

# Equity Market Performances: Evidence from South East, South West, Central and North East Asia Regions

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## Abstract

This work takes a comprehensive look at the macroeconomics and equity market performances from the Asia perspective, using five indicators namely inflation rate (CPI), interest rate (IR), money supply (MS), exchange rate (ER), economic growth (GDP), against six equity market indexes of FBM KLCI (Malaysia), IDX (Indonesia), SENSEX (India), BIST-100 (Turkey), SSE (China), and Nikkei-225 (Japan) based on the framework of the Arbitrage Pricing Theory (APT). The annual data from 1988:2021 are sourced from World Bank, FRED of Federal Reserve Bank, and Central Bank Official website for selected countries. The analysis technique employed is Pooled Ordinary Least Square (POLS). The study established that all four variables which are CPI, IR, ER, and GDP are strongly significant with the actual direction in affecting the performances of six Asia stock exchanges. Our results confirm the economic theories and empirics that there are strong relationships between macroeconomic indicators and equity market performances in six Asia regions. The current study reveals new insights where a modified version of APT Model multi-factor is correctly specified when more than one variable is dominant, which suggests that all four independent variables are crucial in explaining the variation of the equity market performances in South East, South West, Central and North East Asia regions.

**Keywords:** Equity Market Performance, Arbitrage Pricing Theory, Macroeconomic Indicators, Pooled Ordinary Least Square, Asia Regions

## Introduction

The equity or stock market have served the wider economy and become a platform for generating long-term capital, as well as to stimulate the country's economic growth and prosperity. Healthy and well-performed equity market will contribute to economic development and increase savings Keswani (2019) as well as increasing a gross domestic product (GDP) growth rate. Based on CEO Magazine written by Papadopoulos (2020) on 17<sup>th</sup> February, "World's Best Countries to Invest in or do Business for 2020" is Singapore, while the other countries such as *Indonesia* is ranked the fourth, *India* is ranked the fifth, *Malaysia* is ranked the ninth, *Turkey* is ranked the twenty-fifth, *China* is ranked the thirty-first, and *Japan*

is ranked the thirty-second. Macroeconomic will have a major impact on the regional or national economy, hence they will have a tendency to affect the performance of equity market. Even the best country to invest is not exceptional from being affected by macroeconomic indicators. This statement is authenticated based on previous studies in few Asian countries like Malaysia, Indonesia, Korea, and Philippines (Hashim et al., 2018; Ho et al., 2018; Lee & Ryu, 2018).

The necessity to investigate the determinant of equity market in selected Asia regions is crucial because “well-performed stock market” is the main criterion for overall economic development, hence the government must consider a close monitor on its equity market to support economic development and to increase bank reserve. This study investigates the determinants of stock market performance in Asia-6 regions particularly in Malaysia, Indonesia, India, Turkey, Japan and China. These six countries are sampled since Malaysia-Indonesia, India-Turkey and Japan-China share ethnic similarities as well as mutual religious and diplomatic ties. For the diplomatic relations, this would be the 65<sup>th</sup> anniversary between Malaysia and Indonesia, being traditionally neighbouring countries in ASEAN with cordial relationship because they are stemmed from both proximity and kinship spirit. Meanwhile, between India and Turkey, they have had strong social and cultural connections since the early Middle Ages and have marked the 74<sup>th</sup> anniversary of bilateral relations this year. Finally, Japan and China are celebrating the 50<sup>th</sup> anniversary of the normalization of diplomatic relations between the two countries to meet the demands of a new era. Overall, the selection of these regions will represent their own sub-region such as Malaysia-Indonesia (South East Asia), India (South West Asia), Turkey (Central Asia), while China-Japan (North East Asia). Annual data between January 1988 and December 2021 were sourced from official platforms of World Bank, FRED of Federal Reserve Bank, and few data were taken from official website of each Central Bank for the selected countries. Our dataset took into consideration the Asian Financial Crisis 1998-99, Global Financial Crisis 2008-09, as well as COVID-19 Pandemic 2020-2021.

### **Literature Review**

Economic situation in every country is reflected by the performance of the stock exchange. Equity market is the financial domain because the performance of the stock market will measure the economic health of the country. Basically, the volatility of the stock market is caused by macroeconomic factors (Yu et al., 2018). Thereby, forecasting the trend of the stock market is important for risk management, asset allocation, and policy making. Policymaker will be able to reduce systematic risk by utilizing both the fiscal and monetary policy. Previous study corroborates that the stock markets and economy are influenced by movement of the macroeconomic variables (Kumar, 2013) and another study by Khan (2004) certify that the stock price respond to various macroeconomic factor in Pakistan.

Sometimes, stock price changes react contrary to economic conditions because the fluctuation of the stock market seem to be very erratic. This statement is true because most industries were badly affected in the past two years due to COVID-19 pandemic. The impact of the pandemic on the stock market is severe because it had forced the government to impose some restrictions such as banning the short-sales trading to reduce the risk of stock market crash, to curtail volatility, and to bring back the stability of the stock market itself (Nusantara, 2021). The spreading effect of lockdown caused by the pandemic is clearly

evident among Asian, European, and American stock markets (Anh & Gan, 2020). However, the influence of COVID-19 is felt differently across the countries. Some studies stated that the link between macroeconomic factors and equity market performance have been weakened (Barakat et al., 2015). Therefore, the researchers feel that it is interesting to explore further on the dynamic relationship between macroeconomic factors and equity market performance by taking into consideration the COVID-19 pandemic. Moreover, the possible impacts of this study are crucial towards investors (potential or existing), government, and industry. The fact is that poor performance of the stock market will directly affect the investors and the government, hence will indirectly affect the demand and production of the specific industry (Chauque & Rayappan, 2018). It is crucial to further investigate macroeconomic effects on stock market performance due to limited empirical researches in different Asia sub-regions.

An American economist, Stephen Ross (1976) had developed an Arbitrage Pricing Theory (APT) to clarify asset pricing (Connor & Korajczyk, 1986; Joseph, 2013). The APT is an extension of the Capital Asset Pricing Model (CAPM), whereby it describes that systematic risk is not the only factor affecting the rate of return and there are other factors to consider. The APT framework linking multiple macroeconomic risk factors to stock market return rather than using only a single factor like a market risk premium under CAPM (Ullah et al., 2017). Hence, APT is an alternative method when dealing with determinant asset process and it can be claimed as a more accurate model than CAPM. According to Roll and Ross (1980) as cited in Amtiran et al (2017, p. 198), in order to test the APT in relation to the expected return, the three treatments must be fulfilled: "(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". A study by Amtiran et al (2017) revealed that interest rates and exchange rates have a strong influence on Indonesian stock market. Hence, the one-factor APT Model used in their study is more valid than a multi-factor APT.

This study relies on the APT Model by Amtiran et al (2017) with a slight modification. Our research aims to solve the problem between with the macroeconomic factors and the risk of anticipated equity market performance, rather than a stock return. Based on the description outlined above, our first aim is to investigate the relationship between macroeconomic and stock market performance, and our second aim is to examine which macroeconomic factors are more dominant in the context of APT from selected equity market indexes in Asia-6 regions. Based on Figure 1, the researchers focus on inflation rate, interest rate, money supply, exchange rate, and economic growth (representing macroeconomic factors) that act as constructs in affecting an equity market index (measuring stock market performance).

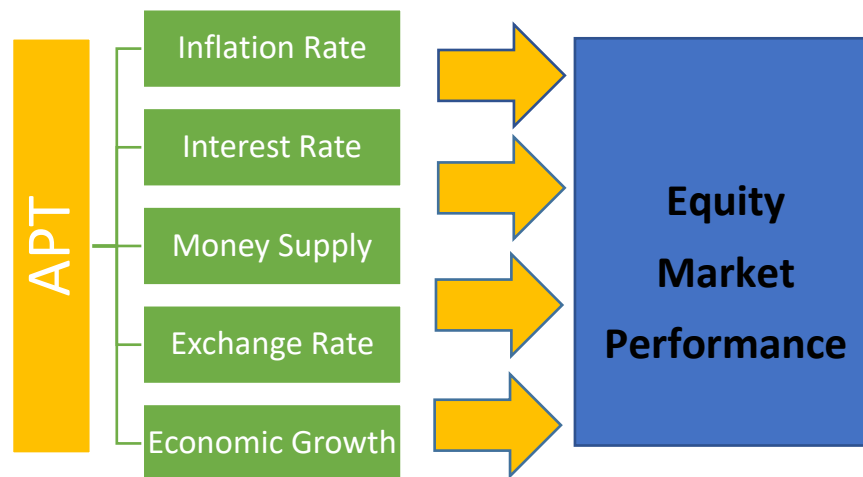


Figure 1 Modified Version of APT Framework based on the work of Amtiran et al (2017, p. 201)

### Methodology

It is important to forecast the trend of overall stock market performance in order to excel in making investment. Potential investors must have a full knowledge about stock market as a guidance to figure out the correlation between macroeconomic and stock market performance. A study by Barakat et al (2015) certified that there is a causal relationship in Egypt between stock market index and inflation, exchange rate, money supply, and interest rate. Findings also revealed that four macroeconomics are co-integrated with the stock market in Egypt and Tunisia between January 1998 and January 2014.

Many studies notified that if one to make profit through investment, inflation rate as one of the macroeconomic factors cannot be neglected. Inflation is defined as persistent and appreciable rise in general price levels of products and services over time. A study by Gay (2016) stated that inflation rate will create a favourable interaction with the stock market, for instance, when inflation rate increases, the performance of the stock market will also rise. Similarly, Mbulawa (2015) examined the effect of inflation on stock market performance in Zimbabwe with a data ranging between 1980 and 2008. The study utilized VECM and found a *positive* relationship between inflation and stock market performance. Similarly, Maku and Atanda (2010) agreed that there is a *positive* relation between inflation and stock market performance in Nigeria between 1984 and 2007. On the other hand, Khan (2016) found evidence that the causality between the inflation and stock market performance turned out *negative* in Pakistan using a VECM approach. Overall, we conclude that it provides a clear indication that the interaction among the variables can change because each country has a different influence from the macroeconomics effect. Based on the literature review of inflation rate in the context of the research, the first hypothesis of this study is

*H1 = The inflation rate has a positive effect on equity market performance in Asia.*

As a pivotal role in macroeconomic factor, interest rate is crucial in estimating the trends of the stock market performance and its future growth. The interest rate is considered as an investment rate. According to Acikalin et al (2008), their study initiated a *positive* correlation between Istanbul Stock Exchange (ISE) performance with interest rate and exchange rate in

Turkey. Their study found that the correlation between ISE Index against macroeconomic factors are unidirectional in relationship and concluded that higher interest and exchange rates cause higher investments, hence, it increases the performance of the stock market performance. In addition, the finding by Patel (2012) also accorded the earlier study. He discovered that the interest rates are in highly *positive* correlation with the stock market performance in Indian Stock Market for the data ranging from January 1991 to December 2011 through VECM approach.

In contrast, Assagaf et al (2019) indicated long-term interest rates in US and Japan, with stock market performance is *inverse* correlation. As a matter of fact, Al-Abbadi and Abdul-Khaliq (2017) stressed that when interest rates continue to rise, stock market performance is adversely affected. Maskay (2007) verified that the true interest rate is boosted by a tightening of the money supply. In fact, an increase in interest rate will lift a discount rate, which in turn will reduce the current value of potential return, hence lowering the stock market performance. Overall, stock market return and its performance will be risen when there is downward in interest rate. The decreasing in interest rate will benefit the stock market because it reflects that the cost of borrowing is slightly reduced, people can borrow more from banks for investment in the stock market. Based on the literature review of interest rate in the context of the research, the next hypothesis of this study is

*H2 = The interest rate has a negative effect on equity market performance in Asia.*

Money supply refers to the quantity of money available in the market. The quantity theory of money assumes that increase in money supply in the market will cause high inflation. In order to control the inflation, a contractionary monetary policy will be utilized to increase the rate of interest, hence reducing the purchasing power. Previous studies confirmed that money supply has a strong nexus with stock market performance in the short-run and long-run (Mukherjee & Naka, 1995; Ratanapakorn & Sharma, 2007; Sohail & Hussain, 2011). The interaction of money supply against US stock price index certify that stock market performance is *positively* related with money supply. Similarly, the analysis by Mookerjee and Yu (1997) that explored the correlation against stock return in Singapore for monthly data between October 1980 and April 1993, authenticated that money supply as well as foreign exchange have steadily formed a long run relationship with the stock market performance. Moreover, Hashemzadeh and Taylor (1988) that studied the connection among S&P 500 and money supply for the period from 1969 to 1972. The finding shows money supply and S&P 500 is *positively* related. Meanwhile, Khan (2014) found that there is an inverse related against money supply and stock market in the United States. Based on the literature review of money supply in the context of the research, the third hypothesis of this study is

*H3 = The money supply has a positive effect on equity market performance in Asia.*

Exchange rate refers to a unit of foreign currency in terms of the domestic currency. Khandelwal (2018) conducted a study to understand dynamics linkages of exchange rates on stock markets of India and Indonesia from 1997 until 2017. By using a Johansen cointegration, the study revealed that exchange rate movements affect the stock markets differently; Indian stock market (negative) while Indonesian stock market (*positive*). Later study by Gunarto and Sembel (2019) examined the effect of IDR changes versus USD on the stock performance of

LQ45 Companies at IDX between 2008 and 2018. Based on the finding, the currency exchange rate is negatively significant in affecting the stock performance. On the other hand, a study by Du and Hu (2012) on the US stock market itself indicated a *positive* relationship between exchange rate and stock market performance using an EGARCH. This is due to the fact that when USD increases, domestic products turn to be relatively high to foreign products. Consequently, the export in the US will be decreased as well as the S&P500 with USD appreciation. To conclude, the higher ER (domestic currency appreciates against USD) in the country causes higher investments and directly pushes up the stock market performance. An exchange rate has a *positive* relationship with stock market performance because when a local currency depreciates, local firms will become more competitive to foreign investors (Suriani et al., 2015). The most recent study by He and Zhao (2022) not only certified that the dollar's exchange rate has a significant *positive* impact on the US stock market performance, the COVID-19 pandemic also has a statistical correlation with performance of the US stock market. Based on the literature review of currency exchange rate in the context of the research, the next hypothesis of this study is:

*H4 = The exchange rate has a **positive** effect on equity market performance in Asia.*

An increase in the amount of goods and services produced by country per head of the population over a time refers to **economic growth**. Al-abadallat and Shabib (2012) explored the influence of macroeconomic indicators towards the movement of the Amman Stock Exchange index between 1990 and 2009. The result revealed that an economic growth has a strong and *positive* correlation that affects the movement of stock performance in Jordan. This study proposed the government to carefully develop economic policies that could stimulate and enhance the growth in GDP for the benefit of the country. In addition, Lee (2006) explored the impact of seven macroeconomics variables on the New Zealand stock market index using co-integration approach for the period between January 1990 and January 2003. Finding reveals that an economic growth is certified as one of the leading macroeconomic indicators in the performance of NZ stock market for the long run. On top of that, Malarvizhi et al (2012) certified that stock market capitalization and economic growth is *positively* related. Hunjra et al (2014) conducted a study in Pakistan demonstrated that economic growth influences the stock market performance in both short and long terms. Based on the literature review of economic growth in the context of the research, the fifth hypothesis of this study is

*H5 = The economic growth has a **positive** effect on equity market performance in Asia.*

This study aspires to demonstrate the performance of equity market towards macroeconomic determinants for six Asia regions that involved annual data collection for 34 years in selected Asia regions. As this study encounters with pooled time series and observations across countries, the Static Panel data analysis is a suitable method to be applied in determining the impact of macroeconomic variables on equity market. The observations data in this study started from 1988 until 2021 for six (6) selected equity markets within Asia regions. Static Panel data is an appropriate method due to its benefits in dealing with degree of freedom, minimizing collinearity among variables, and identifying the existence of heteroscedasticity problem in the sample data. Additionally, this technique is able to observe the individual heterogeneity in the model regression caused from the error term and noise



that may exist in the data as the sample consisted of various country's characteristics. The specific effects then may cause a heterogeneity problem in the model regression. Hence, the estimation panel data equation is presented as follows:

$$EMP_{it} = \alpha + \beta_1 CPI_{it} + \beta_2 IR_{it} + \beta_3 MS_{it} + \beta_4 ER_{it} + \beta_5 GDP_{it} + \varepsilon_{it} \quad (1)$$

Based on the Equation (1),  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ , are the coefficients for each independent variable,  $i$  is the individual dimension,  $t$  is time period, EMP refers to Equity Market Performance (proxy individual equity index), which is the dependent variable, and the independent variables are consumer price index, CPI represents Inflation Rate, IR represents Interest Rate, MS represents Money Supply (proxy M2), ER represents Currency Exchange Rate (over USD), gross domestic product, GDP represents Economic Growth, and  $\varepsilon$  denotes as an error term.

The analysis is conducted in two stages. In the first stage, it begins with the unit root test, and followed by multicollinearity test. The main purpose of testing a unit root is to ensure that all variables are stationary at level or at the first difference. Meanwhile, the multicollinearity checking is imposed for all independent variables using a Variance Inflation Factor (VIF) procedure to identify the collinearity relationship among the independent variables. They perfectly correlate among the independent variables that cause a less reliability statistical inferences. In the second stage, we need to select the best model in determining the macroeconomic risk factors of selected equity indexes of six Asia stock markets. The tests that involved in selecting the best model are Redundant-Fixed Effects Tests and the Hausman Test. The hypothesis for these two tests stated, rejecting null hypothesis means that the model has different intercept and the Fixed Effect is the appropriate model.

## Results and Discussions

The analysis begins with describing the data as demonstrated in Table 1.

Table 1

### Descriptive Analysis

	EMP	CPI	IR	MS	ER	GDP
<b>Mean</b>	7.33237	78.7127	13.35778	102.5	3.242927	26.18971
<b>Minimum</b>	-2.97593	6.25	0.3	1	-6.907755	18.32472
<b>Maximum</b>	12.9747	192.38	67	204	9.587557	30.50651
<b>Std. Dev</b>	2.342474	40.58182	13.86593	59.03389	3.265165	3.221358

The result for multicollinearity by using VIF test is presented in Table 2. Based on the result, this study is free from multicollinearity problem among independent variables as the average VIF result is below than 10.

Table 2

*Multicollinearity Test*

Independent Variables	Centered VIF
CPI	0.574555
IR	0.272513
MS	0.690318
ER	0.637839
GDP	0.181640
MEAN VIF	2.79

Source: Authors' calculation

As discussed in previous section, Breusch-Pagan LM test is executed in order to identify either data can be pooled or has different specific effect. Referring to Table 3, it shows the value of Breusch-Pagan LM is 1.0000, meaning that the data can be pooled together and the countries specific effect does not exist in the model.

Table 3

*Panel Data Results*

Dependent variable: Equity Market Performance (EMP)	
Independent variables:	<b>POLS</b>
Consumer Price Index (CPI)	0.00813***
Interest Rates (IR)	-0.057411***
Money Supply (MS)	-0.004765***
Exchange Rates (ER)	0.222886 ***
Gross Domestic Product (GDP)	0.205568***
R-squared	0.7256
F-statistic	104.74***
Observations	204

Note: The sign \*\*\*, \*\*, \* indicate the result is statistical significance at the 1%, 5% and 10% level respectively.

Source: Authors' calculation

Table 3 demonstrates that all independent variables are statistically significance in influencing the equity market performance (EMP) in selected six Asia regions. Inflation rate (CPI) depicts a **positive** relationship with equity market performance at 99% significant level. A Fisher's Effect suggests that a positive relationship between inflation and stock market that indicates investors are compensated for loss of purchasing power due to inflation over the long-term period. This finding is consistent with Gay (2016); Mbulawa (2015) in their studies towards stock market in Zimbabwe. Hence, the Hypothesis 1 (H1) that explains the relationship between inflation rate and equity market performance (EMP) failed to be rejected.

Meanwhile, interest rate (IR) shows a **negative** and significant relationship on the performance of equity market. Meaning that, equity market is getting better during falling interest rates. This result is consistent with the finding by Assagaf et al. (2019), Al-Abbadi and



Abdul-Khaliq (2017) as well as Maskay (2007) that discovered a negative relationship on equity market performance. Thus, the Hypothesis 2 (H2) failed to be rejected.

Furthermore, money supply (MS) also has a significant impact on the performance of equity market with a *negative* impact. Equity markets outperformed if the amount of money is lesser in the market. Even though this factor is significant, it has a different direction with equity market performance. Therefore, Hypothesis 3 (H3) is rejected.

Conversely, the fourth variable which is exchange rate (ER) depicts a *positive* relationship with equity market performance. When domestic stock market performance rises, it will attract foreign investors to demand more on domestic currency because they have high confidence towards the country's economy. It is aligned with the studies of Du and Hu (2012) as well as He and Zhao (2022) on the US stock market and it is proved that Hypothesis 4 (H4) failed to be rejected.

Eventually, the fifth variable which is economic growth (GDP) also depicts a *positive* relationship with equity market performance consistent with the findings by Al-Abdallat and Shabib (2012) as well as Malarvizhi et al. (2012). The rise in wealth would lead to the increase of the economic growth and the GDP itself. Moreover, GDP plays the major role and becomes important channel for the flow of money through investment in stock market. Subsequently, the finding has supported Hypothesis 5 (H5) to verify a positive impact of GDP towards equity market performance for six selected equity markets in Asia region.

## **Conclusion**

Equity market performance is one of the vital barometers for all countries to ensure their economy is stable and growing rapidly. In that respect, this study strives for macroeconomic indicators that directly impact its performance. Based on the outcome from Pooled Ordinary Least Square (POLS) method, all five indicators included in this study significantly affect the performances of the equity market. Stock market conditions in Malaysia, Indonesia, India, Turkey, Japan, and China are strongly affected by macroeconomic factors, especially with regard to inflation (*positive*), interest rate (*negative*), exchange rate (*positive*), and economic growth (*positive*). These four variables (CPI, IR, ER, GDP) are strongly significant with the actual direction, answering the first research objective. This study has also successfully confirmed the second objective that the modified version of Arbitrage Pricing Model (APT) Model multi-factor is valid more than one factor when four out of five macroeconomic variables in this study are dominant and strongly influence the performances of equity market indexes in six Asia regions. On top of that, the findings also give insight to investors to invest in a country if it has a stable macroeconomic condition.

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