Asymmetric effects of inflation rate changes on the stock market index: The case of Indonesia

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Abstract. Over the years, macroeconomic fundamentals and the stock market were found to have symmetrical relationship in numerous scientific investigations. These fundamentals provide crucial knowledge regarding stock price indices by providing forecasts for the future and information on the current status of the economy. This study employs a Nonlinear Autoregressive Distributed Lags (NARDL) model to fill in the research gap by estimating the asymmetric relationship between inflation and stock market from 1996 to 2020. The study suggests that inflation has a long-run and short-run asymmetric affect on the stock price, while both positive and negative inflation changes harm stock prices. As it reveals, the asymmetric impact of inflation on the stock market, this study can assist investors and businesses in making well-informed decisions that result in a more efficient allocation of resources, ultimately benefiting the economy. Additionally, policymakers can utilize these findings to design effective strategies for managing inflation, stabilizing prices, promoting economic growth, and ensuring financial market stability.

Keywords: stock prices, macroeconomic fundamentals, financial economics, NARDL.

JEL Classification: E310, E510, E6, G10, G15, G120

1. INTRODUCTION

The stock market performance can be a significant indicator signaling overall economic performance and of concern for the authorities. Stock markets have a unilateral impact on economic growth (Hoque & Yakob, 2017) and are a vital focus point of investors. The economy, economists, and investors are all affected by the stock market and the exchange rate.

Stock trading enables companies to raise capital to pay off debt and proceed with organizational expansion. The market offers investors the opportunity to profit from stock price increases and dividend payments from companies. There is a bilateral correlation between economic performance and stock markets. To reduce the risk of loss, investors are likely to increase their investment (Amado & Choon, 2020), conversely, stock prices impact consumer and business confidence, which influences the overall economy.
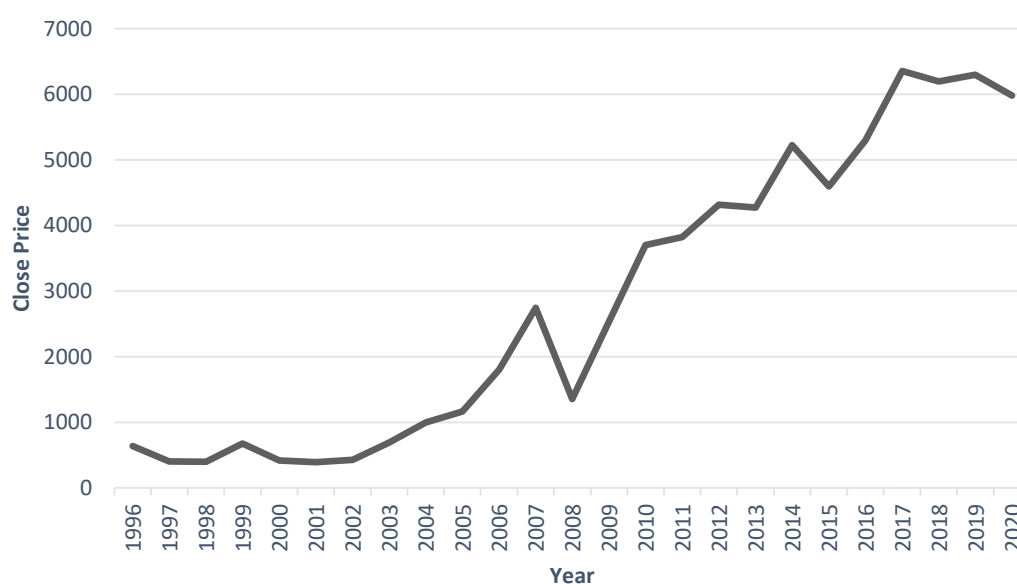

Figure 1. Indonesia equity market index: Jakarta composite
Source: CEIC (2021)

The stock market has experienced several crashes in the past few decades. Figure 1 presents the Indonesia Equity Market Index. The stock market indices determine a country's economic health, therefore, the stock price behavior must be investigated by policymakers to ensure preventive actions before the stock price changes further weaken the economy. In this regard, it is important to predict the stock prices. The presence of asymmetric responses of stock prices to the changes in macroeconomic fundamentals provides an additional avenue for the investigation of stock price behaviour, as more information can be obtained from asymmetric analysis.

Furthermore, monetary policies are linked to interest rates and credit availability, in which the instruments are short-term interest rates and bank reserves that function via the monetary base. The central bank of Indonesia or Bank Indonesia (BI) is a fully autonomous state institution that serves as the monetary authority. The inflation rate in Indonesia reflects the price stability of products and services, therefore, to attain and sustain price and financial system stability, exchange rate stability is essential. Indonesia has been using the Inflation Targeting Framework (ITF) to replace the base monetary policy target since July 1, 2005. In reality, the ITF was executed by using the interbank rate as the operational aim and the policy rate as the monetary policy signal. Subsequently, Flexible ITF was implemented as BI could not solely consider

inflation target but should also include the financial sector stability, capital flow dynamics, and the exchange rate (Hendar, 2016).

Similarly, macroeconomic fundamentals play an indispensable role in economies that affect the stock market performance. According to Ho and Iyke (2017), six fundamentals affect stock market development. Firstly, economic development is critical in determining stock market performance as more individuals can participate in financial services as the economy grows due to lower fixed costs. In addition, long-term economic growth necessitates the development of both the banking sector and the stock market. Several studies suggest a positive association between money supply and stock prices (Rasiah, 2010; Naik, 2013), while several researches show a negative association between stock prices and money supply (Asmy et al., 2009; Humpe & Macmillan, 2009).

Moreover, the impact of inflation on stock returns depends on the investor's ability to hedge and the country's monetary policies. High inflation may be beneficial as it can stimulate job growth but on the other hand, it also affects corporate profits through higher input cost that reduces hiring. Similarly, interest rates can impact the stock market when it is forced to become higher due to domestic currency demand. Resultantly, foreign investors will be drawn in and invest, giving the country the greatest benefit according to Mikhaylov (2018). The stock market and the exchange rate are critical for economic and financial development (Afshan et al., 2018; Gokmenoglu, Eren, & Hesami, 2021), where the exchange rate may determine the stock prices through appreciation and depreciation. Moreover, private capital flows, such as FDI contribute to technological progress, jobs growth, increased production of goods and services, and economic development. Consequently, economic growth positively impacts stock market development and the rise in share prices.

Effective monetary policies can ensure that a country has a productive and well-functioning economy with low and stable inflation. When inflation rises, input prices rise, lowering consumers' purchasing power as a consequence, lowering revenues obtained. As economic activity drives the stock price, it is expected to exhibit nonlinearities. The inflation rate is Indonesia's significant monetary policy target (Hender, 2016), hence, the stock market's development may be influenced by the positive, negative, or insignificant effects of inflation rate fluctuations (Uwubanmwen & Eghosa, 2015). Accordingly, this study provides explanations and evidence for the presence of asymmetries.

Stock prices are expected to react differently based on inflation periods, therefore, it can provide misleading evidence as adopting linear models may not be adequate to study the association between stock price and inflation. In addition, the impact of positive inflation might differ from negative inflation. The stock market reacts more rapidly to information that stimulates speculative capital and induces stock market volatility (Mnif, 2013).

The existing literature illustrates the limited empirical evidence on the asymmetric effect using macroeconomic fundamentals. Recently, Shin, Yu, and Greenwood-Nimmo (2011) proposed a nonlinear ARDL (NARDL) model, which is then extended to explore the applicability and effectiveness in economic field. The advantage of this model is that it can be used regardless the variables are integrated of either zero $I(0)$ or one $I(1)$. Second, this model measures the impact of positive and negative changes of inflation on stock prices. For example, Lee and Ryu (2018) and Bahmani and Saha (2016) were the first few researches which extend NARDL model to study the asymmetric effects of exchange rate and inflation respectively on stock prices. In addition, NARDL were widely adopted in studying the asymmetric impacts of oil prices in the study of Ibrahim (2015) and Sanusi (2020). Therefore, the novelty of this paper is by exploring the asymmetric effect of inflation on the Indonesia's stock market by modified the stock market model accordingly. This will provide additional information to policymakers for effective policy design, simultaneously, the insight gained can assist in further understanding the inflation impacts.

The hypotheses of this study are as below:

H_o: *There is no asymmetric effect of inflation on the stock prices movement in Indonesia.*
H_o: *There is asymmetric effect of inflation on the stock prices movement in Indonesia.*

The paper's objective is to analyze the long run and short run correlation between inflation and stock market performance, taking into account the asymmetric effect in inflation of the country from 1996 to 2020. This paper is outlined in five sections inclusive of this introduction. Section two summarize a literature review on the stock market and the macroeconomic determinants; the section three describes the data and methodology; the fourth section discusses the empirical results and discussion; and the conclusion is drawn in section five.

2. LITERATURE REVIEW

2.1. Stock market and the macroeconomic determinants

The Arbitrage Pricing Theory (APT) was originally formulated by Ross (1976), describes how the market determines an asset price and measures the profit margin considered feasible for an investment. According to Nordin et al.'s (2014) study, APT is a useful theory for explaining the impact of macroeconomic variables on stock market performance in comparison to the market return. Furthermore, the stock exchange provides a platform to connect organizations that acquire funds with investors who have additional money to invest.

The intensive literature reviewed by Ho and Iyke's (2017) study indicates that the macroeconomic fundamentals determine the economic development, banking sector development, inflation rate, interest rates, exchange rates as well as private capital flows. Additionally, this study provides a guideline on selecting macroeconomic fundamentals to estimate the stock prices of Indonesia. The divergences possessed by the fundamental factors can contribute to the asymmetries and elucidate the market dynamics under concern.

According to Wahyudi et al. (2017), the Gross Domestic Product (GDP) has a significant positive effect on the Indonesian aggregate stock prices indexes in Indonesia, Malaysia, Singapore, and the Philippines, whereas a significant negative effect in Thailand. Setiawan's (2020) analysis backs up the positive and significant association between GDP and the stock market in Indonesia. The bank development sector, such as money supply also positively affects the stock market performance (John, 2019). Mahpudin and Batu (2021) confirmed money supply impacted stock prices. Conversely, Upadhyaya, Nag, and Mixon's (2018) study indicates that money supply growth negatively relates to stock prices. In another recent study by Salamat et al. (2021), money supply does not have a significant effect on stock market price index. According to Phong, Van, and Bao (2019), incomes deteriorate due to the declining money value when inflation rises, making the stock market less appealing to investors. In addition, inflation lowers the actual return rate for assets. Nonetheless, a higher interest rate results in higher costs to investors, causing the stock market to suffer due to inflation. Numerous studies show that stock returns and inflation have a negative association (Silva, 2016; Jepkemei, 2017; Eldomiaty et al., 2020). Conversely, Amata et al.'s (2016) study reported that inflation and stock volatility positively affect short and long-runs.

Based on Eldomiaty et al.'s (2018) study, interest rates and stock prices have a positive and significant correlation, suggesting that investors adjust the stock prices to address the real interest rate changes. Alternatively, the interest rate harms the stock market performance (John, 2019; Setiawan, 2020) as interest rates elevate investment costs and obstruct firms from releasing their shares to the stock market (Demir, 2019). Moreover, Mahpudin and Batu (2021) and Luwihono et al.'s (2021) study observed that the interest rate does not correlate with stock prices.

Furthermore, the currency can affect products, services, and securities trades in a given economy. The exchange rate can positively or negatively affect stock prices through various channel such as inflation and

purchasing power. There is a positive association between stock prices and exchange rates when the local currency depreciates and local enterprises become more competitive, thus, increasing exports (Suriani et al., 2015; Upadhyaya, Nag, & Mixon, 2018; Demir, 2019; Luwihono et al., 2021). Alternatively, empirical evidence demonstrates that the exchange rate has a long-run negative association with the stock market (Amado & Choon, 2020). Similarly, Pantas et al. (2019) and Mahpudin and Batu (2021) studies discovered no cointegration between the exchange rate and stock prices index for Indonesia and Brazil respectively. Additionally, private capital flows also impact the stock market index. Increasing FDI inflows significantly raises the stock market index (Demir, 2019). For example, there was a significant and positive association between FDI and the Pakistani aggregate market capitalization (Malik & Amjad, 2013). Conversely, according to Rhee and Wang's (2009) study, FDI has a negative link with Indonesian stock market liquidity. Whereas, Rajapakse's (2018) study proposes no short-term relationship between the stock market and FDI inflows.

2.2. Asymmetric effects of inflation on stock prices

Asymmetric relationships can be discovered between macroeconomic fundamentals and stock prices (Dhaoui, Goutte & Guesmi, 2018). Theoretically, the higher inflation rate is linked to the less liquid and smaller equity markets. Furthermore, existing literature indicates an asymmetric relationship between the inflation rate and the stock price index as a measure of stock market (Boyd et al., 2001; Konstantinos, Ektor & Emmanouil, 2012; Lee & Ryu, 2018; Phong, Van, & Bao, 2019; Alqaralleh, 2020). Boyd et al. (2001) conducted a study on the relation between inflation and stock returns in the US from 1802 to 1995 with a finding that their relationship is nonlinear. According to Konstantinos, Ektor and Emmanouil (2012), a 1% rise in Consumer Price Index (CPI) will result in a 1.25% increase in stock prices, whereas a 1% decrease in CPI will lead to a 0.77% decrease in stock prices. These studies found evidence of nonlinear relationship, with positive effects at low levels of inflation and negative effects at high levels of inflation.

Lee and Ryu (2018) conducted similar study in Korea from 1980 to 2016 and Phong, Van, & Bao (2019) in Vietnam from 2000 to 2017, found evidence of a non-linear relationship between inflation and stock market. Based on Alqaralleh's (2020) study, a 1% increase in negative inflation cause a 0.30% to 0.87% decrease in stock returns in the USA, UK, Canada, Germany, France, Italy, and Japan. Nonetheless, a study by Luwihono et al. (2021) demonstrates that inflation is irrelevant to the stock market. Likewise, with the phenomenon of the financial crisis 1997, the macroeconomic variables and stock performance are affected by the weakening of rupiah currency ultimately impact Indonesia (Hasmirati & Akuba, 2022). Furthermore, this sample which includes the global financial crisis in 2008 may induce nonlinearity and asymmetry in the financial and economic time series (Cheah et al., 2017; Dhaoui et al., 2018). More recently, the economic condition has also been impacted by COVID-19 pandemic.

Based on previous literature, the relationship between macroeconomic variables and the stock market is still a research area of interest. Due to such an ambiguous relationship between inflation and stock prices, as well as other macroeconomic variables, it is difficult to find conclusive evidence. The stock prices reactions will provide essential information to policymakers in designing policies and initiatives aimed at promoting macroeconomic variable expansion or contraction to reduce stock price volatility. Consequently, this study makes another attempt to investigate the potential asymmetric effect of inflation rate on the Indonesian stock market with NARDL model proposed by Shin, Yu, and Greenwood-Nimmo (2011) with various advantages over other techniques as discussed. Resultantly, macroeconomic variables that can trigger persistent shocks to the stock market provide vital information for new policy formation. Diverse policies must be designed to the asymmetric effect contributed by macroeconomic variable changes. In

Indonesia, price changes play a critical role in policy design, hence, inflation's asymmetric effect must be examined.

3. DATA AND METHODOLOGY

In this paper, the asymmetric effect of inflation on the stock prices in Indonesia was economically assessed using the Nonlinear Autoregressive Distributed Lag (NARDL) framework. For this purpose, this empirical analysis utilized data from quarterly observations covering 1996 to 2020. The data used in this investigation is described in Table 1. It is worth noting that stock price index is often used as an indicator of the performance of the stock exchange to evaluate the overall health of the stock market and the broader economy.

Table 1

Description of data

Notation	Variable	Description	Data Source
SP	Stock price	Equity market index, Indonesia stock exchange, JKSE	Indonesia Stock Exchange
ED	Economic development	Nominal gross domestic product (GDP) in USD mn	CEIC
BSD	Banking sector development	Broad money (M2)	CEIC
INF	Inflation rate	IBR, Consumer price index: % change over previous period	CEIC
INT	Interest rate	Short term interest rate in % per annum	CEIC
EXC	Exchange rate	Exchange rate against USD (IDR/USD)	CEIC
PCF	Private capital flows	FDI (% of NGDP)	CEIC

Note: LSP, LED, LBSD, and LEXC are the natural logarithm terms for SP, ED, BSD, and EXC, respectively
Source: own compilation

3.1. Unit root test

Stationarity is crucial when analyzing time-series data because the mean and variance are constant over time. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were used to assess stationarity in this study. The results were displayed in Table 2.

3.2. The NARDL model

To allow for investigation of potential long-run and short-run asymmetries in macroeconomic fundamentals and stock prices, this study used the NARDL model, which was adapted from Shin et al. (2011). Each variable was tested in the vector autoregressive (VAR) models, and the asymmetric long-run equations were specified below (Shin, Yu, & Greenwood-Nimmo, 2011):

$$SP_t = \alpha_0 + \alpha_1 ED_t + \alpha_2 BSD_t + \alpha_3 INF_t^+ + \alpha_4 INF_t^- + \alpha_5 INT_t + \alpha_6 EXC_t + \alpha_7 PCF_t + e_t \qquad (1)$$

where ED_t, BSD_t, INF_t, INT_t, EXC_t, and PCF_t are the economic development, banking sector development, inflation rate, interest rate, exchange rate, and private capital flows. The cointegrating vector, which consists of long-run parameters was indicated by $\alpha = (\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7)$. The INF_t^+ and INF_t^- in equation (1) designated the partial sums of positive and negative changes in dx_t, where x is the inflation rate:

$$INF_t^+ = \sum_{i=1}^{t} \Delta INF_i^+ = \sum_{i=1}^{t} max(\Delta INF_i, 0) \qquad (2)$$

and

$$INF_t^- = \sum_{i=1}^{t} \Delta INF_i^- = \sum_{i=1}^{t} min(\Delta INF_i, 0) \qquad (3)$$

The α for INF_t^+ was utilized to detect the long-run relationship between the regressand and INF_t increase. In contrast, the α for INF_t^- was employed to identify the long-run relationship between the regressand and dx_t decrease. Furthermore, this study assumed that the long-run alteration impacts the regression as the dx_t increase was greater than the dx_t decrease of identical magnitudes. Resultantly, Equation (1) designates that the asymmetric long-run dx_t drifts through to the regressands. Based on Pesaran and Shin's (1999) and Pesaran et al.'s (2001) ARDL framework, Equation (1) was then expressed as:

$$\begin{aligned}
\Delta SP_t = \alpha &+ \sum_{i=1}^{p} \gamma_{1i} \Delta SP_{t-i} + \sum_{i=0}^{q_1} \gamma_{2i} \Delta ED_{t-i} + \sum_{i=0}^{q_2} \gamma_{3i} \Delta BSD_{t-i} \\
&+ \sum_{i=0}^{q_3} (\gamma_{4i}^+ \Delta INF_{t-i}^+ + \gamma_{4i}^- \Delta INF_{t-i}^-) + \sum_{i=0}^{q_4} \gamma_{5i} \Delta INT_{t-i} + \sum_{i=0}^{q_5} \gamma_{6i} \Delta EXC_{t-i} \\
&+ \sum_{i=0}^{q_6} \gamma_{7i} \Delta PCF_{t-i} + \theta_0 SP_{t-1} + \theta_1 ED_{i-1} + \theta_2 BSD_{i-1} + \theta_3 INF_{i-1}^+ \\
&+ \theta_4 INF_{i-1}^- + \theta_5 INT_{i-1} + \theta_6 EXC_{i-1} + \theta_7 PCF_{i-1} + \mu_t
\end{aligned} \qquad (4)$$

Then, equation (4) is estimated by using the standard OLS method relying on the general-to-specific approach. This procedure by trimming insignificant lags was adopted as Katrakilidis and Trachanas (2012) and Ibrahim (2015) until a parsimonious result is obtained to arrive at the final specification of the NARDL model.

4. EMPIRICAL RESULTS AND DISCUSSION

As one of the advantages of nonlinear ARDL (NARDL), it has the ability to decompose independent variables into positive and negative shocks to understand the stock prices responses differently. As previously stated, the NARDL bounds testing approach does not require the unit root test. However, NARDL model provide better results when the variables are integrated of either *I*(0) or *I*(1). Nonetheless, the results of a unit root test were summarised in Table 2 to guarantee that no *I*(2) variables were involved.

Table 2

ADF and PP unit root tests

Variable	ADF		PP	
	Level	First difference	Level	First difference
LSP	-2.3453	**-9.9517*****	-2.3785	**-9.9583*****
LED	-2.1928	**-7.3809*****	-2.4046	**-7.1034*****
LBSD	**-4.2345*****	**-8.0856*****	-3.0125	**-8.0723*****
INF	**-5.1972*****	**-6.5317*****	**-4.9180*****	**-15.6643*****
INT	-2.4831	**-6.8058*****	**-3.3733***	**-6.7381*****
LEXC	**-4.4997*****	**-7.7564*****	**-3.2645***	**-7.7564*****
PCF	**-3.4852****	**-15.2725*****	**-5.1057*****	**-18.4367*****

Source: Author's result. The ADF and PP test estimations incorporate the constant and trend terms. Null rejection is represented by asterisks (*), (**) and (***) at 10%, 5%, and 1% level of significance, respectively.

According to the results of ADF and PP tests, all variables were stationary at the first difference. There is no *I*(2) variable, as per the ADF and PP unit root tests. Following the absence of *I*(2), equation (4) is estimated by apply the general-to-specific procedure to arrive at the model final specification This process includes continuous removing of insignificant lag until a parsimonious outcome is obtained. Therefore, the prerequisite for moving on to the bounds testing procedure has been met.

Table 3

Bounds test for nonlinear cointegration

Dependent variable LSP	F-Statistics	95% lower bound	95% upper bound	Conclusion
Asymmetric model	7.0930	3.233	4.760	Cointegration

Source: Author's evaluation. Narayan (2005) provided the critical values.

Table 3 presents the F-statistic bounds and critical values. The F-statistic value (7.093) was greater than the upper bound critical value (4.760) at the 5% significance level, thus reject the null hypothesis of no cointegration. Based on the result of the test, showing that there was cointegration (long-run association) between stock returns and macroeconomic fundamentals in Indonesia. Thus, the regression equations can be considered and interpreted.

Table 4

Nonlinear ARDL estimation results

Dependent variable: DLSP		
Independent variable	Coefficient	p-value
Constant	1.6225	0.1315
LSP(-1)	-0.3377	0.0000
LED(-1)	0.3790	0.0209
LBSD(-1)	-0.2758	0.0623
INF_POS(-1)	-0.0163	0.0093
INF_NEG(-1)	-0.0240	0.0001
INT(-1)	0.0037	0.0345
LEXC(-1)	-0.3732	0.0326
PCF(-1)	-0.0004	0.9184
Constant	1.6225	0.1315

DLSP(-1)	0.2539	0.0136
DLSP(-2)	0.3739	0.0008
DLSP(-4)	0.2576	0.0040
DLED(-1)	-1.0522	0.0000
DLBSD	0.7875	0.0000
DINF_POS	0.0099	0.0009
DINF_POS(-1)	0.0103	0.0385
DINF_NEG	-0.0165	0.0002
DINF_NEG(-1)	0.0075	0.0621
DINT(-1)	-0.0089	0.0007
DLEXC(-2)	0.3617	0.0351
DLEXC(-3)	0.5374	0.0000
DLEXC(-4)	0.4715	0.0003
Diagnostic Statistics		
R^2	0.7374	
J-B	2.7837	0.2486
LM(1)	2.2083	0.1373
LM(2)	2.4271	0.2971
ARCH(1)	0.0554	0.8138
ARCH(2)	1.0060	0.6047
CUSUM	Stable	
CUSUM of Squares	Stable	

Source: Author's evaluation. The Jarque-Bera test for normality check is abbreviated as J-B. ARCH(.) is the ARCH test for autoregressive conditional heteroskedasticity up to the lag order specified in the parentheses, and LM(.) is the LM test for error autocorrelation. The cumulative sum of recursive residuals test (CUSUM) and the cumulative sum of squares of recursive residuals test (CUSUM of squares) are two elements of the stability test.

The results on Table 4 demonstrates the model estimation results. The correlation between stock price and macroeconomic fundamentals, including positive and negative changes in inflation was analyzed based on the estimation of equation (4). Before inferences are drawn, the dynamic specification adequacy was determined using Jarque-Bera (J-B) statistics test for error normality, Lagrange Multiplier (LM) statistics test for autocorrelation, and Autoregressive Conditional Heteroskedasticity (ARCH) statistics test for autoregressive conditional heteroskedasticity up to order 2. The diagnostic tests indicating error normality, absence of autocorrelation and the heteroskedasticity effect, and parameter stability are all passed by the model.

Besides that, the Cumulative Sum Control Chart (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) were performed to test the structural stability of the model. According to Pesaran et al. (2001), Figures 2 and 3 show that the CUSUM and CUSUMSQ tests for residuals at the 5% significant level that were used to verify the short-run and long-run stability estimations. Based on the results, all the asymmetric effect of inflations and other independents variables in the model were adequately specified.

Table 5

Long-run estimation results

Variables	Coefficient	p-value
Constant	4.8045	0.1451
LED	1.1223	0.0234
LBSD	-0.8168	0.0963
INF_POS	-0.0482	0.0261
INF_NEG	-0.0712	0.0011
INT	0.0111	0.0317
LEXC	-1.1053	0.0319
PCF	-0.0011	0.9187

Source: Author's own evaluation

Table 5 displays the cointegration and long-run estimation results. The findings depict that the JKSE stock market increased by 1.12% as the nominal GDP increased by 1%. In addition, this result indicates that the stock market increased by 0.01% when the interest rate increased by 1%. These results indicate that the long-run relationship for nominal GDP and interest rate is positive and significant at the 5% significance level. The coefficient value is negative and significant for banking sector development at the 10% significance level. When the money supply (M2) rises by 1%, the Indonesian stock market index decreases by 0.82%. Conversely, the Indonesian Rupiah (IDR) had a negative and significant statistical effect at the 5% significant level. Resultantly, the stock prices decreased by 1.11% as IDR currency appreciated by 1%. Alternatively, an insignificant coefficient value was obtained for FDI.

The long-run asymmetric effect indicated by the positive and negative inflation rate changes harms stock prices. The changes to the inflation rate were significant at 5% and 1%, respectively. In addition, the estimated long-run coefficient for INF_POS and INF_NEG were -0.0482 and -0.0712, respectively. Essentially, these results indicate that a 1% inflation increase leads to 0.04% decrease in stock prices. Similarly, a 1% decrease in inflation leads to a 0.07% increase in stock prices. Consequently, these findings conclude that negative inflation changes cause greater effect on stock prices. According to Lee and Ryu's (2018) study, the Korean stock market exhibited a long-run effect on price level and real interest rate when the nonlinear ARDL model was applied. In the short-run, the results in Table 4 corroborate similar asymmetric inflation effect on stock prices similar with the studies of Dabachi et al. (2022). In general, low inflation may be good for equities since it can imply an expanding economy and increasing business earnings. Nevertheless, if inflation increases too rapidly, it can result in higher interest rates and less consumer spending, which would be disastrous for stock prices.

This study postulated that the increase in inflation (INF_POS) negatively affects stock price while the decreased inflation rate (INF_NEG) harms long-run stock prices. These results have a similar finding with Dabachi et al. (2022), where the positive and negative shocks in long-run reduce financial development in Nigeria when analysing with NARDL method. Furthermore, the negative changes possess a significant influence on stock prices more than the positive changes. The results also indicate the importance of negative inflation influence the stock prices in Indonesia as this country has had a history of high inflation ever since the 1997 Asian financial crisis. As a high inflation rate devalues real income over time, this causes deterioration of living standards, particularly affecting low-income individuals. In the case of lower inflation, this would lead to lower prices of goods and services. Thus increase the purchasing power of consumers which ultimately can drive economic growth. Moreover, the higher domestic inflation rate than neighboring countries also decreases domestic interest rates competitiveness and intensifies the local currency pressure. Subsequently, this can lead to increase competitiveness in the international market as lower prices encourage

exports and causes economic growth. Therefore, this study suggests that the stock market is more appealing to investors when the inflation rate declines. This result is aligned with Silva (2016), Jepkemei (2017), and Eldomiaty et al. (2020).
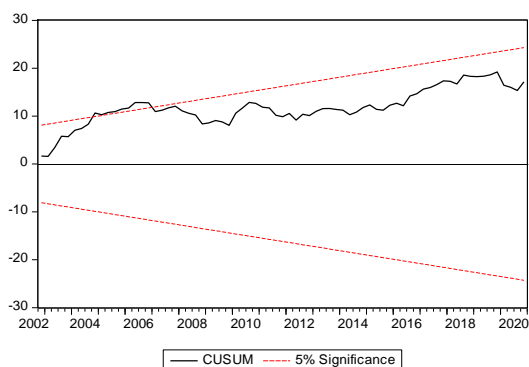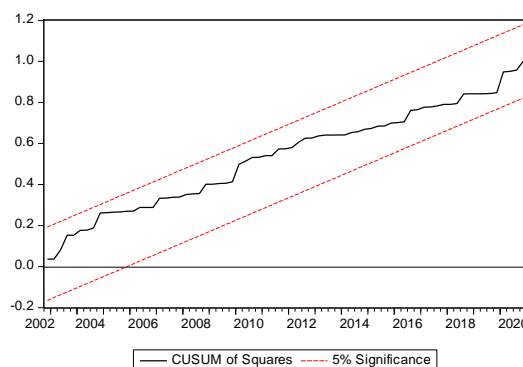

Figure 2. CUSUM

Figure 3. CUSUMSQ

Source: own calculation

5. CONCLUSION

The Republic of Indonesia is the largest archipelago globally and the 14th largest country by land area. In 2020, Indonesia had the fourth largest population worldwide (273 million people). It is one of the fastest emerging markets in the world. As a result, both inflation rates and stock prices are significant in many macroeconomic fundamentals and investment decisions for the country. The relationship between inflation rates and stock prices has sparked a widespread debate in the empirical literature. Most of the macroeconomic fundamentals included in this study affected the Indonesian stock market performance. This study postulated that stock prices are affected by inflation in asymmetric ways both in the short-run and long-run. Moreover, the long-run asymmetric effect of inflation indicates that the stock prices decline irrespective of positive or negative inflation. Furthermore, the empirical results also specify that economic development and interest rates positively correlate with the stock market. Conversely, the banking sector development and exchange rate are found to harm the stock market. Moreover, the stock returns increase when a currency depreciates, similar to Puah and Jayaramaw's (2007) study.

All the macroeconomics variables except FDI were significant. Through the use of NARDL, no significant impact of FDI and stock prices were observed. Similarly, Ramirez's (2018) study indicated that a developed market exists first, and FDI does not necessarily cause the liquidation of the stock market. Nevertheless, FDI inflows are crucial for policymakers to attract investors as a sign of economic openness. Stock prices and inflation may have a negative, positive, or statistically insignificant relationship. This study depicted that a 1% increase in the CPI causes a 0.05% drop in stock prices. In addition, a 1% decrease in CPI results in a 0.07% increase in stock prices. Thus, this concludes that the negative and positive shocks in inflation raise and decline the stock prices respectively. Consequently, a passive monetary policy better boosts the stock market. Indonesia, which has adopted an inflation-targeting monetary policy, should maintain the inflation rate to avoid loss of stock prices value.

Indonesia adopted the Flexible ITF monetary policy to create and maintain rupiah stability by assuring low and stable inflation rates. Maintaining low and stable inflation is obligated for sustainable economic growth, ultimately boosting public prosperity. Accordingly, the capability of central banks to achieve price stability is closely related to their ability to keep inflation expectations at their target. Nevertheless, the

COVID-19 pandemic has affected health, economic, social, and fiscal dimensions worldwide, and most countries have implemented movement restriction orders to break the infection chain. Due to this crisis, the global economy is affected as the pandemic causes the labour markets, global supply chains, and consumption behaviors to stagnate. Based on such limitations, the influence of COVID_19 and other crisis need to be re-evaluated in the future to have a better picture of stock market. As an emerging market, Indonesia has relatively limited resources to deal with pandemic effects. Nonetheless, industries must adapt to the consumer's behavioral changes and prioritize the primary goods for long-term daily needs (Pratomo, 2020).

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