“Market efficiency and tax incentive policies during the COVID-19 pandemic: Case of Indonesia”

AUTHORS	Novi Swandari Budiarso Winston Pontoh
ARTICLE INFO	Novi Swandari Budiarso and Winston Pontoh (2025). Market efficiency and tax incentive policies during the COVID-19 pandemic: Case of Indonesia. *Investment Management and Financial Innovations*, *22*(1), 311-323. doi:10.21511/imfi.22(1).2025.24
DOI	http://dx.doi.org/10.21511/imfi.22(1).2025.24
RELEASED ON	Wednesday, 26 February 2025
RECEIVED ON	Thursday, 26 September 2024
ACCEPTED ON	Monday, 03 February 2025

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
62	5	4

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Novi Swandari Budiarso (Indonesia), Winston Pontoh (Indonesia)

MARKET EFFICIENCY AND TAX INCENTIVE POLICIES DURING THE COVID-19 PANDEMIC: CASE OF INDONESIA

Abstract

From an accounting perspective, taxes reduce profits and are often perceived as diminishing shareholders' rights. Consequently, government support through tax reductions plays a crucial role in enhancing the effectiveness of corporate strategies aimed at minimizing tax burdens. From the perspective of the Efficient Market Hypothesis (EMH), government tax incentive policies serve as vital signals to investors, shaping their expectations and influencing investment decisions. This study focuses on Indonesia's tax incentive policy introduced at the onset of the COVID-19 pandemic on April 1, 2020, and continuing until September 30, 2023. To assess market efficiency during this period, portfolios were constructed from the top 21 firms listed on the IDX Quality 30 and IDX High Dividend 20 indices, categorized by their systematic risk and cost of equity. The findings indicate that portfolios with higher systematic risk and cost of equity exhibit more optimal returns, greater volatility, and better risk-return trade-offs. Conversely, portfolios with lower systematic risk and cost of equity tend to yield suboptimal returns due to their passive investment characteristics. Overall, the returns from all portfolios during the tax incentive period align with the weak form of the EMH, albeit showing negative autocorrelation instead of a purely random walk pattern. These findings imply that information regarding tax incentives influences prices primarily among firms with higher cost of equity or systematic risk. This study contributes to the understanding of the EMH by examining the impact of tax incentives during the pandemic while controlling for both the cost of equity and systematic risk.

Keywords return, systematic risk, equity cost, tax incentives, weak form, EMH, COVID-19

JEL Classification G11, G12, G14, G18, H25

Received on: 26th of September, 2024
Accepted on: 3rd of February, 2025
Published on: 26th of February, 2025

Novi Swandari Budiarso, Lecturer, Economics and Business Faculty, Accounting Department, Sam Ratulangi University, Indonesia. (Corresponding author)

Winston Pontoh, Lecturer, Professor, Economics and Business Faculty, Accounting Department, Sam Ratulangi University, Indonesia.

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

Income taxes represent taxpayer obligations to the state. From an accounting perspective, taxes decrease the profits available to investors (Lintner, 1956; Modigliani & Miller, 1963). This suggests that lowering a firm's tax burden could potentially increase its profits, thereby enhancing its attractiveness to investors. Furthermore, the recent COVID-19 pandemic significantly impacted the global economy, with enduring repercussions that persist to the present. In response to the pandemic, the Indonesian Government implemented policies in 2020, including tax incentives, aimed at bolstering economic growth. Before the pandemic, business entities in Indonesia were subject to a 25% tax rate under Law No. 36 of 2008. From the perspective of the efficient market hypothesis (EMH), events such as the COVID-19 pandemic and the introduction of tax incentives provide significant information relevant to investor interests.

Key events related to this tax policy began with the issuance of Government Regulation in Lieu of Law Number 1 on March 31, 2020, which was subsequently ratified in Law Number 2. Furthermore, on October 29, 2021, Law Number 7 of the Republic of Indonesia was issued to harmonize tax regulations. On April 11, 2023, the Minister of Finance's Regulation Number 40 extended an income tax incentive of 3% for registered capital market firms. These developments were crucial for the performance of listed companies and were anticipated to contribute to national economic growth amid the COVID-19 pandemic. From April 1, 2020 to September 30, 2023, the stock market index exhibited an upward trajectory, indicating a positive investor response to the tax incentives. Consistent with the EMH, tax incentives likely captured investor attention, prompting movements in stock prices within the capital market. This assumes investors structured their portfolios optimistically, expecting reduced tax burdens to enhance firms' financial performance.

1. LITERATURE REVIEW

A market is deemed efficient when pertinent information is fully incorporated into current stock prices (Fama, 1970). Fama (1970) argued that such information reveals underlying risks, thereby influencing investors' expected returns. Malkiel (2003) contended that market risk is affected by unpredictable economic events. In testing for normal optimal returns, the weak form of the EMH, as proposed by Fama (1970), is employed, which posits that information relevant to current stock prices is independent of past prices.

Empirically, the weak-form EMH can elucidate how capital markets respond to information about economic events that influence firms' financial performance. For instance, Duarte-Duarte et al. (2014) discovered inefficiencies in the returns of several Colombian firms during the onset of the global economic crisis from 2008 to 2010. Conversely, Kok and Munir (2015) demonstrated that share prices in Malaysia's finance sector from 1997 to 2014 were efficient, driven by robust long-term prospects and resilience during financial crises. Almujamed (2018) observed that Qatar's stock market prices in various industrial sectors, such as consumer goods, services, industry, and insurance, reflected efficiency alongside economic growth from 2004 to 2017, supported by strong earnings per share. Heymans and Santana (2018) found that market indices comprising well-established firms in South Africa between July 3, 1997 and March 3, 2015, tended to be more efficient owing to their growth potential and solid fundamental strength. However, similar to findings by Nageri and Abdulkadir (2019) in Nigeria and Elangovan et al. (2022) in India, where economic growth was substantial, market inefficiencies persisted due to changes in investor behavior influenced by information asymmetry.

Since 2020, the efficiency of capital markets has been significantly influenced by the COVID-19 pandemic. For instance, Dias et al. (2020) observed that markets in the US, China, and Portugal exhibited inefficiencies compared to those in Spain, Ireland, Greece, Belgium, France, and Germany. Ozkan (2021) reported widespread market inefficiencies globally, particularly in the US, Spain, the UK, Italy, France, and Germany, leading to increased speculation and mispricing amid the pandemic. Similarly, Wang and Wang (2021) noted a decline in market efficiency in the US due to the pandemic, reflected in lower market returns. Dias et al. (2022) found that economic instability and investor pessimism stemming from the pandemic contributed to market inefficiencies, evident in regions such as Africa, the UK, Japan, and the US. Zebende et al. (2022) highlighted a passive return movement pattern in the US and G-20 countries, indicative of uncertain global economic conditions during the pandemic. In contrast, Bolek et al. (2022) suggested that Scandinavian markets became more efficient with increased investor optimism following information about the pandemic. They also found that the Baltic markets remained efficient, unaffected significantly by the COVID-19 pandemic (Bolek et al., 2022). Previous findings by He et al. (2020) in China indicated mixed impacts of the pandemic on the industry, not uniformly negative. Ammy-Driss and Garcin (2023) observed that US market conditions were less efficient compared to Asian and Australian markets during the pandemic crisis. Aslam et al. (2022) attributed changes in market efficiency worldwide, including in Asia and Europe in 2020, to herd behavior driven by fear and anxiety.

Studies by Rizvi et al. (2021), Athira and Ramesh (2023), Daly (2023), and Ispriyarso and Wibawa (2023) underscore the role of fiscal policies, such as tax incentives, in promoting economic recovery.

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A government's tax incentive policy, which alleviates tax burdens, serves as crucial information in capital markets and significantly impacts investment returns. Takirambudde (1995) suggested that tax regulations with incentives play a crucial role in stimulating investment growth through capital markets. Chen (2015) demonstrated that effective utilization of tax incentives by listed firms can bolster profits, thereby influencing investor interest in the capital market. Goh et al. (2016) also highlighted that engaging in tax avoidance can alleviate the equity burden on shareholders. Moreover, Lazăr and Istrate (2018) affirmed that tax hikes diminish firm profitability. Drake et al. (2019) indicated that US investors respond positively to tax avoidance strategies as they enhance firm value, though Ahmad et al. (2023) found limited impact in Pakistan. Koch et al. (2023) discovered that tax incentives in the form of compensation for fiscal losses can enhance share price performance in capital markets. These findings align with Flagmeier et al. (2023), emphasizing that investors consider firm tax conditions as crucial disclosures influencing cost-benefit evaluations. However, Cao et al. (2023) cautioned that profit increases stemming from tax incentives may be short-lived.

Firms often employ various strategies to manage their tax obligations. For instance, in terms of capital structure, taxes are a primary motivator for firms to utilize debt as a tax shield (Jensen & Meckling, 1976; Myers, 2001; Fama & French, 2002; Frank & Goyal, 2003). However, the use of debt often correlates with the risk of bankruptcy (Nazir et al., 2021; Abdullah et al., 2022; Arhinful & Radmehr, 2023) and reduces funds available for investment (Thi et al., 2023). Delgado et al. (2018) observed that large German firms from 1992 to 2009 often utilized significant debt to create tax shields due to high tax burdens. Mocanu et al. (2021) found similar patterns among Romanian firms from 2013 to 2017. Dang and Tran (2021) illustrated how listed Vietnamese firms used debt to gain tax advantages from 2008 to 2020, noting that firms with substantial long-term assets engaged less in tax avoidance strategies. Recently, Lian (2022) revealed that increases in tax burdens prompt firms to allocate more resources to social and environmental initiatives, indirectly benefiting investors.

Based on the preceding empirical evidence, this study identifies three key points: First, economic conditions, whether favorable or adverse, are crucial in determining market efficiency. Second, market inefficiencies were more prevalent during the COVID-19 pandemic. Third, reducing the tax burden reflects the effectiveness of tax planning and attracts investor attention. The COVID-19 pandemic significantly impacted Indonesia's economic conditions, with tax incentives as a stimulus for firms to enhance financial performance and influence investor portfolio decisions. These factors played a key role in shaping market efficiency in its weak form. Thus, this study explores the relationship between systematic risk, cost of equity, and portfolio performance under tax incentives. It investigates their role in market efficiency during the COVID-19 pandemic in Indonesia, providing insights into how tax policies influenced this efficiency.

2. METHOD

This study focuses on the Indonesian market because of its unique economic context. Indonesia, as an emerging market in Southeast Asia, has demonstrated strong economic resilience since the COVID-19 pandemic (Siregar et al., 2021; Anas et al., 2022; Indrawati et al., 2024). Investors responded swiftly to the Indonesian government's economic strengthening efforts during the pandemic, particularly through tax incentives, which were perceived positively. This positivity was evident in the fluctuating but overall positive correction of the stock market index.

The study's sample consists of listed firms in Indonesia, specifically selected from two indices: IDX Quality 30 (IDXQ30) and IDX High Dividend 20 (IDXHIDIV20). The IDXQ30 comprises the top 30 firms based on strong financial performance indicators such as profitability, solvency, stable profit growth, and liquidity. The IDXHIDIV20 includes the top 20 firms with consistently high cash dividend distributions and yields. Firms included in the study had to maintain continuous inclusion in these indices throughout the observation period, from April 1, 2020 to September 30, 2023 (848 market days). The final sample consisted of 21 firms, resulting in 17,808 total observations over the observation period. April 1, 2020, was chosen as the starting point as it is the date of the initial announcement regarding tax incentives during the COVID-19 pandemic.

To test the hypothesis of market efficiency, the weak-form EMH is utilized. The methodology involves analyzing time-series data. First, R_{it}-RF_t is calculated, where R_{it} represents $(P_{it}-P_{it-1})/P_{it-1}$, and RF_t denotes the risk-free interest rate from the Central Bank of Indonesia at time t. Here, P_{it} represents the stock price of firm i at time t, while P_{it-1} represents the stock price at time $t-1$. Second, data normality is assessed using the Anderson-Darling (AD) test, as depicted in Equation (1).

$$AD = -N - \frac{1}{N}\sum_{i=1}^{N}(2i-1) \times \left[\left(lnF\left(Y_i\right)\right) + ln\left(1-F\left(Y_{N+1-i}\right)\right)\right], \tag{1}$$

where N is the sample size, F is the cumulative distribution function, and Y_i is the i^{th} ordered value of the sample. Third, determining the presence of a unit-root problem or stationary data is necessary using the Augmented Dickey-Fuller (ADF) test, as shown in Equation (2).

$$\Delta y_t = \alpha + Y_{yt-1} + V_t, \tag{2}$$

where Δy_t is the change in the time series, $yt-1$ is the lagged value of the series, α is a constant term, and V_t is the error term. Fourth, the variance ratio (VR) test by Lo and MacKinlay (1988, 1989), as outlined in Equation (3), was applied to assess market efficiency within the framework of the EMH. Lo and MacKinlay (1988, 1989) extended Fama's (1970) methodology and established the VR test as a more robust approach for evaluating the EMH. This method's effectiveness has been supported by subsequent studies including Smith et al. (2002), Smith and Ryoo (2003), Borges (2011), Qu and Xiong (2019), Metghalchi et al. (2021), Dias et al. (2022), and Rönkkö et al. (2024).

$$VR(k) = \frac{\sigma^2(k)}{\sigma^2(1)}, \tag{3}$$

where $\sigma^2(k)$ represents the variance of the k-period return defined in Equation (4):

$$\sigma^2(k) = \frac{1}{m}\sum_{t-1}^{T}\left(ln\frac{P_t}{P_{t-k}} - k\hat{\mu}\right)^2, \tag{4}$$

where P_t and P_{t-k} are the asset prices at times t and t-k, $k\hat{\mu}$ is the expected return over the interval k, and m is defined as $k(T-k+1)(1-k/T)$. T is the total number of observations, and k is the length of the interval. $\sigma^2(1)$ represents the variance of a period return (χ_t), defined as shown in Equation (5).

$$\sigma^2(1) = \frac{1}{T-1}\sum_{t-1}^{T}\left(\chi_t - \hat{\mu}\right)^2, \tag{5}$$

where χ_t is the observed return at time t, and $\hat{\mu}$ is the mean of the returns. The z-statistic for the variance ratio test is defined in Equation (6).

$$z(k) = \frac{VR(k)-1}{\sqrt{\varnothing(k)}}. \tag{6}$$

Assuming homoscedasticity, Ø(k) can be defined as in Equation (7).

$$\varnothing(k) = \frac{2(2k-1)(k-1)}{3kT}, \tag{7}$$

where T represents the total number of observations, and k represents lags of 2, 4, 8, and 16. In the VR test, the null hypothesis is accepted if the probability exceeds the 10% significance level. To obtain specific results, R_{it}-RF_t is sorted based on systematic risk (β) and firm cost of equity (ER_i). This approach reflects the critical factors investors must consider when forming portfolios: systematic risk (Hundal et al., 2019; Hoesli & Johner, 2022; Liu, 2022) and the cost of equity (Athanasakou et al., 2020; Artikis & Kampouris, 2022; Abdollahi et al., 2023; Thien & Hung, 2023). β is classified as high risk (high β) if its value is 1 or higher; otherwise, it is considered low risk (low β). Similarly, ER_i is classified as low (low ER) if its value is below the median, and high if it is above (high ER). β is derived using the capital asset pricing model (CAPM), as shown in Equation (8).

$$R_{it} - RF_t = \alpha_t + \beta_{RM_t - RF_t} + \varepsilon_t, \tag{8}$$

where RM_t represents the market return at time t, calculated similarly to R_{it}. ER_i is estimated based on the CAPM, as detailed in Equation (9).

$$ER_i = RF_t + \beta\left(RM_t - RF_t\right). \tag{9}$$

3. RESULTS

Table 1 displays the descriptive statistics of stock returns adjusted for the risk-free rate (RT-RF). The findings indicate that portfolios based on high ER

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and β exhibit higher average returns compared to portfolios with low ER and β. Specifically, the average ER for each portfolio is as follows: (1) RT-RF (high β) = 0.00066, (2) RT-RF (low β) = 0.00042, (3) RT-RF (high ER) = 0.00067, and (4) RT-RF (low ER) = 0.00043. These results suggest that portfolios with higher ER or β generally yield superior returns owing to their higher cost of equity. Furthermore, portfolios characterized by high ER and β show greater standard deviations, indicating greater volatility in market returns for these combinations. Additionally, the coefficient of variation (CV) reveals that portfolios with high ER offer a more favorable balance between risk and return compared to those with high β. The descriptive statistics also indicate that all portfolio combinations exhibit left-skewed distributions with positive (leptokurtic) kurtosis, suggesting that the sampled portfolios produced favorable returns.

Table 1. Descriptive statistics

RT–RF	Mean	SD	CV	Skew	Kurt
High β	0.000448	0.01349	3008.48	–0.16	2.86
Low β	0.000024	0.01033	43177.05	–0.53	5.84
High ER	0.000466	0.01397	2993.57	–0.19	2.78
Low ER	0.000047	0.01002	21528.34	–0.41	4.99

Note: RT-RF = risk-free rate; SD = standard deviation; CV = coefficient of variation; Kurt = kurtosis; β = risk; ER = cost of equity.

Figure 1 displays the results of testing the normality of RT-RF using the AD test. The null hypothesis of this test posits that the time-series data follow a normal distribution at a specified significance level. The AD test results indicate that the probabilities (*p*-values) for RT-RF are below 1%, 5%, and 10%. Consequently, based on these findings, the stock returns across the entire portfolio cannot be considered normally distributed during the tax incentive period.

Table 2 presents the results of the ADF test conducted on RT-RF to detect unit-root issues. Accepting the null hypothesis of the ADF test suggests that the time-series data exhibit a unit-root problem, indicating non-stationarity. The results of the ADF test reveal that all portfolios have t-statistics with probabilities below the 1%, 5%, and 10% significance levels. These findings imply that there is no unit-root problem in the RT-RF time-series data for any of the portfolios; hence, the data are stationary.

Table 3 presents the results of the VR test conducted on RT-RF, categorized by high and low β and ER. The null hypothesis of the VR test posits that the time-series data follow a random walk or are efficient, depending on the chosen significance level. In this test, lags are employed to gauge the

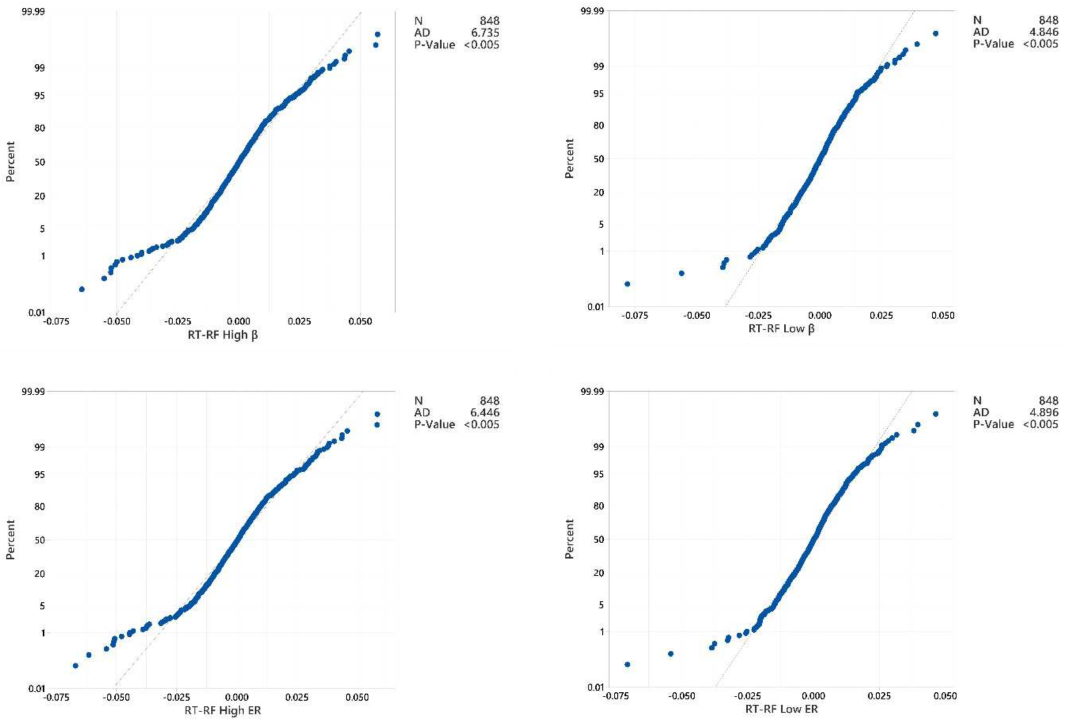

Figure 1. Normality test

Table 2. Unit root problem test

RT–RF	t-statistic				
	1% level	5% level	10% level	ADF test	Prob.
High β	–3.437846	–2.864738	–2.568527	–31.15572	0.0000
Low β	–3.437846	–2.864738	–2.568527	–32.57334	0.0000
High ER	–3.437846	–2.864738	–2.568527	–31.09423	0.0000
Low ER	–3.437846	–2.864738	–2.568527	–32.63563	0.0000

Note: Prob. = probability; β = risk; ER = cost of equity.

Table 3. Variance ratio test

RT–RF	Individual test				Joint test
	Lag 2	Lag 4	Lag 8	Lag 16	
High β					
VR	0.9329	0.8797	0.9244	0.9448	
Stat.	–1.3806	–1.3503	–0.5541	–0.2801	1.3806
Prob.	0.1674	0.1769	0.5795	0.7794	0.5195
Low β					
VR	0.8888	0.8280	0.7989	0.7466	
Stat.	–1.9749	–1.7353	–1.4159	–1.2777	1.9749
Prob.	0.0483	0.0827	0.1568	0.2013	0.1796
High ER					
VR	0.9349	0.8935	0.9446	0.9607	
Stat.	–1.3672	–1.2116	–0.4086	–0.2006	1.3672
Prob.	0.1716	0.2257	0.6828	0.8410	0.5290
Low ER					
VR	0.8869	0.7970	0.7439	0.6920	
Stat.	–1.9663	–2.0214	–1.7845	–1.5342	2.0214
Prob.	0.0493	0.0432	0.0743	0.1250	0.1621

Note: β = risk; Prob. = probability; Stat. = statistical value; ER = cost of equity.

time taken for information to impact stock prices. Additionally, joint tests are utilized to affirm market efficiency across the entire period. Following Lo and MacKinlay (1988), a VR value equal to 1 under normal distribution signifies a pure random walk. Values greater or less than 1 indicate trending (positive autocorrelation) or mean-reverting (negative autocorrelation) behaviors, respectively.

In the joint test, a statistical value of 1.3806 with a probability of 0.5195 suggests that returns associated with high β portfolios tend to exhibit greater randomness over the observation period. Specifically, statistical values at lags 2, 4, 8, and 16 have probabilities above 1%, 5%, and 10%. These findings imply that market prices promptly reflect new information following tax incentive announcements, indicating a higher level of market efficiency. Figure 2 illustrates the trend in VR values for high β portfolios as presented in Table 3. The VR values for high β portfolios are 0.9329 (lag 2), 0.8797 (lag 4), 0.9244 (lag 8), and 0.9448 (lag 16), all below 1. These values suggest that returns tend to exhibit negative autocorrelation (mean-reverting behavior). Graphically, the VR values (depicted by blue lines) closely approach 1, indicating a rapid mean-reverting process.

In the joint test, the statistical value of 1.9749 with a probability of 0.1796 indicates that returns associated with low β portfolios tend to exhibit greater randomness over the observation period. Further evidence from individual tests on low β-based portfolios supports this conclusion. Specifically, statistical significance is observed at lags 2 and 4, at the 5% and 10% levels, respectively, suggesting market inefficiency in response to tax incentive announcements. However, statistical significance diminishes after lags 8 and 16, indicating a shift towards market efficiency in processing tax incentive information. These findings suggest that information regarding tax incentives is not promptly reflected in market prices. Additionally, the individual tests reveal that VR values at all lags (2, 4, 8,

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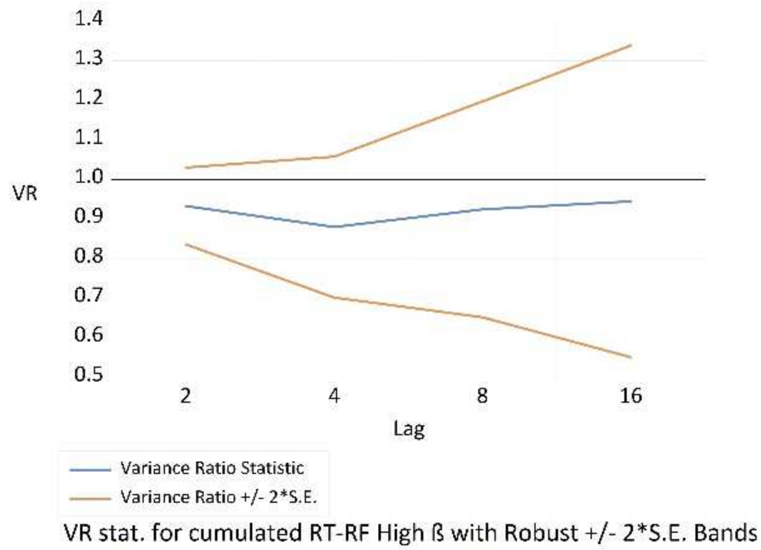

Figure 2. Variance ratio trends of high β

and 16) are less than 1, indicating mean reversion. Figure 3 visually illustrates this with VR values at lags 2 and 4 being 0.8888 and 0.8280, respectively, close to 1, suggesting an accelerated mean-reverting process during market inefficiency or predictability. However, at lags 8 and 16, VR values decrease, indicating a slower mean-reverting process as market efficiency increases.

This study reveals that returns associated with high ER exhibit similar characteristics to those associated with high β. In the joint test, a statistical value of 1.3672 with a probability of 0.5290 indicates efficient market conditions for returns with high ER during the tax incentive period. Individual tests further substantiate these findings by showing that statistical values at lags 2, 4, 8, and 16 are insignificant, suggesting that stock market prices promptly incorporate information on tax incentives. Additionally, Figure 4 illustrates VR values across all lags, indicating symptoms of mean reversion, although they are near 1. This suggests that the market positively responds to tax incentive information, facilitating a faster mean-reverting process. Consequently, returns based on high ER demonstrate the highest mean and the lowest CV.

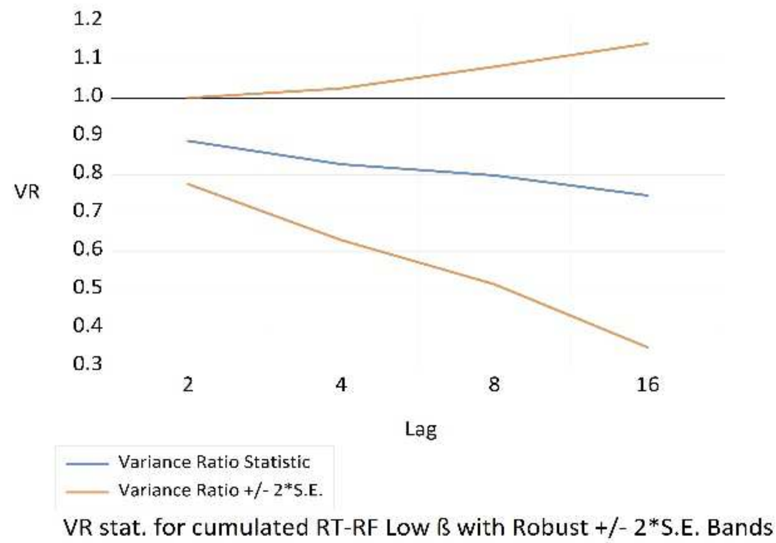

Figure 3. Variance ratio trends of low β

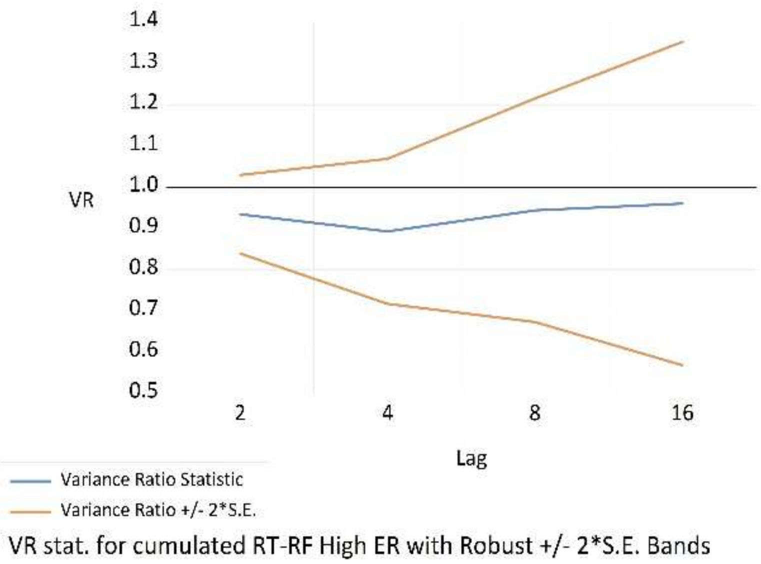

Figure 4. Variance ratio trends of high ER

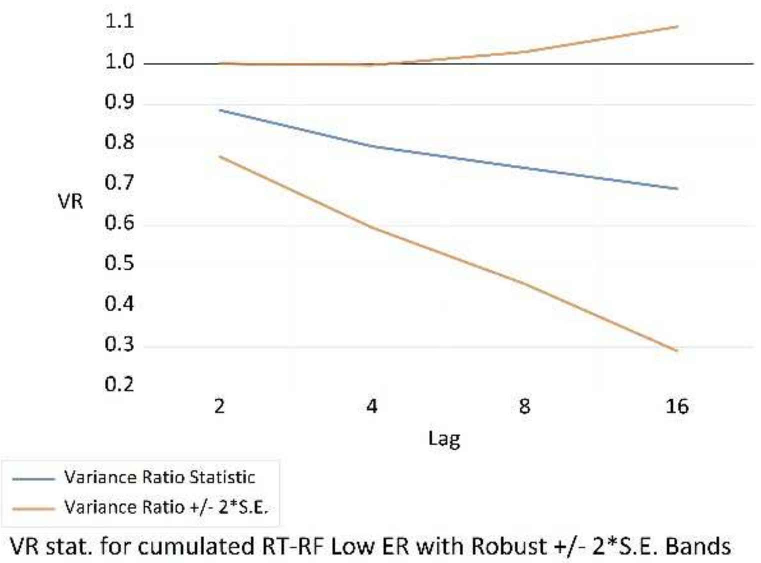

Figure 5. Variance ratio trends of low ER

In the joint test, the test statistic of 2.0214 is not significant at the 1%, 5%, and 10% significance levels, indicating that we fail to reject the null hypothesis. This suggests that the market operates efficiently during the tax incentive announcement period, particularly for returns with low ER. In the individual tests, the statistical value only becomes insignificant at lag 16, indicating a delayed reflection of tax incentive information in stock market prices. Furthermore, VR values of 0.8869, 0.7970, 0.7439, and 0.6920 indicate mean-reverting returns as depicted in Figure 5. This decreasing pattern of VR values mirrors that of low β-based returns, suggesting a slower mean-reverting process.

4. DISCUSSION

This study examines the impact of tax incentives during the COVID-19 pandemic in Indonesia on market efficiency, focusing on systematic risk and cost of equity. The findings reveal that portfolios

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with high β and high ER generated higher average returns, albeit with greater volatility, consistent with the risk-return trade-off. Notably, high ER portfolios exhibited a more favorable risk-return balance than high β portfolios, highlighting the critical role of cost of equity in portfolio selection during economic uncertainty.

Furthermore, high β and high ER portfolios exhibit mean-reverting behavior, indicating that tax incentive announcements are efficiently incorporated into market prices, thereby enhancing market efficiency. These results align with Lintner (1956) and Modigliani & Miller (1963), who emphasize the role of tax incentives in shaping market adjustments through their effects on capital structure, cost of capital, and investment decisions. These findings reinforce the idea that policy interventions, such as tax incentives, influence investor expectations and return predictability, shaping broader market dynamics. In contrast, low β portfolios initially display market inefficiency, as returns at shorter lags (2 and 4) suggest delayed incorporation of tax incentive information. However, efficiency improves over longer lags (8 and 16), reflecting a gradual market adjustment. The accelerated mean reversion at shorter lags suggests initial overreaction, while the slower mean-reverting process at longer lags indicates increasing efficiency. Similarly, low ER portfolios demonstrate a delayed reflection of tax incentives in stock prices, with a pattern of declining VR values mirroring that of low β portfolios. Their lower mean returns and relatively high CV suggest a tendency toward passive investment behavior.

Overall, these findings align with Dias et al. (2020), He et al. (2020), Bolek et al. (2022), and Ammy-Driss and Garcin (2023) regarding the effects of the COVID-19 pandemic on market efficiency. Consistent with Fama (1970) and Malkiel (2003), the results indicate that tax incentive information is incorporated into stock prices, albeit with varying time lags, highlighting their role in enhancing market efficiency. Furthermore, in line with Takirambudde (1995), Chen (2015), Goh et al. (2016), Rizvi et al. (2021), Athira and Ramesh (2023), Daly (2023), Ispriyarso and Wibawa (2023), and Koch et al. (2023), tax incentives tend to elicit positive investor responses, particularly in more stable economic conditions.

CONCLUSION

This study examined the EMH within the context of government policies and investor behavior during the COVID-19 pandemic, specifically focusing on the period marked by the implementation of tax incentives in Indonesia. Rigorous methodologies were employed to test the hypotheses and ensure robust analytical outcomes. The findings indicate that portfolios characterized by higher equity costs and systematic risk tend to yield optimal returns. Specifically, the EMH was tested on four portfolios consisting of top stocks from the IDXQ30 and IDXHIDIV20 indices, with the results indicating weak-form efficiency.

First, all portfolios exhibit mean-reverting returns throughout the tax incentive period, implying that returns tend to decline following information that contradicts market expectations. Second, despite not strictly adhering to a random walk, stocks with high systematic risk or cost of equity are viewed favorably by the market. Third, stocks with low systematic risk or cost of equity are met with a more passive market response to tax incentives, resulting in slower mean reversion. Overall, these findings suggest that the implementation of tax incentive policies sufficiently influences market efficiency for the top stocks listed on the IDXQ30 and IDXHIDIV20, considering both systematic risk and cost of equity. However, other attributes of these portfolios' return require further examination to determine if they conform to a random walk pattern. The study's scope is limited to Indonesia's top stocks during the early stages of the COVID-19 pandemic, emphasizing the need for further research to explore the EMH in countries with similar policies and to investigate additional return characteristics.

AUTHOR CONTRIBUTIONS

Conceptualization: Novi Swandari Budiarso.
Data curation: Winston Pontoh.
Formal analysis: Novi Swandari Budiarso.
Funding acquisition: Winston Pontoh.
Investigation: Winston Pontoh.
Methodology: Novi Swandari Budiarso.
Project administration: Winston Pontoh.
Resources: Winston Pontoh.
Software: Winston Pontoh.
Supervision: Novi Swandari Budiarso.
Validation: Winston Pontoh.
Visualization: Winston Pontoh.
Writing – original draft: Winston Pontoh.
Writing – review & editing: Novi Swandari Budiarso.

REFERENCES

1. Abdollahi, A., Gerayli, M. S., Pitenoei, Y. R., Hasani, K. M., & Riahi, F. (2023). Information risk, cost of equity and stock returns: Evidence from Iranian firms. *Journal of Financial Reporting and Accounting, 21*(2), 370-383. https://doi.org/10.1108/JFRA-01-2021-0025
2. Abdullah, Hashmi, M. A., Mateen, A., Badshah, Y. A., & Iqbal, M. S. (2022). Does tax aggressiveness and cost of debt affect firm performance? The moderating role of political connections. *Cogent Economics & Finance, 10*(1), 1-17. https://doi.org/10.1080/23322039.2022.2132645
3. Ahmad, N., Shah, F. N., Ijaz, F., & Ghouri, M. N. (2023). Corporate income tax, asset turnover and Tobin's Q as firm performance in Pakistan: Moderating role of liquidity ratio. *Cogent Business & Management, 10*(1), 1-14. https://doi.org/10.1080/23311975.2023.2167287
4. Almujamed, H. I. (2018). Predictable returns in an emerging stock market: Evidence from Qatar. *Cogent Business & Management, 5*(1), 1-26. https://doi.org/10.1080/23311975.2018.1497573
5. Ammy-Driss, A., & Garcin, M. (2023). Efficiency of the financial markets during the COVID-19 crisis: Time-varying parameters of fractional stable dynamics. *Physica A: Statistical Mechanics and its Applications, 609,* 1-17. https://doi.org/10.1016/j.physa.2022.128335
6. Anas, T., Hill, H., Narjoko, D., & Putra, C. T. (2022). The Indonesian economy in turbulent times. *Bulletin of Indonesian Economic Studies, 58*(3), 241-271. https://doi.org/10.1080/00074918.2022.2133344
7. Arhinful, R., & Radmehr, M. (2023). The effect of financial leverage on financial performance: Evidence from non-financial institutions listed on the Tokyo stock market. *Journal of Capital Markets Studies, 7*(1), 53-71. https://doi.org/10.1108/JCMS-10-2022-0038
8. Artikis, P. G., & Kampouris, C. G. (2022). Is intrinsic value priced in the cross section of stock returns? *Cogent Economics & Finance, 10*(1), 1-20. https://doi.org/10.1080/23322039.2022.2098607
9. Aslam, F., Ferreira, P., Ali, H., & Kauser, S. (2022). Herding behavior during the Covid-19 pandemic: A comparison between Asian and European stock markets based on intraday multifractality. *Eurasian Economic Review, 12,* 333-359. https://doi.org/10.1007/s40822-021-00191-4
10. Athanasakou, V., Eugster, F., Schleicher, T., & Walker, M. (2020). Annual report narratives and the cost of equity capital: U.K. evidence of a U-shaped relation. *European Accounting Review, 29*(1), 27-54. https://doi.org/10.1080/09638180.2019.1707102
11. Athira, A., & Ramesh, V. K. (2023). COVID-19 and corporate tax avoidance: International evidence. *International Business Review, 32*(4), 1-21. https://doi.org/10.1016/j.ibusrev.2023.102143
12. Bolek, M., Gniadkowska-Szymańska, A., & Lyroudi, K. (2022). Covid-19 pandemic and day-of-the-week anomaly in OMX markets. *Central European Economic Journal, 9*(56), 158-177. https://doi.org/10.2478/ceej-2022-0010
13. Borges, M. R. (2011). Random walk tests for the Lisbon stock market. *Applied Economics, 43*(5), 631-639. https://doi.org/10.1080/00036840802584935
14. Cao, Y., Xie, J., & Zhang, W. (2023). Have tax reduction and fee reduction promoted the development of the financial industry? Empirical evidence based on listed companies in the financial industry. *Economic Research-Ekonomska Istraživanja, 36*(3), 1-20. https://doi.org/10.1080/1331677X.2022.2152358
15. Chen, M. (2015). The effect of stock market pressure on the

tradeoff between corporate and shareholders' tax benefits. *China Journal of Accounting Research, 8*(2), 75-89. https://doi.org/10.1016/j.cjar.2014.12.001

16. Daly, S. (2023). Tax systems: adaptability and resilience during a global pandemic. *Accounting and Business Research, 53*(5), 541–560. https://doi.org/10.1080/00014788.2023.2219151

17. Dang, V. C. & Tran, X. H. (2021). The impact of financial distress on tax avoidance: An empirical analysis of the Vietnamese listed companies. *Cogent Business & Management, 8*(1), 1-10. https://doi.org/10.1080/23311975.2021.1953678

18. Delgado, F. J., Fernández-Rodríguez, E., & Martínez-Arias, A. (2018). Corporation effective tax rates and company size: Evidence from Germany. *Economic Research-Ekonomska Istraživanja, 31*(1), 2081-2099. https://doi.org/10.1080/1331677X.2018.1543056

19. Dias, R., Teixeira, N., Machova, V., Pardal, P., Horak, J., & Vochozka, M. (2020). Random walks and market efficiency tests: Evidence on US, Chinese and European capital markets within the context of the global Covid-19 pandemic. *Oeconomia Copernicana, 11*(4), 585-608. https://doi.org/10.24136/oc.2020.024

20. Dias, R., Pereira, J. M., & Carvalho, L. C. (2022). Are African stock markets efficient? A comparative analysis between Six African Markets, the UK, Japan and the USA in the period of the pandemic. *Naše gospodarstvo/Our economy, 68*(1), 35-51. https://doi.org/10.2478/ngoe-2022-0004

21. Drake, K. D., Lusch, S. J., & Stekelberg, J. (2019). Does tax risk affect investor valuation of tax avoidance? *Journal of Accounting, Auditing & Finance, 34*(1), 151-176. https://doi.org/10.1177/0148558X17692674

22. Duarte-Duarte, J. B., Mascareñas Pérez-Iñigo, J. M., & Sierra-Suárez, K. J. (2014). Testing the efficiency market hypothesis for the Colombian stock market. *DYNA, 81*(185), 100-106. Retrieved from https://www.semanticscholar.org/paper/Testing-the-efficiency-market-hypothesis-for-the-Duarte-Duarte-P%C3%A9rez-I%C3%B1igo/cb8703eea98a8202f9c775a2193308274c506d6f#:~:text=One%20of%20the%20basic%20assumptions%20of%20asset%20pricing,and%20for%20the%20Colombian%20market%C2%B4s%20most%20representative%20assets.

23. Elangovan, R., Irudayasamy, F. G., & Parayitam, S. (2022). Testing the market efficiency in Indian stock market: Evidence from Bombay Stock Exchange broad market indices. *Journal of Economics, Finance and Administrative Science, 27*(54), 313-327. https://doi.org/10.1108/jefas-04-2021-0040

24. Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25*(2), 383-417. https://doi.org/10.2307/2325486

25. Fama, E. F., & French, K. R. (2002). Testing trade-off and pecking order predictions about dividends and debt. *The Review of Financial Studies, 15*(1), 1-33. https://doi.org/10.1093/rfs/15.1.1

26. Flagmeier, V., Müller, J., & Sureth-Sloane, C. (2023). When do firms highlight their effective tax rate? *Accounting and Business Research, 53*(1), 1-37. https://doi.org/10.1080/00014788.2021.1958669

27. Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics, 67*(2), 217-248. https://doi.org/10.1016/S0304-405X(02)00252-0

28. Goh, B. W., Lee, J., Lim, C. Y., Shevlin, T. (2016). The effect of corporate tax avoidance on the cost of equity. *The Accounting Review, 91*(6), 1647-1670. https://doi.org/10.2308/accr-51432

29. He, P., Sun, Y., Zhang, Y., & Li, T. (2020). COVID–19's impact on stock prices across different sectors–An event study based on the Chinese Stock Market. *Emerging Markets Finance and Trade, 56*(10), 2198-2212. https://doi.org/10.1080/1540496X.2020.1785865

30. Heymans, A., & Santana, L. (2018). How efficient is the Johannesburg Stock Exchange really? *South African Journal of Economic and Management Sciences, 21*(1), 1-14. https://doi.org/10.4102/sajems.v21i1.1968

31. Hoesli, M., & Johner, L. (2022). Portfolio diversification across U.S. gateway and non-gateway real estate markets. *Journal of Real Estate Research, 44*(4), 523-552. https://doi.org/10.1080/08965803.2022.2038902

32. Hundal, S., Eskola, A., & Tuan, D. (2019). Risk-return relationship in the Finnish stock market in the light of Capital Asset Pricing Model (CAPM). *Journal of Transnational Management, 24*(4), 305-322. https://doi.org/10.1080/15475778.2019.1641394

33. Indrawati, S. M., Satriawan, E., & Abdurohman. (2024). Indonesia's fiscal policy in the aftermath of the pandemic. *Bulletin of Indonesian Economic Studies, 60*(1), 1-33. https://doi.org/10.1080/00074918.2024.2335967

34. Ispriyarso, B., & Wibawa, K. C. S. (2023). Reconstruction of the national economy post-covid-19 pandemic: Critical study of tax reforms in Indonesia. *Cogent Social Sciences, 9*(1), 1-23. https://doi.org/10.1080/23311886.2023.2174517

35. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X

36. Koch, R., Holtmann, S., & Giese, H. (2023). Losses never sleep – The effect of tax loss offset on stock market returns during economic crises. *Journal of Business Economics, 93,* 59-109. https://doi.org/10.1007/s11573-022-01134-4

37. Kok, S. C., & Munir, Q. (2015). Malaysian finance sector weak-form efficiency: Heterogeneity, structural breaks, and cross-sectional dependence. *Journal of Economics, Finance and Administrative Science, 20*(39), 105-117. https://doi.org/10.1016/j.jefas.2015.10.002

38. Lazăr, S., & Istrate, C. (2018). Corporate tax-mix and firm

performance: A comprehensive assessment for Romanian listed companies. *Economic Research-Ekonomska Istraživanja, 31*(1), 1258-1272. https://doi.org/10.1080/1331677X.2018.1482225

39. Lian, Z. (2022). The nexus between CSR disclosure, effective tax rate, corruption, and sustainable business performance: Evidence from ASEAN countries. *Economic Research-Ekonomska Istraživanja, 35*(1), 5357-5378. https://doi.org/10.1080/1331677X.2022.2026242
40. Lintner, J. (1956). Distribution of incomes of corporations among dividends, retained earnings, and taxes. *The American Economic Review, 46*(2), 97-113. Retrieved from http://www.jstor.org/stable/1910664
41. Liu, Y. (2022). Will and power: Investment diversification and systemic deviation from irrational risk. *Cogent Economics & Finance, 10*(1), 1-12. https://doi.org/10.1080/23322039.2022.2129367
42. Lo, A. W., & MacKinlay, A. C. (1988). Stock market prices do not follow random walks: Evidence from a simple specification test. *The Review of Financial Studies, 1*(1), 41-66. https://doi.org/10.1093/rfs/1.1.41
43. Lo, A. W., & MacKinlay, A. C. (1989). The size and power of the variance ratio test in finite samples: A Monte Carlo investigation. *Journal of Econometrics, 40*(2), 203-238. https://doi.org/10.1016/0304-4076(89)90083-3
44. Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of Economic Perspectives, 17*(1), 59-82. https://doi.org/10.1257/089533003321164958
45. Metghalchi, M., Kagochi, J., Hayes, L., & McMillan, D. (2021). A technical approach to equity investing in South Africa: A tale of two indexes. *Cogent Economics & Finance, 9*(1), 1-20. https://doi.org/10.1080/23322039.2020.1869374
46. Mocanu, M., Constantin, S., & Răileanu, V. (2021). Determinants of tax avoidance-evidence on profit tax-paying companies in Romania. *Economic Research-Ekonomska Istraživanja, 34*(1), 2013-2033. https://doi.org/10.1080/1331677X.2020.1860794
47. Modigliani, F., & Miller, M. H. (1963). Corporate income taxes and the cost of capital: A correction. *The American Economic Review, 53*(3), 433-443. Retrieved from http://www.jstor.org/stable/1809167
48. Myers, S. C. (2001). Capital structure. *Journal of Economic Perspectives, 15*(2), 81-102. https://doi.org/10.1257/jep.15.2.81
49. Nageri, K. I., & Abdulkadir, R. I. (2019). Is the Nigerian Stock Market efficient? Pre and post 2007-2009 meltdown analysis. *Studia Universitatis, Vasile Goldis Arad - Economics Series, 29*(3), 38-63. https://doi.org/10.2478/sues-2019-0011
50. Nazir, A., Azam, M., & Khalid, M. U. (2021). Debt financing and firm performance: Empirical evidence from the Pakistan Stock Exchange. *Asian Journal of Accounting Research, 6*(3), 324-334. https://doi.org/10.1108/AJAR-03-2019-0019
51. Ozkan, O. (2021). Impact of COVID-19 on stock market efficiency: Evidence from developed countries. *Research in International Business and Finance, 58,* 1-10. https://doi.org/10.1016/j.ribaf.2021.101445
52. Qu, Y., & Xiong, P. (2019). Empirical study on the efficiency of the stock index futures market from the information and functional perspectives – empirical evidence from China. *Economic Research-Ekonomska Istraživanja, 32*(1), 3733-3753. https://doi.org/10.1080/1331677X.2019.1674174
53. Rizvi, S. A. R., Juhro, S. M., & Narayan, P. K. (2021). Understanding market reaction to COVID-19 monetary and fiscal stimulus in major ASEAN Countries. *Bulletin of Monetary Economics and Banking, 24*(3), 313-334. https://doi.org/10.21098/bemp.v24i3.1690
54. Rönkkö, M., Holmi, J., Niskanen, M., & Mättö, M. (2024). The adaptive markets hypothesis: Insights into small stock market efficiency. *Applied Economics, 56*(25), 3048-3062. https://doi.org/10.1080/00036846.2024.2326039
55. Siregar, R. Y., Gunawan, A. H., & Saputro, A. N. (2021). Impact of the COVID-19 shock on banking and corporate sector vulnerabilities in Indonesia. *Bulletin of Indonesian Economic Studies, 57*(2), 147-173. https://doi.org/10.1080/00074918.2021.1956397
56. Smith, G., Jefferis, K., & Ryoo, H. J. (2002). African stock markets: multiple variance ratio tests of random walks. *Applied Financial Economics, 12*(7), 475-484. https://doi.org/10.1080/09603100010009957
57. Smith, G., & Ryoo, H. J. (2003). Variance ratio tests of the random walk hypothesis for European emerging stock markets. *The European Journal of Finance, 9*(3), 290-300. https://doi.org/10.1080/1351847021000025777
58. Takirambudde, P. (1995). Financial, corporate and tax harmonisation for capital market development in southern Africa. *Development Southern Africa, 12*(3), 379-399. https://doi.org/10.1080/03768359508439823
59. Thi, M. T., Thu, H. H. T., & Thanh, D. N. T. (2023). The impact of firm leverage on investment decisions: The new approach of hierarchical method. *Cogent Business & Management, 10*(2), 1-19. https://doi.org/10.1080/23311975.2023.2209380
60. Thien, T. H., & Hung, N. X. (2023). Intangible investments and cost of equity capital: An empirical research on Vietnamese firms. *Cogent Economics & Finance, 11*(1), 1-16. https://doi.org/10.1080/23322039.2022.2163075
61. Wang, J., & Wang, X. (2021). COVID-19 and financial market efficiency: Evidence from an entropy-based analysis. *Finance Research Letters, 42,* 1-7. https://doi.org/10.1016/j.frl.2020.101888
62. Zebende, G. F., Santos Dias, R. M. T., & de Aguiar, L. C. (2022). Stock market efficiency: An intraday case of study about the G-20 group. *Heliyon, 8*(1), 1-8. https://doi.org/10.1016/j.heliyon.2022.e08808

http://dx.doi.org/10.21511/imfi.22(1).2025.24

APPENDIX A

Table A1. Sample

Firms	IDXQ30	IDXHIDIV20	Systematic risk (β)		Cost of equity (ER_i)	
			High	Low	High	Low
ACES	√			√		√
ADRO		√	√		√	
ASII		√	√		√	
BBCA	√	√		√		√
BBNI		√	√		√	
BBRI		√	√		√	
BMRI	√	√	√		√	
CPIN	√		√		√	
HMSP	√	√		√		√
INDF		√		√		√
INTP	√		√		√	
ITMG		√		√		√
KLBF	√			√		√
MIKA	√			√		√
MNCN	√		√		√	
PTBA	√	√	√		√	
SCMA	√		√		√	
SIDO	√			√		√
TLKM	√	√	√			√
UNTR	√	√	√		√	
UNVR	√			√		√

http://dx.doi.org/10.21511/imfi.22(1).2025.24