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Indatu Journal of Management and Accounting

Vol. 1, No. 2, 2023



Dynamic Impact of Inflation and Exchange Rate in Indonesia's Top 10 Market Capitalization Companies: Implications for Stock Prices

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Article History

Received 28 September 2023
 Revised 30 October 2023
 Accepted 8 November 2023
 Available Online 14 November 2023

Keywords:

Macroeconomic factors
 Stock price
 Inflation
 Exchange rate
 DOLS
 FMOLS

Abstract

Macroeconomic factors are widely believed to have a crucial role in affecting a company's financial health and, ultimately, its stock price. The study addresses this important issue by investigating the long-term impact of inflation and exchange rates on firm stock prices. This study adopts both panel and cross-firm modeling, along with a dynamic approach, which no prior study has ever conducted in Indonesia's top 10 market capitalization companies. It utilizes monthly data spanning from September 2008 to August 2023. To generate insights into long-term effects, the study applies the Dynamic Ordinary Least Squares (DOLS) method, with a robustness check using the Fully-Modified Ordinary Least Squares (FMOLS) method. The econometric estimations yield results that are consistent with the hypotheses, indicating that the rise in inflation levels has a negative effect, while the strengthening of the domestic currency in exchange rates positively influences firm stock prices in the long term. This implies that investors should carefully assess and navigate inflationary environments, consider diversifying their portfolios across industries and international markets, and maintain a long-term perspective when making investment decisions in the unique context of Indonesia's market landscape.



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1. Introduction

Macroeconomic factors refer to the broader economic conditions that influence an entire economy or a significant portion of it. These factors wield a substantial impact on the performance of individual firms and, consequently, their stock prices. As the intricate web of economic interactions unfolds, these macroeconomic forces become the pulse that guides and regulates the health of the financial market system. Understanding and navigating this complex interplay is essential for companies, investors, and policymakers alike as they strive to thrive in the ever-evolving landscape of the global economy [1–6].

One of the macroeconomic factors, inflation, tends to exert a negative influence on stock prices. Firstly, it affects a company's profitability and earnings potential. When inflation leads to higher costs for raw materials, labor, and other inputs, it can squeeze profit margins, potentially resulting in lower earnings. This can translate into reduced investor confidence and, consequently, a decline in stock prices. Secondly, inflation alters the discount rates used in valuing future cash flows. Investors typically demand higher returns to offset the diminishing purchasing power of money during periods of inflation. This leads to higher discount rates, which can lower the present value of a company's future cash flows, exerting downward pressure on stock prices [7–10].

On the other hand, exchange rates hold a positive impact on stock prices, particularly for firms engaged in international trade. A robust local currency can erode a company's export competitiveness by making its products more expensive for foreign buyers. This can lead to diminished demand, lower sales, and subsequently, reduced revenue, potentially impacting the stock price of export-dependent firms. Conversely, a strong local currency can lower import costs for companies reliant on foreign-sourced raw materials or components, potentially bolstering profitability and contributing to higher stock prices. Additionally, multinational firms are exposed to currency risk, as fluctuations in exchange rates can affect the value of profits when repatriated from foreign subsidiaries. This dynamic, alongside effective hedging strategies, can introduce gains or losses, influencing reported earnings and subsequently impacting stock prices [11–14].

The prominent theory serving as the foundation of this study to comprehend the relationship between macroeconomic factors and firm stock prices is the Efficient Market Hypothesis (EMH). The EMH suggests that financial markets are informationally efficient, signifying that prices of financial assets, including stocks,

reflect all available information. According to the EMH, consistently achieving higher-than-average returns using historical price information or other publicly available data is difficult or impossible, as such information is already reflected in stock prices. Therefore, in an efficient market, changes in stock prices are primarily driven by new and unexpected information. In the context of macroeconomics, this implies that macroeconomic factors, such as inflation, exchange rates, and other economic indicators, are rapidly incorporated into stock prices [15–17].

The earlier research conducted in India focused on the key factors influencing the Bombay Stock Exchange (BSE) Sensex, which included exchange rate and inflation. The outcomes indicated that both exchange rate and inflation have a noteworthy impact on the performance of the BSE Sensex [18]. Another study in Southeast Asia examined the causal connection between the stock price index, exchange rate, and inflation, concluding that all the identified variables exhibit a significant relationship [19]. Additionally, a study in Nigeria delved into the correlation between exchange rate, inflation volatility, and stock price volatility. The study's results confirmed a robust relationship between these factors [20].

Numerous studies have also been conducted in Indonesia, yet the gap still exists. Studies by Rosalyn [21], Ekadjaja & Dianasari [22], Putra [23], Amanda et al. [24], Jefri and Djazuli [25], Pinem [26], Safitri & Kumar [27], and Nugroho et al. [28] examine the impact of exchange rates and inflation on Indonesian firm stock prices. However, all of them employ a static econometric approach, whereas this study utilizes a dynamic and cross-firm decomposing approach.

Based on theoretical concepts, previous studies, and the identified gap explained, this study focuses on investigating the long-term impact of inflation and exchange rates on stock prices. The objective of the study is the Indonesia's Top 10 market capitalization companies, adopting both a cross-firm and dynamic approach, which has not been previously conducted in Indonesia. The valuable findings from this study can provide insights for investors when considering diversifying their portfolios across industries and international markets, especially when making investment decisions in the unique context of Indonesia's stock market.

2. Materials and Methods

2.1. Data

The objective of the study encompassed the top 10 companies listed on the Indonesia Stock Exchange (IDX)

Table 1. Variable synopsis.

Variable	Units (Sources)	Variable's detail
Stock Price (STOCK)	Rupiah (YF)	The share price refers to the cost of one individual share among a set of tradable equity shares belonging to a company.
Inflation (INF)	Percentage (BI)	Inflation refers to the general increase in prices of goods and services in an economy over a period of time.
Exchange Rate (KURS)	Rupiah (MT)	Exchange rate refers to the rate at which one currency can be exchanged for another.

Table 2. Descriptive statistics.

Variable	Ticker	Mean	Median	Maximum	Minimum	Std. Dev.
STOCK	BBCA	3742.22	2697.50	9300.00	470.00	2503.38
	BBRI	2564.32	2315.00	5650.00	340.00	1383.23
	BYAN	2319.13	1096.25	21500.00	85.00	4116.26
	BMRI	2691.70	2581.25	6025.00	366.28	1152.97
	TLKM	2930.08	2995.00	4690.00	1080.00	1063.39
	ASII	6247.31	6650.00	8950.00	935.00	1716.99
	TPIA	929.70	214.12	2781.25	78.5315	911.65
	BBNI	2735.34	2568.75	4950.00	241.74	1178.31
	UNVR	5951.67	5850.00	11180.00	1490.00	2576.85
	ICBP	6512.99	7475.00	12050.00	440.00	3265.81
INF	-	4.50	3.98	12.14	1.32	2.17
KURS	-	12413.24	13321.00	16367.00	8508.00	2232.69

by market capitalization as of June 2023, namely PT. Bank Central Asia Tbk (BBCA), PT. Bank Rakyat Indonesia Tbk (BBRI), PT. Bayan Resources Tbk (BYAN), PT. Bank Mandiri Tbk (BMRI), PT. Telekomunikasi Indonesia Tbk (TLKM), PT. Astra International Tbk (ASII), PT. Chandra Asri Petrochemical Tbk (TPIA), PT. Bank Negara Indonesia Tbk (BBNI), PT. Unilever Indonesia Tbk (UNVR), and PT. Indofood CBP Sukses Makmur Tbk (ICBP).

This study utilized monthly data with a total of 1920 observations spanning from September 2008 to August 2023. Our justification for selecting the period from September 2008 is because of the farthest available stock price data for one of the selected companies, PT. Bayan Resources Tbk (BYAN), is from September 2008. Moreover, the data period extends until August 2023 to ensure a complete 12-month period for every year. The data utilized in this study was sourced from Yahoo Finance (YF) [29], Bank Indonesia (BI) [30], and the Ministry of Trade of the Republic of Indonesia (MT) [31]. Detailed information about the variables employed in this study can be found in Table 1.

2.2. Mathematical Function and Econometric Model

This study examines how stock prices are influenced by two key factors: inflation and exchange rates. The relationship is mathematically expressed in Equation 1, where the stock price is the dependent variable. Equation 1 serves as a crucial tool, providing a structured way to understand and measure how fluctuations in inflation and exchange rates contribute to variations in stock

prices. By using this equation, the aim is to quantify the impact of changes in inflation and exchange rates on stock prices.

$$STOCK = f(INF, KURS) \tag{1}$$

where STOCK refers to the stock price, INF represents inflation, and KURS stands for exchange rate.

Consequently, Equation 2 represents the econometric model depicting the relationship between variables in panel data, while Equation 3 represents the model for time-series data.

$$STOCK_{it} = \beta_0 + \beta_1 INF_{it} + \beta_2 KURS_{it} + \varepsilon_{it} \tag{2}$$

$$STOCK_t = \beta_0 + \beta_1 INF_t + \beta_2 KURS_t + \varepsilon_t \tag{3}$$

Here, *i* represents the company, *t* represents the time of the study period, β_0 signifies the intercept, while β_1 and β_2 represent the coefficients, and ε denotes the error term.

Furthermore, variables STOCK and KURS in Equations 2 and 3 were transformed into logarithmic form, as written in Equations 4 and 5.

$$\ln STOCK_{it} = \beta_0 + \beta_1 INF_{it} + \beta_2 \ln KURS_{it} + \varepsilon_{it} \tag{4}$$

$$\ln STOCK_t = \beta_0 + \beta_1 INF_t + \beta_2 \ln KURS_t + \varepsilon_t \tag{5}$$

Where $\ln STOCK$ and $\ln KURS$ represent the logarithmic forms of stock price and exchange rate, respectively. The INF variable is not transformed into logarithmic form since it is already in percentage units and has a low standard deviation value, as indicated in Table 2.

Table 3. The results of Augmented Dickey-Fuller stationary test.

Data Type	Model	STOCK		INF		KURS	
		Level	1 st Difference	Level	1 st Difference	Level	1 st Difference
Panel	Top 10 Companies	0.2287	0.0000*	0.8560	0.0000*	0.9427	0.0000*
Time-Series	BBCA	0.6098	0.0000*				
	BBRI	0.5027	0.0000*				
	BYAN	0.9475	0.0000*				
	BMRI	0.3536	0.0000*				
	TLKM	0.5084	0.0000*				
	ASII	0.0349**	-	0.5097	0.0000*	0.6911	0.0000*
	TPIA	0.8733	0.0000*				
	BBNI	0.0940	0.0000*				
	UNVR	0.1230	0.0000*				
	ICBP	0.2848	0.0000*				

Note: Significant *(1%), **(5%)

Table 4. The results of Johansen cointegration test.

Data Type	Model	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
Panel	Top 10 Companies	201.1000*	0.0000	155.5000*	0.0000
Time-Series	BBCA	50.1073*	0.0000	27.4597*	0.0013
	BBRI	50.8200*	0.0000	35.7741*	0.0000
	BYAN	28.0227**	0.0161	21.9604**	0.0111
	BMRI	50.7525*	0.0000	30.1939*	0.0004
	TLKM	35.8072*	0.0012	23.6229*	0.0059
	ASII	60.0765*	0.0000	44.9195*	0.0000
	TPIA	33.9152*	0.0023	27.5403*	0.0013
	BBNI	57.2844*	0.0000	39.7131*	0.0000
	UNVR	31.9892*	0.0044	24.0052*	0.0051
	ICBP	50.3846*	0.0000	27.7428*	0.0012

Note: Significant *(1%), **(5%)

2.3. Methods

2.3.1. Dynamic Ordinary Least Squares (DOLS)

DOLS is an expansion of the traditional OLS method, designed specifically to handle situations if variables display non-stationary behavior. Conventional OLS regression assumes that the variables are stationary, meaning their mean and variance remain consistent over time. However, in economic datasets, many variables exhibit non-stationary patterns, which can result in inaccurate regression results and interpretations. The core idea of DOLS is to transform the initial non-stationary time series into stationary ones while maintaining the fundamental long-term connections between the variables [32, 33].

2.3.2. Fully-Modified Ordinary Least Squares (FMOLS)

FMOLS is an advanced regression technique that surpasses the conventional OLS method, designed to tackle the issue of endogeneity in econometric models. Endogeneity arises when the independent variables in a regression model are linked with the error term, leading to skewed and unreliable coefficient estimates. FMOLS is

purposefully crafted to tackle this challenge by simultaneously integrating instrumental variables and performing a generalized instrumental variable regression. By combining instrumental variables and making adjustments to the structural equation, FMOLS can offer dependable and unbiased estimates of the regression coefficients, even in the presence of endogeneity [34, 35].

3. Results and Discussion

3.1. Descriptive Statistics

Detailed information about the descriptive statistics of the data can be seen in Table 2. As shown, both the highest and lowest stock prices ever recorded in this study period are from BYAN company, with a maximum of IDR21,500 and a minimum of IDR85. Furthermore, the highest average stock price is for ICBP company, at IDR6,513. Additionally, as indicated by the standard deviation values, all companies' stock prices demonstrate very high volatility movements in the study period, as well as exchange rate data. This is our justification for deciding to transform the data into logarithmic form to mitigate this problem. The most volatile stock price

Table 5. DOLS results for the impact of INF and KURS on STOCK.

Model	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Top 10 Companies	INF	-0.0954	0.0138	-6.9159*	0.0000
	KURS	2.0077	0.1569	12.7953*	0.0000
			Adjusted R ² = 0.7216		Long-run variance = 1.3831
BBCA	INF	-0.1074	0.0287	-3.7389*	0.0002
	KURS	2.8513	0.3267	8.7266*	0.0000
			Adjusted R ² = 0.7667		Long-run variance = 0.6037
BBRI	INF	-0.0964	0.0267	-3.6059*	0.0004
	KURS	2.3422	0.3041	7.7024*	0.0000
			Adjusted R ² = 0.7201		Long-run variance = 0.5229
BYAN	INF	-0.1186	0.0692	-1.7139	0.0883
	KURS	1.3937	0.7866	1.7718	0.0782
			Adjusted R ² = 0.1911		Long-run variance = 3.4994
BMRI	INF	-0.0761	0.0284	-2.6812*	0.0080
	KURS	1.5416	0.3228	4.7753*	0.0000
			Adjusted R ² = 0.5265		Long-run variance = 0.5894
TLKM	INF	-0.0386	0.0136	-2.8458*	0.0050
	KURS	1.6862	0.1542	10.9339*	0.0000
			Adjusted R ² = 0.7956		Long-run variance = 0.1345
ASII	INF	-0.0641	0.0308	-2.0830**	0.0387
	KURS	0.1995	0.3499	0.5702	0.5693
			Adjusted R ² = 0.1329		Long-run variance = 0.6924
TPIA	INF	-0.2235	0.0494	-4.5292*	0.0000
	KURS	4.5056	0.5612	8.0284*	0.0000
			Adjusted R ² = 0.7598		Long-run variance = 1.7812
BBNI	INF	-0.0828	0.0352	-2.3542**	0.0197
	KURS	1.5037	0.3998	3.7609*	0.0002
			Adjusted R ² = 0.4259		Long-run variance = 0.9040
UNVR	INF	-0.0428	0.0323	-1.3233	0.1874
	KURS	1.4462	0.3676	3.9343*	0.0001
			Adjusted R ² = 0.3844		Long-run variance = 0.7641
ICBP	INF	-0.1040	0.0376	-2.7687*	0.0062
	KURS	2.6073	0.4272	6.1033*	0.0000
			Adjusted R ² = 0.6259		Long-run variance = 1.0320

Note: Significant *(1%), **(5%)

belongs to BYAN company, followed closely by ICBP and UNVR companies, ranking in the top three for the most volatile stock prices.

3.2. Diagnostic Tests

3.2.1. Stationary Test

A stationary test is used to determine whether a dataset contains a unit root problem or not. Stationarity is an important assumption in dynamic models because it affects the validity of various statistical techniques. A stationary dataset indicates that the mean, variance, and covariance remain constant over time. In other words, the data does not exhibit trends, seasonal patterns, or other systematic patterns. This study uses the Augmented Dickey-Fuller (ADF) test to detect a unit root problem in the dataset [36]. As shown in Table 3, most variables are observed to exhibit stationarity in the 1st difference order. This indicates that the average and variability of the data remain constant over time, which is reliable for dynamic estimation.

3.2.2. Cointegration Test

Other than a stationary test, a cointegration test is also important to conduct before employing a dynamic method, which is used to determine if a set of variables is cointegrated. This study employs a widely used method for testing cointegration, especially among multiple variables, which is the Johansen cointegration test [37]. As indicated in Table 4, both panel and time-series models exhibit significant cointegration at a 5% probability level. This leads to the conclusion that the dynamic estimation methods utilized in this study indicate a stable long-term relationship.

3.3. Econometric Results

3.3.1. Panel Long-term Estimation with DOLS

As shown in Table 5, the empirical findings of this study, conducted using the DOLS method, which aims to assess the dynamic influence of inflation and exchange rates on the stock prices of Indonesia's top 10 biggest market

Table 6. FMOLS results for the impact of INF and KURS on STOCK.

Model	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Top 10 Companies	INF	-0.0912	0.0136	-6.7172*	0.0000
	KURS	2.1072	0.1497	14.0762*	0.0000
		Adjusted R ² = 0.7177		Long-run variance = 1.2587	
BBCA	INF	-0.1087	0.0257	-4.2349*	0.0000
	KURS	2.9354	0.2831	10.3691*	0.0000
		Adjusted R ² = 0.7603		Long-run variance = 0.4532	
BBRI	INF	-0.0938	0.0244	-3.8429*	0.0002
	KURS	2.4519	0.2691	9.1132*	0.0000
		Adjusted R ² = 0.7116		Long-run variance = 0.4094	
BYAN	INF	-0.1004	0.0698	-1.4384	0.1521
	KURS	1.5398	0.7698	2.0002**	0.0470
		Adjusted R ² = 0.1743		Long-run variance = 3.3509	
BMRI	INF	-0.0643	0.0253	-2.5375**	0.0120
	KURS	1.6754	0.2793	5.9986*	0.0000
		Adjusted R ² = 0.5080		Long-run variance = 0.4411	
TLKM	INF	-0.0299	0.0123	-2.4226**	0.0164
	KURS	1.7813	0.1361	13.0910*	0.0000
		Adjusted R ² = 0.7887		Long-run variance = 0.1047	
ASII	INF	-0.0541	0.0280	-1.9316	0.0550
	KURS	0.2905	0.3089	0.9402	0.3484
		Adjusted R ² = 0.1026		Long-run variance = 0.5397	
TPIA	INF	-0.2480	0.0489	-5.0661*	0.0000
	KURS	4.5407	0.5399	8.4103*	0.0000
		Adjusted R ² = 0.7661		Long-run variance = 1.6483	
BBNI	INF	-0.0683	0.0319	-2.1379**	0.0339
	KURS	1.6529	0.3521	4.6945*	0.0000
		Adjusted R ² = 0.4030		Long-run variance = 0.7011	
UNVR	INF	-0.0457	0.0315	-1.4523	0.1482
	KURS	1.4687	0.3469	4.2337*	0.0000
		Adjusted R ² = 0.3687		Long-run variance = 0.6806	
ICBP	INF	-0.0987	0.0329	-2.9922*	0.0032
	KURS	2.7352	0.3638	7.5188*	0.0000
		Adjusted R ² = 0.6145		Long-run variance = 0.7483	

Note: Significant *(1%), **(5%)

capitalization companies, align with the established theory and hypotheses. They suggest that inflation exerts a negative impact, while exchange rates have a positive effect on stock prices in the long term.

The statistical significance is notably high for both inflation and exchange rates, with probability values less than 0.01. Additionally, the coefficient of determination stands at an acceptable 72.16%, complemented by a low long-run variance value of 1.3831. Specifically, a 1.0% rise in inflation could potentially lead to a stock price decrease of up to 0.0954%. Conversely, a 1.0% increase in the exchange rate could potentially result in a stock price increase of as much as 2.0077%.

3.3.2. Time-series Long-term Estimation with DOLS

Apart from the panel estimation outcomes, this study also provides time-series estimation results for each of Indonesia's top 10 biggest market capitalization companies. This serves to offer more comprehensive empirical insights. As depicted in Table 5, eight out of ten

companies demonstrate similar results to the panel data, with inflation producing a negative influence, while the exchange rate exerts a positive effect on stock prices over the long term. The statistical significance of the model for eight companies is also high for both inflation and exchange rates, with probability values less than 0.05. Moreover, the coefficient of determination stands at the same acceptable percentage of an average of 66%, supported by a low long-run variance value of an average of 0.7954.

Specifically, a 1.0% rise in inflation can lead to a decrease in stock prices ranging from 0.0386%, as indicated by the TLKM company model results, to 0.2235%, as demonstrated by the TPIA company model results. Conversely, a 1.0% increase in exchange rates can drive stock prices up within a range of 1.4462%, according to the UNVR company model, to 4.5056%, as shown in the TPIA company model results.

3.3.3. Robustness check with FMOLS

To enhance the reliability of the empirical findings from the DOLS method, we supplemented it with a robustness check using the FMOLS method. As depicted in Table 6, the results demonstrate consistent and robust patterns with those obtained through the DOLS method. Notably, they confirm that inflation exerts a negative influence, while exchange rates exert a positive impact on stock prices in the long term, across both panel and individual time-series model companies.

The statistical significance is same notably high for both inflation and exchange rates, with probability values less than 0.05 in both panel and each time-series company model. Additionally, the average coefficient of determination stands at an acceptable percentage above 60%, with also a low long-run variance average value of less than 0.1.

In intricate detail, within the panel model, a 1.0% uptick in inflation might lead to a potential stock price drop of 0.0912%. Similarly, in the time-series model, a 1.0% inflation increase can lead to stock price decreases ranging from 0.0299% (as indicated by the TLKM company model results) to 0.2480% (as demonstrated by the TPIA company model results). Conversely, in the panel model, a 1.0% rise in the exchange rate could potentially result in a stock price increase of up to 2.1072%. Similarly, in the time-series model, a 1.0% increase in exchange rates can drive stock prices up within a range of 1.4687% (according to the UNVR company model) to 4.5407% (as shown in the TPIA company model results).

3.4. Discussion

The study's utilization of the DOLS method, coupled with the FMOLS method, to derive empirical findings regarding the long-term relationship between inflation, exchange rates, and stock prices within the context of Indonesia's top 10 market capitalization companies is noteworthy. This approach is significant as it facilitates the assessment of dynamic influences. The selection of these methodologies is consistent with previous studies that have employed similar techniques to analyze the impact of macroeconomic variables on financial markets [38–43].

The negative impact of inflation on stock prices is in line with the expectations of economic theory [44–47]. High inflation erodes purchasing power and can lead to uncertainty in the market, which can negatively affect stock prices. The finding that a 1.0% increase in inflation potentially leads to a stock price decrease of up to 0.0954% underscores the importance of controlling inflation for a stable and healthy stock market.

On the other hand, the positive effect of exchange rates on stock prices in the long term is also consistent with economic theory [48–50]. A favorable exchange rate can enhance the competitiveness of a country's exports, positively impacting the profitability of companies and thereby influencing stock prices. The result that a 1.0% increase in the exchange rate could potentially result in a stock price increase of as much as 2.0077% indicates the significance of exchange rate movements for these companies.

The high level of statistical significance for both inflation and exchange rates strengthens the credibility of the study's findings. This suggests a robust relationship between these variables and stock prices. Furthermore, the coefficient of determination (R^2) values of 72.16% for the panel estimation and an average of 66% for the individual company models indicate that the models explain a substantial portion of the variation in stock prices. This implies that inflation and exchange rates are important determinants of stock prices for these companies. Additionally, the low long-run variance values, 1.3831 for the panel estimation and an average of 0.7954 for the individual company models, suggest that the models exhibit relatively low volatility, providing further support for the stability of the relationships identified.

The main highlight of this study is that, in addition to panel estimation results, the time-series estimation results for each of Indonesia's top 10 biggest market capitalization companies provide additional granularity to the findings, offering a company-specific perspective. The consistency of results across eight out of ten companies further bolsters the robustness of the overall findings that both inflation and exchange rates have a significant long-term impact on firm stock prices.

4. Conclusions, Implications and Limitations

As the stock price is widely believed to have a crucial connection to macroeconomic factors, this study aims to investigate the long-term impact of inflation and exchange rates on stock prices in Indonesia's top 10 market capitalization companies. It offers new insights by adopting both panel and cross-firm modeling, as well as employing dynamic methods. The empirical findings yield results that are consistent with the theory and hypotheses, indicating that inflation has a negative effect, while exchange rates positively influence stock prices in the long term.

The study's findings have significant implications for various stakeholders. Investors should take note of the negative effect of inflation and the positive influence of exchange rates on stock prices, enabling them to make

more informed investment decisions. Traders should remain vigilant about inflation and exchange rate trends, as they may influence market sentiment. Long-term investors should incorporate this information into their investment strategies, considering how these macroeconomic factors could affect the performance of their investments over an extended period. Policymakers, particularly those involved in monetary and exchange rate policies, should take these relationships into account when formulating strategies to support a healthy stock market.

Regarding the significance of this study, it is also crucial to acknowledge its limitations, primarily stemming from its cross-firm focus, confined to just ten companies. For the progression of research in this field, future studies should endeavor to encompass a broader sample of companies in their modeling framework. This expansion will undoubtedly yield more comprehensive findings, enriching the existing literature with a deeper understanding of the relationships between macroeconomic factors and stock price.

Author Contributions: Conceptualization, I.H.; methodology, I.H. and G.M.I.; software, I.H., G.M.I., R.T.U., R.A.H. and N.A.K.H.; validation, R.T.U., P.D., M.A.F.M. and R.M.; formal analysis, G.M.I., P.D., M.A.F.M., R.C. and N.A.K.H.; investigation, R.T.U., P.D., R.A.H., M.A.F.M. and N.A.K.H.; resources, I.H. and G.M.I.; data curation, I.H.; writing—original draft preparation, I.H.; writing—review and editing, I.H. and G.M.I.; visualization, I.H., G.M.I., R.T.U., R.A.H., R.C. and N.A.K.H.; supervision, R.T.U., P.D., M.A.F.M. and R.M.; project administration, G.M.I. All authors have read and agreed to the published version of the manuscript.

Funding: This study does not receive external funding.

Data Availability Statement: All data can be accessed independently through Yahoo Finance, Bank Indonesia, and the Ministry of Trade of the Republic of Indonesia.

Acknowledgments: The authors would like to express their gratitude to their respective institutions.

Conflicts of Interest: All the authors declare that there are no conflicts of interest.

References

- Hondroyannis, G., and Papapetrou, E. (2001). Macroeconomic influences on the stock market, *Journal of Economics and Finance*, Vol. 25, No. 1, 33–49.
- Wongbangpo, P., and Sharma, S. C. (2002). Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries, *Journal of Asian Economics*, Vol. 13, No. 1, 27–51. doi:10.1016/S1049-0078(01)00111-7.
- Noviandy, T. R., Idroes, G. M., Maulana, A., Hardi, I., Ringga, E. S., and Idroes, R. (2023). Credit Card Fraud Detection for Contemporary Financial Management Using XGBoost-Driven Machine Learning and Data Augmentation Techniques, *Indatu Journal of Management and Accounting*, Vol. 1, No. 1, 29–35. doi:10.60084/ijma.v1i1.78.
- Hardi, I., Idroes, G. M., Hardia, N. A. K., Fajri, I., Furqan, N., Noviandy, T. R., and Utami, R. T. (2023). Assessing the Linkage Between Sustainability Reporting and Indonesia's Firm Value: The Role of Firm Size and Leverage, *Indatu Journal of Management and Accounting*, Vol. 1, No. 1, 21–28. doi:10.60084/ijma.v1i1.79.
- Huy, D. T. N., Nhan, V. K., Bich, N. T. N., Hong, N. T. P., Chung, N. T., and Huy, P. Q. (2021). Impacts of Internal and External Macroeconomic Factors on Firm Stock Price in an Expansion Econometric model—A Case in Vietnam Real Estate Industry, 189–205. doi:10.1007/978-3-030-48853-6_14.
- Yandri, E., Idroes, R., Maulana, A., and Zahriah, Z. (2023). Design Concept of Information Control Systems for Green Manufacturing Industries with IoT-Based Energy Efficiency and Productivity, *Leuser Journal of Environmental Studies*, Vol. 1, No. 1, 9–17. doi:10.60084/ljes.v1i1.36.
- Anari, A., and Kolari, J. (2001). STOCK PRICES AND INFLATION, *Journal of Financial Research*, Vol. 24, No. 4, 587–602. doi:10.1111/j.1475-6803.2001.tb00832.x.
- Antonakakis, N., Gupta, R., and 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*, Vol. 42, 1–8. doi:10.1016/j.ribaf.2017.04.005.
- Rapach, D. E. (2002). The long-run relationship between inflation and real stock prices, *Journal of Macroeconomics*, Vol. 24, No. 3, 331–351. doi:10.1016/S0164-0704(02)00041-1.
- Hardi, I., Saputra, J., Hadiyani, R., Maulana, A. R. R., and Idroes, G. M. (2023). Decrypting the Relationship Between Corruption and Human Development: Evidence from Indonesia, *Ekonomikalia Journal of Economics*, Vol. 1, No. 1, 1–9. doi:10.60084/eje.v1i1.22.
- Zhao, H. (2010). Dynamic relationship between exchange rate and stock price: Evidence from China, *Research in International Business and Finance*, Vol. 24, No. 2, 103–112. doi:10.1016/j.ribaf.2009.09.001.
- Phylaktis, K., and Ravazzolo, F. (2005). Stock prices and exchange rate dynamics, *Journal of International Money and Finance*, Vol. 24, No. 7, 1031–1053. doi:10.1016/j.jimonfin.2005.08.001.
- Jayashankar, M., and Rath, B. N. (2017). The dynamic linkage between exchange rate, stock price and interest rate in India, *Studies in Economics and Finance*, Vol. 34, No. 3, 383–406. doi:10.1108/SEF-02-2016-0043.
- Hardi, I., Ringga, E. S., Fijay, A. H., Maulana, A. R. R., Hadiyani, R., and Idroes, G. M. (2023). Decomposed Impact of Democracy on Indonesia's Economic Growth, *Ekonomikalia Journal of Economics*, Vol. 1, No. 2, 51–60. doi:10.60084/eje.v1i2.80.
- Țițan, A. G. (2015). The Efficient Market Hypothesis: Review of Specialized Literature and Empirical Research, *Procedia Economics and Finance*, Vol. 32, 442–449. doi:10.1016/S2212-5671(15)01416-1.
- Degutis, A., and Novickýtė, L. (2014). The efficient market hypothesis: A critical review of literature and methodology, *Ekonomika*, Vol. 93, 7–23.
- Naseer, M., and Bin Tariq, D. Y. (2015). The efficient market hypothesis: A critical review of the literature, *The IUP Journal of Financial Risk Management*, Vol. 12, No. 4, 48–63.
- Singh, S., Tripathi, L. K., and Lalwani, K. (2012). An empirical study of impact of exchange rate & inflation rate on performance of BSE SENSEX, *Spectrum: A Journal of Multidisciplinary Research*, Vol. 1, No. 3, 637–2278.
- Amelia, T. N. (2016). Causality test between exchange rate, inflation rate and Stock Price Index in Southeast Asia, *Journal of Administrative and Business Studies*, Vol. 2, No. 2, 101–106.
- Nkoro, E., and Uko, A. K. (2016). Exchange rate and inflation volatility and stock prices volatility: Evidence from Nigeria, 1986–2012, *Journal of Applied Finance and Banking*, Vol. 6, No. 6, 57.

21. Rosalyn, A. M. (2018). The effect of rupiah exchange rate and inflation rate towards composite stock price index in Indonesia stock exchange, *Russian Journal of Agricultural and Socio-Economic Sciences*, Vol. 78, No. 6, 53–58.
22. Ekadjaja, M., and Dianasari, D. (2017). The impact of inflation, certificate of Bank Indonesia, and exchange rate of IDR/USD on the Indonesia Composite Stock Price Index, *Jurnal Muara Ilmu Ekonomi Dan Bisnis*, Vol. 1, No. 1, 42–51.
23. Putra, D. A. A. (2016). The effect of rupiah/US \$ exchange rate, inflation and SBI interest rate on composite stock price index (CSPI) in Indonesia Stock Exchange, *International Conference on Education*, 202–214.
24. Amanda, S. T., Akhyar, C., and Ilham, R. N. (2023). THE EFFECT OF INFLATION, EXCHANGE EXCHANGE, INTEREST RATE ON STOCK PRICE IN THE TRANSPORTATION SUB-SECTOR, 2018-2020, *Journal of Accounting Research, Utility Finance and Digital Assets*, Vol. 1, No. 4, 342–352.
25. Jeffrey, J., and Djazuli, A. (2020). The Effect of Inflation, Interest Rates and Exchange Rates on Stock Prices of Manufacturing Companies in Basic and Chemical Industrial Sectors on the Indonesia Stock Exchange (IDX), *International Journal of Business, Management and Economics*, Vol. 1, No. 1, 34–49.
26. Pinem, D. B. (2019). Analysis of Global Stock Exchange Index, Foreign Exchange Rate, Interest Rate and Inflation Rate Influences CSPI in Indonesia Stock Exchange (Period of January 2014–2015), *European Journal of Business and Management Research*, Vol. 4, No. 6.
27. Safitri, I. R., and Kumar, S. (2014). The impact of interest rates, inflation, exchange rates and GDP on stock price index of plantation sector: Empirical analysis on Bei in the year of 2008–2012, *Full Paper Proceeding TMBER*, Vol. 1, 55–61.
28. Nugroho, R. H., Andarini, S., Wijaya, R. S., and Prabowo, B. (2020). Analysis Of The Effect Of Exchange Value, Inflation Level, SBI Interest Rate And Hang Seng Index For Joint Stock Price Index In Indonesia Stock Exchange (Study On IDX 2016-2019), *PalArch's Journal of Archaeology of Egypt/Egyptology*, Vol. 17, No. 6, 8304–8314.
29. Yahoo. (2023). Yahoo Finance, from <https://finance.yahoo.com>.
30. Bank Indonesia. (2023). Inflation Data, from <https://www.bi.go.id/id/statistik/indikator/data-inflasi.aspx>.
31. Ministry of Trade of the Republic of Indonesia. (2023). Satudata Perdagangan, from <https://satudata.kemendag.go.id/data-informasi/perdagangan-dalam-negeri/nilai-tukar>.
32. Adem, M. (2023). The impact of macroprudential policy and political institutions on bank credit risk in Ethiopia: A dynamic ordinary least squares analysis, *Cogent Business & Management*, Vol. 10, No. 3, 2257829.
33. Panopoulou, E., and Pittis, N. (2004). A comparison of autoregressive distributed lag and dynamic OLS cointegration estimators in the case of a serially correlated cointegration error, *The Econometrics Journal*, Vol. 7, No. 2, 585–617.
34. Pedroni, P. (2001). Fully modified OLS for heterogeneous cointegrated panels, *Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, Emerald Group Publishing Limited, 93–130.
35. Wagner, M., and Reichold, K. (2023). Panel cointegrating polynomial regressions: group-mean fully modified OLS estimation and inference, *Econometric Reviews*, Vol. 42, No. 4, 358–392. doi:10.1080/07474938.2023.2178141.
36. Cheung, Y.-W., and Lai, K. S. (1995). Lag Order and Critical Values of the Augmented Dickey–Fuller Test, *Journal of Business & Economic Statistics*, Vol. 13, No. 3, 277–280. doi:10.1080/07350015.1995.10524601.
37. Poh, C. W., and Tan, R. (1997). Performance of Johansen's Cointegration Test, *East Asian Economic Issues*, WORLD SCIENTIFIC, 402–414. doi:10.1142/9789812819376_0029.
38. Tetteh, J. E., Adenutsi, D. E., and Amoah, A. (2019). The determinants of stock market return in Ghana: FMOLS and DOLS approaches, *IUP Journal of Applied Finance*, Vol. 25, No. 4, 5–27.
39. Alexius, A., and Sp, D. (2018). Stock prices and GDP in the long run, *Journal of Applied Finance and Banking*, Vol. 8, No. 4, 107–126.
40. Liang, C.-C., Lin, J.-B., and Hsu, H.-C. (2013). Reexamining the relationships between stock prices and exchange rates in ASEAN-5 using panel Granger causality approach, *Economic Modelling*, Vol. 32, 560–563. doi:10.1016/j.econmod.2013.03.001.
41. Shibli, K. A., and Ahmed, N. (2017). Macroeconomic Determinants of Stock Price of Banking Sector: A Panel Data Analysis on all Listed Banks in Dhaka Stock Exchange, *The Jahangirnagar University Journal of Business Research*, Vol. 19, 15–27.
42. Idroes, G. M., Hardi, I., Nasir, M., Gunawan, E., Maulidar, P., and Maulana, A. R. R. (2023). Natural Disasters and Economic Growth in Indonesia, *Ekonomikalia Journal of Economics*, Vol. 1, No. 1, 33–39. doi:10.60084/eje.v1i1.55.
43. Idroes, G. M., Syahnur, S., Majid, M. S. A., Idroes, R., Kusumo, F., and Hardi, I. (2023). Unveiling the Carbon Footprint: Biomass vs. Geothermal Energy in Indonesia, *Ekonomikalia Journal of Economics*, Vol. 1, No. 1, 10–18. doi:10.60084/eje.v1i1.47.
44. Campbell, J. Y., and Vuolteenaho, T. (2004). Inflation Illusion and Stock Prices, *American Economic Review*, Vol. 94, No. 2, 19–23. doi:10.1257/0002828041301533.
45. Caporale, T., and Jung, C. (1997). Inflation and real stock prices, *Applied Financial Economics*, Vol. 7, No. 3, 265–266. doi:10.1080/096031097333619.
46. Abdullah, D. A., and Hayworth, S. C. (1993). Macroeconometrics of stock price fluctuations, *Quarterly Journal of Business and Economics*, 50–67.
47. Apergis, N., and Eleftheriou, S. (2002). Interest rates, inflation, and stock prices: the case of the Athens Stock Exchange, *Journal of Policy Modeling*, Vol. 24, No. 3, 231–236. doi:10.1016/S0161-8938(02)00105-9.
48. Ma, C. K., and Kao, G. W. (1990). On exchange rate changes and stock price reactions, *Journal of Business Finance & Accounting*, Vol. 17, No. 3, 441–449.
49. Abdalla, I. S. A., and Murinde, V. (1997). Exchange rate and stock price interactions in emerging financial markets: evidence on India, Korea, Pakistan and the Philippines, *Applied Financial Economics*, Vol. 7, No. 1, 25–35. doi:10.1080/096031097333826.
50. Gavin, M. (1989). The stock market and exchange rate dynamics, *Journal of International Money and Finance*, Vol. 8, No. 2, 181–200. doi:10.1016/0261-5606(89)90022-3.