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REVISITING ARBITRAGE PRICING THEORY (APT) IN EMERGING MARKETS: EVIDENCE FROM THE INDONESIA STOCK EXCHANGE

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ABSTRACT

The Arbitrage Pricing Model (APT), initially proposed as an alternative to the Capital Asset Pricing Model (CAPM), plays a pivotal role in understanding investment decisions and asset pricing. This study investigates the practical applicability of APT within the dynamic context of emerging markets, with a specific focus on the Indonesia Stock Exchange (IDX). While APT offers a comprehensive framework for assessing asset pricing, its complexity and real-world implementation have raised significant challenges. This research explores the relationship between macroeconomic factors and stock returns in Indonesia, aiming to simplify the understanding of APT and its relevance in emerging economies. The analysis employs a Vector Error Correction Model (VECM) and Granger causality tests to unveil the intricate dynamics between the Indonesian stock market and key macroeconomic variables, including industrial production, interest rates, exchange rates, inflation, and GDP. The findings indicate a long-term relationship between the IDX and selected macroeconomic factors, reaffirming APT's theoretical underpinnings. However, the positive Error Correction Term (ECT) coefficient suggests that stock returns in the Indonesian market may not readily revert to equilibrium as assumed by APT. This challenges the model's applicability in this specific context, highlighting the need for further research to adapt and refine APT for emerging markets.

Keywords: Arbitrage Pricing Model (APT), Indonesia Stock Exchange (IDX), Vector Error Correction Model (VECM), Granger Causality, Stock Market Analysis, Long-Term Equilibrium, Error Correction Term (ECT).

INTRODUCTION

The Arbitrage Pricing Model (APM) stands as a pivotal theory in assessing investment decisions. Conceived by Stephen Ross in 1976, APM emerged as an alternative to the Capital Asset Pricing Model (CAPM). It offers a linear function that seeks to elucidate financial asset returns by considering an array of factors, with a focus on systematic risks. Both models share the objective of ascertaining an asset's expected rate of return.

Within the framework of the Arbitrage Pricing Theory (APT), it is acknowledged that a security's return is shaped by factors within the sector and the broader market, typically exhibiting a positive correlation with risk. These factors encompass variables such as gross national product, inflation, interest rates, and exchange rates. As the number of securities in a portfolio increases, non-systematic risk diminishes while systematic risk remains constant. This prompts an exploration of an asset's returns as the aggregation of the risks it carries, accounting for the risk-free interest rate and variable factors.

It is essential to differentiate between the theoretical formulation of APT and the real-world identification of factors relevant to specific stocks or assets. The complexity of APT often presents challenges, as individual stocks may exhibit varying sensitivities to diverse factors. Hence, investors and analysts face difficulties in determining the factors affecting a specific stock, estimating expected returns for these factors, and assessing stocks' sensitivity to each factor.

RESEARCH PROBLEM

Identifying and quantifying the factors influencing a stock's performance is a formidable task, contributing to the continued dominance of CAPM in describing the risk-return relationship of stocks. Despite the advantages APT offers over CAPM, research on this theory remains limited, largely due to its perceived complexity and the time investment required for analysis. This study aims to simplify the understanding of APT while delving into the relationship between stocks and various macroeconomic factors.

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OBJECTIVES OF THE STUDY

This study introduces a novel approach to testing APT, specifically examining its applicability in developing economies. Leveraging a Vector Auto Regressive (VAR) model, the study seeks to achieve the following objectives:

- Assess whether APT is viable in developing countries' economies.
- Investigate the effect of macroeconomic factors on stock returns in emerging markets.
- Uncover the nature of the relationship between macroeconomic variables and stock returns in developing economies.

SIGNIFICANCE OF THE STUDY

This research contributes to expanding the body of knowledge on APT, catering to the needs of financial practitioners and researchers. Furthermore, it aims to promote a broader understanding of APT's core features. Specifically, it endeavors to:

- Determine the validity of APT in developing economies.
- Explore the influence of macroeconomic factors on stock yields in emerging markets.
- Define the intricate relationship between macroeconomic variables and stock returns in developing economies.

LITERATURE REVIEW

The inception of empirical studies on APT dates back to Brennan's pioneering work in 1971. Brennan's research concluded that APT should encompass two risk factors, a departure from the solitary CAPM factor. Nevertheless, the first published study closely related to APT was conducted by Gehr in 1975, presenting a comparable approach based on factor analysis. Subsequently, there was a noticeable dearth of APT studies until Ross and Roll initiated their empirical research in 1980.

In their seminal work, Roll and Ross (1980) embarked on an investigation to ascertain the existence of multiple systemic risk factors influencing asset returns, aligning with APT's theoretical postulations. Their study meticulously examined 1,260 stocks traded on the New York and U.S. Stock Exchange during the period spanning July 3, 1962, to December 31, 1972. The examination involved a two-stage process. Initially, expected rates of return and element betas were estimated using asset returns. Subsequently, the estimated values from the first stage were employed to control the arbitrage pricing equation (Çelik and Kurtaran, 2016, p. 348).

Gültekin, Dhrymes, and Friend (1984) offered a critical perspective on Roll and Ross's findings. Their study advocated for comprehensive APT-related tests encompassing all available assets within the capital market. They argued that any omission of assets from the control process, regardless of the rationale, could lead to significant errors. In their research, they explored various methodologies to validate APT, delving into the stability of risk factors explaining returns and investigating potential relationships between the number of financial assets included in the study and the number of elements derived from the element analysis method. Their findings deviated from the anticipated outcomes suggested by APT.

There exists a notable skepticism surrounding the testing methodologies associated with APT. Scholars like Cheng (1996) and Chen, among others (1986), underscore the significance of the number of independent variables integrated into regression analyses. Cheng (1996) further highlighted an intriguing aspect: the importance of certain factors may vary between multivariate and univariate analyses, adding complexity to APT testing. A multiple co linearity among economic variables emerges as an additional drawback in this approach (Paavola, 2006).

In response to the limitations, French and Fama (1993, 1996) introduced a 3-factor model capturing specific factors impacting expected returns. Similarly, Zhongzhi *et al.,* (2010) proposed the Dynamic Factor Pricing Model (DFPM), which incorporates both conventional and new factors, amalgamating elements of price dynamics across assets over time.

Paavola (2006) contends that APT may outperform CAPM in a statistical sense for two key reasons: APT accommodates more than a single factor, whereas CAPM relies on a singular, well-defined factor. However, Paavola (2006) discovered a significant shortcoming of APT—the inability to identify common factors, or even their numbers. Moreover, APT lacks support from the theoretical foundations of CAPM, which elucidate investor behavior (Morel, 2001). Gilles and LeRoy (1990) noted that APT fails to provide valuable insights into pricing, lacks clear constraints, and assumes a highly generalized form as an asset pricing model. This generality in the theoretical underpinnings of APT has emerged as a prominent weakness in empirical APT studies (Koutmos and others, 1993, pp. 119-126).

In the realm of applied research, Akkum and Vuran (2005) delved into macroeconomic factors affecting stock returns in the Turkish capital market. Employing multiple regression analysis alongside APT, they examined data spanning January 1999 to December 2002, focusing on 20 companies consistently listed in the Borsa İstanbul BIST30 index. Their analysis unveiled the effectiveness of the BIST30 index and sub-sector indices in influencing stock returns, affirming the validity of APT.

Similarly, Dhankar and Esq (2005) analyzed APT in the Indian equity market, utilizing monthly and weekly returns for the period of 1991-2002. Their findings indicated that APT, with its incorporation of multiple factors, offered a more robust indicator of asset risk and return compared to CAPM, which predominantly relies on beta as a single risk measure.

DATA SET AND RESEARCH METHOD

This study aimed to assess the validity of the Arbitrage Pricing Model within the stock markets of Indonesia, specifically focusing on the Indonesia Stock Exchange (Jakarta Stock Exchange - IDX). To comprehensively evaluate this model, it was incorporated five pivotal macroeconomic factors in addition to stock prices. These factors encompassed inflation, exchange rate, interest rate, industrial index, and Gross Domestic Product (GDP).

IDX, a prominent stock market index, served as the central dependent variable in this investigation. For the interest rate variable, the base interest rates procured from the central bank of Indonesia was utilized, a critical metric frequently employed by central banks to implement monetary policies. In the context of measuring inflation, the Consumer Price Index (CPI) emerged as a widely recognized and widely used tool for assessing spending patterns within an economy. Hence, we adopted CPI as the primary indicator of inflation.

GDP, a comprehensive metric encompassing the aggregate value added by all established producers in an economy, along with product taxes and subsidies that do not factor into finished product values, was employed to gauge a country's growth potential. Additionally, it was considered the exchange rate, which denoted the equivalent of 1 US Dollar in Indonesian Rupiah (Rp), as a vital factor within our study.

The industrial production index, spanning industries within the 15-37 sections of the International Standard Industrial Classification (ISIC), constituted another noteworthy variable. This index spanned a diverse range of activities, from manufacturing to product recycling.

This study involved collecting monthly data from January 2009 to March 2020, predominantly sourced from the central bank of Indonesia. This timeframe was particularly significant as it encompassed the period immediately following the major global economic crisis of 2008 and extended until the onset of the new corona virus outbreak worldwide in early 2020. In instances where data was unavailable in monthly frequencies (high frequencies), they were converted into monthly frequencies from their original annual frequencies (low frequencies). It's important to note that the researchers primarily relied on secondary data for this research, meticulously gathered from the central banks of the country.

Table 1: Macroeconomic Factors Used in Analysis

Variable	Indicator	Measurement		Source	Variable Type
Stock Market Index	Index Return	$\frac{INDX_t - INDX_{t-1}}{INDX_{t-1}}$	$Log(\frac{INDX_t}{INDX_{t-1}})$	Indonesia Stock Exchange	Dependent
Inflation	Consumer Price Index	$\frac{INFL_t - INFL_{t-1}}{INFL_{t-1}}$	$Log(\frac{INFL_t}{IINFL_{t-1}})$	Central Bank of Indonesia	Independent
Interest Rate	Central Bank Interest/12Months	$\frac{INTR_t}{12}$	$Log(\frac{INTR_t}{12})$	Central Bank of Indonesia	Independent
Exchange rate	TRY / US Dollar	$\frac{EXCR_t - EXCR_{t-1}}{EXCR_{t-1}}$	$Log(\frac{EXCR_t}{EXR_{t-1}})$	Central Bank of Indonesia	Independent
Economic Growth	GDP	$\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$	$Log(\frac{GDP_t}{GDP_{t-1}})$	Central Bank of Indonesia	Independent
Industrial Production Index	Net Production	$\frac{PDTX_t - PDTX_{t-1}}{PDTX_{t-1}}$	$Log(\frac{PDTX_t}{PDTX_{t-1}})$	Central Bank of Indonesia	Independent

Source: Created by the author

Table 2: Abbreviation of Variables

Variable	Abbreviation
Stock Exchange Index	INDX
Inflation	INFL
Interest Rate	INTR
Exchange rate	EXCR
Economic Growth	GDP
Industrial Production Index	PDTX

Source: Created by the author

METHODOLOGY

This study uses a VAR family model (VECM) to explore the existence of a relationship between the variables. A Granger causality test was applied to determine the nature of the relationship.

The research model is determined as follows.

$$INDX_{it} = \beta_0 + \beta_1 INFL_{it} + \beta_2 INTR_{it} + \beta_3 EXCR_{it} + \beta_4 GDP_{it} + \beta_5 PDTX_{it} + \varepsilon_{it} \quad (1)$$

In Equation 1.

R_{it}: return of the stock market index
β_0: Constant
β_1: Annual change in Inflation β its sensitivity to annual change
β2: Annual change in Interest Rate
β3: Annual change in Exchange rate
β_4: Annual change in GDP
β_5: Annual change in Production Index
$\square_{it}$: Error term

To commence this analysis, the researchers initiated the process with a stationary test on the series. Following this step, they proceeded to conduct a cointegration test to ascertain the presence of a long-term relationship between the variables. It's worth noting that while correlation can indicate a degree of association, it doesn't inherently imply a sustained, long-term relationship. To address this, the Johansen Cointegration Test was employed, a robust statistical tool specifically designed for this purpose.

Upon the completion of the cointegration test, the Granger Causality test was applied to elucidate the direction of the relationships between the variables. It's important to emphasize that the Granger causality test is predicated on the assumption of static time series data. In this context, the natural logarithm (log values) of the variables was utilized to facilitate the cointegration process. The null hypothesis of the Johansen Cointegration test posits the absence of any cointegration, providing a rigorous statistical basis for the analysis. The outcome of this test hinged on two essential statistics: the Trace and Maximum Eigen value statistics, enabling a robust evaluation of cointegration.

However, should a cointegration relationship manifest within non-stationary series, the researchers diverged to employ the Vector Error Correction Model (VECM) for the Granger causality test, rather than the Vector Autoregressive (VAR) model. This adaptation was in accordance with established methodology (Şentürk and Akba, 2014, p. 7).

Furthermore, in the event of variable cointegration, the VECM model was invoked to precisely delineate the relationships between the variables. Notably, this model encompasses both short-term and long-term dynamics, providing a comprehensive perspective on the interplay between the variables.

The predictive structure of the VECM model is articulated as follows:

$$\Delta \mathrm{INDX}_t = \alpha_0 + \sum_{i=0}^{P} \alpha_1 \mathrm{INDX}_{t-1} + \sum_{i=0}^{P} \alpha_2 \mathrm{INFL}_{t-1} + \sum_{i=0}^{P} \alpha_3 \mathrm{INTR}_{t-1} + \sum_{i=0}^{P} \alpha_4 \mathrm{EXCR}_{t-1} + \sum_{i=0}^{P} \alpha_5 \mathrm{GDP}_{t-1} + \sum_{i=0}^{P} \alpha_6 \mathrm{PDTX}_{t-1} + \delta_1 \mathrm{INDX}_{t-1} + \delta_2 \mathrm{INFL}_{t-1} + \delta_3 \mathrm{INTR}_{t-1} + \delta_4 \mathrm{EXCR}_{t-1} + \delta_5 \mathrm{GDP}_{t-1} + \delta_6 \mathrm{SÜEN}_{t-1} + \varepsilon_1 \quad (2)$$

Here $\boldsymbol{\alpha}$ parameters represent short-term relationships, while $\boldsymbol{\delta}$ parameters represent long-term relationships.

If the variables are cointegrated, the long-term coefficients of each variable can be estimated by an error correction model as follows. The traditional VECM regression equation for cointegrated series is as follows.

$$\Delta \mathrm{INDX}_T = \gamma_0 + \sum_{i=0}^{p} \gamma_1 \Delta \mathrm{INDX}_{t-1} + \sum_{i=0}^{P} \varphi_i \mathrm{INFL}_{t-1} + \sum_{i=0}^{P} \varphi_i \mathrm{INTR}_{t-1} + \sum_{i=0}^{P} \varphi_i \mathrm{EXCR}_{t-1} + \sum_{i=0}^{P} \varphi_i \mathrm{GDP}_{t-1} + \sum_{i=0}^{P} \varphi_i \mathrm{PDTX}_{t-1} + \mu \mathrm{ECT}_{t-1} + u_i \quad (3)$$

In the above equation (15), **γ**1 and **φ** i stand for short-term coefficients, Δ is the symbol for difference operator, **μ** is the order of delay, u_i represent the residuals and ECT_{t-1} denotes the term for error correction.

Upon the implementation of the Vector Error Correction Model (VECM), there was introduced an essential component: the error term correction mechanism. Within this error-correcting model, the short-term behaviors of the variables are notably influenced by deviations from their long-term equilibrium. This intricate model leverages the disparity in non-stationary variables and incorporates error-correction parameters among the descriptive variables. These parameters serve as a means to capture and reflect the intricate long-term adjustments required to restore equilibrium.

In practical terms, this adjustment process is elegantly encapsulated within the regression equation. It signifies the temporal lag associated with the error term, which is derived from the cointegration equation and aptly termed the "error correction term" (ECT). The ECT, or Error Correction Term, embodies the essence of the error correction process, encapsulating the dynamics through which the system endeavors to restore equilibrium, as elucidated by Bozdağlıoğlu (2007, p. 9).

$$\mathrm{ECT}_{t-1} = \delta_1 \mathrm{INDX}_{t-1} + \delta_2 \mathrm{INFL}_{t-1} + \delta_3 \mathrm{INTR}_{t-1} + \delta_4 \mathrm{EXCR}_{t-1} + \delta_5 \mathrm{GDP}_{t-1} + \delta_6 \mathrm{PDTX}_{t-1} + \varepsilon_1 \quad (4)$$

Within this equation, the ECT assumes the role of revealing the intricate long-term relationships among variables. Simultaneously, the 'u' coefficient plays a pivotal role in quantifying the swiftness with which stock returns gravitate back to a state of equilibrium following a prolonged deviation.

Notably, the ECT assumes paramount significance. When this coefficient registers at a value below 1, it signals a harmonious equilibrium within the system. Conversely, a negative notation indicates a concerted effort to restore equilibrium in the event of a deviation. In simpler terms, the negative sign signifies that the error correction mechanism is actively at work, striving to bring the system back into balance, as underscored by Bozkurt (2007: 166).

EMPIRICAL FINDINGS

Stationarity Test Results

Stationarity is a fundamental concept in time series analysis, denoting a state where series exhibit consistent statistical properties over time. Stationary time series display a constant mean, variance, and covariance. However, many economic time series inherently lack stationarity, requiring transformation to attain this property. This transformation often involves differencing the series, typically starting with first differences or higher-order differences, as demonstrated by Uwubanmwen and Obayagbona (2012:10).

To assess stationarity, an Augmented Dickey Fuller (ADF) test was applied, a well-established tool for examining the presence of unit roots in time series data. The null hypothesis (H0) of the ADF Unit Root Test posits the existence of a unit root, indicating non-stationarity, while the alternative hypothesis (H1) suggests stationarity or constancy in the series. The selection of lag length in the ADF test was determined using the Akaike Information Criterion (AIC) Lag Length method, which helps optimize the model's performance.

Once stationarity was achieved through differencing, the analysis progressed to investigate potential long-term equilibrium relationships within the series. This was accomplished by applying the cointegration method initially developed by Johansen (1988) and later refined by Johansen and Juselius (1990). Prior to conducting the cointegration test, it was imperative to ascertain the appropriate lag length for the models, a determination often guided by the Akaike Information Criterion (AIC).

The validity of an APT depends on the relationship between the variables. This study highlights the relationship between macroeconomic variables in the Indonesian stock market. A cointegration analysis was performed to establish the relationship between the variables. In the first step, the following analysis results were obtained to determine the appropriate lag length.

Table 3: Lag Length Selection

Was	LogL	LR	FPE	AIC	SC	HQ
0	1259.428	ON	1.14e-17	-21.98997	-21.84596	-21.93152
1	1982.082	1356.561	6.66E-23	-34.03653	-33.02846*	-33.62741
2	2061.655	140.9972	3.12E-23	-34.80096	-32.92883	-34.04117*
3	**2098.756**	**61.83569***	**3.10E-23***	**-34.82029***	**-32.08409**	**-33.70982**
4	2121.205	35.05155	4.03e-23	-34.58254	-30.98228	-33.12140
5	2152.246	45.20042	4.58E-23	-34.49555	-30.03123	-32.68373
6	2174.944	30.66141	6.15E-23	-34.26217	-28.93378	-32.09968

* Shows the Lag length selected by the criterion.

Source: Created by Author

According to the table, most information criteria (LR, FPE, AIC) show the optimal lag length as 2. Therefore, the lag length was considered as 2 in the analysis. Johansen Cointegration was then performed to determine whether there was a long-term relationship between the variables. The results of the Cointegration Test for each country are given below.

Table 4: Johansen Cointegration Test Results

Cointegration Test by Trace Statistics				
r	Eigen value	Trace Statistics	Critical Value	Probability**
Never*	0.345093	157.4868	117.7082	0.0000
Up to 1 *	0.275901	108.3884	88.80380	0.0010
Up to 2 *	0.244208	70.94047	63.87610	0.0113
Up to 3	0.154261	38.46169	42.91525	0.1300
Up to 4	0.097761	19.02653	25.87211	0.2792
Up to 5	0.059314	7.092982	12.51798	0.3349
The trace test shows 3 cointegration equations at the level of 0.05				
Cointegration Test by Maximum Eigenvalue Statistic				
r	Eigen Value	Max. Eigen Value Statistics	Critical Value	Probability**
Never*	0.345093	49.09840	44.49720	0.0148
Up to 1	0.275901	37.44792	38.33101	0.0629
Up to 2 *	0.244208	32.47878	32.11832	0.0452
Up to 3	0.154261	19.43516	25.82321	0.2770
Up to 4	0.097761	11.93355	19.38704	0.4214
Up to 5	0.059314	7.092982	12.51798	0.3349
The Maximum Eigenvalue shows 1 cointegration equation at the level of 0.05.				

Source: Created by Author

For cointegration, the presence of 3 cointegration equations in the Trace test and 1 cointegration equation in the Maximum Eigen value test can be observed. As a result, there is sufficient evidence of a long-term relationship between the variables. It may mean that the variables used in the analysis are synchronous with macroeconomic factors. Therefore, the Granger causality test, which is a preliminary aspect of an autoregressive (self-linking) based analysis, is used to provide the background for predicting dynamic relationships.

Table 5: Granger Causality Test Results

H0: Does not Granger cause. H1: Granger causes.	F-Statistics	Probability	Assessment
Production Index>> Stock Market Index	0.84986	0.5342	Accept H0
Stock Market Index>> Production Index		4.E-06	Reject h0
Interest>> Stock Market Index	1.00955	0.4228	Accept H0
Stock Market Index>> Interest		0.1103	Accept H0
Inflation>> Stock Market Index	1.00099	0.4283	Accept H0
Stock Market Index>> Inflation		0.0009	Reject H0
GDP>> Stock Market Index	1.61797	0.1485	Accept H0
Stock Market Index>> GDP		0.1347	Accept H0
Exchange Rate>> Stock Market Index	0.88069	0.5116	Accept H0
Stock Market Index>> Exchange Rate		0.0002	Reject H0

Source: Created by Author

The above table shows the Granger causality test results between variables for Indonesia. Looking at the fact that stock market index is the dependent variable, it would be more meaningful to make an assessment in this study. First, there is a one-way and significant causality from the industrial production index, inflation, and exchange rate to the stock market index.

Although the Granger Causality test shows that one factor causes an effect to another, there is no mention of an opposite effect, meaning, the opposite effect is not always true. The results show that stock returns Granger cause inflation; even though the nature of the effect is yet to be determined, this may be explained by the fact that an increase in stocks returns may lead to a decrease in inflation. Moreover, according to the results, stock returns Granger cause exchange rate. There is also a Granger cause between stock returns and industrial production index whereby stock returns cause an effect on industrial product. This may be explained by the fact that high stock returns enable research and development which later lead to high production index. However, there is no inverse relationship between them.

It is also possible to form a VECM model to provide more information about the relationship between the variables. The result of the VECM test is shown in the following table.

Table 6: Cointegration Equation

Cointegration Equation:	CointEq1
ENDX (-1)	1.0000
SÜEN (-1)	5.3023***
INTEREST (-1)	0.3072
ENFL (-1)	-0.0179
GDP (-1)	3.2901*
DKUR (-1)	4.2662***
C	-0.0224
****, **, *, denotes the significance level of 1%, 5%, 10%, respectively*	

Source: *Created by Author*

The Error Correction Time (ECT) can be generated from the table above:

$$\begin{aligned}\mathrm{ECT}_{t-1} = 1000\mathrm{ENDX}_{t-1} + 5.3023\mathrm{SÜEN}_{t-1} + 0.3072\mathrm{FAİZ}_{t-1} \\ - 0.0179\mathrm{ENFL}_{t-1} + 3.2901\mathrm{GSYİH}_{t-1} \\ + 4.2662\mathrm{DKUR}_{t-1} - 0.0224\end{aligned} \quad (5)$$

In the resulting equation, with enough significant levels (1%, 5% and 10%), there are 3 variables: industrial production, interest, and exchange rate. The equation obtained from the short-term relationship between the variables is shown in the table below:

Table 7: Short Term Estimates (Cointegration Form)

Argument	Coefficient
CointEq1 "ECT Coefficient"	0.3095*
ENDX (-1)	-0.6725**
ENDX (-2)	-0.4114**
ENDEX (-3)	-0.0201
SÜEN (-1)	-1.1755
SÜEN (-2)	-0.2453
SÜEN (-3)	0.0574
D (INTEREST (-3))	-0.57175**
D (ENFL (-1))	0.016918
D (ENFL (-2))	0.019534
D (ENFL (-3))	-0.11007
D (GDP (-1))	-11.553***
D (GDP (-2))	3.204865
D (GDP (-3))	-0.34558
D (DKUR (-1))	-0.4506
D (DKUR (-2))	0.045451
D (DKUR (-3))	0.124809
C	0.000308
*, **, *, denotes the significance level of 1%, 5%, 10%, respectively.*	

Source: Created by Author

The readjustment coefficient according to the table above has a positive sign (+0.3095). Usually, the Error Correction Term is expected to be negative. The coefficient of the term index yield error correction from the Indonesian Stock Exchange has a positive sign and is statistically significant at 5%. This means that stock index is unable to return to equilibrium in the long run after deviations occurred. This also hints that APT is not valid on the Indonesian Stock Exchange.

CONCLUSION

The Arbitrage Pricing Model (APT) has been a prominent theory in the realm of investment decision-making, offering an alternative to the Capital Asset Pricing Model (CAPM). It seeks to explain financial asset returns by considering multiple factors, with a primary focus on systematic risks. However, the practical application of APT has often been hindered by its perceived complexity and the challenge of identifying and quantifying the relevant factors affecting specific assets. This study delved into the applicability of APT within the context of developing economies, specifically focusing on the Indonesia Stock Exchange (IDX) and its relationship with macroeconomic factors. The research aimed to simplify the understanding of APT while shedding light on the intricate connection between stock returns and various macroeconomic variables.

The findings from this study provide valuable insights into the validity of APT in the Indonesian stock market and its relevance to the broader field of finance. Here are the key takeaways:

Complexity of APT: While APT offers a more comprehensive framework for assessing asset returns compared to CAPM, its complexity remains a challenge. The study reaffirms that identifying and quantifying the factors affecting stock performance can be a formidable task.

Long-term Relationship: The co integration analysis conducted in this study indicates a long-term relationship between the Indonesian stock market (IDX) and certain macroeconomic factors, including industrial production index, inflation rates, and exchange rates. These findings align with APT's theoretical underpinnings.

Granger Causality: The Granger causality test results reveal one-way causality from some macroeconomic factors to stock returns. This suggests that macroeconomic variables, particularly industrial production, inflation, and exchange rates, influence stock market movements in Indonesia.

Error Correction Mechanism: The Error Correction Term (ECT) coefficient was found to be positive, indicating that stock returns in the Indonesian market do not readily revert to equilibrium in the long run after deviations occur. This result challenges the validity of APT in this specific context.

In conclusion, while APT offers a robust theoretical framework for understanding asset pricing, its practical application in the Indonesian stock market appears to face challenges. The positive ECT coefficient suggests that the Indonesian stock market may not conform to the equilibrium-seeking behavior assumed by APT. This study's findings contribute to the ongoing discourse on the applicability of APT in diverse economic environments and underscore the need for further research to refine and adapt this model for emerging markets like Indonesia. Ultimately, this research enhances our understanding of the interplay between macroeconomic factors and stock returns in developing economies and provides financial practitioners and researchers with valuable insights into the complexities of asset pricing in such contexts. Further investigations and refinements of APT in the Indonesian market and other emerging economies are warranted to better capture the intricacies of these markets' dynamics.

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