model to utilize. In order to make predictions, the Capital Asset Pricing Model (CAPM) looks at the factors that affect market returns in isolation. This method is great for individuals who want a straightforward approach to predicting stock returns. As an alternative, investors who want a thorough understanding of the specific macro factors impacting stock price fluctuations could benefit from the Arbitrage Pricing Theory (APT). This is because the APT considers a broader set of factors. Consistent with the previous research, this study found no statistically significant difference in accuracy between the Capital Asset Pricing Model and the Arbitrage Pricing Theory when comparing the two with the help of (Abdillah & Putra, 2021; Hartoyo, 2016; Rijal Balatif et al., 2021).

An essential component of the CAPM and APT models is the beta (β), which is a measure of the performance of the elements that are thought to have an influence. Consequently, this beta (β) needs to be BLUE, which stands for Best linear unbiased estimator. A higher beta error (β) indicates that the model is more accurate in calculating and forecasting the actual return (Ri) of equities. In addition to this, there are data disturbances that can lead to errors in the computation of beta(β), such as issues with normality, non-homogeneous variance, correlation between independent variables, and correlation between the current and previous observation periods, among others Ibrahim et al. (2017). Since both the CAPM and APT can predict stock returns, investors can tailor their choice of model to their preferences. A model for making predictions, CAPM relies solely on market return parameters. Therefore, APT is best suited for investors who seek a detailed understanding of the macroeconomic variables that impact stock price changes, whereas our approach is more suited to those who want a simple and easy way to forecast stock returns. According to Abdillah & Putra (2021).

To reiterate, the expected return for securities subject to the same amount of systemic risk should be the same in both the CAPM and the APT models. The APT model suggests the presence of many systemic risk factors, in contrast to the CAPM model, which implies the existence of only one. When determining a security's worth, it's important to keep in mind the sensitivity of returns and the beta coefficient, which are measures of market risk in the CAPM model, to make sure that the expected return matches the systematic risk of vulnerabilities in the APT paradigm to a plethora of unforeseeable risk variables. So, it's clear that the APT model requires investors to be compensated for a wider range of systemic risks, whereas the CAPM model just only requires them to be compensated for market risk. In line with the efficient market hypothesis, which serves as a basic foundation for both models, it is included in both that securities should not be under-or overpriced, but rather fully valued Lekovic & Stanisic (2018).

5. Conclusion

The calculation of Mean Absolute Deviation (MAD) reveals that the APT's MAD is somewhat lower than the CAPM's MAD. This is something that can be recognized based on the results of the calculation. Following the completion of a comparative examination of the two models, it has become abundantly clear that the Arbitrage Pricing Theory (APT) model demonstrates a greater degree of accuracy in directing investment choices regarding the purchase of LQ45 shares. This is in contrast to the Capital Asset Pricing Model (CAPM), which demonstrates a lower degree of precision.

The results of the statistical research reveal that there is no significant difference between the forecasting skills of the Arbitrage Pricing Theory (APT) models and the Capital Asset Pricing Model (CAPM) models when it comes to predicting the returns of LQ45 stocks. In light of this, it may be deduced that investors are given the free option to choose the model that most effectively corresponds to their tastes and needs. The Capital Asset Pricing Model, often known as the CAPM, is a kind of prediction model that relies only on the features of market returns. This instrument is highly beneficial for investors who are looking for a clear and effective technique to anticipate the returns on their stock investments. Alternatively, investors who want a detailed grasp of the precise macroeconomic issues that affect swings in stock prices may find that applying the Arbitrage Pricing Theory (APT) is useful. This theory was developed by economists. Increasing the length of time that researchers spend doing their researches is recommended in order to improve the accuracy of their forecasts about future stock returns.

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