



# Moderation Of Percapita Income On Macroeconomic Effects On Stock Return

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## Abstract

Arbitrage Pricing Theory is a theory that has been tested by various researchers, the majority of the results show a similarity, namely asset pricing can be predicted by looking at macroeconomic indicators. The ever-changing macroeconomy results in investors' profits in making investments also changing, on that basis it is necessary for investors to properly adjust to macroeconomic conditions in making investment decisions. Interestingly, empirically it shows that there are differences in patterns of influence in emerging market countries and in developed countries, this encourages researchers to prioritize the moderating variable, namely per capita income. This study uses macroeconomic data, per capita income, and stock returns in Indonesia during 1998-2020. The results of the study show that with moderation of per capita income there is an increase in the effect of macroeconomics on stock returns. This indicates that investors also need to study the development of per capita income in Indonesia, as an effort to increase optimal returns.

**Keywords:** Income per capita; Macroeconomics; Stock returns.

## Introduction

Arbitrage Pricing Theory (APT) is an asset pricing model based on the idea that the return on an asset can be predicted using the relationship that exists between the same asset and risk factors in general. The APT theory shows that there is a macroeconomic influence on stock returns. This theory has been widely used in research, such as the latest research in 2021, conducted by Dada, et.al (2021) in Nigeria; Marane & Asaad (2021) on India; Moradi, et.al (2021) in Iran; Bui & Nguyen (2021) in Vietnam; Gu, Zhu, & Wang (2022) in China. This indicates that the APT theory is an "undisputable" theory indicating that there is a macroeconomic influence on stock returns. However, after researchers conducted further investigations, there was an interesting pattern of macroeconomic influences on stock returns

in developed countries with stock returns in emerging market countries, in which research in developed countries showed consistency, while research in emerging market countries showed the effect macroeconomics that show different patterns of stock returns. In general, the results of research that investigates the relationship between macroeconomic variables and the stock market in emerging market countries, such as those conducted by Marane, B., & Asaad, Z. (2021) in India; Moradi (2021) in Iran; Bui & Nguyen (2021) in Vietnam; Gu, Zhu, & Wang (2022) in China; Naseer, et.al (2021) in Pakistan; Ceylan (2021) in Turkey; Gautam & Gautam (2021) in Nepal.

The factors that affect stock returns are macroeconomic factors that come from economic growth, interest rates, currency exchange rates, inflation rates, and

unemployment rates. Macroeconomic factors come from broad economic problems, one of which is inflation (Sudarsono and Sudiyatno, 2016). Inflation has a large impact on a national economy. High inflation will push the price of production materials to become more expensive, causing high production costs to be paid by companies. Declining purchasing power and high production costs will indirectly affect capital market conditions.

The effect of macroeconomics on stock returns shows a different research pattern. Based on research by researchers regarding the macroeconomic effect on stock returns in emerging market countries, it shows that the pattern in emerging market countries is that there are different patterns of macroeconomic influence on stock returns. The inflation variable has an influence on stock returns in the research of Ugur and Ramazan (2005); Nasir and Mizra (2011); Muchiri (2012); Shafana (2014); Okech and Mugambi (2016); Lindayani and Dewi (2016); and Bhattarai (2018). Meanwhile, the results of Murungi's research (2014) show that inflation has no effect on stock returns.

Macroeconomic factors, such as interest rates also have an influence on stock returns found in research by Okech and Mugambi (2016); Murungi (2014); Muchiri (2012); Nasir and Mizra (2011); Jefferis and Okeahalam (2000). The results of this study indicate that consistently interest rates have an influence on stock returns in emerging market countries. Research in non-emerging market countries shows that interest rates have a large impact on investors to invest their capital, interest rates have an influence on stock returns. Tarun K. Mukherjee and Atsuyuki Naka (1995) conducted research in

Japan, the results showed that interest rates have a long-term effect on stock returns.

Research in emerging market countries, conducted by Wongbangpo and Sharma (2002) in Indonesia, Malaysia, the Philippines, Singapore and Thailand, the results showed that interest rates have a long-term negative effect on stock returns, except for Indonesia and Malaysia which have a positive effect. Ruslihati and Fathoni (2011) conducted research in Indonesia, the results showed that interest rates have an effect on stock returns. Ozlen and Ergun (2012) conducted research in Turkey, the results showed that interest rates have an effect on stock returns.

Meanwhile, other studies have shown that interest rates have no effect on stock returns (Andes & Prakoso, 2017; Dwita & Rahmidani, 2012; Kewal, 2012). On that basis, it shows that the pattern of the relationship between interest rates and stock returns in developed countries shows a consistent influence between inflation and stock returns, this can be seen from research in the United States, Norway, Greece, Singapore and Japan. Meanwhile, studies in emerging market countries show that there are differences in the pattern of the influence of interest rates on stock returns.

Wongbangpo and Sharma (2002) conducted research in Indonesia, Malaysia, the Philippines, Singapore and Thailand, the results showed that the exchange rate has a negative long-term effect on stock returns, except for Indonesia and Malaysia which have a long-term positive effect. Riantani and Tambunan (2013) research results show that the exchange rate has a negative effect on stock returns. The latest research in 2019 conducted by Mahpudin (2020) who

conducted research in Indonesia, India, China, South Korea, Taiwan and Brazil shows that the exchange rate has a long and short term negative effect on stocks in emerging market countries.

The difference in the pattern of this research with research in other emerging market countries is the exchange rate variable. Okech and Mugambi (2016) and Muchiri (2012) conducted research in Kenya. Shafana (2014) conducted research in Sri Lanka and Bhattarai (2018) conducted research in Nepal which showed that the exchange rate had an effect on stock returns. Meanwhile, Murungi (2014) conducted research in Kenya which showed the exchange rate had no effect on stock returns. This pattern indicates that there are differences in the pattern of the relationship between exchange rates and stock returns in emerging market countries, this is because many emerging market countries are filled with foreign investors.

The pattern of the relationship between the exchange rate and stock returns in emerging market countries shows a consistent influence between the exchange rate and stock returns even though there are differences between positive and negative, this can be seen from studies in Ghana, Brazil, India, China, South Africa, Nigeria, Pakistan, Malaysia, Turkey, India, Philippines and Thailand.

According to Prasetyo (2009) the most commonly used measure in studying the type of money supply and its impact on the economy in most countries in the world, including in Indonesia, is the type of  $M_1$  and

$M_2$ . Forson and Janrattanagul (2014) conducted research in Thailand, the results showed that the money supply has an influence on stock returns.

Aigbovo and Izekor (2015) conducted research in Nigeria, the results showed that the money supply has a long-term effect on stock returns. Ayuba, Balago and Dagwom (2018) conducted research in Nigeria, the results of which show that the money supply has a negative effect on stock returns. The latest research in 2019 conducted by Mahpudin (2020) who conducted research in Indonesia, India, China, South Korea, Taiwan and Brazil shows that the money supply has a long and short term negative effect on stocks in emerging market countries.

Empirically, there are differences in research results even though the variables studied are the same, this is due to many factors such as different time spans, different research sector focuses, research differences between emerging market countries and developed countries, as well as the influence of economic macroeconomic factors on stock returns. Based on previous research which showed differences in research results, the scope of this research will be further reduced in an effort to provide coherent research results.

An important aspect in testing the established APT is to see the effect of moderation, in research using per capita income as a moderating variable. The following is data on the movement of per capita income.

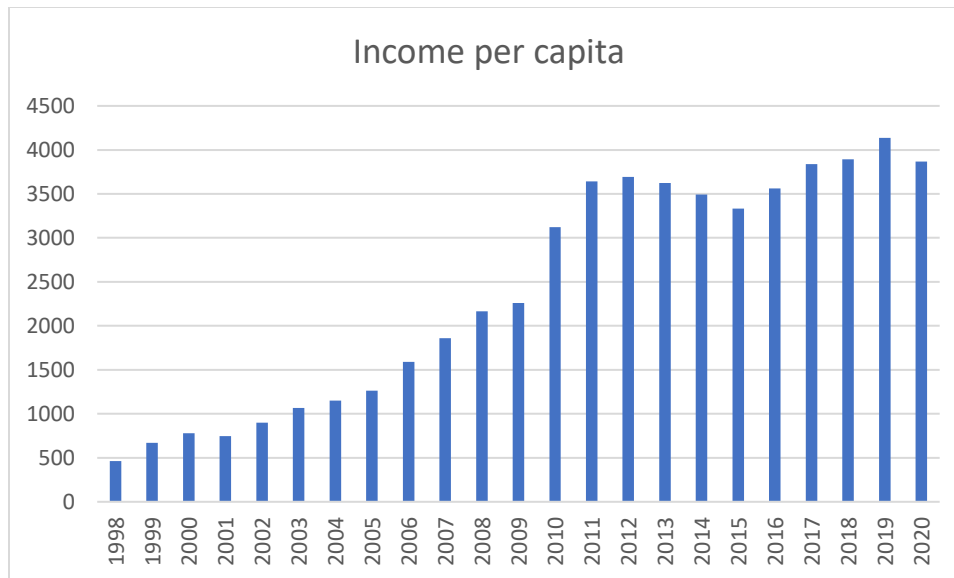


Figure 1. Per Capita Income Data in Indonesia

This study focuses on examining the moderating effect of per capita income on macroeconomic effects on stock returns. Therefore, the factors that influence people's welfare are income per capita. According to Sukirno (2004) said that per capita income is the average income of the population of a country or region in a certain period which is usually one year. Per capita income is a very important factor in determining people's welfare. If the higher the per capita income of a country or region, the higher the level of welfare of its people and vice versa, if the lower the per capita income of a country or region, the level of welfare of its people will also be low.

### Method

In this study the authors used an associative descriptive approach because there are variables to be examined and the relationship is to present a structured, factual, and accurate description of the facts and the relationships between the variables studied.

The objects in this study are macroeconomic factors as the X variable, per capita income as the M variable and stock returns as the Y variable.

The population in this study are companies that are included in the Indonesia Stock Exchange and data on inflation, exchange rates, interest rates, money supply and per capita income are obtained from the exchange website and the central bank. The sample technique used in this study is a saturated sample, which means that all populations are used as the research sample. The samples used in this study are data on inflation, exchange rates, general interest rates, money supply and per capita income during 1998-2020. The data test uses classical assumptions, namely normality, heteroscedasticity, multicollinearity, linearity, and utocorrelation tests. Then a test was carried out using moderation of per capita income on the effect of macroeconomics on stock returns.

## Results and Discussion

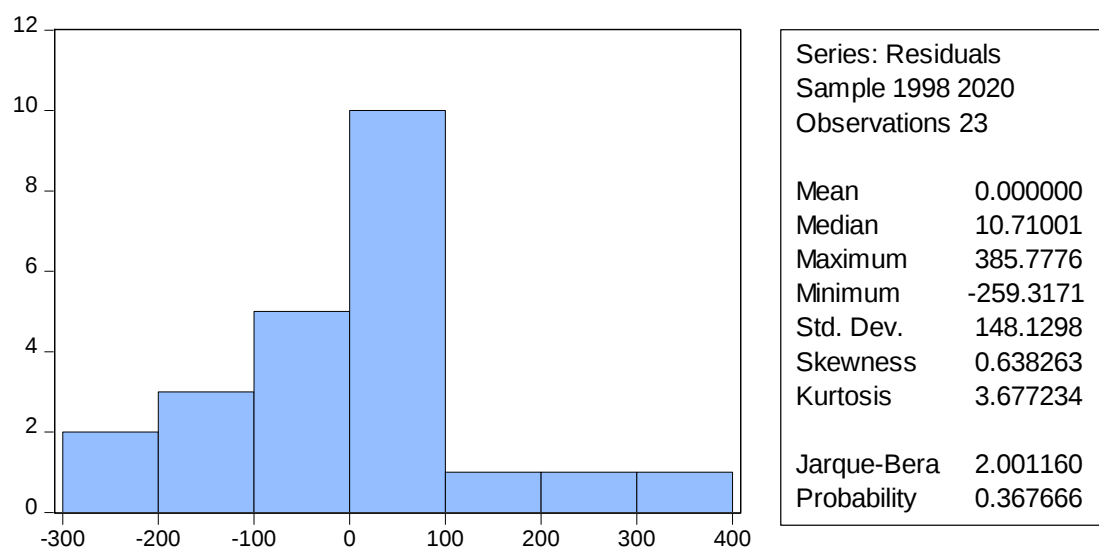


Figure 2. Normality Test

The decision is whether or not the residuals are normally distributed by simply comparing the calculated JB (Jarque-Bera) Probability value with an alpha level of 0.05 (5%). If Prob. JB count is greater than 0.05, it can be concluded that the residuals are normally distributed and vice versa, if the

value is smaller then there is not enough evidence to state that the residuals are normally distributed. Prob Value JB count of  $0.367666 > 0.05$  so it can be concluded that the residuals are normally distributed, which means that the classical assumptions about normalcy have been fulfilled.

Table 1. Multicollinearity Test

| Variable | Coefficient<br>Variance | Uncentered<br>VIF | Centered<br>VIF |
|----------|-------------------------|-------------------|-----------------|
| C        | 0.022639                | 190.4482          | NA              |
| INF      | 1.96E-05                | 70.63325          | 3.467584        |
| KURS     | 3.58E-10                | 255.8915          | 1.439953        |
| SBI      | 4.11E-05                | 129.2044          | 4.537709        |
| JUB      | 3.62E-09                | 33.30657          | 3.723334        |

The results of the multicollinearity test can be seen in the Centered VIF column table. VIF values for all variables are not more than 5, so it can be said that there is no multicollinearity in the two independent

variables. Based on the classical assumptions of linear regression with OLS, a good linear regression model is free from multicollinearity. Thus, the above model is free from multicollinearity.

Table 2. Heteroscedasticity Test

|                     |          |                     |        |
|---------------------|----------|---------------------|--------|
| F-statistic         | 5.399422 | Prob. F(4,6)        | 0.2024 |
| Obs*R-squared       | 10.05683 | Prob. Chi-Square(4) | 0.2395 |
| Scaled explained SS | 5.173207 | Prob. Chi-Square(4) | 0.6700 |

The decision whether or not heteroscedasticity occurs in the linear regression model is by looking at the Prob Value. F-statistic (F count). If the Prob. F count is greater than the alpha level of 0.05 (5%) then H0 is accepted which means there is no heteroscedasticity, whereas if the Prob.

F count is smaller than the alpha level of 0.05 (5%) then H0 is rejected which means there is heteroscedasticity. Prob Value F count of 0.2024 is greater than the alpha level of 0.05 (5%) so, based on the hypothesis test, H0 is accepted, which means there is no heteroscedasticity.

Table 3. Linearity Test

|                  | Value    | df     | Probability |
|------------------|----------|--------|-------------|
| t-statistic      | 0.149933 | 5      | 0.8867      |
| F-statistic      | 0.022480 | (1, 5) | 0.8867      |
| Likelihood ratio | 0.049345 | 1      | 0.8242      |

| F-test summary:  |            |    |              |
|------------------|------------|----|--------------|
|                  | Sum of Sq. | df | Mean Squares |
| Test SSR         | 3.51E-05   | 1  | 3.51E-05     |
| Restricted SSR   | 0.007846   | 6  | 0.001308     |
| Unrestricted SSR | 0.007810   | 5  | 0.001562     |

| LR test summary:  |          |
|-------------------|----------|
|                   | Value    |
| Restricted LogL   | 24.24305 |
| Unrestricted LogL | 24.26773 |

If the Prob. F count is greater than the alpha level of 0.05 (5%) then the regression model meets the assumption of linearity and vice versa, if the value of Prob. F count is less than 0.05, so the model does not meet the assumption of linearity. Prob Value F count

can be seen in the F-statistic row of the Probability column. In this case the value of 0.8867 is greater than 0.05 so it can be concluded that the regression model meets the assumption of linearity

Table 4. Autocorrelation Test

|               |          |                     |        |
|---------------|----------|---------------------|--------|
| F-statistic   | 2.334362 | Prob. F(2,4)        | 0.2129 |
| Obs*R-squared | 5.924282 | Prob. Chi-Square(2) | 0.1517 |

Prob Value F(2.4) of 0.2129 can also be referred to as the calculated F probability value. Prob Value F count is greater than the

alpha level of 0.05 (5%) so, based on the hypothesis test, H0 is accepted, which means that there is no autocorrelation.

Table 5. Panel Data Test

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| C                  | -0.213131   | 0.150462              | -1.416507   | 0.0009   |
| INF                | -0.005140   | 0.004424              | -1.161829   | 0.0422   |
| KURS               | 1.01E-05    | 1.89E-05              | 0.534919    | 0.0167   |
| SBI                | 0.008162    | 0.006411              | 1.273098    | 0.0005   |
| JUB                | 6.63E-05    | 6.01E-05              | 1.101627    | 0.1203   |
| R-squared          | 0.772389    | Mean dependent var    |             | 1423.545 |
| Adjusted R-squared | 0.752576    | S.D. dependent var    |             | 462.5646 |
| S.E. of regression | 44.33591    | Akaike info criterion |             | 36.65701 |
| Sum squared resid  | 1724.579    | Schwarz criterion     |             | 13.78767 |
| Log likelihood     | -25.92330   | Hannan-Quinn criter.  |             | 13.72540 |
| F-statistic        | 18.25669    | Durbin-Watson stat    |             | 2.456926 |
| Prob(F-statistic)  | 0.000093    |                       |             |          |

Based on these data, it shows that partially inflation has a negative effect on stock returns during the crisis in Indonesia. The exchange rate has a positive effect on stock returns during the crisis in Indonesia. Interest rates have a positive effect on stock returns during the crisis in Indonesia. The money supply has no effect on stock returns during the crisis in Indonesia. Per capita income has

a positive effect on stock returns during the crisis in Indonesia. Based on the Prob (F-statistic) it shows a value of 0.000093 which is less than 0.05, meaning that macroeconomic variables have an effect on stock returns. Meanwhile, this research model contributes to changes in stock returns by 77%.

Table 6. Moderation Test

| Variable | Coefficient | Std. Error | t-Statistic | Prob.  |
|----------|-------------|------------|-------------|--------|
| C        | 0.311985    | 0.972242   | 0.320892    | 0.0023 |
| INF      | 0.016019    | 0.019683   | 0.813856    | 0.0051 |
| KURS     | -3.02E-05   | 9.57E-05   | -0.315602   | 0.0054 |
| SBI      | -0.030383   | 0.033912   | -0.895945   | 0.0349 |
| JUB      | 7.41E-05    | 6.62E-05   | 1.119957    | 0.0640 |
| GNI      | -0.001112   | 0.001795   | -0.619304   | 0.0470 |

|                    |           |                       |           |        |
|--------------------|-----------|-----------------------|-----------|--------|
| INF*GNI            | -6.21E-05 | 4.93E-05              | -1.259642 | 0.0324 |
| KURS*GNI           | -4.37E-08 | 1.29E-07              | -0.339313 | 0.0338 |
| SBI*GNI            | 0.000120  | 9.95E-05              | 1.207268  | 0.0298 |
| JUB*GNI            | 7.86E-07  | 8.52E-07              | 0.922492  | 0.0132 |
|                    |           |                       |           |        |
| R-squared          | 0.804203  | Mean dependent var    | 1244.645  |        |
| Adjusted R-squared | 0.742033  | S.D. dependent var    | 323.5346  |        |
| S.E. of regression | 134.4595  | Akaike info criterion | 14.69931  |        |
| Sum squared resid  | 1501.197  | Schwarz criterion     | 14.08208  |        |
| Log likelihood     | -34.58462 | Hannan-Quinn criter.  | 15.97946  |        |
| F-statistic        | 8.048753  | Durbin-Watson stat    | 2.191102  |        |
| Prob(F-statistic)  | 0.000008  |                       |           |        |

Based on the results of the study indicate that per capita income is able to moderate the effect of inflation on stock returns in a negative direction. Per capita income is able to moderate the effect of the exchange rate on stock returns in a negative direction. Per capita income is able to moderate the effect of interest rates on stock returns in a positive direction. Per capita income is able to moderate the influence of the money supply on stock returns in a positive direction. This research model contributes to changes in stock returns by 80%. The test results show that per capita income is able to increase the macroeconomic effect on stock returns in Indonesia.

Comparison with previous research shows many similarities, Okech and Mugambi (2016) explored the impact of macroeconomic variables on stock returns of banks listed on the Nairobi Securities Exchange (NSE). The main economic variable considered for the analysis is per capita income. Empirical results show that per capita income has a significant impact at the 5% significance level.

Nauman Khan and Sharif Zaman (2012) examined the same research on the Karachi Stock Exchange (KSE) for the period 1998 to 2009 using multiple regression analysis with a fixed effects model. The results showed that

per capita income has a significant positive and the consumer price index has a significant negative impact on stock returns. Bhattarai (2018) tested the effect of company specific and macroeconomic variables on stock returns of commercial banks and insurance companies in Nepal showing that per capita income has an effect on stock returns. Outreville (1990) assessed the relationship between property liability insurance (general insurance) in gross domestic product and financial development. The results show that income in terms of per capita income and financial development has a significant contribution to the development of demand for property liability insurance in less developed countries.

Imam and Amin (2004) examined the relationship between the DSE stock index and a set of macroeconomic variables, namely per capita income. They find unidirectional causality from changes in per capita income to stock market returns. Jefferis and Okeahalam (2000) studied the relationship between stock prices and selected economic variables for South Africa, Zimbabwe and Botswana. For South Africa, they show that the stock market is positively influenced by real per capita income and the real exchange rate.

Each country uses certain economic instruments to measure the level of productivity and welfare, per capita income is one of them. In the economic context, per capita income is the amount of real money earned by individuals in a country and reflects how their economic activities are on a micro scale. On an international scale, per capita income is an indicator to determine the class of a country, whether it is a developed, upper middle class, lower middle class or underdeveloped country. Meanwhile on a national scale, the government can utilize per capita income data under various conditions.

Empirically, per capita income is an indicator or benchmark in measuring the level of social welfare in a country. There are several functions of per capita income for a country, namely: knowing the level of prosperity of the country & its people, as already explained that per capita income will display the results of the average income of the people of a country. Thus, the function of per capita income is to determine the level of prosperity of the country and its people. Because per capita income involves calculating people's income.

One component of the country's per capita income is through investments made in the capital market. The capital market plays an important role in driving a country's economic growth through investment in the capital market, because the capital market offers various instruments with various levels of risk and various returns. Increasing investment in the capital market is a measure of the smooth running of a country's economic activity.

The ability of per capita income as a moderation is because the function of per capita income is to measure the smooth

implementation of a country's economic activity. This is because a country's income cannot be separated from various economic activities. The existence of per capita income makes the state able to assess the results of economic activities that have been carried out. Per capita income also reflects the economic situation of the people and the country at a certain time, a country definitely needs information regarding the results of its activities and economic conditions. So that the function of per capita income is to reflect the economic situation of society and the country at a certain time. Because per capita income contains economic data to be analyzed in order to evaluate. Thus, the state is able to recognize the strengths and weaknesses of the country.

Per capita income can be the basis for future policy making, because one of the functions of per capita income is as a basis for future policy making. Because per capita income reflects the condition of the prosperity of the population. These results can be used by the government as material for consideration in making a decision. So that the state is able to implement policies according to conditions so as to be able to achieve economic goals.

The importance of per capita income in a country makes it have an important role as a moderator of the effect of macroeconomics on stock returns. Investors use the state of society's per capita income as a reference in buying or selling shares, because per capita income can change the views of the government, companies, and also investors in carrying out economic activities.

The results of this study were analyzed using the APT theory which explains the price at which a mispriced asset is expected to be so. It is often seen as an alternative to the Capital

Asset Pricing Model (CAPM), as APT has more flexible assumption requirements. While the CAPM formula requires the expected rate of return by the market, the APT uses the expected rate of return on risky assets and the underlying risk of a number of macro-economic factors. Arbitrage uses the Arbitrage Pricing Theory model to benefit by taking advantage of mispriced securities (Haritha & Rishad, 2020). A mispriced security will have a price that is different from the price predicted by the model in theory. By taking short positions on overpriced securities, while simultaneously taking long positions on portfolios using APT calculations, arbitrageurs are in a position to take theoretical risk-free profits.

According to Husnan (2005), "a share is a piece of paper that shows the right of the investor (ie the party who owns the paper) to obtain a share of the prospects or wealth of the organization that issues the security and various conditions that allow these investors to exercise their rights". Stocks are one of several alternatives that can be chosen to invest. Meanwhile, according to Jogiyanto (2000), shares are a sign of ownership of a company that represents management to run the company's operations. So shares are securities which are a sign of ownership of a person or entity in a company.

In this case, shares have the meaning as securities issued by a company in the form of a limited liability company (PT) or what is called an issuer. Stocks as an alternative investment media have the potential for greater profit and loss levels compared to other investment media in the long term. For that you need to learn the ins and outs of this stock investment first, so you can avoid unnecessary losses. As a potential investor, of course you want to have stocks with high

selling value (Chuke Nwude, 2012), therefore it is necessary to be careful so as not to suffer losses when investing.

Efforts that need to be studied by investors are to pay close attention to the state of per capita income which according to Sukirno (2004) says that the average income of the population of a country or region in a certain period, which is usually one year. Per capita income is calculated based on regional income divided by the total population. Per capita income is often used as a measure of the prosperity and level of development of a country or region.

According to Adjii, et al (2007) said that per capita income also has several benefits, including as an indicator of the welfare of the country, a standard for the growth of the country's prosperity, as a guide for the government in making economic policies, and a comparison of the level of prosperity between countries. The following is an explanation of each of the benefits of per capita income: a. The country's welfare indicator is the most reliable measure to see the level of welfare of a country. This is because per capita income includes the total population so that it can directly show the level of prosperity; b. The standard of growth of the country's prosperity. Income per capita is a general standard for comparing the level of prosperity or welfare of a country from year to year; c. As an investor for the government in making economic policies. Per capita income can be used as a guideline for the government in making economic policies because the government can monitor economic growth in society; and D. Comparison of the level of prosperity between countries. Income per capita is also commonly used as a comparison of the level of prosperity between one country and

another. By setting per capita standards, countries in the world can be grouped into low, middle, or high income countries.

## Conclusion

The contribution of per capita income to macroeconomic influences indicates that per capita income is able to strengthen macroeconomic effects on stock returns. Macroeconomic conditions that show changes make investors to consider the investment decisions to be taken. This indicates that APT is a theory that already has a strong correlation empirically in predicting asset pricing. This research contributes to the strengthening of APT, namely by observing per capita income in a moderation that can strengthen the macroeconomic effect on stock returns.

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