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AUTHORS	Elmira Siska Oyyappan Duraipandi Purwanto Widodo
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Elmira Siska (Malaysia), **Oyyappan Duraipandi** (Malaysia), **Purwanto Widodo** (Indonesia)

DETERMINANTS OF INDONESIAN STOCK MARKET DEVELOPMENT: IMPLEMENTATION OF AN ARDL BOUND TESTING APPROACH

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Elmira Siska, Ph.D. Candidate, Faculty of Business and Accountancy, Management Department, Lincoln University College, Malaysia. (Corresponding author)

Oyyappan Duraipandi, Senior Lecturer, Faculty of Business and Accountancy, Management Department, Lincoln University College, Malaysia.

Purwanto Widodo, Senior Lecturer, Faculty of Economics and Business, Management Department, Universitas Pembangunan Nasional Veteran Jakarta, Indonesia.

Abstract

The Indonesian stock market is a growing financial industry that plays a strategic role in the growth of the country's economy. Its development is affected by various factors. This study examined the impact of the exchange rate, gross domestic product (GDP), interest rates, inflation, foreign portfolio investment (FPI), and domestic political stability on stock market capitalization. Quarterly data between 2000:Q1 and 2020:Q4 are used. The autoregressive distributed lag (ARDL) method is applied to identify long-run relationships between variables. To understand how fast the system reaches equilibrium after a shock, the model also examines short-run relationships using an error correction model (ECM). The findings show that the impact of exchange rate, interest rate, and inflation on stock market capitalization is negative in the long run. While the GDP, FPI, and political stability are positive. Increment in the US Dollar against the Indonesian Rupiah, interest rate, and inflation by 1% respectively, caused stock market capitalization to fall by 1.31%, 0.06%, and 0.04%. A rise in GDP, FPI, and political stability by 1% respectively, increases the stock market's value by 1.17%, 1.08%, and 1.28%. In the short run, the coefficient of ECM indicates the speed of adjustment of the system: the occurrence of the shock to reach long-run equilibrium is quick enough, at 63.8% each quarter. The study recommends governments evaluate the impact of these factors when formulating monetary policies, promote economic growth, and continuously implement good governance, thus supporting stock market development.

Keywords exchange rate, gross domestic product, inflation, foreign portfolio investment, political stability, stock market capitalization

JEL Classification E44, O43, F21, O16

INTRODUCTION

The Indonesian stock market is over a hundred years old. The first stock exchange was established in Jakarta in 1912, and the second one was founded in Surabaya in 1925. Due to World War II, politics, and the economic situation in the country, it was closed for 65 years. After the Indonesian government reactivated its capital market in 1977, its development was still underdeveloped. Several reforms have been implemented since 1990 to encourage the expansion of the Indonesian capital market, including the establishment of the Capital Market Supervisory Agency (popularly known as Bapepam-LK),the implementation of digital technology for the trading system, and the establishment of the Indonesia Stock Exchange (IDX) through the merger of the Surabaya and Jakarta stock exchanges. The development of Indonesia's capital market entered a new phase as a result of this consolidation.

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The main issue with Indonesia's stock market is its limited size and lack of liquidity. Compared to other ASEAN countries, the size of the stock market capitalization in Indonesia remains small. According to Global Economy Database Report 2020, it was only 46.8% of the GDP in 2020. Regional peers like Malaysia and Singapore, despite having a much smaller population than Indonesia, have stock market capitalizations that far exceed their annual GDP by 129% and 189%, respectively. Indonesia even lags behind the Philippines and Thailand, which already have ratios of stock market capitalization to GDP of 75% and 108%, respectively. Market liquidity in Indonesia is also low enough, as evidenced by the value of daily trading at only 0.13% of market capitalization in 2020 (Indonesia Stock Exchange, 2020). Both phenomena indicate that there is still a big opportunity for the Indonesian stock market to expand.

Various factors affect the development of the stock market. These factors can be classified into two groups. The first is macroeconomic factors (Acikalin et al., 2008; Jareño & Negrut, 2016; Sunardi & Ula, 2017; Amtiran et al., 2017; Shabbir & Muhammad, 2019). The second group is institutional factors (Lehkonen & Heimonen, 2015; Hussain et al., 2017; Hoque et al., 2018). Concerning the Indonesian economy, empirical studies regarding the dynamic interplay between these factors and stock market developments are still very rare, so this has become motivation to highlight the nexus between these factors and stock market development.

1. LITERATURE REVIEW

Solid financial systems have been acknowledged as a significant economic stabilization and development determinant in recent years. The financial system facilitates the exchange of funds between institutions such as insurance companies, banks, and the capital market (Gokmenoglu et al., 2015). As part of the financial system, the stock market plays three essential roles. First, the stock market acts as an economic barometer. Countries with better stock market performance usually also have higher-performing economies. Second, the stock market is a source of liquidity. When companies need to raise capital, they may offer a new share to the public to have more funds. Third, the stock market contributes to the expansion of industry and commerce, hence its support for the country's economic development (Yadav, 2017; Hamidi et al., 2018; Omorokunwa, 2018).

The development of the stock market is a multidimensional concept. It is often quantified using stock market metrics such as the market index, return, liquidity, volatility, and market capitalization. This study assesses stock market development using the stock exchange capitalization often referred to as "stock market capitalization". It is calculated by multiplying the number of shares outstanding of all companies by its price when the bourse's trading is closed. Stock market capitalization is a reasonable proxy for general stock market development. A rise in stock market capitalization indicates that the capital market is experiencing favorable growth. Garcia and Liu (1999) explained that the usage of stock market capitalization as a gauge of stock market growth is a more appropriate proxy than a composite index. Raza and Jawaid (2014) argued that stock market capitalization is preferred over other market indicators for time series analysis. Further, they explain that market capitalization is likely to have time series properties that make it appropriate for cointegration analysis.

Dynamic relationship between macroeconomic indicators and stock market growth is a fascinating subject of debate in the field of financial economics. Several academics have used a variety of theoretical frameworks to simulate variations in macroeconomic conditions that affect stock market performance. To emphasize the connection between macroeconomic factors and the development of the stock market, the current study uses two most important theories, namely the Efficient Market Hypothesis (EMH) developed by Fama (1970) and the Arbitrage Pricing Theory (APT) promoted by Ross (1976). The EMH theory assumed that stocks are always in equilibrium and that the market price takes into account all publicly available information at any point in time, be it historical information, public or private information, or projections of expected future prices. Hence, investors have no opportunity to generate abnormal profits as prices automatically adjust to

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reflect any new information. The APT establishes a theoretical framework for the relationship between share prices and macroeconomics. The APT theory asserts that a variety of macroeconomic factors have an influence on how well the stock market performs. The main idea of APT is that more than one independent factor influences the stock market's long-term performance. However, the theory itself doesn't inform the investor of what all of these factors are. Therefore, the implication is that they need to be determined empirically.

Macroeconomic variables are the main indicators signaling the current trends in the economy. The effect of some macroeconomic variables could vary from one market to another and from one period to another. This drives a more in-depth investigation of the nature of the relationship between macroeconomic variables and stock markets in different economies. Therefore, the study investigates the relationship prediction of stock market performance through macroeconomic variables is a serious concern of both academicians and professionals (Barakat et al., 2015). Based on various kinds of literature that have been reviewed, the author draws a common thread that economic factors influence the stock market's development. Exchange rate, Gross Domestic Product (GDP), interest rate, inflation, Foreign Portfolio Investments (FPI), and a country's political stability have an impact on the performance of the stock market. These factors are seen to be crucial for the economy of a country. Any alteration to these factors has a variety of effects on the economy. Additionally, regulatory agencies can take action to improve their policies in a way that benefits the economy.

To clarify the influence of macroeconomic variables on stock market capitalization, the current review starts with exchange rates. Exchange rate fluctuations are a considerable source of risk for businesses because they make their realized cash flows more volatile. The exchange rate fluctuations make it difficult for economic actors to estimate the return on their investments (Misra, 2018). The depreciation of the domestic currency, which implies that foreign currencies are appreciating, indicates that economic conditions are not good. As a result, investors lose interest in making stock investments since their expected profits are reduced. Stock prices will decrease as demand for stock declines. Surbakti et al. (2016) investigate how the exchange rate's movement affects the risk level of the Jakarta Composite Index (JCI). By applying GARCH's model, they found that the appreciation of foreign currencies against the Indonesian Rupiah hurt the return of JCI. This is supported by a number of other studies, including Amtiran et al. (2017), Huy et al. (2020), and Omodero (2020). These investigators concur that a weakening of the domestic currency rate creates negative sentiment in the capital market, causing stock prices to fall. Market capitalization decreases along with falling stock prices.

Gross domestic product (GDP) provides a scorecard of a country's overall economic health. Investment decision of the investor is heavily influenced by the GDP report of the country. The size of the GDP, which helps to increase corporate earnings and stock market performance, is often a sign of a nation's positive economic growth. If GDP is rising, it can be assumed that the economy is on a positive trajectory. Economic growth will boost industrial growth, which in turn spurs individual company performance and then raises stock prices (Jareño & Negrut, 2016). Demir (2019) conducted a study to determine how fundamental macroeconomic conditions affected the index of Borsa Istanbul-100 (BIST-100) over the period of 2003–2017. The regression analysis's findings indicated that rising economic growth would increase the stock market index. Other studies by Omodero and Mlanga (2019), Baranidharan and Vanitha (2016), Igoni et al. (2020), and Setiawan (2020) also confirmed a similar result that stock market performance is enhanced by a country's healthy economic growth. People's purchasing power rises as economic growth improves. This is a chance for the corporation to boost its sales. The increment in sales implies that the firm is performing well, which will indirectly lead to an increase in share prices. As the GDP grows, share prices will rise, which will encourage the expansion of stock market capitalization.

The other key macroeconomic factor that has a direct bearing on economic expansion is the interest rate. In general, the interest rate is regarded as the cost of capital, or the price paid for using the money for a specific length of time. A spike in interest rates means higher debt payments and more chances of creditors having difficulty repaying their loans (Everett, 2015). Once interest rates have risen, investors are likely to reallocate more of their money to banks and less to stocks (Block et al., 2018). Some previous studies that investigated this topic resulted in similar findings. Ullah et al. (2017) examined how interest rates and the stock market performance of SAARC countries are related. According to the statistical result of OLS multiple regression analysis, there is an adverse connection between the rate of interest and the market indices. Moreover, the panel data approach was used by Assefa et al. (2017), and they found statistically significant adverse impacts of rates of interest on stock return in developed countries. They mentioned that, in comparison to countries with higher interest rates, those with lower interest rates have stronger stock markets. Another study by Al-Abdallah and Aljarayesh (2017) also indicated the similar result. An increase in the interest rate will cause share prices to fall. This is due to an increase in the required rate of return on stocks, which drives down share prices and results in a subsequent decline in market capitalization.

Inflation is one of the most intriguing economic indicators to analyze. Investors perceive rising inflation adversely as a sign of a weak economy. As a result, investors are losing trust in their stock market investments. According to Acikalin et al. (2008), rising inflation shows that the risk of investing is quite high. A high rate of inflation will lower the rate of return for investors. Employing a panel vector autoregressive technique of 34 OECD countries spanning the years 1960 to 2012, Pradhan et al. (2015) found that dominantly proven a negative relationship between stock market performance and inflation. Other investigations by Rachel and Moses (2017) and Aggarwal and Manish (2020) also demonstrated an adverse association between inflation and stock prices. They concluded that a sharp rise in inflation has a detrimental impact on the stock market's performance as well. Inflation increases a company's revenue and costs. The company's profitability will decline if the rise in production costs is greater than the increase in the price of its products. The decline in profitability of a company causes investors to be reluctant to buy its stock. The company's stock price will fall due to decreased demand for these stocks. This situation triggers a decrease in stock market capitalization.

Nowadays, Foreign Portfolio Investment (FPI) is thriving, and capital is flowing across the world because foreign investors are investing in the world's stock markets. FPI is the practice of investing an investor from a foreign country in financial assets such as stocks, bonds, and other securities (Ezeanyeji & Maureen, 2019). A study by Shabbir and Muhammad (2019), which applied the ARDL approach to examine 32 years of data between 1984 and 2016, concluded that FPI has a significant positive impact on stock prices on the Pakistan Stock Exchange. Tite et al. (2022) conducted research applying the ARDL method to examine the effect of foreign portfolio inflows on the performance of the Nigerian stock market using monthly data from January 2007 to December 2018. The study discovered that FPI positively and significantly affects stock market performance. According to recent research (Okolie & Ehiedu, 2023) that utilized the Johansen co-integration test to analyze data spanning 40 years, from 1981 to 2022, it was concluded that the capitalization of the Nigerian market was positively and significantly impacted by FPI. They preserved the idea that flows of foreign capital are an indicator of the country's stock market growth. FPI growth indicates that more capital influx into the country ethically boosts stock market performance by raising domestic stock prices.

Political stability also affects stock market growth in the country. Starting in 1990, the majority of emerging markets opened their stock exchanges to global investors (Lehkonen & Heimonen, 2015). Developing countries can draw higher inflows of foreign capital if their country is more politically stable, which can lead to increased stock market development. Political stability would boost foreign investors' confidence and encourage them to invest more money in the host country. Thanh et al. (2017) investigated determinants of the stock market development in Vietnam and other developing countries. They applied the Generalized Method of Moments to the panel data of 36 developing countries for the period of 2003–2014. One of their main findings is that political stability has a positive and substantial impact on the stock market development. This finding was supported by other studies, such as Hussain et al. (2017), Hoque et al. (2018), and Modugu and Dempere (2020). The stability of a country's political situation is one of the criteria for a good business atmosphere that can attract more capital inflow to the country. A country's political stability may continue to have a direct impact on stock market performance.

The objective of this study was to investigate the effects of exchange rate, GDP, interest rate, inflation,

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PFI, and political stability on stock market capitalization in Indonesia over 21 years, covering from Q1: 2000 to Q4: 2020.

Based on the basic concepts of theory and previous studies, the following hypotheses were developed:

H_1: *An increase in USD against the rupiah's exchange rate may exert a negative impact on the stock market capitalization in Indonesia.*

H_2: *An increase in the GDP may exert a positive impact on the stock market capitalization in Indonesia.*

H_3: *The higher interest may exert a negative impact on the stock market capitalization in Indonesia.*

H_4: *The higher inflation pressure may exert a negative impact on the stock market capitalization in Indonesia.*

H_5: *The higher foreign portfolio investment may exert a positive impact on the stock market capitalization in Indonesia.*

H_6: *The higher Political Stability Index may exert a positive impact on the stock market capitalization in Indonesia.*

2. METHODOLOGY

To achieve the objective targeted, this analysis used 21 years of quarterly time series data gathered from various sources and included 84 series ranging from Q1:2000 to Q4:2020. The investigation was conducted by implementing the autoregressive distributed lag (ARDL) model. The dependent variable is stock market capitalization (MCAP), which is a function of a set of independent variables, namely, exchange rate of US Dollar/IDR (ER), gross domestic product (GDP), interest rate (IR), inflation (INR), foreign portfolio investment (FPI), and political stability (PS). Data for MCAP and FPI is sourced from the Indonesian stock exchange directory through the website https://www.idx.co.id/. MCAP and FPI are reported in billions of Indonesian Rupiah. Data for ER, IR, and INR are obtained from the Central Bank of Indonesia directory through the website https://www.bi.go.id/. Data for ER is reported in thousands of Indonesian Rupiah, while IR and INR are reported in percent (%). Data for GDP at current market prices were collected from the publication of the Central Bureau of Statistics Indonesia on the website https://www.bps.go.id/ and reported in billions of Indonesian Rupiah. Data for political stability is sourced from the political stability index released by the business and economic data directory through the website https://www.theglobaleconomy.com/. Political stability expressed in points. Data was processed using the statistical program Eviews10.

The estimated model of stock market capitalization could be written in semi-logarithmic form as follows:

$$\ln MCAP_t = \beta_0 + \beta_1 \ln ER_t + \\ + \beta_2 \ln GDP_t + \beta_3 IR_t + \beta_4 INR_t + \\ + \beta_5 \ln FPI_t + \beta_6 PS_t + \varepsilon_t, \quad (1)$$

where $MCAP_t$ is stock market capitalization, which represents stock market growth at time t, ER_t represents the exchange rate US$ against Rupiah (USD/IDR) at the time t, GDP_t represents the real gross domestic product of the country at the time t, IR represents the interest rate at the time t, INR_t represents the inflation rate at the time t, FPI_t represents foreign portfolio investment at the time t, and PS_t represents the political stability at the time t. β_0 is the constant, β_1, β_2, β_3, β_4, β_5, and β_6 are the coefficients of the model and ε_t is the error term. The following are the expected signs of the coefficients of the variables:

$$\beta_1, \beta_3, \beta_4 < 0, \text{ and } \beta_2, \beta_5, \beta_6 > 0. \quad (2)$$

The initial step before running the ARDL technique is checking the stationarity of the variables by using the unit root test. The Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) test is a common unit root test. Both provide similar outcomes, but PP is a little more sophisticated (Rothe & Sibbertsen, 2006). The PP test evaluates if the variance of the time series is constant over time, whereas the ADF test evaluates whether the time series' mean is consistent over time. Therefore, this study employs the PP test. The objective of these tests is to make sure the variable is stationary at the level (I(0)), at the first difference (I(1)), or in a combination of I(0) and I(1). The ARDL is not suitable for use with stationary data at second difference (I(2)). The null hypothesis of the unit root was tested against its alternative hypothesis of no unit root. Following the completion of a stationary analysis, the next step is to choose the optimum lag length for each underlying variable in the ARDL model. According to Widarjono (2005), the smallest value of AIC is more often used in selecting the optimal lag length than other parameters.

Then, by applying the F-test, the bound testing approach is run to evaluate the existence of cointegration between the variables. Cointegration indicates there is a long-run relationship in the model. If the F-statistic value exceeds the upper bound, suggesting the presence of a long-run equilibrium relationship between the variables, the null hypothesis is rejected. Otherwise, the analysis must accept the null hypothesis that there is no long-run link between the variables if the value of the F-statistic is smaller than the lower bound. The next step is to select the most suitable ARDL model based on AIC. The model that has the lowest AIC value out of the 20 different models offered is the relevant model. The general specification of the ARDL bound test approach to market capitalization in Indonesia is given in the following model:

$$\begin{aligned}\Delta \ln MCAP_t &= \beta_0 + \delta_1 \ln MCAP_{t-1} + \\ &+\delta_2 \ln ER_{t-1} + \delta_3 \ln GDP_{t-1} + \delta_4 IR_{t-1} + \\ &+\delta_5 INR_{t-1} + \delta_6 \ln FPI_{t-1} + \delta_7 PS_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_1 \Delta \ln MCAP_{t-1} + \sum_{i=0}^{p}\alpha_2 \Delta \ln ER_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_3 \Delta \ln GDP_{t-1} + \sum_{i=0}^{p}\alpha_4 \Delta IR_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_5 \Delta INR_{t-1} + \sum_{i=0}^{p}\alpha_6 \Delta \ln FPI_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_7 \Delta PS_{t-1} + \varepsilon_t,\end{aligned} \tag{3}$$

where, $\Delta lnMCAP_t$ denotes the changes in the lagged market capitalization, Δ is the first difference of the variable, and t describes the time period. The long-run coefficients, short-run coefficients, and error term are denoted by δ, α, and ε, respectively.

Upon specification of the model's cointegrating relationship, the long-run and short-run estimations are obtained using the ARDL technique. Using equation (3), the long-run relationship of the model is represented by the variables' coefficients of $\delta_2 - \delta_7$ normalized by δ_1. The variables' coefficients of $\alpha_1 - \alpha_7$ reflect the short-run relationship between variables. After finding evidence that a long-run relationship exists in the model, an error correction model (ECM) was estimated. The ECM gives an understanding of how the observed variables adjust in the short run when they deviate from their long-term equilibrium relationship. Thus, using equation (3), the short-run dynamic error correction model may be expressed as follows:

$$\begin{aligned}\Delta \ln MCAP_t &= \beta_0 + \sum_{i=0}^{p}\alpha_1 \Delta \ln MCAP_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_2 \Delta \ln ER_{t-1} + \sum_{i=0}^{p}\alpha_3 \Delta \ln GDP_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_4 \Delta IR_{t-1} + \sum_{i=0}^{p}\alpha_5 \Delta INR_{t-1} + \\ &+\sum_{i=0}^{p}\alpha_6 \Delta \ln FPI_{t-1} + \sum_{i=0}^{p}\alpha_7 \Delta PS_{t-1} + \\ &+\lambda EC_{t-1} + \varepsilon_t,\end{aligned} \tag{4}$$

where, EC_{t-1} and λ denote the one-lag period of error correction term and the coefficient of ECM.

Lastly, to examine the robustness and capability for the prediction power of the estimated model, the ARDL model will be tested for its functionality forms of normality, serial correlation, heteroscedasticity, misspecification error form, and ends up with an instability test for parameters. The Jarque-Bera (J-B) was used in this analysis to assess if the sample's skewness (S) and kurtosis (K) are in accordance with the normal distribution. When the skewness of all variables is zero and the kurtosis is three, the data is distributed normally. If J-B statistic < $\chi^2(\alpha, 2)$ or p-value > α, H_0 is accepted, which means the residuals have a normal distribution. Conversely, if J-B statistic > $\chi^2(\alpha,2)$ or p-value < α, H_0 must be disapproved. The Breusch-Godfrey serial correlation LM test was used to detect autocorrelation issues. The chi-square probability value (χ^2) is used to determine whether H_0 should be rejected or accepted. If the chi-square probability

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value exceeds α, it means that it fails to reject H_0 or that there is no autocorrelation. However, if the chi-square probability value (χ^2) is lower than α, it means that H_0 is rejected or that there is autocorrelation. The White test was used to perform the heteroscedasticity test. If the value of χ^2 is less than α, H_0 is rejected, which indicates heteroscedasticity. Otherwise, if χ^2 has a value larger than α, H_0 is accepted, indicating there is no indication of heteroscedasticity. The linearity test is checked using the Ramsey Regression Equation Specification Error Test (RESET). If p-value is smaller than α, then H_0, which assumes there is no misspecification in the model or the model is in linear form, is rejected, and vice versa. The CUSUM and CUSUMSQ tests are used to measure the stability of the models. If the CUSUM and CUSUMSQ lines are within 5% of the significant line, the ARDL model is deemed to be stable.

3. RESULTS AND DISCUSSION

Descriptive statistical computation is commonly employed for explaining the collected data to make the data more interesting, readable, and understandable for data users. Table 1 depicts the descriptive statistics of each variable out of 84 observations from the 1st quarter of 2000 to the 4th quarter of 2020.

The mean of MCAP, ER, GDP, IR, INR, FPI, and PSI are IDR 3,075.6 trillion, IDR 10,931, IDR1,796.1 trillion, 8.2%, 6.7%, IDR 29,213.9 trillion, and –0.9 points, respectively. The standard deviations of MCAP, ER, GDP, IR, INR, FPI, and PSI are IDR 2,424.9 trillion, IDR 2,171.9, IDR 1,211.6 trillion, 3.9%, 3.46%, IDR 20,508.6 trillion, and 0.551 points. The standard deviation's value reveals that PSI has low variability. FPI has very high variability, whereas MCAP, ER, GDP, IR, and INR have moderate variability. MCAP, ER, GDP, IR, INR, and PSI all show positive skewness, meaning that the data for these variables falls on the right side of the probability distribution in a bell-shaped curve. PSI, on the other hand, shows negative skewness, meaning that the data for PSI falls near the tail on the left side of the curve. The results of the kurtosis diagnostic indicate that the distributions of MCAP, ER, FPI, and GDP are platykurtic, or flat, in comparison to a normal distribution. In contrast, the distribution of IR and INR is leptokurtic, meaning that it peaked when compared to a normal distribution.

The results of the PP tests presented in Table 2 clearly indicate that the null hypothesis of the unit root existence is not accepted at the level, meaning all variables are non-stationary. All variables were then confirmed to be stationary after differencing them once. The result of the PP test finds that all the variables are stationary at the 1% significance level. PP tests indicated that all variables have an order of integration of 1. The result of the stationarity is already appropriate for the requirements of the ARDL method. Therefore, the ARDL-bound testing approach can be used in this study.

The following step after completing the stationarity test is to choose the optimum lag length for each of the variables in the model. According to Pesaran et al. (2001), for quarterly observations, 1-8 lags are sufficient before estimating the selected model using OLS regression. Some indicators are used to identify the optimal lag length, but AIC is the most frequently used. Table 3 suggests that by applying 8 maximum lags, the optimal lag length is 4.

The forthcoming step is to select the best ARDL model based on the AIC. AIC provides 20 distinct

Table 1. Summary statistics

Source: Author's calculation.

Variable	Mean	Max	Min	Std. Dev	Skewness	Kurtosis
MCAP (IDR Bn)	3,075,632.9	7,356,328.4	213,761.0	2,424,905.7	0.306	1.846
ER (%)	10,931.8	16,448.8	8.325.0	2,171.9	0.714	0.787
GDP (IDR Bn)	1,796,142.1	4,077,378.1	324,956.6	1.211,265.5	0.495	1.738
IR (%)	8.17	17.76	3.75	3.39	1.267	3.920
INR (%)	6.72	17.11	1.42	3.46	0.381	3.233
FPI (IDR Bn)	29,213,951.3	72.338,890.2	1,891,768.5	20,508,658.4	0.414	2.389
PS (points)	–0.993	–0.371	–2.091	0.551	–0623	1.866

Table 2. PP test results

Source: Author's calculation.

	Levels			First Difference			Order of Integration
Series	*t*-stat	Prob.	Remark	*t*-stat	Prob.	Remark	
lnMCAP	–1.6028	0.4766	N–S	–7.471	0.0000	S	I (1)
lnER	–0.9014	0.7832	N–S	–10.4552	0.0000	S	I (1)
lnGDP	–2.9091	0.0485	N–S	–9.3042	0.0000	S	I (1)
IR	–1.5196	0.5187	N–S	–4.5712	0.0000	S	I (1)
INR	–2.6718	0.0834	N–S	–8.6748	0.0000	S	I (1)
lnFPI	–2.2266	0.1987	N–S	–19.7534	0.0000	S	I (1)
PS	–1.6793	0.4378	N–S	–3.9201	0.0000	S	I (1)

Note: N-S is non-stationary, S is stationary.

Table 3. Optimal lag length selection

Source: Author's calculation.

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	–249.6912	NA	2.02e–06	–1.7550	1.96971	1.8408
1	318.7085	1017.1372*	2.36e–12	–2.0933	–1.1959	–1.9070*
2	318.7082	101.6124	2.67e–12	–2.1096	–1.0173	–1.8027
3	426.2326	62.8456	2.06e–12	–2.1140	–1.4412	–1.7765
4	478.2271	64.3087	2.01e–12*	–2.1358*	–1.5861*	–1.7548
5	536.1738	60.9955	2.37e–12	–2.1278	–1.4499	–1.3896
6	604.6827	59.4950	2.40e–12	–2.1228	–1.3292	–1.3025
7	693.1774	60.5492	2.57e–12	–2.1109	–1.2706	–1.2413
8	805.7256	64.3087	2.84e–12	–2.0203	–1.2330	–1.1830

ARDL models. The model with the smallest AIC score, that is, ARDL (1, 1, 0, 4, 3, 1, 2), as presented in Table 4, is the appropriate model for this study.

Table 4. Estimation of ARDL model (1, 1, 0, 4, 3, 1, 2)

Source: Author's calculation.

Variable	Coefficient	Std. Error	t-Statistic	Prob
lnMCAP(–1)	1.0037	0.0721	13.9062	0.0000***
lnER	–1.0077	0.1695	–5.9446	0.0000***
lnER(–1)	–1.0646	0.1905	–5.5858	0.0000***
lnGDP	0.2745	0.1132	2.4247	0.0177**
IR	–0.0408	0.0188	–2.1594	0.0339**
IR(–1)	0.0079	0.0288	0.2747	0.7844
IR(–2)	0.0088	0.0292	0.3019	0.7637
IR(–3)	–0.0326	0.0290	–1.1228	0.2659
IR(–4)	–0.0480	0.0179	–2.6832	0.0089***
INR	–0.0215	0.0064	–3.3247	0.0014***
INR(–1)	0.0038	0.0070	0.5453	0.5875
INR(–2)	–0.0179	0.0072	–2.4936	0.0154
INR(–3)	–0.0179	0.0060	–2.9673	0.0043***
lnFP	0.0190	0.0076	2.4961	0.0147**
lnFPI (–1)	0.0692	0.0352	–1.9612	0.0535*
PS	0.4564	0.2163	2.1100	0.0381**
PS (–1)	1.0892	0.5566	1.9568	0.0419**
PS (–2)	0.7467	0.3278	2.2776	0.0255**
C	3.2015	0.9575	3.3436	0.0014

Note: R-squared = 0.996566, Adjusted R-squared = 0.995553, F-statistic = 983.4475, Prob. (F-statistic) = 0.000000.

Cointegration between variables in the model is identified through the bound test for cointegration. The value of F-statistic compared to the bound critical value. Table 5 indicates that at any level of significance, value ofF-statistic, 4.556671, is greater than the lower bound and upper bound critical values. In this situation, the null hypothesis of no cointegration, can be rejected at any significance level. This result strongly indicates that cointegration exists between the underlying variables in the model. Therefore, it may be claimed that all variables move together throughout time in the long run.

Table 5. ARDL bound testing for cointegration

Source: Author's calculation.

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	4.556671	10%	2.0880	3.1030
k	6	5%	2.4310	3.5180
		1%	3.1730	4.4850

The existence of a cointegration relationship confirms the need to proceed with the estimation of the long-run relationship between variables. The results of the estimation of the long-run coefficient after running the appropriate ARDL model are exhibited in Table 6. The outcomes of estimat-

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ing the long-run coefficient indicated that all variables that affect MCAP are significant statistically. The ER, GDP, and PS are significant at the 1% level. Meanwhile, IR, INR, and FPI are significant at the 5% significance level.

Table 6. Long-run coefficients estimation of ARDL (1, 1, 0, 4, 3, 1, 2)

Source: Author's calculation.

Variables	Coefficient	Std. Error	t-statistic	Prob.
lnER	–1.3149	0.3103	–4.2362	0.0001***
lnGDP	1.1745	0.5322	3.2214	0.0019***
IR	–0.0594	0.0293	–2.0250	0.0463**
INR	–0.0358	0.0159	–2.2476	0.0275**
lnFPI	1.0838	0.5103	2.1236	0.0396**
PS	1.2859	0.4057	3.1691	0.0022***
C	8.2097	2.7247	3.0130	0.0035***

Note: *, **, and *** denote stationarity of time series at the significance level of 10%, 5% , and 1% , respectively.

According to statistical analysis, there is a negative significant relationship between the exchange rate and stock market capitalization. The USD strengthens 1% against the IDR (depreciated IDR), causing the stock market value to fall by 1.31%. Thus, *H1* is accepted. The negative exchange rate coefficient implies that an appreciation in USD against IDR (depreciated IDR) leads to a drop in stock market capitalization. Investors respond quickly to a depreciation of IDR against USD by selling the stocks. The weakening of the IDR reduces the return on investment in US dollars for foreign investors. As a result, they decided to withdraw their funds from the Indonesian stock exchange. This worries local investors, who finally follow international investors' behavior and withdraw their funds. Furthermore, foreign investors hold approximately 40% of the Indonesian stock market. As a result, when a large amount of such foreign funds exits the Indonesian stock market, the JCI will fall or be corrected, reducing the stock market's capitalization. The research findings are in line with Amtiran et al. (2017), Setiawan (2020), Huy et al. (2020), and Omodero (2020).

Long-run estimate results prove the positive relationship between GDP and stock market capitalization. Indonesia's GDP of 1% will increase the stock market capitalization by 1.17 percent, with other variables held constant. This result is in line with previous expectations. Hence, *H2* is accepted. The positive GDP coefficient demonstrates that a favorable economic trajectory drives market capitalization to grow as investors prefer to invest more funds. GDP has a positive outlook for the stock market. Investors will be enticed to invest if the GDP of a country rises. A country's domestic economic environment has a substantial impact on the demand for a company's goods and services and then affects its profitability and growth. The good performance of listed corporations will indirectly drive the stock market. The purchasing power of the general public increases as the economy grows. This is a great chance for the business to boost sales. A surge in sales volume means that the firm is operating well, which encourages stock prices to rise. The regression results support the previous work carried out by Demir (2019), Omodero & Mlanga (2019), Baranidharan & Vanitha (2016), Igoni et al. (2020), and Setiawan (2020) verified that GDP and stock market capitalization were positively correlated.

The interest rate and stock market capitalization are adversely related in the long run. A 1% increase in interest rates causes the stock's market value to decline by 0.06%. This indicates that an increase in the interest rate encouraged investors to reduce their investments in risky financial assets such as equities. Investors, on the other hand, tend to expand their ownership of financial instruments that are more secure, such as deposits or bonds. Research's findings are consistent with Ullah et al. (2017), Al-Abdallah and Aljarayesh, (2017), and Assefa et al.(2017). Thus, in this study, *H3* formulated as the interest rate negatively related to stock market capitalization is accepted.

The inflation level and stock market capitalization have a negative relationship in the long run. A 1% increase in the inflation rate causes the stock's market value to decline by 0.04%. This suggests that inflation reduces the real value of money, causing the prices of goods or services to increase. In this condition, people's consumption seems to be higher at any level of income they earn, and the desire of investing in the stock market is low. Therefore, the quantity of stock demanded and traded decreased, followed by a decrease in stock price, which then eroded the stock market capitalization. Therefore, *H4* is accepted in this study. The study's findings support the studies by Pradhan et al. (2015), Rachel and Moses (2017), and Aggarwal and Manish (2020).

According to the findings in Table 6, FPI shows a positive relationship with stock market capitalization. If all other variables remain constant, a 1% rise in FPI will result in 1.08% growth in the Indonesian stock market capitalization. This implies that a rise in stock purchases by foreigners will increase the stock market capitalization. Emerging economies need foreign capital to support local resources because there is a mismatch between their domestic capital stock and capital demand. The increased inflow of foreign funds into Indonesia's capital market will boost stock market prices, causing the JCI to rise and, as a result, the market capitalization value of Indonesia's capital market to rise. By this finding, *H5* formulized that FPI is positively related to stock market capitalization is accepted. The study's findings support the previous research conducted by Shabbir and Muhammad (2019), Tite et al. (2022), and Okolie and Ehiedu (2023).

Furthermore, as shown in Table 6, the long-run estimate shows a positive link between political stability and stock market capitalization. An increase in political stability by 1% will increase the growth of the Indonesian stock market by 1.28%; other variables will remain constant. This finding indicates that a country with good governance and a stable political situation will attract more capital and boost the development of the capital market. Improving governance in all dimensions, including legal and political stability, is required for the stock market to develop sustainably. The study's findings support the previous investigation carried out by Thanh et al. (2017), Hussain et al. (2017), Hoque et al. (2018), and Modugu and Dempere (2020). Therefore, *H6* that stated political stability correlates positively with stock market capitalization is accepted.

The error correction model (ECM), as explained by Engle and Granger (1987), is the best approach for estimating the relationship when there is a complementarily relationship among the variables. Therefore, the short-run dynamic between stock market capitalization and the proposed macroeconomic variables is investigated using the Error Correction Model (ECM) based on the ARDL method. The ECM approach is used to identify dynamic movements in the short term to predict equilibrium in the long run. Following short-run shocks, the coefficient of ECT measures how quickly long-run equilibrium recovers (Widarjono, 2005). A robust ECM model must have a significant ECT coefficient with a value between 0 and –1.

Table 7. Short-run coefficients estimation using the ARDL (1, 1, 0, 4, 3, 1, 2)

Source: Author's calculation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnMCAP)	0.65371	0.28612	2.2847	0.0251**
D(lnER)	–1.0077	0.1495	–6.7402	0.0000***
D(lnGDP)	1.0012	0.1450	6.9030	0.0000***
D(IR)	–0.0481	0.0152	–3.1590	0.0023***
D(INR)	–0.0179	0.0272	–0.6587	0.5121
D(lnFPI)	0.0581	0.0254	2.2883	0.0249**
D(PS)	0.7468	0.2764	2.7015	0.0085***
CointEq(–1)*	–0.6173	0.1395	–4.4266	0.0000***

Note: *, **, and *** denote the significance level of 10%, 5%, and 1%, respectively.

Table 7 shows that the short-run effect of ER, GDP, IR, INR FPI, and PS on MCAP indicated by the error correction coefficient is negative and statistically significant at the 1% significance level, which is –0.6173. This result means that the speed of adjustment to the long-run equilibrium of stock market capitalization's value against current shocks in the affecting factors is quick enough, at 61.7% each quarter. Looking at Table 7, the short-run ECM coefficient verifies that all variables influencing stock market capitalization, namely ER, GDP, IR, FPI, and PSI, have consistent results with the long-run's result. An intriguing discovery from this study is that INR fails to exert a significant impact on Indonesian stock market capitalization in the short run. However, it is in line with the research by Nugraha et al. (2020). A possible explanation for the insignificance of this is the fact that over the past ten years, Indonesia's inflation tendency has begun to decline and is now under control at a low and stable level. According to information released by the Central Bureau of Statistics, Indonesia have the lowest annual inflation rate, at 1.68%, in 2020. The average annual inflation rate over the previous ten years was 4.23%, with the greatest annual inflation rate of 8.38% occurring in 2013. Investor interest and confidence in the capital market increases due to the low and controlled inflation rate, which will encourage an increase in stock market capitalization.

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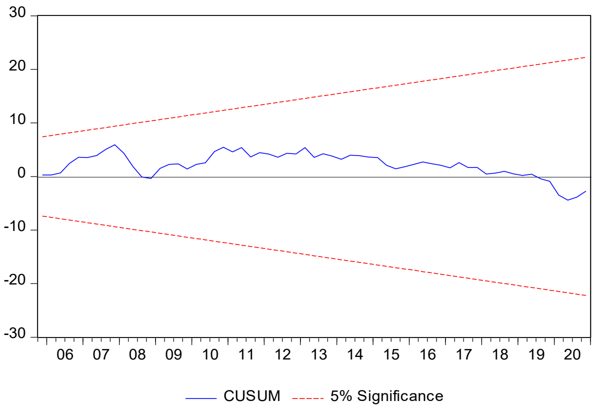

Figure 1. Graphical view of CUSUM

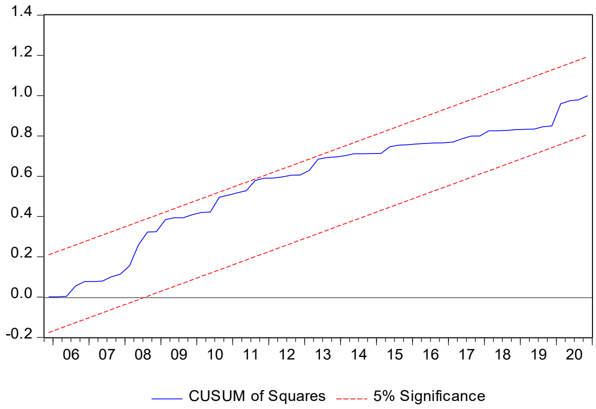

Figure 2. Graphical view of CUSUM of Square

Table 8. Diagnostic checking

Source: Author's calculation.

Diagnostic test	Prob. Value	Meaning
Normality	0.6158	The residuals have a normally distribute
Serial Correlation Test	0.8497	There is no autocorrelation
Heteroscedasticity Test	0,5554	There is no indication of heteroscedasticity
Misspecification Test	0.4629	There is no misspecification in the model

In terms of normality, autocorrelation, conditional heteroscedasticity, and functioning form, the ARDL model (1, 1, 0, 4, 3, 1, 2) has passed all the criteria as reflected in diagnostic checking results with a probability value greater than 5% (Table 8). This implies that the ARDL model is stable, and its output may be trusted and reliable when formulating policies.

The long-run and short-run stability of the model was examined using the CUSUM and CUSUMSQ tests. Figures 1 and 2 show that both the CUSUM and CUSUMSQ lines do not break the line of 5% level of significance. This indicates that the coefficients of the variables under study are stable.

CONCLUSION

This study was conducted to investigate the effects of exchange rate, GDP, interest rate, inflation, PFI, and political stability on stock market capitalization in Indonesia over 21 years, covering the period from Q1:2000 to Q4:2020. This investigation was conducted by implementing the autoregressive distributed lag (ARDL) bounds testing approach. The empirical results revealed that the results of the short-run analysis are consistent with the long-run finding. A country's GDP, foreign portfolio investment, and political stability all have a statistically significant positive relationship with stock market capitalization. Meanwhile, the exchange rate and interest rate have a negative relationship and are statistically significant with stock market capitalization. Interestingly, Indonesia's stock market capitalization was not significantly affected by inflation in the short run.

The study recommends that policymakers should evaluate the impact of these underlying macroeconomic factors when formulating monetary and economic policies. Bank Indonesia, the country's central bank, continues monitoring, achieving, and maintaining currency rate stability through a policy of double intervention in the foreign exchange market. Furthermore, through the inflation targeting framework, Bank Indonesia must continue to develop the monetary policy framework in response to changing economic dynamics and challenges. Besides that, to support the development of the stock market, the government should continue to strive to develop policies that encourage economic growth, formulate strategies to attract more investors into the Indonesian capital market and create good political stability.

It is expected that future research can address some of the limitations of this study by expanding the variables to be analyzed, for example by adding fiscal policy variables and trade opens. Further research can also be carried out to analyze the macroeconomic impact on stock market capitalization in several emerging market countries using panel data, so it will expand our knowledge and provide us with a more comprehensive picture of the dynamics at play.

AUTHOR CONTRIBUTIONS

Conceptualization: Elmira Siska, Oyyappan Duraipandi.
Data curation: Elmira Siska.
Formal analysis: Elmira Siska.
Funding acquisition: Elmira Siska.
Investigation: Elmira Siska.
Methodology: Elmira Siska, Oyyappan Duraipandi, Purwanto Widodo.
Project administration: Elmira Siska.
Resources: Elmira Siska, Oyyappan Duraipandi, Purwanto Widodo.
Software: Elmira Siska, Purwanto Widodo.
Supervision: Oyyappan Duraipandi, Purwanto Widodo.
Validation: Elmira Siska, Oyyappan Duraipandi, Purwanto Widodo.
Visualization: Elmira Siska, Oyyappan Duraipandi, Purwanto Widodo.
Writing – original draft: Elmira Siska.
Writing – review & editing: Elmira Siska, Oyyappan Duraipandi, Purwanto Widodo.

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