Empirical Test of Apt Model to Predicting Portofolio's Stock Return Incorporated with Lq45 from 2014 until 2018 in Indonesia

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Abstract. The purpose of this study was to test the APT model as a model of capital market equilibrium price in predicting the return of shares incorporated in LQ45. This research using multipass- Regression to test the validity and validity on CAPM model by using data in this study was closing price of 45 blue chip stocks and a monthly return LQ45 index, the variables used were US dollar exchange rate, inflation and market risk. For data analysis using two stage regression, time series at one stage and cross-sectional regression on a two-stage regression. The study found that less APT model works well in predicting stock prices in the Indonesian capital market, especially stocks incorporated in LQ45.

Keywords: APT, Stock Return, Portfolio, LQ45, Cross Sectional, Time Series, Two Stage Regression, Systematic Risk, Non-Systematic Risk, Return Expectations, Macroeconomic Variables, Variable Residual

1 Introduction

Since the discovery of the theory of efficient portfolio by Markowitch Hendry (1950), the researchers there after vying to create a model of capital market equilibrium. Model balance of capital markets, which first appeared is the Capital Asset Pricing Model, or better known as the CAPM introduced by Sharpe (1964) which is a new revolution in the world of investment where the investment can be assessed, or return the extra what will be received by investors with regard to the level of risk faced (Fama and French, 2004), further on this model only emphasizes the return expectations of market risk securities portfolio. After CAPM was introduced, many emerging models by offering a capital market equilibrium relationship between risk and yield better,

Model CAPM, APT and Model 3 Factor compete in offering an alternative explanation of the relationship between risk and return. CAPM is widely accepted as the proper techniques to evaluate financial assets. It is used to build a portfolio, measures the performance of investment management, develop project-level screening for capital budgeting, and the value of the company. Beta is calculated and displayed based on the used market index. Proponents of the Arbitrage Pricing Theory (APT), which offers an alternative explanation of the relationship between risk and return, even though its application was limited in the financial world due to the complexity of determining a suitable factor.

The principle in the model balance price on the model APT (Arbiterage Pricing Theory) actually lies in how the same assets may experience error rates so that it will open up opportunities arbiterase against the gains of investors without their risks to be faced, this is due to the activity of buying and selling securities in simultaneous to profit from price differences that occur

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(Bodie & Kane, 2014). In accordance with the theory of the balance of the capital market, that opportunity will be lost due arbiterase capital markets will form a new equilibrium by strong pressure on arbiterase patterns that occur. In accordance with the rules of the theory the Law of One Price that two assets are equivalent in all aspects relevant economic will produce the same asset prices.

APT model introduced by Ross (1976) is an elegant model in explaining the relationship between return and risk. APT itself offers fewer assumptions than the CAPM model. The results obtained in the cross-sectional relationship of the relationship between return and risk is more attractive in various empirical studies are opposed to the proposal CAPM. APT model first developed by Ross (1976) is a model of a single period in which each investor convinced that reeturn stochastic for securities of asset prices soon is consistent with a structure factor. As discussed earlier, the CAPM only use market portfolios as the center of the relationship of asset prices. But a number of empirical testing of the CAPM as Gibbon (1982), Reinganum (1981), Lakonishok and Shapiro (1986) was not able to present hard evidence of the relationship between the expected returns with market beta which indicates there is weakness on the CAPM model. But the findings contradict the

The purpose of this study is to conduct empirical testing of APT in predicting retun assets using a number of macroeconomic variables. Although in this study, insert variables to represent the APT factors, may also be considered to represent a multi CAPM beta. Some of the relevant findings and present evidence that APT uses macroeconomic variables can lead to estimates slightly better than the risk and the expected results of CAPM and other capital market equilibrium model like the model of 3 factors (Fama and French, 2002;Baghdadabad & Glabadanidis,2014),

Other studies (Geske and Roll, 1983), which examines the relationship of fiscal, monetary, and inflation. Geske and Roll concluded there is a causal link between the factors studied. In studies with macroeconomic variables were examined 25 industry macroeconomic variables, shows that the macroeconomic variables and industry is very important to explain the return on assets. The same is done by Cagnetti (2002) using 25 macroeconomic variables in testing on the Italian stock market. Furthermore, Flannery and Protopapadakis (2002) concluded that the index of industrial products and consumer price index (Consumer Price reindexs) significantly affect the return of portfolio formed at a certain level. Al-Khazali and Pyun (2004) examines the relationship between the level of inflation in the Asia-Pacific region such as Australia, Hong Kong, Japan, South Korea, Indonesia, Malaysia, the Philippines, Singapore and Thailand in the period 1980 to 2001 den conclude that there is a negative relationship with short-term stock price. In the APT model there is a fundamental weakness in determining where economic factors that influence the return of securities, as well as Atlay (2003) in which the models tested using factor analysis (Factor Analysis) to seek economic factors are relevant.(Rjoub et al., 2009).

Capital market development in Indonesia has mengami very rapid development, seen from the number of issuers incorporated into members of the exchange, in addition to the many companies that provide financial information that is better than the stock market 10 years ago. As usual, capital market equilibrium model is often used by investment analysts and fund managers to determine investment decisions on securities traded on the stock market. As commentator on the background of the problem, that the APT model is able to provide a better explanation than the other capital market equilibrium model (CAPM, Model 3 factors) to connect between yields on securities with macroeconomic factors. Therefore, the question arises: How well does the APT model is able to explain the relationship between yields with macroeconomic factors and specialized in the Indonesian capital market this sata?

2 Theoritical Review

2.1 APT (Arbiterage Pricing Theory)

This model was first introduced by Ross (1976), the framework of the APT model generally describes the linear relationship between the expected returns and the number of common factors recommended assumption investor expectations are homogenous (similar), utility maximization of shareholder value as well as small parts (friction) perfectly competitive market without arbiterase. (Altlay, 2003).

Exploitation error sekurutas price of a certain way causes the gain can be obtained without the risk of so-called arbiterase (*arbiterage*) Which melibatrkan activity of buying and selling the same securities simultaneously to earn a profit on the price difference that occurs, then the stock market will soon negate arbiterase opportunities. Multifactor model is used to measure and manage the exposure to any large-scale macro-economic factors such as the business cycle risk, interest rate risk, inflation risk, the risk of energy prices and so on. Furthermore factor model combined with the condition without arbiterase opportunities that would lead to the simple relationship between the expected returns and risks of the so-called APT. Furthermore, arbiterase interpreted as an action / activity that generates positive profits without spending any capital and without the risk will be borne.

In the APT model is usually more than one factor that is included with the intention of seeing the behavior of stocks against those factors that are usually known by the model of multi- factor, this model is very useful in the analysis of modern finance to measure exposure to securities of an economic risk, and may form a portfolios in order to hedge against these risks. Suppose contained in model 2 factors expressed by the following equation:

$$r_i = E(r_i) + þ_{i1}F_1 + þ_{i2}F_{2+}s_i \quad (1)$$

Then the risk premium factor 1 is a portfolio exposures on factor 1, wherein the beta-1 multiplied by the premium received on the portfolio I factor 1 (plus beta 2 times the premium received first portfolio on a factor of 2 ($þ_{i1}[E(r_1) - r_f]$)$þ_{i2}[E(r_2) - r_f]$).

According to Charles P. Jones (2010) are some of the assumptions of the CAPM which is also used in APT, but there is also the assumption of CAPM which is not used in APT, APT is a simplified nutshell CAPM assumptions are:

Assumptions used in CAPM and APT :

a) Investors have the belief that a uniform (homogenous beliefs)
b) Investors are risk averse in the maximize utility
c) The market is in a state of balance
d) Return generated by a factor model

Assumptions used in CAPM tetaapi not be used in APT :

a) All investors have a time span the same period (similar investment horizon).
b) The absence of tax
c) Borrow and lend at the risk-free interest rate
d) Investors choose the portfolio based on the mean-variance criteria

2.2 Formation Price Arbiterase

APT theory introduced by Stephen Ross in 1976 that predicts the securities market line that connects between the expected returns of securities with a risk that the SML slightly different paths. APT is actually based on three proportions, namely:

a) Return of securities can be explained by a model factor.
b) There are plenty of special securities to eliminate the risk by diversification.
c) Capital markets work well in eliminating the chance arbiterase.

Actually this arbiterase opportunities occur if the investor makes a profit which is not at risk without making investments, such as stocks sold at different prices on different capital markets so as to obtain benefits without capital. (Law of One Price) says if two identical assets can not be sold at different prices, and deviations will arise arbiterase action where to buy cheap assets in place and then sell expensive place until the market will eliminate the chance. Unlike the CAPM which mentions all the investor holds a portfolio of efficient on average and variants which will increase the cost of the portfolio securities (underpriced) and remove the price is too expensive (over priced).

APT model itself has a conclusion that is identical to the CAPM, for example, the relationship between return and risk linineг, but APT has different assumptions with CAPM which is not based on the rule variants. Ross describes the linear relationship between return and risk arises from the absence arbiterase opportunities. APT fundamental assumptions about where the return is obtained from a process that is identical to the multi-factor models or single-factor (*single-multifactor*), Where the covariance between return securities that appear related to the trigger factors so as to create a linear hubunga between returns to these factors. Then return to the first stock in period t is assumed to be calculated by the following equation (Baghdadabad & Glabadanidis, 2014):

$$r_{i,t} = A_j + þ_{1,i}I_{1,t} + þ_{2,i}I_{2,t} + \cdots + þ_{n,i}I_{n,t} + e_{i,t} \quad (2)$$

Where

I = Value factors affecting the level of stock returns

Aj = Intercept the expected returns of securities depends on the fact that all the factors havea value of zero (no effect on the securities).

Beta individuals can be either positive or negative number of factors to factors and from stock to stock.

$e_{i,t}$= A firm-specific factors are residual components that will not be correlated between the companies.

Then the residual variance or company-specific factors indicated by the following equation

$$a^2(Ee) = \sum_{j=1}^{n} X^2 j a^2(E_j) \quad (3)$$

Thus, it can be calculated variants in the form of multi-factor portfolio as follows:

$$a^2(r_p) = þ_{1p}{}^2 a_1{}^2 + þ_{2p}{}^2 a^2(I_2) + \cdots + þ_{np}{}^2 a^2(I_n) + a^2(Ee) \quad (4)$$

Wherein the beta of each factor is a weighted average of the beta-beta securities in the portfolio yangdinyatakan in the formula:

$$þ_{1p} = \sum_{j=1}^{n} X_j þ_{1,j} \quad (5)$$

Furthermore, according to APT on which the determinant of asset prices is a risk and return expectations with APT has different procedures and assumptions with CAPM, APT know there are some risks that affect the return securities. APT assumed asset returns linearly related to the number of indexes, where each index represents a factor influencing the return securities. Risk

factors are a reflection of the strength of the economy and not the special nature of the company, which factors in question must have three characteristics, namely:

1. Each factor must have spread influence on the return securities.
2. These factors are predominant should affect the expected returns.
3. At the beginning of each period, the risk factors should not predictable to the total market. APT model itself assumes that investors believe that asset returns randomly obtained in accordance with the n factor for securities i where the actual return can be expressed by the formula:

Where :

$$R_i = E(R_1) + þ_{1,i}f_1 + þ_{2,i}f_2 + \cdots + þ_{n,i}f_n + s_1 \quad (6)$$

R_i = Actual rate of return on the securities *i* in period t.
$E(R_1)$ = Return expectations of securities *i*
$þ_i$ = Sensitivity of securities *i* against faktot.
s_1 = Error acakk unique for securities *i*,
f = Deviation F systematic factor of hope, usually the expected value of each factor F is zero, meaning that if it and so on.

$$F_1 - E(F_1) = 0F_2 - E(F_2) = 0 \quad (7)$$

If the balance is transformed into a model of expected returns which require factor model. Equation expectations of a security's return is:

$$(R_i) = a_O + þ_{1,i}F_1 + þ_{2,i}F_2 + \cdots + þ_{n,i}F_n \quad (8)$$

Where :

$E(R_i)$ = Return securities hope i
a_O = Return securities who have the systematic risk is zero
F = Premium risk factor $[E(F_n) - a_O]$

In APT, risk sensitivity is defined in the form of securities on the basis of economic factors, while the expected returns are directly associated with sensitivity. Then return expectations of return-risk model is described as follows:

$$E(R_1) = r_f + þ_{i,1}(\text{ereNi resiko } f\text{aktor } 1) + \cdots + þ_{i,n}(\text{ereNi resiko } f\text{aktor } 1) \quad (9)$$

The Arbiterage Pricing Theory (APT) is based on the law of one price. The law says that all goods with the same risk should be sold at the same price so the market can achieve a balance that would prevent arbiterase(Authors, 2017), No further requirements are similar to the assumptions of the CAPM associated with market efficiency, homogenous confidence from investors and the average variance-their investment criteria. This assumption ensures that there are no arbitrage opportunities and the market is in equilibrium what is important for APT. Sthepan Ross (1976) there are eight requirements needed for significance APT:

a) The absence of transaction costs
b) Asset split / divided
c) Short Selling and buys unlimited long
d) Investors can borrow at the risk-free rate
e) There are no barriers to the sale and purchase of assets
f) The decision is based on the mean-variance criteria
g) Individual investors' decision about their position in any of the assets would not affect prices.

Sebahagian above assumption fits the Indonesian Stock Exchange (Stock Exchange Indonesia). First in the Indonesia Stock Exchange there is a transaction fee, but the size of very large transactions, costs will be relatively small even these costs are negligible. In the real business world, the smallest unit that can be traded in real market is a stock which can not be divided into parts and then traded. However, it can be presumed that the market participants to invest in the purchase of an expensive stock. With this assumption the stock situation can be viewed separately.

2.3 APT Multi-Factor

Assumed many systematic macro economic factors affecting stock returns, such as interest rates, inflation, oil prices, the price of gold and so forth. Exposure one of the factors will affect the risk and return of these shares. Each company-specific factors and components have zero expected returns, for each variable in the variable rate shock is not systematic variables. In forming a multifactor APT APT is similar to the single factor that refers to the concept of a diversified portfolio with a good factor referred to as portfolio tracking which tracks certain macro economic resources but is not correlated with other risk sources.

M, ccording to the theory that the APT assumes that investors are confident in the Nx1 vector of random single-period return on capital assets that can be explained by a model factor So can be the following equation:

$$r_i = E(r_i) + \text{þ}f + e_i \tag{10}$$

Where e is a vector Nx1 of random variables, f is a vector kx1 of random variables (factors), is a vector Nx1 and is a matrix nxm on condition E (f) = 0, E (e) = 0, where mathematical proof requires restrictions E(ri)þ

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a & a & \text{a} & \\ 21 & 22 & & 2n \\ \cdots & \cdots & \cdots & \cdots \\ q & a & & \\ m1 & m2 & a & mn \end{bmatrix} \begin{bmatrix} x_1 \\ \text{x} \\ 2 \\ \cdots \\ x \\ n \end{bmatrix} = \begin{bmatrix} b_1 \\ \text{b} \\ 2 \\ \cdots \\ \text{b}\ m \end{bmatrix} \tag{11}$$

in beta and covariance matrix. An additional specific assumptions that, but this assumption is not necessary in floating APT model.Ω = E[eei]E(e|*f*) = 0

Number of assets, n, is assumed to amount to more than the number of economic factors (k). on some models, n is infinite or nearly infinite. In this case, the first asset of the asset to factor k n (n + 1) is equal to the asset factor n k in the first row of the matrix beta factor k (n + 1). As already discussed above that the APT model predictions in a perfectly competitive market so that there is a relationship with the stock returns of certain economic factors eg k factor, the APT begins with the assumption that the return on a wide range of stocks Rit generated by a model of multi-factor (k-factor) of the form of the following equation (Roll and Ross, 1980):

$$\text{Rit} = E(\text{Ri}) + \text{b1i}f1\text{t} + \text{b2i}f2\text{t} + \cdots + \text{bik}f\text{kt} + \text{sit} \tag{12}$$

Where E(Ri)is the expected returns of securities / shares of i, i = 1,2,3, ..., n, is an economic factor that can not be observed, k = 1,2,3, ..., k, then the sensitivity sekurtias I to factor k and is a risk idiosincratik on stock i. in addition that the expectation of the risk factors that appear to zero and = 0 for i = 1,2,3, ..., n as well as the expectations of the company-specific risk for securities is zero, then.*f*ktbiksitsit2 = a2ei < ∞

As the above description it is assumed there is a k-factor (I1, I2, … , Ik) And securities to j

is affected by factors that are represented by the sensitivity of the securities of the factors (), so the model APT can be formed by the following equation (Nai Fu, 1986):þi1, þ2j, … , þkj

$$rj = \alpha j + þ1jI1 + þ2jI2 + \cdots + þjkIk + si \quad (13)$$

From the equation above $\alpha_j$is a constant of the risk-free rate (the return stock with a beta of zero). Ross (1976) shows if a large enough number of shares then the linear relationship between return and risk in equilibrium can be written:

$$r_j = y_O + þ_{1j}y_1 + þ_{2j}y_2 + \cdots + þ_{jk}y_k \quad (14)$$

To establish APT must understand the concept of portfolio factor (*factor portfolio*)Which is the well where the terdifersifikasi portfolio has a beta 1 on one factor and zero on lain.yang factor is a benchmark for SML multifactorial. Further multifactor mention that the risk premium that the risk premium throughout a dfolio porto equal to the risk premium required tocompensate for any source of systematic risk.

3 Research Methodology

3.1 Against Testing Model APT

Fama and French (1992) conducted a study and find a statistically significant relationship between beta and return the securities viewed from several factors such as the size of the company (*Firm Size*) And the ratio of book value versus market value company (Book to Market Ratio / BM Ratio), so the results support the argument that the market portfolio is at your sole risk not being able to explain the return on average so it can only be explained by the multifactor model, one of the APT model. APT itself is actually an extension of the CAPM model that describes the relationship between the expected returns and the return covariance with other random variables (in the CAPM model described by the covariance return with return of portfolio securities market).

3.2 Determining Factors in the Model APT

In return CAPM model stock / securities only react to market risk, then the APT model is believed beereaksi to economic events. Some of the changes in macroeconomic variables will affect the price of securities and some other macroeconomic variables affecting not even at all. Besides, there are differences that affect macroeconomic variables in each country (Atlay, 2003). Basically, any excess of the model certainly has a flaw, it turns APT model also has limitations that APT does not explain the factors that influence the return of shares / securities. APT model seems to leave a puzzle that must be disclosed by researchers seelanjutnya in conducting empirical testing by using a multifactor model. One of the research and testing of the model of the famous APT conducted by Chen, Roll dan Ross (1986), which considers there are several macroeconomic variables that had a significant influence by having a systematic risk on stock returns are:

a) Inflation - have an impact on the discount rate and future cash flows to investors
b) Conditions Interest Rate Structure - the difference between short-term bonds and long-term bonds that affect the value of future liabilities compared to obligations due within a shorter time.
c) Risk premium - the difference low-quality corporate bonds and high-grade corporate bond

market reaction to the risk approach.

d) Production-industry - differences in industrial production have an impact on the investment opportunities and the real value of cash flows.

Several other empirical studies of the APT model focuses on determining the amount of the factors that systematically determines stock returns by applying the factor analysis model. A large number of papers and financial journals using factor analysis method as practiced by Chen Roll and Ross (1980) found 3 to 4 systematic risk factors that are statistically sufficient to explain stock returns in the period 1962-1974, on the other hand Chen (1983) found there are five factors on the NYSE and AMEX between 1963-1978, Dhrymes et at (1985) found a number of factors change depending on the length of the period used and the size of the stock groups in the analysis by using additional information in connection with the return relationship of macroeconomic events.

Estimating the risk of unexpected factors, the next few portfolios built to test the procedure. In the first stage, the beta coefficient factors of each portfolio is estimated by regression time series, and the second stage cross-sectional regression process is executed to estimate the relationship between beta factor and return on average assets / securities. In this experiment, the authors use the methodology of testing two stages which are widely used in the empirical testing of the model CAPM and APT, as practiced by Fama Macbeth (1973), Roll and Ross (1980), Chen (1983), Chen, Roll and Ross (1986).

3.3 Research Design Methodology

In the APT mode, not to mention what my risk factors included in the study, in that it gives the freedom of researchers using the macro economic factors always include market risk (Gul and Khan, 2013). The author uses 13 macroeconomic variables are then filtered using Principal Component Analysis (PCA). By using PCA, and obtained three variables, namely the USD exchange rate, inflation and market risk by using proxy LQ45.

3.4 Population and Sample Research

The current study took a span of 5 years with a range into 60 monthly from 2014 until 2018. The study population here is the entire shares incorporated in the LQ 45, so that in the study period there will be some stocks that will be eliminated because does not meet the criteria. Sampling technique using purposive random sampling to rank the 45 blue chip stocks by market capitalization. Having obtained a few stocks meet the criteria, researchers established a portfolio of stocks where one portfolio consists of 5 stocks established based on market capitalization. A portfolio of five stocks with the highest market capitalization so the next and gained five portfolios for a total amount of 20 shares.

The next step is the selection of macro-economic variables based on the conceptual framework of APT models that yield securities are influenced by factors ekonomim but Ross (1976) did not specify where the economic factors are included in the study. It is easier for researchers to enter any macro economic variables and the large number of economic variables that will be included. In this study, the variables to be included is the inflation rate, exchange rate US Dollar against the Indonesian Rupiah and the Capital Markets Index LQ45 after going through screening using PCA.

3.5 Operational Variables

Researchers used four variables to test the reliability of the APT model in predicting the yield of a stock portfolio with risk factors as independent variables. The definitions of the variables are detailed in the table below:

Table 1. Operational Variables

Variable / Concept	Formula	Scale
Yield Portfolio (), Ross (1976); Gul and Khan, 2013R_p	$Rp = w_1R_s + w_2R_2 + \cdots + w_nR_n$	ratios
USD exchange rate against Rupiah, Atlay (Atlay, 2004)	$R_{Kurs} = \frac{Kurs_t - Kurs_{t-1}}{Kurs_{t-1}}$	ratios
Inflation, Tripathi (2014)	$R_{In\dagger lasi} = \frac{In\dagger lasi_t - In\dagger lasi_{t-1}}{In\dagger lasi_{t-1}}$	ratios
Market Risk (Beta), Drew (2010)	$R_{LQ45} = \frac{LQ45_t - LQ45_{t-1}}{LQ45_{t-1}}$	ratios

Source: Processed Alone

4 Result and Discussion

Methods of data analysis using Two Stage Regression in testing the APT model, in which the first regression lines using time series regression (Time-Series Regression) in order to obtain beta estimates masig each pasing factor in their portfolios.

4.1 Time Series Regression (Time-Series Regression)

After beta portfolios formed based on the size of the company that has been done in the above steps that lead to 5 portfolios, where the average monthly return of each portfolio is calculated. The regression equation used time series, converging on testing conducted by Chen (1983) by using three macroeconomic variables and market risk by the following equation:

$$R_{P,t} = \alpha_O + y_1F_{1,t} + y_2F_{2,t} + y_3F_{3,t} + s_t \quad (15)$$

After regression Time Series, then the data is carried out treatment, to test the classical assumption using normality test, collinearity, Auto Correlation and Heteroskedastilitas, this is in accordance with the rules of statistics that if a financial model to be tested, it is necessary to test the data using the classical assumption caused Data must be BLUE (Best Linear Estimation unbias) (Said and Chandra, 2005).

4.2 Regression Sessions Cross (Cross Sectional Regression)

To test for non-linearity between the portfolio return to economic factors, the authors used the equations described by the following formula:

$$R_p = Q_O + Q_1y_1 + Q_1^2y_1 + Q_2y_2 + Q_2^2y_2 + Q_3y_3 + Q_3^2y_3 + s_p \quad (16)$$

APT mentioned if the model is valid, then it should be equal to zero, it is decisive to the

invalidity of the model tested in the capital markets.Q_O, Q_1^2, Q_2^2, Q_3^2, Q_4^2

$$R_{P,t} = \alpha_O + y_1F_{1,t} + y_2F_{2,t} + y_3F_{3,t} + y_4F_{4,t} + s_t \quad (17)$$

The regression results of phase one or regression Time Series are summarized in the following table:

Table 2. Estimated Rregresi Time Series of Coefficient Factor Beta on Stocks incorporated in LQ45 Index Portfolio through Shares

			Inflasi			Kurs USD			Risiko Pasar		
	R	**R Sqr**	**Ŷ1**	**T-Stat**	**Sig**	**Ŷ2**	**T-Stat**	**Sig**	**Ŷ4**	**T-Stat**	**Sig**
Portofolio 1	0,861	0,739	-0,007	-0,086	0,932	-0,105	-1,284	0,206	0,880	10,485	0,000
Portofolio 2	0,721	0,52	-0,053	-0,482	0,632	-0,002	-0,018	0,986	0,708	6,213	0,000
Portofolio 3	0,733	0,537	0,128	1,191	0,241	-0,025	-0,234	0,816	0,758	6,779	0,000
Portofolio 4	0,628	0,394	-0,133	-1,079	0,287	0,131	1,052	0,299	0,538	4,204	0,000
Portofolio 5	0,442	0,196	0,345	2,429	0,020	-0,001	-0,005	0,996	0,365	2,477	0,017

The regression results of phase one or regression Time Series found that three macroeconomic variables (inflation, exchange rate USD and Market Risk) were included in the study, only the market risk that has the most powerful effect is statistically significant. This strengthens the evidence that the APT model could not explain Return the stock portfolio is incorporated in LQ 45. This finding is consistent with the model introduced by William Sharpe (1964), Lintner (1965) and Mosin (1966) which describes the trade-off between return securities with a single risk is the market risk. The results of empirical research is also consistent with previous empirical research conducted by Lintner, quoted by Douglas (1968), Black, Jensen and Scholes (1972), Blume and Friend (1973) and Fama and Macbeth (1973). For the interim results that the APT model still can not menggunguli CAPM model due to market risk have a strong influence on the portfolio return than other macro-economic risks are included in this study. In addition there were exposed to some portfolio exposure was statistically insignificant inflation linked portfolio yield 1, 3 and 4. On the other hand, exposure to risk of changes in exchange rates against the US Dollar yields APT model stock portfolio also has the effect of inversion, although not statistically significant.

Furthermore, the results of the regression Time Series also shows that there is a relationship of linearity between market risk portfolio return, it is shown by the amount of influence between the market risk with a portfolio that is formed, the greater the shares of companies incorporated in a portfolio will be increasingly influenced by risk markets, while macroeconomic risks have less influence is strong enough. Then, a portfolio which was formed from the combined shares of companies that have a small market capitalization shows the effect of the variability is very weak. A great value of the T- statistic states that the effect of a very strong market premium of the portfolio return kertimbang other macro-economic factors, at the 0.05 level, because T-Stats qualitas here describe a model in which the high value of the above table intuk overall portfolio. This preliminary evidence has shown that the CAPM model menggunguli APT model in explaining the relationship between risk and return of securities and any risks that should be considered by investors.

The next stages of testing with testing the CAPM model which is across-sectional regression based on data obtained in time series regression. The data will be used in the cross-sectional regressions are shown in the following table:

Table 3. Results of a Cross Sectional Rregresi Beta Coefficient Factor In stocks incorporated in LQ45 Index Portfolio Through Shares

Coefficients unstandardized				standardized Coefficients	t	Sig.
Model B			Std. Error	beta		
1	(Constant)	, 021	, 020		1.034	, 489
	Binflasi	-, 039	, 026	-1.221	-1.486	, 377
	Bkurs	-, 107	, 063	-1.544	-1.719	, 335
	Bpasar	-, 023	, 029	-, 785	-, 801	570

To test parameter estimates, t-statistics are used to generate hypotheses as follows:

H_O : $Q_O = 0$, Then the parameters of inflation is insignificant staistik

H_O : $Q_O \neq 0$, Then the parameters are statistically significant inflation

At the significant level $\alpha = 0.05$ where P-value of the t-statistic is equal to 0, which leads to the conclusion that there is not enough evidence to reject, therefore the parameters as constant or intercept is statistically insignificant.H_OƳ0

H_O : $Q_1 = 0$ = INFLASI_CS, Then the parameters Inflation does not affect the average return of the portfolio ()R_p

H_O : $Q_1 = 0 \neq$ INFLASI_CS, Then the parameters Inflation affects the average return ()R_p

At the $\alpha = 0.05$ significance level P-Value of the t-statistic value equal to 0.377 which lead to the conclusion that there is not enough evidence to reject, therefore variables (inflation) does not affect the average return of the portfolio.H_OƳ1

H_O : Q_2 = KURS_CS = 0, Then the parameters of the US Dollar exchange rate the US does not affect the average return of the portfolio ()R_p

H_O : Q_2 = KURS_CS ≠ 0, Then the exchange rate of US Dollar parameter k affects the average return ()R_p

At the $\alpha = 0.05$ significance level P-Value of the t-statistic value equal to 0.335 which lead to the conclusion that there is not enough evidence to reject, therefore, the variable (Exchange Rate US Dollar) does not affect the average return of the portfolio.H_OƳ2

H_O : Q_4 = Resiko Pasar = 0, The Market Risk parameter does not affect the average return of the portfolio ()R_p

H_O : Q_4 = Resiko Pasar ≠ 0, Then the market risk parameters affect the average return ()R_p

At the $\alpha = 0.05$ significance level P-Value of the t-statistic value equal to 0.570 which lead to the conclusion that there is not enough evidence to reject, therefore, the variable (Market Risk) does not affect the average return of the portfolio.H_OƳ2

Then, the researchers tested the residual variable linearity or Return Error Term Review of the APT model portfolio, by performing regression residuals to yield APT
model portfolio that has been established. In a theoretical study discussed that the residual variable should not need to be appreciated, in other words that this variable has no effect on the portfolio return hypothesis as follows:

H_O : $y_p > 0, 05$, Then the residual component has no influence on the yield P_APT

H_O : $y_p < 0, 05$**,** residual components affect yield P_APT

Table 4. Variable Regression Results Residual Model APT

Coefficientsa

Coefficients unstandardized				Standardized Coefficients beta	T	Sig.
Model	B		Std. Error			
1	(Constant)	, 004	, 003		1,270	, 294
	Residual unstandardized	1,000	1.645	, 331	, 608	, 586

From the description above table, note the significance value greater than 0.05 with 95% confidence level that is equal to 0, that there is not enough evidence to reject, therefore the residual element has no influence on R_APT.$H_O y_{p.}$ In testing the APT model, it is said that the residuals should be normally distributed variables. Researchers tested using the residual variable sample testing in the same direction by forming hypotheses Smirnov kolmogorof.

Table 5. Testing Variable Residual Normality One-Sample Kolmogorov-Smirnov Test

Residual unstandardized

N		5
Normal Parameters, b	Mean	, 0000000
	Std. deviation	,00195656
Most Extreme Differences	Absolute	, 239
	Positve	, 239
	Negative	, 172
Test Statitic		, 239
Asymp. Sig (2-tailed)		, 200C, d

a. Test distribution is Normal.

H_O: $y_p > 0, 05$, Then the residual component of normal distribution

H_O: $y_p < 0, 05$, then the residual component is not normal

From the description above table, it is known Kolmogrof-Smirnov value of 0.200 which is greater than $\alpha = 0.05$, so it can be concluded that there is not enough evidence to reject, therefore the residual elements normally distributed.$H_O y_{p.}$

4.3 Non-Linearity Testing the APT Model

To test for non-linearity between the portfolio return to economic factors, then use the equation described by the following formula:

$$\overline{R_p} = Q_O + Q_1 y_1 + Q_1^2 y_1 + Q_2 y_2 + Q_2^2 y_2 + Q_3 y_3 + Q_3^2 y_3 + s_p \qquad (18)$$

APT mentioned if the model is valid, then it should be equal to zero, it is decisive to the invalidity of the model tested in the capital markets. The results obtained are shown in the table below:Q_O, Q_1^2, Q_2^2, Q_3^2

Table 6. Testing Non-Systematic Review of the APT Model

Coefficients unstandardized				standardized Coefficients beta	t	Sig.
Model	B		Std. Error			
1	(Constant)	-, 002	.016		-, 132	, 916

BInf2	-, 016	, 131	-, 132	-, 119	, 924
BKurs2	-, 193	, 512	-, 259	-, 377	, 770
BPasar2	.016	, 024	, 689	, 669	, 625

In the above table the results obtained were statistically insignificant affect the average return of the portfolio, it is seen from the significant value respectively 0.924, 0.770, and 0.625 greater than the significance level of $\alpha = 0.05$. It opposed to a model that should be zero. Q_1^2, Q_2^2, $Q_3^2Q_1^2$, Q_2^2, Q_3^2.

Based on the overall test results above, the version of the APT model presented in this study do not work well on the stock market in Indonesia, mainly blue-chip stocks with a market proxy LQ45. All testing is statistically significant does not seem to affect retrurn portfolio. The overall conclusion after testing the APT model in the Indonesian capital market is less likely to work, but still outperformed the CAPM model of the overall testing the APT model.

5 Conclusion

Empirical testing of the model balance of capital markets APT model does not work well in the Indonesian capital market, especially stocks incorporated in the index of 45, it is seen from the significance of each macro economic variables included in the study was not able to explain the relationship of risk with returns the average yield of the portfolio shares, thus indicating proof against the APT model. Then, the APT model showed that none of the economic factors are selected and included in the study showed a linear relationship with the average yield of the portfolio, therefore the findings in the study were consistent with the hypothesis APT model and shown strong evidence against the APT model.

Implication

Provide guidance to investors regarding the relationship between yields on securities with the accompanying risk factors. In this case Pengujan prove that investors can consider other models that are more valid in explaining the relationship between yields on securities with the factors to be used in the search for Abnormal Return.

The results of this study are used as input for capital market analysts and investors in making investment analysis indicates that the model of market equilibrium on stocks incorporated in LQ45 resistant to macroeconomic variables, namely inflation and changes in exchange rates against local currency, will but able to work well using beta risk market proxy with LQ45.

Research Limitations

This study uses very little risk factor that is only 13 macroeconomic variables usingPCA techniques, so just pass three macroeconomic variables. The next in this study a very short observation period of 60 months or the period of 5 years, while Wang et al (2011) recommends a minimum period were 100 observations, this is to avoid interference with statistics on the regression phase two. Therefore, he proposed when using the data 10 years with a 10-year period, in order to obtain 120 months or 120 observations.

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