An Application of Arbitrage Pricing Theory to Determine the Influence of Macroeconomic Factors on the Top Eight Thai Stocks

Adirek Vajrapatkul[1]
a.vajrapatkul@gmail.com
(Received: 2023-08-14; Revised: 2023-10-26; Accepted: 2023-11-30)

บทคัดย่อ

งานวิจัยฉบับนี้ช่วยในการสำรวจอิทธิพลของตัวบ่งชี้เศรษฐกิจมหภาคต่อผลตอบแทนของหุ้นภายใต้ทฤษฎีการหาราคาเพื่อเก็งกำไรโดยใช้ข้อมูลจากประเทศไทย การศึกษามุ่งเน้นที่มูลค่าของหุ้น 8 อันดับแรกประกาศบนเว็บไซต์ตลาดหลักทรัพย์แห่งประเทศไทยเมื่อวันที่ 16/5/2565 และใช้เทคนิคการถดถอยแบบพาแนล กับข้อมูลรายเดือนตั้งแต่วันที่ 6/2/2561 ถึง 1/11/2565 ผลการวิเคราะห์เชิงประจักษ์เผยให้เห็นว่าอัตราเงินเฟ้อ อัตราแลกเปลี่ยน และการเติบโตของผลผลิตโดยวัดจากดัชนีการผลิต แสดงผลกระทบเชิงลบต่อผลตอบแทนส่วนเกินของหุ้น ในทางตรงกันข้ามการส่งออกสุทธิแสดงให้เห็นถึงอิทธิพลเชิงบวกต่อผลตอบแทนส่วนเกินของหุ้น ในขณะที่อัตราดอกเบี้ยไม่ได้กำหนดผลตอบแทนส่วนเกินของหุ้นอย่างมีนัยสำคัญ ดังนั้นนักลงทุนและผู้จัดการทางการเงินจึงสามารถใช้ข้อมูลนี้เพื่อประกอบการตัดสินใจลงทุนของตน และรัฐบาลสามารถใช้เพื่อส่งเสริมเสถียรภาพทางเศรษฐกิจ

คำสำคัญ : ทฤษฎีการกำหนดราคาเพื่อเก็งกำไร; ผลตอบแทนของหุ้น;
ปัจจัยทางเศรษฐกิจมหภาค; ประเทศไทย

[1]Assist Pro. Dr.,School of Economics, Sukhothai Thammathirat Open University

ABSTRACT

This research contributes to the ongoing exploration of the influence of macroeconomic indicators on stock returns based on the Arbitrage Pricing Theory, utilizing data from Thailand. The study focuses on the top 8 trade value stocks announced on the SET website on 16/5/23 and implements the panel regression technique on monthly data from 2/6/2018 to 1/11/2022. The empirical analysis reveals that inflation, exchange rate, and output growth, as measured by production index, exhibit a negative impact on the excess return of stocks. In contrast, net export demonstrates a positive influence on the excess return of stocks, while interest rate does not significantly determine the excess return of stocks. Consequently, investors and financial managers can use this information to inform their investment decisions, and the government can use it to promote economic stability.

Keywords: Arbitrage pricing theory; Stock return;Macroeconomic factors; Thailand

1. INTRODUCTION

The subject of pricing financial assets has long been a pivotal topic in the field of finance. Among the various financial models that endeavor to explain the relationship between expected returns and risks for both individual assets and portfolios of assets, the Capital Asset Pricing Model (CAPM) stands out as a widely used and respected model. At its foundation, the CAPM is rooted in the efficient market hypothesis, which posits that asset prices reflect all relevant information and that investors are rational and risk-averse(Stout, 1997). In essence, the CAPM postulates that the expected return on an asset is equivalent to the risk-free rate, augmented by a risk premium that is proportional to the asset's beta. Beta, which measures an asset's sensitivity to market risk, is a key determinant in the CAPM's risk-return tradeoff. While the Capital Asset Pricing Model (CAPM) has been a useful framework for understanding the relationship between risk and return, it has not been immune to criticism. One of the primary critiques of the model is its reliance on assumptions that may not always hold true in the real world. For instance, the efficient market hypothesis and the rationality of investors are two assumptions that have been scrutinized by skeptics. Moreover, the CAPM is based on historical data, which may not be an accurate predictor of future

returns(Kisman & Restiyanita, 2015). Despite these criticisms, the CAPM remains a popular choice among academics and is widely used in finance courses. Its simplicity and intuitive design make it an accessible model for students and practitioners alike.

Alternatively, the Arbitrage Pricing Theory (APT) is a significant financial model utilized to estimate an asset's expected return based on the assumption that it is subject to various macroeconomic variables. Stephen Ross introduced the APT model in 1976, which suggests that an asset's expected return is a linear function of systematic risk factors, such as GDP growth, inflation, and interest rates(Huberman & Wang, 2005)(Iqbal & Haider, 2005).

The APT model, a widely used asset pricing model in finance, is founded on the principle of no-arbitrage. This fundamental concept dictates that in an efficient market, it is impossible to make a riskless profit(Khan & Sun, 1997). In the case of any mispricing of an asset, investors can capitalize on the discrepancy by purchasing the undervalued asset and concurrently selling the overvalued one, earning a riskless profit through the process of arbitrage. The APT model boasts several advantages over the Capital Asset Pricing Model (CAPM), such as its flexibility and ability to account for the impact of diverse macroeconomic factors(Nguyen et al., 2017). However, it is not without limitations. One such limitation is identifying the appropriate factor structure necessary to explain the fluctuations in stock returns. Existing empirical evidence reveals significant inconsistencies in the causal relationship between stock returns and macroeconomic factors. These inconsistencies are largely dependent on the specific sets of macroeconomic factors used in the analysis. As such, further empirical research is needed to examine the model using different stock markets and time periods to better understand the variations in the results. It is imperative that such research be conducted with meticulous attention to detail, using sound empirical methods and rigorous analytical techniques.

In order to contribute to the existing body of APT literature and offer valuable insights to stock market participants, particularly investors and financial managers, this study aims to examine the impact of macroeconomic risk factors on the return of the top 8 stocks in the Thai environment. By delving into these macroeconomic risk factors, the findings of this study seek to provide additional measures for better comprehending the pivotal relationship between macroeconomic factors and stock returns. The objective of our research is to investigate the effects of key macroeconomic factors on the return of the top 8 trade volume stocks, thereby shedding light on this

critical aspect of stock market dynamics.

To achieve the objective of the research, the remaining sections will be organised as follows: The section that follows will elaborate on the theoretical explanation of the impact of macroeconomic variables on stock return, as well as related research. This study's research methodology will be described in Section 3. Section 4 will present the empirical results. The study will conclude with a list of recommendations.

2. LITERATURE REVIEW

This section will provide some explanation about the impact of macroeconomic variables on stork market and stock return.

The stock market plays a pivotal role in the global economy and is subject to the influence of various macroeconomic variables (Taylor & Poon, 1991). These variables wield considerable influence over stock prices, making it essential for investors and traders to comprehend their relationship. Macroeconomic variables encompass a range of broad economic indicators that provide insights into the overall health of the economy. These indicators include inflation, interest rates, gross domestic product (GDP), unemployment, and government policies

Possibly the most fundamental macroeconomic variable to consider when assessing the health of the economy and its impact on the stock market is Gross Domestic Product (GDP). Numerous investors and analysts espouse the notion that a robust correlation exists between GDP and stock returns (Singh et al., 2011). A growing GDP signifies the expansion of the country's economy, thereby indicating a healthy business environment. As the GDP grows, businesses are likely to experience higher revenues, profits, and earnings per share (EPS). Consequently, this could lead to an increase in stock prices, as investors anticipate higher returns from the companies.However, the effect of GDP on stock price and returns depends on various factors, including industry, sector, and company size. For example, companies in the technology sector are more likely to sensitive to economic growth, and as such, companies in this sector will likely experience higher earnings volatility during periods of GDP growth(Sadorsky, 2003). Furthermore, the size of the company also affects the relationship between GDP and stock returns. Small-cap companies are more sensitive to changes in GDP growth compared to large-cap companies(Fort et al., 2013). Small-cap companies are typically more focused on domestic operations, and as such, they are more exposed to changes in the domestic economy. When the GDP is growing, investors tend to be more optimistic

about the future prospects of the economy. This optimism can lead to an increase in demand for stocks, which could lead to higher stock prices(Ayopo et al., 2016).

Interest rates are another key macroeconomic variable that can have a profound impact on the stock market. Interest rates refer to the cost of borrowing money, and they are set by central banks to regulate the economy. When interest rates are low, borrowing money becomes cheaper, and when they are high, borrowing money becomes more expensive. This has a ripple effect on various sectors of the economy, including the stock market. One of the most significant effects of interest rates on the stock market is the impact on the cost of capital(Hussain et al., 2020). Lower interest rates mean that borrowing money to invest in stocks is cheaper, which increases the demand for stocks and drives up their prices. In addition to the cost of capital, interest rates also affect the earnings of companies. When interest rates are low, companies can borrow money at a lower cost, which reduces their debt burden and increases their profitability. This, in turn, can lead to an increase in stock prices.Therefore, a negative correlation between interest rates and stock prices has been observed and documented in various studies (Alam & Uddin, 2009).

Inflation is another key macroeconomic variable that can impact the stock market. Inflationrefers to a sustained increase in the general price level of goods and services in an economy over time. The effects of inflation can be far-reaching, impacting various aspects of economic activity, including the stock market. One of the most significant effects of inflation on the stock market is that it can lead to an increase in stock prices. Inflation influences stock prices positively through two channels: Initially, a monetary easing that stimulates the economy and inflation would have a positive effect on the dividend growth rate. Second, a monetary expansion that depresses bond returns would lead to an increase in the demand for equities, which would cause the average investor to reduce the expected rate of return on equities. Increased dividend yields and decreased expected investment returns both serve to increase stock prices (Antonakakis et al., 2017). However, inflation can also have a negative impact on the stock market. One of the primary concerns is that it can lead to higher interest rates, which can reduce the profitability of companies and increase borrowing costs. This is because when inflation rises, central banks may increase interest rates in order to cool down the economy and prevent runaway inflation. This can increase the cost of debt for companies and reduce their earnings. Another potential concern is

that inflation can lead to increased volatility in the stock market. This is because investors may become more uncertain about the future direction of the economy and the impact of inflation on companies. This can lead to increased selling pressure and a decline in stock prices(Apergis & Eleftheriou, 2002). Additionally, higher inflation rates reduce the incentive for a business to issue bonds for the purpose of raising capital, as the firm would be required to lock in payments at a higher nominal rate of interest after adjusting for inflation. Therefore, it is preferable for a company to raise capital through the sale of equity rather than the issuance of debt securities. This results in an increase in stock availability. A rise in supply would inevitably result in a decline in stock prices (Quayes & Jamal, 2008).

The effects of exchange rates on stock markets have also been a subject of great interest for economists and investors. The exchange rate is the value of one currency in terms of another, and it can have a significant impact on a country's economy and financial markets. When an exchange rate changes, it can have a ripple effect on the economy, including the stock market. Specifically, changes in exchange rates can affect the profitability of companies, their competitiveness in global markets, and the value of investments.One of the most immediate effects of exchange rate changes on the stock market is through the valuation of companies. When a country's currency depreciates, it becomes cheaper to export goods and services. This can lead to an increase in revenue for companies that export, which can lead to higher stock prices. Another way exchange rates can negatively affect the stock market asthe depreciation of a domestic currency against a foreign currency will increases returns on the foreign currency. This induces investors to shift funds from domestic assets (stocks) towards foreign assets, depressing stock prices. Thus, a depreciating currency has a negative impact on stock market price and returns (Adjasi et al., 2011).

In terms of net exports, the disparity between a country's exports and imports holds significant theoretical implications for the stock market. The correlation between international trade and economic growth provides an academic foundation for understanding its impact. An increase in net exports leads to an increase in economic growth, which, in turn, results in an increase in the stock market's value. The relationship between net exports and economic growth can be explained through the concept of the multiplier effect. The multiplier effect suggests that an increase in net exports leads to an increase in income, which, in turn, leads to an increase in consumption spending. This increase in consumption spending leads to an increase in

economic growth(Tsen, 2010), resulting in an increase in the stock market's value.

In addition to the discussion above, other studies that examined the effects of macroeconomic factors on the overall stock market have demonstrated that a variety of macroeconomic factors have a significant impact on companies listed on the stock market. It has been determined that inflation rates, interest rates, money supply, and foreign exchange rates all have a significant impact on the economy (Assagaf et al., 2019). GDP growth and exchange rates have been shown to positively impact the stock market, while interest rates have a negative effect (Demir, 2019). Moreover, a positive and significant relationship has been observed between the stock market and GDP (Algarini, 2020). However, exchange rates in some cases has been found to be negative (Nordin et al., 2020)., while trade openness has a positive, long-term effect on the stock market (Ho & Odhiambo, 2020). Furthermore, a long-term unidirectional relationship has been identified between the Stock Index and macroeconomic variables, including M2, three-month deposit interest rates, exchange rates, and inflation rates (Sya'bani & Fathoni, 2022). These findings underscore the importance of considering a range of macroeconomic factors when analyzing the performance of companies on the stock market.

In the case of the impacts of macroeconomic factors on the stock price, the analysis of previous studies reveals that export activities have a favorable impact on the stock price, as evidenced by empirical studies (Hasanujzaman, 2016). Furthermore, a positive correlation has been established between GDP and stock prices, whereas inflation and interest rates have been found to have a negative impact on stock prices (Šimáková et al., 2019; Huy, Dat, et al., 2020). According to recent research, an upsurge in GDP growth, lending rate, and risk-free rate plays a pivotal role in boosting stock prices (Huy, Loan, et al., 2020). However, in some instances, the exchange rate, interest rate, and GDP growth have been shown to have a significant negative effect on the stock price (Toni & Simorangkir, 2022). Concerning stock return, the research indicates that inflation has a significant effect on stock returns, while GDP does not significantly affect stock returns (Sya'bani & Fathoni, 2022).

The exploration of various literatures pertaining to the impact of significant macroeconomic indicators, such as GDP, interest rate, inflation, exchange rate, and net exports, on the stock market and stock prices has engendered an inquiry into their influence on stock returns in Thailand. These

variables have attracted attention due to their pivotal role in government investigations. Consequently, when the government manages these variables, they can potentially yield effects on the stock market, which can then serve as an indicator of the efficacy of macro policy.

3. METHODOLOGY

This research will employs the asset pricing analysis method, in particular the Arbitrage Pricing Theory (APT), to gain insight into the underlying factors that affect the stock return. To accomplish this, the models will be represented as follows(Huberman & Wang, 2005;Basu & Chawla, 2012):

$$RSEC = \alpha_{i,t} + \beta_1 CPI_t + \beta_2 EXCH_t + \beta_3 INR_t + \beta_4 NEX_t + \beta_5 PI_t + \varepsilon_{i,t}, \quad (1)$$

where $RSEC = R_{i,t} - R_{f,t}$ is the different between stock return and risk free rate. CPI , $EXCH$, INR , NEX , and PI denote core consumer price index, exchange rate, interest rate, net export, and production index respectively. In this study, the production index, reflecting the quantity of production output in the country, is utilized as an alternative measure to GDP due to the unavailability of monthly GDP reports. The explanatory variables under study are of great interest to this research as they are expected to shed light on the systematic risks that impact the overall market and economy, and consequently, the excess return of stocks.

This study collected the monthly data of the top eight traded value stocksnamely AAV, BANPU, JAS, LH, SIRI, TRUE, TTB, and WHA, as announced on the SET website on 16/5/23, from the Yahoo Finance website. The data of macroeconomic variables are collected from the Bank of Thailand website over a period spanning from 2/6/2018 to 1/11/2022, totaling 53 periods.These periods encompass the most recent data available during the time of conducting this study.

4. RESULT

Table 1 represents the basic information of macroeconomic indicators and stock return.

Table 1 Descriptive statistics

Stat.	RSEC	RCPI	REXC	RINR	RNEX	RPI
Mean	-0.0086	0.0002	0.0023	-0.0157	-0.0912	0.0011
Median	-0.0174	0.0002	-0.0007	0.0000	-0.4527	0.0087
Maximum	0.7601	0.0046	0.0392	0.5000	10.1461	0.1050
Minimum	-0.3010	-0.0039	-0.0394	-0.9900	-21.1345	-0.2782
Std. Dev.	0.1123	0.0010	0.0173	0.1782	4.1296	0.0737
Skewness	1.2991	0.1381	0.0419	-2.5961	-1.7780	-1.4879
Kurtosis	8.9846	9.7989	2.5582	18.9210	14.4600	6.2199
Jarque-Bera	752.0203	818.0000	3.5724	4954.6280	2543.6400	339.6239
Probability	0.0000	0.0000	0.1675	0.0000	0.0000	0.0000

Source: Author calculation

In Table 1, the results of the Jarque-Bera test indicate that only REXC follows a normal distribution.

The results of the Likelihood Ratio Test, which provide evidence supporting the use of pooled panel regression in this study, are presented in Table 2.

Table 2 Likelihood Ratio Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.0823	(7,411)	0.9991
Cross-section Chi-square	0.5940	7	0.9990

Source: Author calculation

In Table 3, the findings from the pooled panel regression analysis reveal interesting insights regarding various economic indicators. RCPI, REXC, and RNEX, all exhibit coefficient signs that align with the anticipated direction, explained in the literature review section. In relation to inflation, the observed negative impact on stock return coincides with the findings of Apergis & Eleftheriou (2002) and Quayes & Jamal (2008). Similarly, the negative influence of the exchange rate on stock return harmonizes with the study conducted by Adjasi et al. (2011). Finally, the positive effect of net exports on stock return supports Tsen's (2010) study findings in this regard.

However, RINR does not demonstrate statistical significance. Furthermore, the results indicate that the output growth, as measured by RPI, holds significant implications. Nevertheless, the coefficient sign of this variable is inconsistent with the expectations established by the study of Ayopo et al. (2016).

Table 3 Panel Least Squares

Variable			Coefficient
RCPI			-17.5344***
REXCH			-1.21543***
RINR			-0.01502
RNEX			0.002494**
RPI			-0.19618***
C			-0.00143
R-squared	0.0923	F-statistic	8.5040***

*** P<0.01, ** P<0.05, * P<0.1,

Source: Author calculation

Based on the abovementioned results, it can be inferred that the majority of surplus returns from the chosen stocks can be comprehended by the variations ofRCPI, REXCH, RINR, RNEX, and RPI. As a consequence, investors may utilize these discoveries to assess thesestocks and make investment decisions.

5. IMPLICATION

This study offers valuable insights for investors and shareholders seeking to gain a better understanding of the relationship between macroeconomic factors and stock returns. By carefully considering the impact

of external factors on stock returns, investors can make informed decisions that minimize risk and uncertainty while maximizing returns. Additionally, the findings of this research can provide financial managers with a deeper understanding of the factors that influence stock returns, which can inform their decision-making when it comes to fund allocation. Beyond its implications for the financial industry, this research also has important implications for government policymakers. A thorough understanding of how macroeconomic factors affect stock returns, which further affects the flow of fund within and between countries, is essential for proposing policies that promote stability within country.For instance, in order to encourage stock returns, governments may consider reducing interest rates through expanding monetary policies. However, it is imperative to acknowledge that this study was conducted amidst the unprecedented COVID-19 pandemic, which can potentially engender adverse effects on market returns (Herwany et al., 2021;Nurcahyono et al., 2021). This suggests that the deleterious impact of inflation rate and exchange rate on stock returns may be exacerbated under these circumstances, while the beneficial influence of net exports may be attenuated.

6. CONCLUSION

This study applies the Arbitrage Pricing Theory to investigate the effect of macroeconomic factors on the returns of the stocks. The study focuses on the top 8 trade value stocks announce by stock exchange of Thailand and implements the panel regression technique on monthly data from 2/6/2018 to 1/11/2022. The empirical analysis reveals that inflation, exchange rate, and output growth, as measured by production index, exhibit a negative impact on the excess return of stocks. In contrast, net export demonstrates a positive influence on the excess return of stocks, while interest rate does not significantly determine the excess return of stocks. Most of coefficient sign are as expected except the production index. These findings hold significant implications for investors and financial managers, providing valuable insights that can guide their investment decisions. Additionally, the government can utilize this research to enhance economic stability.

ACKNOWLEDGEMENT

This research is supported by the School of Economics, Sukhothai Thammathirat Open University, Thailand.

REFERENCE

Adjasi, C. K., Biekpe, N. B., & Osei, K. A. (2011). Stock prices and exchange rate dynamics in selected African countries: A bivariate analysis. *African Journal of Economic and Management Studies.*

Alam, M., & Uddin, G. (2009). Relationship between interest rate and stock price: Empirical evidence from developed and developing countries. *International Journal of Business and Management, 4*(3), 43–51.

Algarini, A. (2020). Impact of Gdp, Foreign Direct Investment, Inflation Rate, and Interst Rate on Stock Market Values in Saudi Arabia. *Int. J. Soc. Sci. Econ. Res, 5*(7), 1667–1678.

Antonakakis, N., Gupta, R., & Tiwari, A. K. (2017). Has the correlation of inflation and stock prices changed in the United States over the last two centuries? *Research in International Business and Finance, 42,* 1-8.

Apergis, N., & Eleftheriou, S. (2002). Interest rates, inflation, and stock prices: The case of the Athens Stock Exchange. *Journal of Policy Modeling, 24*(3), 231-236.

Assagaf, A., Murwaningsari, E., Gunawan, J., & Mayangsari, S. (2019). The effect of Macro Economic variables on stock return of companies that listed in stock exchange: Empirical evidence from Indonesia. *International Journal of Business and Management, 14*(8), 108-116.

Ayopo, B. A., Isola, L. A., & Olukayode, S. R. (2016). Stock market response to economic growth and interest rate volatility: Evidence from Nigeria. *International Journal of Economics and Financial Issues, 6*(1), 354–360.

Basu, D., & Chawla, D. (2012). An empirical test of the arbitrage pricing theory—The case of Indian stock market. *Global Business Review, 13*(3), 421-432.

Demir, C. (2019). Macroeconomic determinants of stock market fluctuations: The case of BIST-100. *Economies, 7*(1), 8.

Fort, T. C., Haltiwanger, J., Jarmin, R. S., & Miranda, J. (2013). How firms respond to business cycles: The role of firm age and firm size. *IMF Economic Review, 61*(3), 520–559.

Hasanujzaman, M. (2016). *The impact of export growth to stock market in a managed floating exchange rate regime: A VAR Analysis* (MPRA Paper No. 77123; pp. 1–12). Munich Personal RePEc Archive.

Herwany, A., Febrian, E., Anwar, M., & Gunardi, A. (2021). The influence of the COVID-19 pandemic on stock market returns in Indonesia stock exchange. *Journal of Asian Finance, Economics and Business, 8*(3), 39-47.

Ho, S.-Y., & Odhiambo, N. M. (2020). The macroeconomic drivers of stock market development: Evidence from Hong Kong. *Journal of Financial Economic Policy, 12*(2), 185–207.

Huberman, G., & Wang, Z. (2005). *Arbitrage Pricing Theory* (Federal Reserve Bank of New York Staff Reports, no. 216; pp. 1–20).

Hussain, S., Quddus, A., Pham, P. T., Rafiq, M., & Pavelková, D. (2020). The moderating role of firm size and interest rate in capital structure of the firms: Selected sample from sugar sector of Pakistan. *Investment Management and Financial Innovations.*

Huy, D. T. N., Dat, P. M., & Anh, P. T. (2020). Building an Econometric Model of Selected Factors'impact on Stock Price: A Case Study. *Journal of Security & Sustainability Issues, 9,* 77-93.

Huy, D. T. N., Loan, B. T. T., & Pham, T. A. (2020). Impact of selected factors on stock price: A case study of Vietcombank in Vietnam. *Entrepreneurship and Sustainability Issues, 7*(4), 2715.

Iqbal, J., & Haider, A. (2005). *Arbitrage pricing theory: Evidence from an emerging stock market.*

Khan, M. A., & Sun, Y. (1997). The capital-asset-pricing model and arbitrage pricing theory: A unification. *Proceedings of the National Academy of Sciences, 94*(8), 4229-4232.

Kisman, Z., & Restiyanita, S. (2015). The Validity of Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) in Predicting the Return of Stocks in Indonesia Stock Exchange. *American Journal of Economics, Finance and Management, 1*(3), 184–189.

Nguyen, T., Stalin, O., Diagne, A., Aukea, L., Rootzen, P. H., & Herbertsson, A. (2017). The Capital asset pricing model and the Arbitrage pricing theory. *Gothenburg University, Financial Risk, MSA400.*

Nordin, N., Nordin, S., & Ismail, R. (2020). The Impact of Commodity Prices, Interest Rate and Exchange Rate on Stock Market Performance: An Empirical Analysis From Malaysia. *Malaysian Management Journal, 18,* 39–52. https://doi.org/10.32890/mmj.18.2014.9015

Nurcahyono, N., Hanum, A. N., & Sukesti, F. (2021). The COVID-19 Outbreak and Stock Market Return: Evidence from Indonesia. *Jurnal Dinamika Akuntansi Dan Bisnis, 8*(1), 47–58.

Quayes, S., & Jamal, A. (2008). Does inflation affect stock prices? *Applied Economics Letters, 15*(10), 767–769.

Sadorsky, P. (2003). The macroeconomic determinants of technology stock price volatility. *Review of Financial Economics, 12*(2), 191–205.

Šimáková, J., Stavárek, D., Pražák, T., & Ligocká, M. (2019). Macroeconomic factors and stock prices in the food and drink industry. *British Food Journal*.

Singh, T., Mehta, S., & Varsha, M. (2011). Macroeconomic factors and stock returns: Evidence from Taiwan. *Journal of Economics and International Finance, 3*(4), 217.

Stout, L. A. (1997). How efficient markets undervalue stocks: CAPM and ECMH under conditions of uncertainty and disagreement. *Cardozo L. Rev., 19,* 475.

Sya'bani, M. J. R., & Fathoni, M. A. (2022). The Impact of Macroeconomic and Fundamental Ratios Against Sharia Stock Returns at JII. *European Journal of Islamic Finance, 9*(2), 27-34.

Taylor, S. P.-S., & Poon, S. (1991). "Macroeconomic Factors and the UK Stock Market." *Journal of Business Finance and Accounting, 18*(5), 619-636.

Toni, N., & Simorangkir, E. N. (2022). Analysis of the Effect of Exchange Rate, Interest Rate, Inflation, and GDP Growth on Property and Real Estate Stock Price Index Listed On IDX in 2011-2019. *International Journal of Business, Economics and Law, 26*(2), 33-39.

Tsen, W. H. (2010). Exports, domestic demand, and economic growth in China: Granger causality analysis. *Review of Development Economics, 14*(3), 625-639.