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Macroeconomic Factors And Stock Returns In APT Framework

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ABSTRACT

This study was conducted to see the effect of the relationship between macroeconomic factors, economic growth, inflation rate and the exchange rate on stock returns in the Indonesian capital market approach Arbitrage Pricing Theory (APT). The data used in this research is secondary data from The Indonesian Capital Market Directory (ICMD) and the Central Bureau of Statistics from 2007 to 2014. The sampling technique used purposive sampling and the total sample of this research are 80 companies listed in The Indonesian Stock Exchange (BEI). The analysis technique used is ordinary least square regression - OLS. We hope this research can provide an overview of the market participants regarding the relationship between macroeconomic factors and stock returns in the Indonesia Stock Exchange from the framework of the Arbitrage Pricing Theory.

Keywords: APT, BEI, Macroeconomic Factors , Stock Returns

JEL Classification: G12, G00.

INTRODUCTION

Macroeconomic factors are one of indicators of a country to see or measure the economic development of a country. Stakeholders need information of the development of economic factors with the aim to make decisions related to economic policies such as fiscal and monetary policies, the movement of foreign exchange rates, stock movements and other economic policies. In addition to macroeconomic factors, knowledge is also required so that the investors can invest safely in a country. This is because in investing, investors must take into account the various risks that may occur, so as to minimize the risks investors should fully understand the possible risks, especially which regard to the risks caused by changes or fluctuations of macroeconomic factors.

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Arbitrage Pricing Theory (APT) is an equilibrium theory explicated by Ross (1976). Arbitrage Pricing Theory (APT) is an advanced theory of Capital Asset Pricing Model (CAPM) where, according to APT, systematic risk is not the only factor affecting the rate of return. There are other factors influencing the rate of return which is macroeconomic factors.

Roll and Ross (1980) explain that there are three treatments to test the APT in relation to the expected return, i.e. : Roll and Ross (1980) explain that there are three treatments to test the APT and the expected return, namely: (a) the relationship APT to return, (b) determining the correlation between residual, and (3) consider the difference between the factor structure of the various securities.

Unlike the single factor, CAPM is used to estimate the systematic risk of investment, APT can use a single factor, the market portfolio, and a multifactor model to see the effect on stock returns. However, one major limitation of APT is the fact that the magnitude of the factor or index model is not known. Hence, it is necessary to test through statistical analysis or economic (Benakovic and Posedel, 2010).

In the context of multi APT explained if an investor to diversify a stock or portfolio well, then the residual ratio will be close to zero and only the systematic risk that is relevant, where the sensitivity of the stock or portfolio asset returns A and Bis represented by the factors of the respective Bia and Bib the respective portfolios. This condition occurs, because the investor has an interest in the expected rate of return and risk. Therefore multifactor APT is an extension of the specification APT involving three or more factors.

Herwany, Omar, Meera and Febrian (2014) describes the results of their research in Indonesia that APT is not enough to determine the factors which are consistently included to estimate the stock price. That is because APT still showed some significant drawbacks, especially in dealing with economic change and economic characteristics are different across the country. Differences in economic characteristics can explain the variations in results related research as a study that found a positive relationship between return and risk in an economy, while the same study conducted in other countries with research results revealed no significant relationship between return and risk.

Indonesian macroeconomic conditions in 2014 slowed quite sharply, as seen from the decline in economic growth in Indonesia at 5:21% from the previous period at 5.72%. This decrease was caused by the limited consumption of government for their austerity budget that investment activity is limited. While inflation has increased 8.2% from the previous period. At the same time the exchange rate to depreciate against the US dollar by 1.8%. This is due to the US economic recovery, the dollar needs to rise at the end of the year from local companies as well as the flow of funds related to the sale of bonds.

Based on the description of this study wanted to see the relationship between macroeconomic and stock returns and macroeconomic factors are more dominant in the context of APT from companies listed on the Indonesia Stock Exchange.

LITERATURE REVIEW

Using the excuse of arbitration shows that the market is efficient, the expected result is a linear combination of each factor beta (Morel, 2001). Risks associated with certain securities derived from two sources of risk. The first source of risk is macroeconomic factors affecting all securities. Influence of macroeconomic factors includes market overall assets that cannot be diversified. The second source is the element of idiosyncratic risk. These elements are unique for each securities and according to APT, the portfolio can be diversified.

Chen, Roll and Ross(1986) used a variable inflation, interest rate, long-term government debt, the index of industrial production, consumption, prices of oil, low-grade bonds, equally with equities, and value-weighted equities. Most of the macro variables have a significant influence on stock returns. Additionally, the return of shares affected by economic news thatis systematically measured as an innovation in the identified variables and can be achieved through financial theory is simple and intuitive.

Cheong (1991) used macroeconomic factors such as; index of labor cost per unit of output, producers, inventory indexes, producers shipments indexes, bond premium, the wholesale price index, wholesale and retail trade indexes, claims of government, monetary deposits in deposit banks, yields of corporate bonds. Cheong revealed the stock becomes more sensitive to macroeconomic factors in the Korean stock market.

Chen and Jin (2004) tested the robustness of APT with the aim to investigate and determine the appropriate balance models using some of the macroeconomic factors, i.e. interest rates, expected inflation, unexpected inflation changes, the industrial production index. The empirical results show that the excess rates of returns can be explained by the previously expected inflation, unexpected premium prior periods, changes in the interest rate structure, seasonal dummies, and the market return of the previous period.

Paavola (2006) APT test the efficiency of the capital market of Russia. This study uses macroeconomic variables; money supply, inflation, oil prices, exchange rates, and production industry see the effect of the systematic risk of the return on the capital market of Russia. Results Paavola study (2006) revealed that the macroeconomic variables used could explain the excess return on the capital market of Russia.

While Tursoy, Gunsel and Rjoub (2008) conducted a study on the Turkish stock market. Macroeconomic variables used are 13 variables: Money Supply (M2), Industrial Production, Oil Prices, Consumer Price Index, Import, Export, Gold Prices, Exchange Rate, Interest Rates, Economic Growth, Foreign Reserve, Unemployment Rate and Market Pressure Index in 11 sectors in the Turkish stock market. They found that the impact of macroeconomic variables on the portfolio return and the results of the regression analysis did not have a significant impact on stock returns in the stock market of Turkey. This is because the impact of macroeconomic variables on the portfolio in each industry is different, where there are macroeconomic variables that have a positive impact and some have a negative impact.

Benakovic *et al.,* (2010) conducted a study on the Croatian capital market with the aim to see the relationship between changes in macroeconomic factors, i.e; inflation, industrial production, interest rates, market indices and oil prices and the stock return and observe the sensitivity of asset returns as a function of one or more macroeconomic factors. The results of

the study are consistent with Chen *et al.,* (1986) using macroeconomic factors which indicate a very high level of significance with stock returns in the Croatian capital market.

Herwany *et al.,* (2014) examined the macroeconomic factors that can be used as a basis for determining the return and at the same time to minimize the risk, as in a previous study using the model CAPM, APT and multifactor. This study focuses on the combination of the most significant variable in determining stock returns in Indonesia. From the study Herwany *et al.,* (2014) found that APT is more effective in explaining the relationship of risk and return than the CAPM. To the use of variable market capitalization, the consumer price index unexpectedly, interest rate risk premium has contributed in affecting change in the excess return of the portfolio.

Tandiontong *et al.,* (2015) conducted a study using macroeconomic factors such as; inflation, interest rate, the rupiah, return of capital markets of the world, world inflation, interest rates and the exchange rate of the world. The results of the study Tandiontong *et al.,* (2015) found the volatility of stock returns across sectors have differences before the economic crisis, its implications investors tend to have a different perception of and response to sectoral stocks. In addition Tandiontong *et al.,* (2015) revealed that the CAPM model is more valid than the APT multifactor in explaining the variation return sectoral stocks because of variations in return generated can only be explained by a single factor, namely the market risk premium. While Kisman *et al.,* (2015) found that variables excess return has a positive and significant impact on stock returns. It is clear that the higher the excess return, the higher the market share and the market return is more confident about the prospects of companies so attractive for investors to invest.

Of the various empirical studies found different results between one country and another. It is caused by several factors, among others; (1) the impact of macroeconomic factors on return shock produces positive and negative influences caused by the differences in the sensitivity of macroeconomic factors in return; (2) differences in the level of market efficiency between developing and developed countries. In other words the implications of APT in an effective country, but in other countries the implications APT ineffective.

Table 1. Macroeconomic Variables in testing APT

GDP	Tursoy (2008), Jecheche (2008), Kisman (2015)
Inflation	Chen,Roll & Ross (1986), Chen & Jin (2004), Paavola (2006), Benakovic &Posedel (2010), Iqbal *et al.,* (2012), Herwany *et al.,* (2014), Tandiontong *et al.,*(2015)
Exchange Rate	Paavola (2006), Tursoy (2008), Iqbal *et al.,* (2012), Herwany *et al.,* (2014), Tandiontong *et al.,* (2015)
Interest Rate	Chen,Roll & Ross (1986), Tursoy (2008), Benakovic & Posedel (2010), Herwany *et al.,* (2014), Tandiontong *et al.,* (2015)
Industrial Production Index	Chen, Roll & Ross (1986), Chen & Jin (2004), Paavola (2006), Tursoy (2008), Benakovic & Posedel (2010),

Based on the literature review of macroeconomic factors in the context of the research hypotheses of this study are, as follows:

H_1: GDP has a positive influence on stock returns
H_2: Inflation has a positive influence on stock returns
H_3: Interest rates have a positive influence on stock returns
H_4: The exchange rate has a positive effect on stock returns

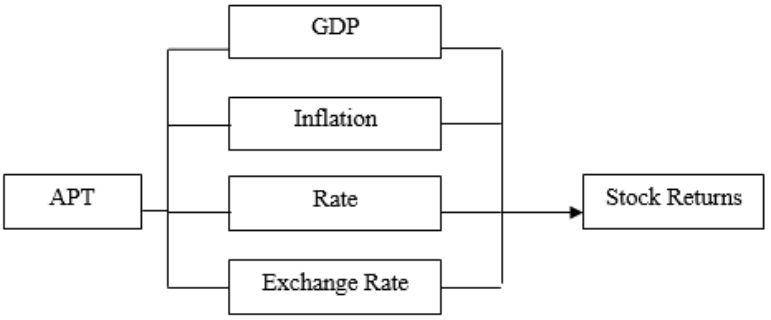

Figure 1. Research Framework

DATA AND METHOD

The object of this research is macroeconomic factors and the level of stock returns. The unit of analysis of this research is manufacturing companies listed in Indonesia Stock Exchange (BEI) during the study period from January 2007 - December 2014. The samples were taken using purposive sampling. Thus, companies that meet the criteria for the determination of the sample in this study were 80 companies listed on the Indonesia Stock Exchange.

Source data used are secondary data, which includes data of annual financial firms listed in Indonesia Stock Exchange period January 2007 - December 2014, obtained from the Indonesian Capital Market Directory (ICMD). Data collection research using data time series and cross-section during the study period January 2007 - December 2014.

Table 2. Macroeconomic Factors Used In Analysis

Variable	Indicator	Measurement	Scale
Economic Growth	GDP	$\frac{GDP_t - GDP_{t-1}}{DP_{t-1}}$	Ratio
Inflation	Consumer Price Index	$\frac{IHK_t - IHKt\text{-}1}{IHK_{t-1}}$	Ratio
Interest Rate	SBI 1/ Month	$\frac{SBIt}{12}$	Ratio
Exchange Rate	Rp / USD	$\frac{Rpt - Rp_{t-1}}{Rp_{t-1}}$	Ratio
Stock Return	Stock Price	$\frac{Pt - P_{t-1}}{P_{t-1}}$	Ratio

The APT model given by;

$$R_{it} = \alpha 0 + \beta_1 GDP_{it} + \beta_2 INF_{it} + \beta_3 IR_{it} + \beta_4 EXRATE_{it} + \varepsilon_{it}$$

Where:

R_{it}	: stock *return*
i	: *cross section*
t	: *time series*
α_0	: constanta
$ß_1 GDP_{it}$	: sensitivity of stock i to annual change in GDP
$ß_2 INF_{it}$	: sensitivity of stock i to annual change in inflation
$ß_3 IR_{it}$	: sensitivity of stock i to annual change in interest rate
$ß_4 EXRATE_{it}$	: sensitivity of stock i to annual change in exchange rate
ε_{it}	: *error*

The data analysis method was in two stages, i.e. time series regression between macroeconomic factors and stock returns to estimate the beta value of each of macroeconomic factor. The second stage was with a cross-section regression between the beta value of each macroeconomic factor with an average return of each stock.

RESULT AND DISCUSSION

Before performing regression testing to all data stationary macroeconomic variables. The purpose of testing is to determine which variables are used has been stationary or not. The stationary test results as shown in Table 3 below ;

Table 3. Unit Root Tests

Macroeconomic Factors	Unit Root Tests						Stationary
	Level			1st Difference			
	ADF	Critical Value at 1% of sig.level	PROB	ADF	Critical Value at 1% of sig.level	PROB	
GDP	-4.680947	-3.493747	0.0002				Level
Inflation	-8.059961	-3.493129	0.0000				Level
Interest Rate	-2.281387	-3.493129	0.1799	-4.542592	-3.493129	0.0003	1st Difference
Exchange Rate	-4.673835	-3.493747	0.0002				Level

Source: Result Analysis

Stationarity test results on macroeconomic factors: for GDP ADF -4.680947 value greater than 1% critical value is -3.493747, means that GDP data have been already stationary at the current level. Inflation has -8.059961 ADF values greater than 1% critical value is -3.493129, meaning inflation data were already stationary at the current level. Interest rates have -2.193431

ADF values smaller than 1% critical value is -3.493129 should be done at the level of the unit root test first difference. Based on the testing of two values ADF -4.649932 interest rate greater than 1% critical value is -3.493129 means the data rate is already stationary at first difference current level. Value ADF -4.673835 rate greater than 1% critical value of -3.493747 means of data exchange has been already stationary at the current level.

The results of the analysis found that the rate of return of each stock varies. The difference between the returns of these varied due to the share price of each company have differences and characteristics of each company. Time series regression analysis conducted found beta respective macroeconomic factors are as follows: (a) beta GDP: a large part of the company's stock value associated beta GDP positive (significant / insignificant) with stock return. The beta value of GDP ranging between -0.005501 to 0.388654. This means that the GDP beta value of each company's share is listed on the Indonesia Stock Exchange is not sensitive to GDP factor in the overall GDP beta value smaller than 1 (defensive stocks) ; (b) beta inflation: most of the inflationary beta value of shares of companies listed on the Stock Exchange had a negative relationship (significant / insignificant) with stock return. The inflation beta value has a value less than 1. This indicates that the majority of shares in the Indonesian Stock Exchange is not overly sensitive to changes in inflation ; (c) beta interest rate: the average interest rate the beta value of each share has a positive and negative values, but the overall value is still lower than 1. This indicates that the beta of interest rate is too sensitive to the return of the shares of listed companies in the Indonesia Stock Exchange ; (d) beta exchange rate: some stock returns have a negative beta value exchange rate (significant / insignificant) on stock returns. Indicates that the beta value of the exchange rate is not so sensitive to the return of each stock.

The regression analysis of cross section are as follows: (a) GDP has a significant positive relationship and not to return, accept the hypothesis H_1, (b) inflation has a negative correlation and no significant effect on stock returns reject the hypothesis H_2, (c) the interest rate has a positive and significant correlation to stock return, accept the hypothesis H_3, (d) the exchange rate has a positive and significant relationship to the level of the stock return receive hypothesis H_4, as shown by table 4:

Table 4. Cross Sectional Result

Variable	Coef	Prob
GDP	0.006377	0.5080
Inflation	-0.038748	0.4982
Rate	0.017444	0.0305**
Exchange Rate	0.433215	0.0091***

Note : ***,** Significant Level at 1%, 5%

The cross sectional regression analysis showed that macroeconomic factors are used as an indicator to see the relationship with stock return rate of 80 companies during the research period January 2007 - December 2014 no dominant macroeconomic factors affecting the rate of return from shares of companies listed on the Indonesia Stock Exchange. This is caused by the global economic crisis that affected the Indonesian economy as reflected by macroeconomic indicators. The results showed in 2007-2008 Indonesia is experiencing a crisis impacting the overall macroeconomic conditions.

GDP has decreased, while at the same time, inflation had fluctuated so that the purchasing power of the general public. In addition to the policy of the central bank with regard to the determination of interest rates that impact the business. These conditions impact on the market so as to make the most of the investors reacted negatively to the economic development of Indonesia, which ultimately result in low stock returns generated by the company.

After 2008, the economic development of Indonesia began to experience growth as GDP has increased, the policy-setting interest rate by the central bank with the aim of attracting investors as well as the penetration of the rupiah against the US dollar began to improve but still volatile making participants responded positively to the condition that impact on increasing the volume of trade in the Indonesia Stock Exchange, but not so with inflation where the purchasing power is still low, this is due to price increases in administered prices, the increase in subsidized fuel prices as well as the development of volatile food prices are not stable.

The results also show that inflation is a factor that affects the movement of the stock price as it relates to people's purchasing power so the impact on the value of the company, which in 2013 and 2014 inflation increased by 0.95% compared to 2012. Depreciation of the rupiah against the US dollar contributed to cause inflation in Indonesia. As a result of these conditions investors will reconsider the investment made in Indonesia.

The results of this study are consistent with research conducted by Chen *et al.,* (1986), Tandiontong *et al.,* (2015). While interest rates are part of the monetary policy is a significant positive effect on stock returns. An increase in interest rates has a positive impact and a negative return generated. For companies that want to expand the business required additional funds from their own capital or from other party lines. As a result, the company will bear the cost burden of interest on these loans so the impact on net profit obtained by the company. On the other hand, with the rise in interest rates can attract the flow of foreign funds into Indonesia.

While the exchange rate variable shows significant positive effect on stock price movements that have an impact on the return of the company. This condition is caused by the exchange rate depreciated against the US dollar. This is indicated by the results of statistic where the exchange rate has a positive effect on stock returns, because one hand can increase exports, but on the other hand reduce imports. These results are consistent with research conducted by Tandiontong *et al.*, (2015).

The results of this study indicate that not all the results together with previous studies and macroeconomic factors are used as an indicator of research. This is because the data used and the time and place of research and different methods so that the results were different. Another finding of this study is the APT does not explicitly explain the macroeconomic factors that most affect the rate of return, because all macroeconomic factors are interrelated to one another.

CONCLUSION

The level of stock returns of companies listed on the Indonesia Stock Exchange differences on macroeconomic factor beta value, i.e. GDP, inflation, interest rate and exchange rate where there is a return of stocks that have a high level of sensitivity to one of the macroeconomic factors, but on the other hand there is the stock return which has a low sensitivity to other macroeconomic

factors. This is caused by their surprise both positive and negative values of macroeconomic factors on stock returns. GDP has a positive relationship with stock returns, inflation has a negative correlation with stock returns, interest rates have a positive relationship with stock returns, exchange rates had a positive relationship with stock returns. Market conditions in Indonesia is strongly influenced by macroeconomic factors, especially with regard to interest rates and exchange rates. Investors will invest in a country if that country stable macroeconomic conditions. Model APT one factor is valid more than multi-factor APT.

For further research may consider macroeconomic factors such as the money supply, oil prices and non-macroeconomic factors such as the political, security, socio-cultural so as to provide a clearer picture according to the conditions existing empirical results obtained so that it can be more effective and significant.

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