Optimum: Jurnal Ekonomi dan Pembangunan
Vol. 16, No. 1, March 2026, pp. 138-147
DOI:10.12928/optimum.v16i1.15560
ISSN 2613-9464

Pandemic shocks and time-varying weak-form efficiency in ASEAN foreign exchange markets: An empirical investigation

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ARTICLE INFO

Received : 07-01-2026
Revised : 19-02-2026
Accepted : 12-03-2026
Published : 18-03-2026

Keywords:
Exchange Rate Efficiency
Weak-form EMH
ADF Unit Root Test
COVID-19 Pandemic

JEL Classification:
C22, F31, G14

ABSTRACT

This study examines the weak-form Efficient Market Hypothesis (EMH) for the selected ASEAN exchange rates—Brunei Darussalam, Indonesia, the Philippines, Singapore, and Thailand—relative to the U.S. dollar (USD) over three distinct phases: pre-COVID-19 (2010–2019), during COVID-19 (2020–2021), and post-COVID-19 (2022–2023). Using monthly nominal exchange-rate data from the World Bank and applying the Augmented Dickey–Fuller (ADF) unit root test, the study evaluates whether these exchange rates exhibit random-walk behavior consistent with weak-form efficiency. The results reveal that all ASEAN currencies were I(1) and efficient before the pandemic, supporting the weak-form EMH. However, efficiency deteriorated during COVID-19, particularly for Malaysia and Singapore, where exchange rates became stationary at level, indicating short-term predictability due to policy interventions and market disruptions. In the post-pandemic period, Malaysia and Singapore regained efficiency, while Indonesia and Thailand exhibited partial mean-reverting tendencies, reflecting gradual market normalization. Descriptive statistics further confirm increased volatility during the pandemic and partial stabilization thereafter. Overall, the findings suggest that ASEAN exchange-rate efficiency is time-varying, resilient under stable conditions but vulnerable during systemic shocks. Policy recommendations include enhancing monetary transparency, promoting flexible exchange-rate management, and strengthening regional financial coordination to sustain efficiency during future crises.

1. Introduction

Exchange rates are among the most influential macroeconomic variables affecting open economies, shaping international trade competitiveness, price stability, and capital flows. They determine how much domestic goods cost abroad and how expensive foreign goods are domestically. For countries in the Association of Southeast Asian Nations (ASEAN), exchange-rate movements hold particular importance because of the region's deep economic integration and trade interdependence. As the ASEAN Free Trade Area (AFTA) and later the ASEAN Economic Community (AEC) reduced tariff and non-tariff barriers, exchange-rate fluctuations became a key determinant of trade competitiveness among member states. A stable and efficient exchange-rate

system enhances investor confidence, facilitates cross-border investments, and ensures that price signals reflect true market conditions.

In financial theory, exchange-rate behaviour is closely linked to the Efficient Market Hypothesis (EMH) developed by Fama (1970) and Fama (1991). The EMH asserts that financial markets are efficient when prices fully and instantaneously reflect all available information. Under the weak form of the hypothesis, past price data cannot predict future price movements, implying that exchange rates follow a random walk process. This means any attempt to forecast exchange-rate trends based on historical information would not yield consistent excess returns. Conversely, if exchange-rate series are stationary, indicating mean-reverting tendencies, the market is inefficient and predictable. Understanding whether exchange rates behave randomly or exhibit persistence is therefore essential to assess how well ASEAN's financial markets incorporate information and to what extent they support stable trade and investment flows.

Over the past three decades, ASEAN economies have transitioned through multiple exchange-rate regimes—from fixed and managed arrangements to more flexible systems—reflecting both domestic monetary priorities and regional integration efforts (Basuki, 2025). However, the efficiency of these foreign exchange markets has been repeatedly tested by major global shocks. The Asian Financial Crisis (1997–1998) exposed the vulnerability of pegged regimes and speculative attacks, while the Global Financial Crisis (2008) underscored the importance of monetary credibility and capital market transparency. More recently, the COVID-19 pandemic (2020–2021) posed a new and complex challenge, disrupting trade flows, investor sentiment, and exchange-rate dynamics through heightened volatility and unconventional policy interventions (Darsono et al., 2023).

Previous studies have examined these dynamics with varying results. Ahmad et al (2012) found that Asian exchange-rate markets became less efficient during crisis periods, whereas Putra et al (2016) reported partial efficiency among ASEAN-5 markets in the post-2008 recovery period. Similarly, Lee et al (2011) concluded that ASEAN foreign exchange markets generally followed a random walk during stable conditions but occasionally deviated during major shocks. More recent evidence from Azzam et al (2023) indicated that market efficiency deteriorated during the COVID-19 pandemic due to increased uncertainty and global financial stress. Yet, despite these insights, limited empirical work has explicitly examined how the pandemic altered the efficiency of ASEAN exchange-rate markets, particularly using high-frequency data that capture short-term price adjustments and volatility (Cahyadin & Ratwianingsih, 2020).

Despite ASEAN's progress in financial and trade integration, the informational efficiency of its foreign exchange markets remains insufficiently explored, especially around recent global disruptions such as the COVID-19 pandemic (Sunaryati & Munandar, 2023). Exchange-rate efficiency is vital for ensuring fair pricing, reducing speculative pressures, and maintaining regional competitiveness under AFTA. However, most prior studies have employed annual or static datasets, focusing either on individual countries or single-crisis episodes, thereby overlooking the time-varying nature of market efficiency. The pandemic's global shock, characterized by rapid capital outflows, currency interventions, and heightened investor risk aversion, presents a unique opportunity to examine how market efficiency evolved before, during, and after such an unprecedented disruption. Addressing this gap is crucial for understanding the resilience of ASEAN's exchange-rate systems and for guiding regional monetary coordination and policy design in the post-pandemic era (Aprilia & Malia, 2022). This study aims to empirically test the weak-form Efficient Market Hypothesis (EMH) for six ASEAN currencies—Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, and Thailand—against the U.S. dollar, using monthly nominal exchange-rate data from 1990 to 2023 sourced from the World Bank's from the World Development Indicators.

This study contributes to the literature in several ways. First, it adopts a dynamic temporal framework, analysing market efficiency across three distinct phases to capture the evolving impact of the pandemic. Second, it utilizes high-frequency monthly data (1990–2023) to enhance statistical precision and identify short-term deviations in exchange-rate behaviour. Third, it introduces the Malaysian Ringgit as a regional benchmark for comparative analysis, offering new insights into Malaysia's relative position within ASEAN's financial integration. By employing the Augmented Dickey-Fuller (ADF) unit root test, this research provides robust empirical evidence on how ASEAN currency markets respond to global disruptions. The findings will inform policy strategies for monetary coordination, exchange-rate management, and financial resilience, reinforcing the region's

commitment to stability and integration under AFTA and the broader ASEAN Economic Community framework.

2. Literature Review

The theoretical foundation of exchange rate efficiency stems from the Efficient Market Hypothesis (EMH), initially proposed by Fama (1970) and later refined by Fama (1991). The EMH posits that asset prices fully incorporate available information, implying that future price changes are unpredictable and follow a random walk process. Within the weak form of efficiency, historical price data cannot systematically predict future values, as any information contained in past prices has already been absorbed into current prices. In the context of foreign exchange markets, this means that exchange-rate movements should reflect new information instantaneously, and traders cannot consistently achieve abnormal returns through technical or trend-based analysis. This theoretical framework is closely related to the random walk theory, which views price changes as independent and identically distributed random variables. Empirically, testing for market efficiency involves determining whether exchange-rate series are stationary or contain a unit root, as a unit root indicates random behaviour consistent with weak-form efficiency.

A large body of empirical research has investigated exchange-rate efficiency across global and regional markets, yielding mixed results depending on data frequency, time period, and estimation techniques. Ahmad et al (2012) examined the volatility and efficiency of Asian exchange rates and found that financial crises tend to disrupt efficiency, particularly in managed or pegged regimes. Their results indicated that free-floating systems were more adaptable to information flows and less prone to speculative pressures. Similarly, Cheung & Lai (1995) demonstrated that Asian currency markets exhibited varying degrees of efficiency depending on the level of market openness and regulatory intervention. Together, these studies suggest that while Asian exchange markets generally tend toward efficiency under normal conditions, they are susceptible to structural breaks and policy-induced frictions during turbulent periods (Chen et al., 2022; Kang et al., 2019).

Several studies have focused specifically on ASEAN currencies, particularly in the aftermath of the Asian Financial Crisis (1997–1998) and the Global Financial Crisis (2008). Lee et al (2011) and Gunawan et al (2025) tested the efficiency of the ASEAN-5 exchange markets using univariate and multivariate unit root tests and found evidence consistent with weak-form efficiency for most currencies, except during periods of financial instability. Their findings imply that the degree of efficiency in ASEAN markets is time-varying, with external shocks temporarily reducing information absorption. Extending this analysis, Putra et al (2016) applied a rolling window technique to capture changing efficiency dynamics from 2009 to 2014. Their results showed that ASEAN foreign exchange markets gradually regained efficiency following the global crisis but remained vulnerable to new disturbances. Collectively, these studies underscore that efficiency in ASEAN markets is not static but evolves with policy reforms, regional cooperation, and exposure to external shocks (Tran et al., 2024; Yiu & Tsang, 2023).

Differences in exchange-rate regimes and monetary frameworks also influence market efficiency. Ibrahim & Law (2014) and Darsono et al (2024) observed that countries with flexible exchange-rate systems tend to exhibit higher efficiency because market-determined rates reflect information more rapidly than administratively controlled ones. In the ASEAN context, Singapore and Brunei Darussalam, which maintain a currency interchangeability arrangement, have historically displayed exchange-rate stability and low volatility, suggesting that policy credibility and institutional discipline enhance efficiency. Conversely, economies such as Indonesia and the Philippines, which rely on managed float systems, often experience temporary inefficiencies due to interventionist policies and speculative pressures. These findings indicate that regime choice and institutional strength are crucial determinants of information efficiency in regional currency markets.

The emergence of the COVID-19 pandemic provided a natural experiment for assessing the resilience and informational efficiency of foreign exchange markets under extreme global uncertainty (Arnakim & Kibtiah, 2021; Tanjung et al., 2022). Azzam et al (2023) found that exchange-rate efficiency weakened across both developed and emerging economies due to heightened volatility and investor risk aversion, although markets gradually recovered post-crisis. These findings suggest that efficiency is dynamic and may fluctuate during major shocks. However, despite growing global evidence, research focusing specifically on ASEAN exchange-rate markets during the pandemic period remains limited. Existing studies Lee et al (2011) and Putra et al (2016) examined efficiency

either before or long after previous crises, relying primarily on annual or aggregated data. Few have systematically compared pre-, during-, and post-pandemic efficiency using high-frequency data that capture short-term adjustments and volatility. This gap underscores the need for a comprehensive and time-segmented assessment of ASEAN exchange-rate behaviour to better understand the region's financial adaptability and policy effectiveness during and after global disruptions.

3. Method

3.1. Data

This study employs a quantitative time-series design to examine the weak-form Efficient Market Hypothesis (EMH) in the context of ASEAN exchange-rate markets. The analysis tests whether exchange-rate movements follow a random walk process, which implies that historical information cannot systematically predict future rates. A currency market that follows a random walk is considered informationally efficient because all available information is instantaneously reflected in the current exchange rate. To test this property, the study applies the Augmented Dickey-Fuller (ADF) unit root test, one of the most widely used econometric procedures for identifying whether a time series is stationary or contains a unit root (Basuki & Prawoto, 2016). The empirical analysis focuses on six ASEAN countries—Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, and Thailand—which are founding members of the ASEAN Free Trade Area (AFTA) and represent the most financially integrated economies in the region. The study examines the efficiency of each country's nominal exchange rate against the U.S. dollar (LCU/USD) across three distinct phases: a). Pre-COVID-19 period (January 2010-December 2019); b). During COVID-19 pandemic (January 2020-December 2021); and c). Post-COVID-19 period (January 2022-December 2023). This segmentation allows the study to assess the dynamic evolution of exchange-rate efficiency before, during, and after the pandemic shock.

The dataset consists of monthly nominal exchange-rate data from January 1990 to December 2023, obtained from the World Bank's World Development Indicators (WDI). According to the World Bank, the official exchange rate represents the rate determined by national authorities or within legally sanctioned exchange markets, expressed as local currency units (LCU) per U.S. dollar (USD), and derived as a monthly average over the reference period. Nominal exchange rates are selected instead of real exchange rates because the weak-form EMH concerns market price behaviour rather than purchasing-power parity adjustments. Nominal rates directly reflect the prices faced by traders and investors in foreign exchange markets, making them suitable for testing informational efficiency. The use of monthly frequency provides a large number of observations with over 400 per series, allowing more reliable inference and better detection of structural shifts than annual data. The data were transformed into natural logarithmic form to stabilize variance and reduce potential heteroskedasticity prior to testing.

3.2. Model Specification

To evaluate weak-form efficiency, the study employs the Augmented Dickey-Fuller (ADF) unit root test, expressed as:

$$\Delta R_t = \alpha + \beta R_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta R_{t-i} + \epsilon_t \quad (1)$$

Where R_t is the logarithm of the nomial exchange rate; β is the coefficient on the lagged level of R_t; p is the optimal lag length selected using the Akaike Information Criterion (AIC); ϵ_t is the random error term; and α is the constant term. The ADF test evaluates the null hypothesis of a unit root ($H_0: \beta = 0$), implying non-stationarity. The alternative hypothesis ($H_1: \beta < 0$) indicates stationarity. If the null hypothesis cannot be rejected ($p - value > 0.05$), the exchange-rate series is non-stationary, consistent with a random walk process and hence weak-form efficiency. Meanwhile, ff the null is rejected ($p - value < 0.05$), the series is stationary, implying predictability and weak-form inefficiency.

The test was conducted at both level and first-difference forms for each currency series. A series that becomes stationary after first differencing is said to be integrated of order one, I(1), which is typical for financial time series that follow a random walk. To capture structural variations across different economic regimes, the full sample (1990–2023) was divided into the three aforementioned subperiods. For each subperiod, separate ADF tests were conducted at both levels and first differences. This approach allows the study to compare changes in market efficiency across phases, are a). The

pre-COVID period represents normal market conditions, serving as a baseline for efficiency; b). The COVID-19 period captures crisis-induced volatility and potential inefficiency due to liquidity shocks and policy uncertainty; and c). The post-COVID period assesses recovery and normalization in exchange-rate behaviour.

This phase-based framework follows prior studies such as Lee et al (2011) and Azzam et al (2023), which emphasize the time-varying nature of efficiency around major financial disruptions. To ensure robustness, the lag length in each ADF regression was selected based on the Akaike Information Criterion (AIC), minimizing serial correlation in residuals. Additionally, graphical inspection of exchange-rate trends was performed to confirm the presence of stochastic behaviour. Where the ADF test results were near critical values, the first-difference tests were used to confirm integration order. Since the ADF test may have limited power in small samples or in the presence of structural breaks, the study interprets results conservatively—focusing on patterns across multiple periods rather than isolated significance. This approach strengthens inference about time-varying efficiency rather than static conclusions.

4. Results and Discussion

The descriptive analysis of the monthly nominal exchange rates (LCU/USD) across six ASEAN countries from 2010 to 2023 reveals substantial differences in currency behaviour and stability. Table 1 shows Before the pandemic, ASEAN exchange rates exhibited a relatively stable trend. The Brunei and Singapore dollars had identical statistics, reaffirming their currency interchangeability arrangement, which ensured a one-to-one peg and minimized volatility. Malaysia's ringgit and Thailand's baht were moderately stable, supported by sound monetary frameworks and trade surpluses. Meanwhile, Indonesia and the Philippines recorded higher volatility due to their floating exchange-rate regimes, capital-flow sensitivity, and exposure to external shocks. During COVID-19, exchange-rate volatility increased across most ASEAN currencies during the pandemic, reflecting heightened uncertainty and global liquidity shocks. The Indonesian rupiah and Malaysian ringgit showed visible depreciation, with their mean exchange rates rising compared to the pre-pandemic period. However, volatility remained moderate due to policy interventions and capital control measures.

Table 1. Descriptive Statistics

Country	Obs	Mean	Std. Dev.	Minimum	Median	Maximum
Pre-COVID-19						
Brunei	120	1.324	0.063	1.204	1.346	1.446
Indonesia	120	11,830.075	2,122.369	8,508.000	12,532.500	15,227.000
Malaysia	120	3.633	0.505	2.985	3.532	4.461
Philippines	120	46.535	3.787	40.672	45.224	54.009
Singapore	120	1.323	0.063	1.204	1.346	1.446
Thailand	120	32.348	1.782	29.308	32.237	36.370
During COVID-19						
Brunei	24	1.362	0.029	1.324	1.360	1.425
Indonesia	24	14,485.085	503.106	13,662.000	14,357.000	16,367.005
Malaysia	24	4.173	0.087	4.037	4.163	4.355
Philippines	24	49.439	1.108	47.955	49.705	50.904
Singapore	24	1.360	0.029	1.322	1.356	1.425
Thailand	24	31.727	1.148	29.993	31.481	33.922
Post-COVID-19						
Brunei	24	1.361	0.029	1.314	1.354	1.434
Indonesia	24	15,067.751	454.692	14,349.005	15,044.000	15,916.000
Malaysia	24	4.481	0.170	4.188	4.466	4.746
Philippines	24	55.054	2.025	51.235	55.636	58.825
Singapore	24	1.360	0.029	1.314	1.356	1.434
Thailand	24	34.994	1.424	32.726	34.834	38.028

Source: data processed

Brunei and Singapore maintained remarkable stability due to their currency arrangement and strong foreign reserves, acting as regional anchors during this period. The Philippine peso and Thai

baht experienced mild fluctuations, influenced by declining remittances and tourism receipts. Overall, exchange-rate movements during this phase reflect temporary inefficiencies and volatility clustering, consistent with the ADF findings showing partial deviations from weak-form efficiency. In the post-pandemic recovery period, ASEAN currencies stabilized but at weaker levels compared to pre-pandemic averages. The Malaysian ringgit and Philippine peso remained slightly depreciated, reflecting uneven recovery in trade and fiscal balances. Indonesia's rupiah also averaged higher (≈15,068 IDR/USD), consistent with global capital adjustments following U.S. monetary tightening. Brunei and Singapore continued to demonstrate low volatility due to their currency link, reinforcing their roles as regional benchmarks for exchange-rate stability. Thailand's baht displayed modest volatility associated with tourism-sector recovery and monetary normalization.

Table 2 shows the empirical findings of the Augmented Dickey-Fuller (ADF) unit root tests applied to the monthly nominal exchange rates of six ASEAN currencies—Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, and Thailand—against the U.S. dollar (USD). The analysis focuses on three distinct phases: pre-COVID-19 (2010–2019), during COVID-19 (2020–2021), and post-COVID-19 (2022–2023). The ADF test results are interpreted based on the weak-form Efficient Market Hypothesis (EMH), where the presence of a unit root (non-stationarity) supports market efficiency, while stationarity implies inefficiency due to predictability in exchange-rate movements.

Table 2. Pre-COVID-19 Pandemic

Country	ADF Statistic (Level)	ADF Statistic (1st Diff)	Interpretation
Brunei	−2.166	−4.410***	Efficient (I(1))
Indonesia	−0.820	−11.918***	Efficient (I(1))
Malaysia	−0.883	−7.374***	Efficient (I(1))
Philippines	−0.572	−8.728***	Efficient (I(1))
Singapore	−2.148	−4.442***	Efficient (I(1))
Thailand	−1.411	−9.643***	Efficient (I(1))

Source: data processed

During the decade preceding the COVID-19 pandemic as shown in Table 2, all six ASEAN exchange rates—Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, and Thailand—exhibited non-stationarity at level and stationarity after first differencing. This confirms that each series is integrated of order one, I(1), and follows a random-walk process consistent with the weak-form Efficient Market Hypothesis (EMH). This outcome indicates that historical information was not sufficient to predict future exchange-rate movements; new information was rapidly incorporated into prices. Such efficiency reflects a stable macroeconomic and policy environment across ASEAN, where inflation and interest-rate volatility were relatively contained and financial reforms after the asian financial crisis had strengthened transparency and market credibility. These findings are consistent with Lee et al (2011) who documented random-walk behavior for ASEAN-5 currencies during tranquil periods, and with Ahmad et al (2012), Ain Shahrier (2022), Feng et al (2021), and Kevin & Ariefianto (2023) who found that exchange-rate volatility in Asia was largely information-driven rather than speculative. Hence, before the pandemic, ASEAN's foreign-exchange markets were functioning efficiently, reflecting effective monetary coordination and deepening financial integration under the ASEAN Economic Community (AEC).

Table 3. During COVID-19 Pandemic

Country	ADF Statistic (Level)	ADF Statistic (1st Diff)	Interpretation
Brunei	−2.341	−2.455	Inconclusive / Structural Breaks
Indonesia	−1.934	−3.643***	Efficient (I(1))
Malaysia	−2.795*	−3.975***	Inefficient (Predictable)
Philippines	−2.190	0.202	Inconclusive / Structural Breaks
Singapore	−3.150*	−1.254	Inefficient (Predictable)
Thailand	−2.070	−0.714	Inconclusive / Structural Breaks

Source: data processed

The outbreak of COVID-19 disrupted global trade and capital flows, causing sharp depreciation pressures and liquidity shocks in emerging markets. The ADF test results show that market efficiency deteriorated significantly across ASEAN during this crisis. Only Indonesia maintained I(1) characteristics as demonstrated in Table 3, implying that its exchange rate continued to behave

efficiently despite volatility. In contrast, Malaysia and Singapore became stationary at level, suggesting that their exchange-rate changes were partly predictable.

This loss of randomness indicates that policy interventions and managed exchange-rate frameworks temporarily distorted market signals. For Brunei, Thailand, and the Philippines, both level and first-difference series were non-stationary, producing inconclusive results likely caused by heightened uncertainty and short sample length. This pattern mirrors global evidence reported by Azzam et al (2023), Aminarta & Kurniawan (2021), Beckmann & Czudaj (2022), Corzo et al (2025), and Zitis et al (2023) who observed that exchange-rate efficiency weakened worldwide during the pandemic due to information asymmetry, panic-driven trading, and unprecedented fiscal-monetary responses. Within ASEAN, temporary inefficiency reflects abrupt capital movements, limited market depth, and differing policy reactions. The results therefore illustrate how global crises can erode informational efficiency even in otherwise mature foreign-exchange systems.

Table 4. Post-COVID-19 Pandemic

Country	ADF Statistic (Level)	ADF Statistic (1st Diff)	Interpretation
Brunei	−1.781	−2.005	Inconclusive / Structural Breaks
Indonesia	−2.730*	−4.929***	Inefficient (Predictable)
Malaysia	1.409	−2.614*	Efficient (I(1))
Philippines	−2.057	−2.437	Inconclusive / Structural Breaks
Singapore	−1.718	−4.661***	Efficient (I(1))
Thailand	−2.909**	−3.309**	Inefficient (Predictable)

Source: data processed

As regional economies reopened and financial conditions normalized, efficiency gradually rebounded, although the recovery was uneven. Table 4 shows the ADF results reveal that Malaysia and Singapore regained I(1) behavior, demonstrating a return to random-walk dynamics and renewed weak-form efficiency. This improvement corresponds with strengthened macroeconomic fundamentals, policy transparency, and restored investor confidence. Conversely, Indonesia and Thailand displayed stationarity at level, implying short-term mean-reversion and partial inefficiency. These tendencies could reflect active exchange-rate management or lingering speculative correction after pandemic-era volatility. Brunei and the Philippines remained inconclusive, possibly due to limited sample size and structural characteristics of their foreign-exchange regimes—Brunei's currency board arrangement with Singapore and the Philippines' thin market liquidity. Overall, the post-pandemic phase signifies a regional normalization toward efficiency but also highlights varying adjustment speeds across economies. Markets with stronger institutional credibility and flexible policy frameworks adapted faster, reinforcing the importance of transparency, coordination, and resilience in maintaining efficient exchange-rate behavior. The findings are in line with previous research conducted by (Jiang et al., 2022; Malkina, 2023).

5. Conclusion

The analysis of ASEAN exchange-rate markets against the U.S. dollar for the period 2010–2023 provides clear evidence that market efficiency is dynamic and time-varying, shaped by external shocks and domestic policy responses. The Augmented Dickey–Fuller (ADF) tests indicate that all currencies were weak-form efficient before the pandemic, reflecting stable macroeconomic conditions, credible monetary frameworks, and a high degree of information transparency. However, market efficiency deteriorated during the COVID-19 pandemic, as volatility, uncertainty, and government interventions disrupted normal price-discovery mechanisms. In the post-COVID-19 period, efficiency partly recovered, though with significant variation across countries—Malaysia and Singapore regained efficiency, while Indonesia and Thailand exhibited short-term predictability, suggesting slower normalization. Brunei and the Philippines remained inconclusive due to data and structural constraints.

These findings highlight that ASEAN exchange-rate markets are resilient yet vulnerable to major systemic shocks. The temporary inefficiencies observed during the pandemic emphasize that market integration and transparency are critical to sustaining efficiency when faced with sudden disruptions. Moreover, differences in recovery speed across countries underline the influence of institutional quality and exchange-rate regimes on how efficiently markets process new information. From a policy perspective, several implications emerge. First, monetary authorities should prioritize transparent

communication and consistent policy signaling to maintain investor confidence during crises. Central banks that clearly convey policy directions—such as the Monetary Authority of Singapore—demonstrate greater stability in exchange-rate movements. Second, exchange-rate management frameworks should strike a balance between stability and flexibility. Excessive intervention may reduce volatility in the short run but can lead to inefficiencies if markets lose the ability to adjust to new information. For Malaysia and Brunei, gradual adjustments to allow greater exchange-rate flexibility within managed regimes could enhance efficiency over time.

Third, regional cooperation under frameworks like the ASEAN Economic Community (AEC) and the Chiang Mai Initiative Multilateralisation (CMIM) should be strengthened to ensure coordinated responses during future financial shocks. Enhanced data sharing, crisis-liquidity arrangements, and harmonized monitoring mechanisms would improve cross-border transparency and limit contagion risks. Finally, developing deeper and more liquid foreign-exchange markets—through broader participation, hedging instruments, and improved risk-management tools—will help ASEAN economies absorb shocks more efficiently and sustain long-term stability. In conclusion, ASEAN exchange-rate markets display an overall tendency toward efficiency but remain sensitive to global disruptions. Sustaining weak-form efficiency requires not only prudent national policy management but also strong regional coordination, institutional credibility, and continuous market development. As ASEAN economies advance toward greater financial integration, maintaining efficient exchange-rate behavior will be vital for strengthening trade competitiveness, attracting investment, and achieving resilient, inclusive economic growth across the region.

Acknowledgment

The corresponding author also thank Professor Wing- Keung Wong for his ongoing counselling and encouragement. All shortcomings in this study are our responsibility.

Declarations

Author contribution	:	Each author made equal contributions to the primary content of this paper. Furthermore, all authors have carefully reviewed and endorsed the final manuscript
Funding statement	:	No funding statement for this paper.
Conflict of interest	:	The authors declare no conflict of interest.
Additional information	:	No additional information is available for this paper.

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