Does Macroeconomics Risk Influence Stock Return in Indonesia Capital Market?

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Abstract: Macroeconomic risk is one of the variables which can arbitrage the market condition to determine return volatility in capital market. One of the most famous methodologies to determine macroeconomic risk in capital market is Arbitrage Pricing Theory (APT). Using monthly data of Indonesia composite index return and sector index return in five years (2013-2017), it has been known that there is no economics risk factor of APT model which can explain the movement of stock return in Indonesia Capital Market. This condition is able to show two posibilities. First, investors act irrationally. Second, investors tend to consider the performance of company than considering sistematic risk that can influence the overal condition of market and industrial.
Keywords: Capital Market, CAPM, APT, Systematic Risk.
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INTRODUCTION

The theory of Capital Asset Pricing Model (CAPM) is still being discussed to this day. There is no doubt that the CAPM is the famous and powerful theoretical model. However, empirically the CAPM has a serious problem. Some researchers have found the evidence that CAPM cannot explain the volatility portfolio return. Fama and French [1] had ever conducted an empirical test of CAPM theory in some countries and shows inconsistent conclusion. Nevertheless, according to them, even though CAPM theory has not been proven, CAPM theory is still needed by investors as guidance for deciding and forming an optimal portfolio.

The CAPM theory which was developed by Sharpe [2], Lintner [3], and Mossin [4] is a theory of asset pricing is still not replaced. This theory is based on asset pricing on stock price trend in the market. In efficient market, the price of an asset will follow and relatively be the same with the market price. The market price in an efficient market has absorbed all information so the existing price in the market reflected the actual price. However, even though the argument of Sharpe, Linther, and Mossin was very rational, in empirical test, this CAPM theory has not ever been proven. This is the main weakness of the CAPM theory, it is strong in the theoretical models but weak in the empirical test.

The CAPM theory is still containing weaknesses and has not captured the reality [5-9], CAPM theory can be modified so that hopefully it can be more appropriate with the real condition of capital market. Modification and the development of CAPM concept have ever been performed by some researchers such as Merton [10, 11] by inserting continues-time model into real model of CAPM so that the new model is formed, Intertemporal Capital Asset Pricing Model (ICAPM). Breeden [12] also modified the genuine model of CAPM by inserting consumption level as the basic calculation of utility maximization into CAPM basic model so that the Consumption model of CAPM (CCAPM) was formed.

The development of CAPM basic model has been performed many times but the empirical testing result shows that the result has not been consistent. Moreover, some teoritical model cannot be applied because there is no empirical variable that can be employed. Based on that, Ross [13] tried to developed alternative model from CAPM. According to Ross, if the market cannot be the instument to determine asset price so that the investor can conduct arbitrage step with other variables which is qual to market characteristics and has relationship with asset price.various variable for the arbitrage process is called factor by Ross. Therefore, this theory is also called as factor theory. Nevertheless, this approach of Ross is more popular with Arbitrage Pricing Theory (APT).

The factors used as the arbitrage variable by Ross [13] are variables that are not anticipated by investors. Factors in the Ross APT model are risk variables in the classic CAPM. Therefore, the factor in the APT model is the difference between the actual value and the expected value.

In its development, the use of arbitrage in APT model is divided into two main groups, such as macroeconomic variables group and firm specific variables group. Fama and French became the pioneer in firm specific usage as the arbitrage variables in asset pricing. In 1995, Fama and French invented a new model to perform asset pricing by using firm specific. That model is well known as Fama French Three Factors Model. In 2015, Fama and French developed their model by adding two variables so that their model is well known as Fama and French Five Factors Model. Fama and French Five Factors Model is determined as the most comprehensive and accurate model in conducting asset pricing by using firm specific.

On the other side, the use of macroeconomic variables as arbitrage risks of the market keeps growing. This is based on a strong enough assumption that macroeconomic variables are systematic risks that affect the market as a whole and the risk cannot be eliminated by forming a portfolio consisting of various securities. In contrary of non-systematic risk (firm specific) can be eliminated by forming a portfolio containing some of securities [13].

This study tries to find the effect of the shock of macroeconomic variables in the Indonesian stock market, both as a whole and at the level of a particular industry portfolio. The influence of economic risk variables in this study is divided into several groups, namely the influence on the Indonesian capital market as a whole and on several industrial portfolios. This research is conducted to clarify the effect of macroeconomic risk more comprehensively.

LITERATURE REVIEW

There are several weaknesses in the CAPM theory that have been criticized by researchers. CAPM theory always makes market prices as the main variable of modeling whereas companies operating in the capital market have different characteristics such as financial and non-financial companies [14]. The different characteristics of the company and industry cannot be justified by only one market price. Therefore, market prices commonly cannot be used as good instruments for determining asset prices [13]. In addition, the CAPM theory only tests a single period for a multi-period observation period. This generates the CAPM results time-biased [15].

When market prices cannot be used as instruments to determine asset prices, investors can take arbitrary steps with other variables that are similar to market characteristics and have a relationship with asset prices. Various variables for the arbitrage process was mentioned by Ross as factor. The theory developed by Ross is popular as factor theory. But in its development, the theory developed by Ross is better known as Arbitrage Pricing Theory (APT). The APT theory is expected to overcome various weaknesses in the classical CAPM theory [15].

Factors that influence asset prices in APT theory are systematic risks that affect overall asset prices [16]. Systematic risk is a risk that influences overall business conditions such as fluctuations in interest rates, inflation rates, global oil prices, economic growth, and other macroeconomic variables [17, 18]. Therefore, in APT theory has many betas and unlike CAPM theory which only has one beta (single beta) [19].

The use of macroeconomic variables as risk factors that replace market risk variables was started by Chen *et al.*, [17]. The macroeconomic variables used by Chen *et al.*, are the Industrial Production Index (IPI), unpredictable inflation rate, the difference between the corporate bond and government bond, and the difference in government bond with the central bank's reference interest rate. From those five factors, only two have a significant effect, are the IPI factor and the difference between the government bond and the central bank's reference interest rate.

Empirical test of the macroeconomic variables using the APT model is continuously conducted by researchers in various countries with different macroeconomic variables and with different development methods and calculation techniques. Darrat and Mukherjee [20] attempted to see the effect of macroeconomic factors on stock returns in the Indian capital Market using the Vector Auto Regression (VAR) Model. They find a causal relationship between macroeconomic factors and stock returns.

Chan *et al.*, [21] found that the classic CAPM could not identify systematic risk factors that could explain the movement of stock returns on the Japanese capital market. Poon and Taylor [22] examined the British capital market using data on monthly macroeconomic variables and the results show that macroeconomic variables have no influence on the British capital market. Mukherjee and Naka [23] examined the relationship between six macroeconomic variables and stock returns on the Japanese capital market using Vector Error Correction Model (VECM) and they found a relationship between the six macroeconomic variables by stock returns.

Research on the ASEAN stock market has ever been conducted by Wongbangpo and Sharma [24]. Using the APT and VECM models, they found a long-term relationship between economic growth and stock returns. But they also found varied results among other macroeconomic variables with stock returns in five ASEAN countries (Indonesia, Malaysia, Philippine, and Thailand).

Research on the influence of macroeconomic risks has also been conducted in Indonesia by Endri [25] and Rahmawati [26]. Endri [25] found that macroeconomic risk has a short-term and long-term relationship with the return of composite price index in Indonesia capital market. However Rahmawati [26] found different things in the consumer goods industry sector. The return portfolio in it's sector is not affected by macroeconomic risks.

Researches and testing on APT model by paying attention on macroeconomic variables is kept doing by researchers. Those researches have ever been conducted by Srivastava [27], Basu and Chawla [28], Zang and LI [19], Wen-Jen [29], Shiva and Sheti [30], and Srivastava *et al.*, [31]. But the results of those researches are still vary both in terms of variables used in the research and countries as the place where the research is conducted. The different factors significantly influence from various researches which shows that macroeconomics of APT model is not consistent. In the future, it is needed more proof and research specifically for every country and various time horizon.

METHODOLOGY
Data
The data used in this study are monthly data of the composite stock price index (IHSG) and sectoral indices in the Indonesia Stock Exchange (IDX) from the period of January 2008 to December 2017. There are four sectoral indices used in this study, such as; the LQ45 index (45 companies with the highest traded), the agricultural sector index, the property and real estate sector index, and the financial sector index. Returns used are returns from each of these indices.

Model
The research model used in this study is the APT model developed by Roll and Ross [15] with multivariate analysis model. According to the APT model developed by Ross, the advantages for every securities traded on the stock market (stock) consist of two components. First, the level of profit is normal or expected and is part of the level of actual profit expected by shareholders. The level of profit is influenced by information held by investors. Second, is the level of profit that is uncertain or risky. This portion of the profit level comes from unexpected information. Formally, the share profit level can be written as follows:

$$R = \bar{R} + U \quad \text{.….……………………………………….……………... (1)}$$

Where,

  R : The level of actual stock profit
  $\bar{R}$: The level of expected stock profit
  U : The surprise profit

From equation (1), the expected profit $\bar{R}$ is the level of profit that has been estimated by investors on the basis of various information that investors have on the stock market so there is no surprise factor. The unexpected portion of the profit U is the profit generated from the new information in the stock market which is previously unexpected (surprise factor).

The unexpected or anticipated profit portion, which is generated from unexpected information (surprise factors), is the risk faced by investors. These sources of risk can come from factors that affect all or many companies (systematic risk), but there are also certain specific companies (unsystematic risk). Dividing the surprise factor into two parts, then the equation of the level of profits that investors obtain can be written into [15]:

$$R = \bar{R} + U \text{ , and } \quad \text{.….………………………………………….…...……...(2)}$$

$$U = m + \mathcal{E} \text{ , so } \quad \text{……….…………………………………...……………..(3)}$$

$$R = \bar{R} + m + \mathcal{E} \quad \text{……………………………………………………………..(4)}$$

Based on the aforementioned equation, R is the actual profit level, $\bar{R}$ is the expected profit level, m is a systematic risk or market risk which influence all companies in the exchange. Meanwhile, Emer $\mathcal{E}$ is not a systematical risk or specific risk for certain companies. Specific risk commonly can be eliminated by using optimal portfolio, so that in this specific APT risk model is assumed as zero.

Based on the APT model developed by Roll and Ross [15] which concerns on the effect of macroeconomic variables on stock returns, the model based on the APT model will be used in this study with the yield of each sectoral stock index as the dependent variable and the independent variables are the agricultural sector, property and real estate sector, financial sector, LQ45, and the composite stock index (CSPI). While the independent variable consists of four factors, they are the Industrial Production Index (IPI), the inflation rate, the exchange rate of Rp / dollar, and the reference interest rate. The same APT model used is as follows:

$$R_i = \bar{R}_i + \beta_{IPI}F_{IPI} + \beta_{INF}F_{INF} + \beta_{KURS}F_{KURS} + \beta_{SBI}F_{SBI} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where,

R_i	= Actual i stock profit rate
$\bar{R}_i$	= Expexted i Stock Profit rate
β_i	= Variable Coefficient
F_{IPI}	= Surprise factorIPI (actual IPI – expectedIPI)
F_{INF}	= Surprise factor inflasi (actual inflation – expected inflation)
F_{KURS}	= Surprise factor rate Rp/dollar (actual kurs – expected kurs)
F_{SBI}	= Surprise factor of interest rate SBI (actual – expected interest rate)

Expected valued of each variable is obtained by an approach developed by Markowitz [32]. According to Markowitz, the expectation value of a variable is the average value of the variable.

RESULTS AND DISCUSSION

The result of analysing data using multivariate analysis, it is obtained that all model has low R square even the adjusted R value is negative. This is proven that there is no APT factor model of macroeconomic variabes that can explain the movement of stock return in capital market of Indonesia. For more clearly, the R square can be seen in Table-1.

Table-1: Goodness of Fit Model

Model	Sector (s)	R	R Square	Adjusted R Square
1	Return of IHSG (Y1)	0.174	0.030	-0.043
2	Stock Return of LQ45 (Y2)	0.161	0.026	-0.047
3	Stock Return of Agriculture Sector (Y3)	0.201	0.040	-0.032
4	Stock Return of Property and Real Estate (Y4)	0.116	0.014	-0.061
5	Stock Return of Financial Sector (Y5)	0.203	0.041	-0.031

Model 1 is a model which dependent variable is the return of composite index. Model 2 is a model which index return is 45 stocks with the most liquid in Indonesia capital market (LQ45) as it's dependent variable. Model 3,4, and 5 are respectively stock return on agriculture sector, property and real estate sector, and financial sector. Meanwhile, the independent variable for all models are the same, they are the factor of Industrial Production Index (IPI), factor of inflation rate, factor of rupiah exchange rate towards US Dollar, and the factor of reference interest rate. The results of data analysis using multivariate analysis shows that none of the models can explain changes in stock returns either in the composite stock price index or sectoral returns.

Besides the low Goodness of Fit value, all models are also insignificant. All models have a significance value greater than 0.05 or no model has a significance value of less than 0.05. Thus the overall model test is not significant. From the Model Test Table, it is known that none of the models that are able to predict stock return movements in Indonesia capital market.

Table-2: Simultaneous Model Test Table

Model	Sector (s)	F	Sig.
1	Return of IHSG (Y1)	0.412	0.799
2	Stock Return of LQ45 (Y2)	0.355	0.840
3	Stock Return of Agriculture Sector (Y3)	0.559	0.694
4	Stock Return of Property and Real Estate (Y4)	0.181	0.947
5	Stock Return of Financial Sector (Y5)	0.568	0.687

Nevertheless, to see whether there is one factor or more that influence the movement if stock return in Indonesia capital market, partial test is needed for all factors in all models. The result of partial test from all factors in all models show the same results that by using the overall model test but still there is not any variable at all in all model that has

impact on stock return movement in Indonesia Capital Market. The result of partial test can clearly be seen in Partial Test Table. All factors from all models has not any significant value, less than 0.05. it shows that there is none of risk factors of macroeconomic variables that has impact on the movement of stock return in Capital market of Indonesia.

The risk of Indonesia's macroeconomic variables is not a variable that influences the movement of stock returns in Indonesia capital market. In other words, investors in the Indonesia capital market do not pay too much attention to the risks of macroeconomic variables as risks that can affect the return of securities or portfolios they make. Investors prefer to choose other variables that is not included in the model to create investment decisions.

There are two things that can be consoderation by investors in deciding and making the stock portfolio in the Indonesia capital market out of the risk of macroeconomic variables. First, Firm specific. Investors are very likely to consider individual companies' performance rather than potential systematic risks that can affect the overall market. Second, choices that are random and irrational. When systematic risk does not take into account investors' decisions in the Indonesian capital market, it is likely that investors are not rational in deciding their securities or portfolios. Investors' decisions are more speculative so that environmental conditions are not the main consideration.

The investors consideration in deciding and determining the stocks that enter the portfolio will be greatly influenced by the level of knowledge. Investors with a broad level of knowledge will have a lot of consideration in choosing stocks that enter the portfolio. The broader the knowledge of investors, the more factors that will be taken into consideration include taking into account macroeconomic risk variables.

Therefore, it is quite understandable if in some developed countries with high levels of knowledge and education of investors, the risk of macroeconomic variables influences the movement of returns. Investors who have broad knowledge will be more rational by considering various aspects that can affect stock price movements. Conversely, investors with a low level of knowledge will be more speculative in choosing and determining their shares. Findings from Mukherjee and Naka [23] in Japan and Wongbangpodan Sharma [24] in five ASEAN countries have already proven this.

As a developing country with capital market players whose level of education is not as good as capital market players in developed countries, it is quite understandable if the Indonesian capital market players do not take into account systematic risk which is derived from macroeconomic risk variables. Indonesian capital market players are more likely to base their stock choices on expectations and speculations about the company's performance in the future. Therefore, Indonesian capital market investors often hunt for stocks that have just made an IPO because usually the new IPO share price will experience a substantial increase [33].

Tabel-3: Partial Test of Model

Model	Dependent Variables	Factor	Coef. B	t	Sig.
Model 1	Return of IHSG (Y1)	IPI Factor	0.000	0.076	0.940
		Inflation Factor	-0.008	-1.170	0.247
		Exchange Rate Factor	-0.006	-0.348	0.729
		Interest Rate Factor	-0.002	-0.168	0.867
Model 2	Stock Return of LQ45 (Y2)	IPI Factor	0.001	0.429	0.669
		Inflation Factor	-0.008	-1.064	0.292
		Exchange Rate Factor	-0.006	-0.132	0.895
		Interest Rate Factor	-0.001	-0.055	0.956
Model 3	Stock Return of Agriculture Sector (Y3)	IPI Factor	0.004	1.134	0.262
		Inflation Factor	-0.011	-0.839	0.405
		Exchange Rate Factor	-0.006	-0.109	0.914
		Interest Rate Factor	0.006	0.241	0.810
Model 4	Stock Return of Property and Real Estate (Y4)	IPI Factor	0.001	0.344	0.732
		Inflation Factor	-0.009	-0.693	0.491
		Exchange Rate Factor	-0.006	0.082	0.935
		Interest Rate Factor	-0.005	-0.213	0.832
Model 5	Stock Return of Financial Sector (Y5)	IPI Factor	-0.005	0.026	0.979
		Inflation Factor	-0.013	-1.307	0.197
		Exchange Rate Factor	-0.006	0.480	0.634
		Interest Rate Factor	-0.009	-0.475	0.637

Therefore, to predict stock returns in the Indonesian capital market, other variables outside the macroeconomic risk variables are needed. In addition, to predict stock returns in the Indonesia capital market can also use other models besides APT models with firm specific variables such as Fama and French Five Factors Model capital.

CONCLUSION

The APT model with the variables of macroeconomic risk cannot explain the movement of stock returns in capital market of Indonesia either by the return of composite index or by the return of sectoral stock indeces. This condition can indicate two possibilities that are considered by investors in choosing their securities. First, investors choose randomly or speculatively so that they do not consider rational variables. The second possibility is that investors who invest in capital market of Indonesia will more consider the performance of individual companies than conditions and systematic risks that have an impact on overall market conditions. Therefore, risky environmental conditions do not affect the investment decisions of investors in capital market of Indonesia.

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