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ARTICLE

Emerging Stock Markets' Performance in Presence of Pandemics and Exchange Rate Policy Regime: An Empirical Clarification

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Abstract

The objectives are to analyze the impact of exchange rate policy regime shifts, number of infections/deaths from HIV/AIDS and covid-19 diseases on returns and prices of emerging stock markets. The Markov switching model was estimated while the quantile regression method was used for robustness checks to further verify the credibility of results. According to the findings of the study, developing nations will most likely remain in a period of high volatility for 32 years and 3 months before moving to lower volatility regimes. The same group of nations will maintain a low stock-price regime for approximately 12 years before shifting to a highly volatile regime. Exchange rate regimes had a significant impact on stock returns. HIV infections are inversely related to returns without significance and covid-19 deaths had significant impact on the returns of emerging markets. So, the health crisis manifesting in form of covid-19 disease outbreak significantly destabilized stock market indices confirming the lack of resilience of emerging markets. Exchange rate regime shifts were not significant in predicting stock prices of developing countries covered by the study. Hence, market participants and investors in emerging nations do not see changes in exchange rate regimes as important factors influencing stocks, which might be owing to investor confidence. The research further discovered that, in developing nations experiencing periods of increased volatility, a proportion adjustment in the currency-defining rate regime's pattern results in a matching adjustment in stock returns by 0.62 percent while it changes by 0.05 percent with minimal market swings. The research findings are relevant to the decisions of market investors for the purpose of advancing a course for a holistic approach to stock markets' diagnosis, and risk assessment in a globalized world.

JEL Classification: B20, D40, A46
Keywords: Covid-19, HIV infections, stock returns, stock prices, exchange rate regime shift, developing countries

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1. Introduction

Financial markets have been labeled as core components of a nation's economy because they take up intermediary functions by pushing funds from areas of abundance to areas of scarcity. These markets in addition, facilitate trade between buyers and sellers of financial holdings as a result of the embedded ease of exchange the arrangement provides. Nevertheless, market behaviours within other macroeconomic conditions exist in different economies across developing and developed climates. However, the enhancement of welfare by financial markets could be restricted by exchange rate policy regime shift adopted by countries whether developing or

developed. Meanwhile the need for exchange rate policy would have been unnecessary if the different currencies in use throughout the world today did not evolve by man. Exchange rate fluctuation, characterized by appreciation or depreciation, serves as a hallmark of inherent instability. The exchange rate's oscillations introduce a dimension of risk, indicative of the extent to which a currency's value can undergo substantial fluctuations. Heightened volatility implies greater potential for significant, abrupt currency price shifts over short periods. Conversely, lower volatility signals a more stable scenario, where currency prices undergo gradual and prolonged fluctuations (**Nyunt, 2019**). The choice of an exchange rate regime carries substantial significance, as it has a profound impact on a nation's political-economic landscape. It ultimately determines the approach and mechanics by which macroeconomic adjustments are executed (**Boucheta, 2021**).

In the realm of global finance, the interplay between exchange rate regimes, the impact of pandemics such as HIV/AIDS and the COVID-19 pandemic, and the consequent currency and stock market fluctuations, has become an increasingly critical area of study. Regrettably, the influence of HIV/AIDS and on stock markets has received limited attention within the confines of developing countries researches. Following the huge crisis of exchange rate regimes globally and specifically for developing countries and the emergence of the economic effects of pandemics on various facets of the economy and specifically on financial markets, it becomes desirous to embark on this research. Monetary policies regarding financial markets may be twitched owing to the direction of the exchange rate policy regime, outbreak of pandemics in order to reduce shock in financial markets with its consequential impact on the welfare of the citizens. While some researchers have dealt with the different aspect of relationship between exchange rate policy regime shifts & financial markets in some countries, some have also death with the effect of Covid-19 pandemic on financial markets, however, the questions that deal with the relationship between, exchange rate policy regime shift and infections/deaths from pandemics and financial markets are yet to be determine.

Consequently, this study attempted to analyze the impact of exchange rate policy regime shifts and plague of pandemic on financial markets of developed countries. Financial markets are fundamental in any economy as it play a vital role in facilitating the smooth operation in every aspect of the economy as they provide funds from surplus ends to desire ends. The study explores the exchange rate policy regime shifts, outbreaks of pandemics and financial markets comparative evidence from developing and developed countries from 1990-2023 countries. This research work is subdivided into five sections. Section two reviews related studies. Section three discusses the methodology of the research while section four analyses the results. The conclusion of the study is in section five.

2. Literature Review

This section provides a review of previous research findings. **Korley & Giouvris (2021)** examined the relationship between foreign exchange and frontier stock markets. They used the Markov Switching Vector Auto Regressive (MSVAR) model to examine the relationship between FX and frontier stock markets. They noted the existence of two distinct regimes in both the frontier stock market and the FX market: a low volatility and a high volatility regime. In contrast with emerging markets characterized by high volatility/low return. Frontier stock markets provide high (positive returns in high volatility regime in the high volatility regime dependent. Changes in stock market have a significant impact on the FX market during both normal (calm) and (turbulent) periods. In conclusion, it was noted that irrespective of the regime there is no relationship between the stock market and the FX market in Cote d'Ivoire.

Korhan *et al.* (2021) investigated the effect of the exchange rates on the stock market by applying the recently developed QQR approach those accounts for the market state and the sign of the stocks. The quantile-on-quantile approach is employed to present an inclusive and detailed image of the association between variables under investigation. In their study, they noted that the exchange rate flexibility has a crucial role in determining the market returns depending on the bearish or bullish conditions. The outcome also demonstrated that the countries examined stock market performance is not affected by the exchange rate changes unless certain market conditions are established.

Ngo (2020) investigated the dynamic linkage between stock prices and exchange rate changes for the Gulf Arab countries. They used the Markov switching autoregression to detect regime swift behavior in the stock returns of the Gulf Arab countries and the Markov switching vector autoregressive (MS-VAR) model to capture the dynamic interrelatedness between exchange rate and stock returns over the period. Evidence showed persistence of two distinct regimes for all markets, namely a low volatility regime and a high volatility regime: The low volatility regime illustrates more persistence than the high volatility regime. Specifically, exchange rate changes do not have an influence on the stock market returns of the Gulf Arab countries, regardless of the regimes. On the other hand, stock

market returns have a substantial impact on exchanges for all countries except Saudi Arabia. **Zira *et al.* (2022)** examined Nigerian exchange rate returns in two and three distinct regimes. They employed the Markov regime switching model autorogressive model with data from 2018 to 2020. Four MS AR candidate models were estimated for exchange rate series. Based on the least AIC value, MS (3) AR (2) was returned as the most parsimonious model among the four candidate models. The MS (3) AR (2) analyses established a high probability that the returns system remains in the liquidation and awareness states. It implies that only unconventional or severe events could switch the series from regime 2 (liquidation phase) and regime 3 (awareness). While there is a low probability that the system will stay in an imbalanced regime, this implies high switching of regimes. Thus, the findings, i.e., imbalance and liquidation regime identification and their average durations, show that the naira in the foreign exchange market is not favorable for investors to trade.

Mechril *et al*. (2018) studied the impact of exchange rate volatility on stock market dynamics in Tunisia and Turkey. Their research provided an overview of the link between exchange rate volatility and the dynamics of stock market returns in order to identify the influence of several macroeconomic variables on the volatility of the stock market, useful for practical decision-makers as well as investors to better control the portfolio risk level. They used the GARCH regression model. The result showed that for both Tunisia and Turkey, exchange rate volatility has significant stock market fluctuation. Manasseh *et al.* (2019) examined the interaction between stock prices and exchange rates. They used the multivariate VAR-GARCH model using monthly data from January 2000 to 2014. The results of the Engle, Granger, and Johansen co-integration test show that there is a stable long-term relationship between stock prices and exchange rates. The empirical evidence of the VAR GARCH model shows a significant mean spillover running from stock market to exchange market but not a mean spillover from exchange market to stock market.

In terms of studies on outbreaks of pandemics on stock markets in developing countries, **Insaidoo *et al.* (2020)** investigated the co-movement of the COVID-19 pandemic and the performance of the stock market of four emerging economies. The quantile-on-quantile regression model was applied to daily share prices of stock markets from March 13, 2020, to November 30, 2021, in these economies. The results indicated varied relationships across various quantiles of COVID-19 cases and share prices. While both positive and negative relationships are established at different quantiles of share prices for Brazil and Kenya, negative co-movements are recorded for India and South Africa for all quantiles of share prices. The varying dependence between COVID-19 and stock markets provides critical insights to policymakers. **Ashraf (2020)** examined the reaction of stock markets to COVID-19 due to a lack of uniform reactions across countries as regards literature reports on stock markets around the world. The research postulates that the national-level uncertainty avoidance, which determines how sensitive members of a nation are to uncertainty, moderates the stock markets' reaction to the pandemic. They used daily data of COVID-19 and observed that confirmed cases and stock market returns from 43 countries revealed robust evidence that the decline in stock market returns responding to a 1% increase in growth in confirmed cases is stronger for the countries with higher national-level uncertainty aversion.

In another study, **Sandy *et al.* (2022)** concluded that the incidence of the Corona virus pandemic intensified liquidity risk and worsened the vulnerability of individual stocks, leading to aggregate shocks in global financial markets. **Isiaka et al (2021)** examined the reaction of stock returns of 201 firms listed on the Nigerian stock exchange to the COVID-19 pandemic and lockdown policy. They deployed both pooled OLS and Panel VAR as estimation methods. Findings showed that the stock market returns of the Nigerian firms reacted negatively more to the global COVID-19 confirmed cases and deaths than the domestic COVID-19. **Shaista (2022)** investigated the effect of the coronavirus health crisis on the performance of the Saudi stock market and the prices of the Tadawul. All share indexes (TASI) and all sector indices are collected from December 2019 to the end of July 2020. Analysis of the pandemic on the return and volatility is carried out using the GARCH (1, 1) model. The result showed that the pandemic has a positive impact on the mean returns of all indices except for the REITS sector, but the impact according to them is mostly insignificant. Analysis of the pandemic on the volatility shows that TASI itself experienced lower volatility during the pandemic period, but the impact is insignificant, while out of 21 sectors, only 9 experiences a significant impact on volatility. Out of the 9 sectors, 5 experienced significantly lower volatility.

Yakubu *et al.* (2022) examined the impact of the COVID-19 pandemic on sectoral stock prices in the Nigerian stock market using daily data covering from February 28, 2020, to June 26, 2020. Applying the ARDL bounds test, the study finds that the COVID-19 pandemic had an adverse impact on the stock market indices in the short run. Furthermore, the study documents the negative response of sectoral stock prices of the banking subsector, which is the worst hit compared to the consumer goods and industrial

subsector indices. The speed of adjustment to long-run equilibrium is faster for the banking subsector. Results from sensitivity analysis also indicate that the stock market responds negatively to pandemics when the number of deaths is used. However, the stock market performance is more sensitive to the total number of confirmed cases than the total number of confirmed deaths. This implies that the market responds quickly to the pandemic. Findings conclude that the COVID-19 pandemic had negative and heterogeneous impacts on sectorial stock prices in Nigeria during the first wave of the pandemic.

Takyi & Bentum-Ennin (2020) assessed and quantified the short-term consequences of the 2019 coronavirus disease (COVID-19) on stock market performance in thirteen African nations. They use daily time series stock market data spanning from October 1, 2019, to June 30, 2020, and employ a novel Bayesian structural time series approach, specifically a state-space model, to estimate the relative impact of the COVID-19 pandemic on stock market performance in these countries. In general, their Bayesian posterior estimates reveal that, in relative terms, stock market performances across Africa experienced significant declines during and after the occurrence of COVID-19, typically falling between 2.7% and -21%. At a more granular level, they discovered that ten countries had their stock markets considerably and negatively affected by COVID-19, while the remaining three countries exhibited no significant impact or a relatively short-lived negative impact due to the pandemic on their stock markets. The study further highlights that, within the sample period examined, there was almost no probability that the COVID-19 pandemic could have positive effects on stock market performance in Africa. These findings contribute valuable empirical evidence to the ongoing discussions and research concerning the economic repercussions of the COVID-19 pandemic by illustrating its constraining effects on stock market performance in African economies. **Elias *et al.* (2022)** employed the daily panel dataset spanning January 5, 2015, to January 28, 2021. They examined the reaction prowess of African stock markets to the different phases of the COVID-19 outbreak, namely, the pre-COVID period, the epidemic period, and the pandemic period. They showed that irrespective of the different phases of the COVID-19 outbreak, South Africa ranked first as the country with the highest incidence of COVID-19 in Africa, both in terms of the number of confirmed cases and deaths. However, while Morocco and Tunisia ranked second and third in terms of the number of COVID-19 cases, it was Egypt that ranked second in terms of the number of COVID-19 deaths. Employing a PMG-based panel ARDL model, we offer evidence-based insights on the dynamic of stock markets during COVID-19. We show that the number of confirmed cases rather than the number deaths tends to be responsible for the declining stock returns in Africa during the pandemic phase of the COVID-19 outbreak. Whereas, the evidence of declining stock returns during the epidemic phase of COVID-19 appears to be mainly attributable to changes in the international oil prices and exchange rates, respectively. Accordingly, the effectiveness or otherwise of efforts at minimizing negative reactions of stock returns to COVID-19 cannot be in isolation of whether the emphasis is on the number of confirmed cases and/or the number of confirmed deaths.

Chaouachi & Chaouachi (2020) investigated the effect of COVID-19 pandemic on stock market in KSA applying an Autoregressive Distributed Lag (ARDL) co-integration approach. More especially, they analyze the relationship between the natural logarithm of trading volume of Tadawull All shares index (TASI) and the natural logarithm of short run and the long-run. The bounds test for the period from March 02, 2020 till May 2020.Toda-Yamamoto causality test is implementable between variables. Their findings indicated that there is a negative impact of COVID-19 on stock market only in the long-run. Causality test reveals a unidirectional causality of COVID-19 prevalence on stock markets globally. **Mert & Omer (2020)** investigated the impact of COVID-19 on emerging stock markets over the period March 10 to April 30, 2020. Findings revealed that the negative impact of pandemic on emerging stock markets fell gradually. It was noted in terms of regional classification, that the impact of outbreak was highest in Asian emerging markets whereas emerging markets in Europe experienced the lowest. It was also noted that official response time and the size. The gap the study has assisted with is the fact that a lot of works on exchange rate policy regime and stock market as well as on pandemic and stock has been on a few countries of developing countries and on a small scope. However, this work has expanded the number of both developing and developed countries as well as, increasing the data range from 1990 to 2022.

3. Methodology

The study tested the presence of ARCH effects in stock prices and stock returns. Having established the presence of the volatility of nominal exchange rates, stock prices, and stock returns over time across developing nation's panels, the GARCH models were estimated. The presence of asymmetry in the model implies that the model is set to determine the distinctive patterns of investors' reactions to good and bad news within the respective markets. Given the panel form of

data used for this study, GARCH models were panel-tailored, implying that they consider both periods and cross-section (country) effects in the final output. The conditional mean equations of the GARCH model for both stock prices and returns are given as:

$$SP_t = \mathrm{E}(SP_t|\pi_{t-1}) + \varepsilon_t \quad (3.1)$$

$$SR_t = \mathrm{E}(SR_t|\pi_{t-1}) + \varepsilon_t \quad (3.2)$$

The corresponding conditional variance equations of the GARCH model for both stock prices and returns are given as:

$$var_{spt} = \vartheta_0 + \sum_{i=1}^{q} \vartheta_i \mu_{spt-1}^2 + \sum_{j=1}^{p} \emptyset_j var_{spt-j} \quad (3.3)$$

$$var_{srt} = \vartheta_0 + \sum_{i=1}^{q} \vartheta_i \mu_{srt-1}^2 + \sum_{j=1}^{p} \emptyset_j var_{srt-j} \quad (3.4)$$

Where: $\mu_t = \sqrt{varu_t}$ is residual; $u_t \backsim I.I.D.$, p and q-non-negative integers and order of variance equation; $\vartheta_0 > 0, \vartheta_i \geq 0, (i = 1,2, \dots, p)$. The study also utilized the methodology of the Markov Switching Regression Model (MSRM). The specification of the relevant Markov Switching Regression Model (MSRM) was as follows:

$$SP_{ket} = \beta_{e0}^{(i)} + \beta_{e1}^{(i)} EXPRS_{e_{ke,t-\delta}} + \beta_{e2}^{(i)} \Delta HIV_{ke.t}^{*} + \beta_{e3}^{(i)} \Delta COVID\_C_{ke.t}^{*} + \beta_{e4}^{(i)} \Delta COVID\_D_{ke.t}^{*} + \beta_{e5}^{(i)} D_{fixed,NC} \Delta EXPRS_{e}^{j}{}_{ke.t} + \beta_{e6}^{(i)} D_{fixed,C} \Delta EXPRS_{ke.t}^{j} + \beta_{e7}^{(i)} D_{flex,NC} \Delta EXPRS_{e}^{j}{}_{ke.t} + \beta_{e8}^{(i)} D_{flex,C} \Delta EXPRS_{e}^{j}{}_{ke.t} + + \beta_{e9}^{(i)} \Delta V_t \quad (3.5)$$

$$SR_{ket} = \beta_{e0}^{(i)} + \beta_{e1}^{(i)} EXPRS_{e_{ke,t-\delta}} + \beta_{e2}^{(i)} \Delta HIV_{ke.t}^{*} + \beta_{e3}^{(i)} \Delta COVID\_C_{ke.t}^{*} + \beta_{e4}^{(i)} \Delta COVID\_D_{ke.t}^{*} + \beta_{e5}^{(i)} D_{fixed,NC} \Delta EXPRS_{e}^{j}{}_{ke.t} + \beta_{e6}^{(i)} D_{fixed,C} \Delta EXPRS_{e}^{j}{}_{ke.t} + \beta_{e7}^{(i)} D_{flex,NC} \Delta EXPRS_{e}^{j}{}_{ke.t} + \beta_{e}^{(i)} D_{flex,C} \Delta EXPRS_{e}^{j}{}_{ke.t} + + \beta_{e9}^{(i)} \Delta V_t \quad (3.6)$$

where: SP- Stock prices; SR- Stock returns; $\mathrm{D_{fixed,NC}}\Delta\mathrm{EXR}_{\mathrm{k.t}}^{\mathrm{j}}$-Regime 1; $\mathrm{D_{flex,NC}}\Delta\mathrm{EXPRS}_{\mathrm{k.t}}^{\mathrm{j}}$-Regime 2; e-emerging stock markets. The rationale for estimating MSRM was that it is an econometric model that account for regime shifts. In this study, this approach is adopted to examine whether the relationship between financial variables and infectious diseases and how this relationship varies across different market conditions or regimes. This method is also expected to account for regime-specific dynamics and shifts in coefficients by identifying distinct regimes within the panel dataset and estimating regressions within each identified regime. The specification of the relevant Markov Switching Regression Model (MSRM) was as follows:

$$Q_{\tau u}(SP_u|EXPRS_e, HIV_e, COVID\_C_e, COVID\_D_e) = \beta_{0e,\tau} + \beta_{1e,\tau} EXPRS_e + \beta_{2e,\tau} HIV_e + \beta_{3e,\tau} COVID\_C_e + \beta_{4e,\tau} COVID\_D_e \quad (3.7)$$

$$Q_{\tau u}(SR_u|EXPRS_e, HIV_e, COVID\_C_e, COVID\_D_e) = \beta_{0e,\tau} + \beta_{1e,\tau} EXPRS_e + \beta_{2e,\tau} HIV_e + \beta_{3e,\tau} COVID\_C_e + \beta_{4e,\tau} COVID\_D_e \quad (3.8)$$

$Q_\tau(SP|EXPRS, COVID_C, COVID_D)$is the τ-thquantile of the conditional distribution of stock prices given the independent variables,$\mathrm{Q_\tau(SR|EXPRS, COVID_C, COVID_D)}$ is the τ-th quantile of the conditional distribution of stock returns given the independent variables, $\beta_{0,\tau}$-constant term of the τ-thquantile; $\beta_{1,\tau}$to $\beta_{4,\tau}$- coefficients ot independent variables at the τ-th quantile; e emerging stock markets. Quantile regression is used to ascertain the relationship between outcome variables and predictor variables through a more robust methodology (distribution over distinct quantiles) than the OLS, which focuses on the conditional mean of the y variable. Nine (9) quantiles were used in analysis for each of the analysis. It was important to conduct the Ramsey Reset test as a diagnostic tool to detect functional misspecification in the study models. If a significant result reveals functional misspecification, the model may not effectively describe the link between the independent variables and the outcome variable, implying non-linear behaviour. The study covers the following developing countries: Algeria, Bangladesh, Botswana, China, Colombia, Cote d'Ivoire, Croatia, India, Indonesia, Kenya, Malaysia, Malta, Mauritius, Morocco, Namibia, Nigeria, Pakistan, South Africa, Thailand and Tunisia. Exchange rate policy regimes were represented using categorical ordered variables 1, 2 and 3 for Fixed, Managed float/peg and Floating exchange rate regimes. The number of covid-19 cases and deaths as declared by the World Health organization (WHO) were used for empirical estimations. A stock return was calculated as the first differences of annual market capitalization on country-basis calculated in Spreadsheets from retrieved market capitalization values. A stock price was calculated as the natural logarithm of annual market capitalization values obtained from the World Bank Database. The calculations were done on country-basis.

4. Results and Discussion

As shown in Figure 1, Cote d'Ivoire, Croatia, Morocco, Namibia, and Nigeria had fixed exchange rate regimes throughout the study period. Czechia, Thailand, China, and Algeria transitioned from a fixed regime to a managed float. Thailand, Kenya, China, and Algeria transitioned from fixed regimes to free floating regimes. Tunisia had always maintained the managed float since 1990 till date. Mauritius, Pakistan, and Colombia moved

from the pegged floating system to the free-floating system. Malaysia and South Africa had two transitions through the period, moving from fixed to pegged or managed float to floating regimes. India transitioned from fixed to peg to managed float regimes. Altogether, seven out of twenty (35%) employ the free float exchange rate regime, eight (40%) employ the pegged or managed float, while five (25%) have the fixed regime, although Nigeria is operating a floating system currently. **Obadan (2007)** suggests that developing countries had to resort to intermediate regimes using pegs instead of a free-floating exchange rate to cushion the negative repercussions of extremes of fixed and floating rates and to also mitigate uncertainties arising from the fluctuations of major currencies. Furthermore, globalization trends (cross-country trade relations, foreign direct investment integration) and various financial crises since the 1990s have been stated to have significantly impacted the choice of exchange rate regimes in developing countries. **Staehr (2016)**, in support of economies that transitioned into flexible exchange rate regimes, opine that these regime types serve as shock absorbers and are therefore more encouraged in developing countries. Nevertheless, some analysts argue that certain countries are better suited for fixed exchange rates with monetary unions or currency boards, while others may benefit more from a flexible regime (**Obadan, 2007**).

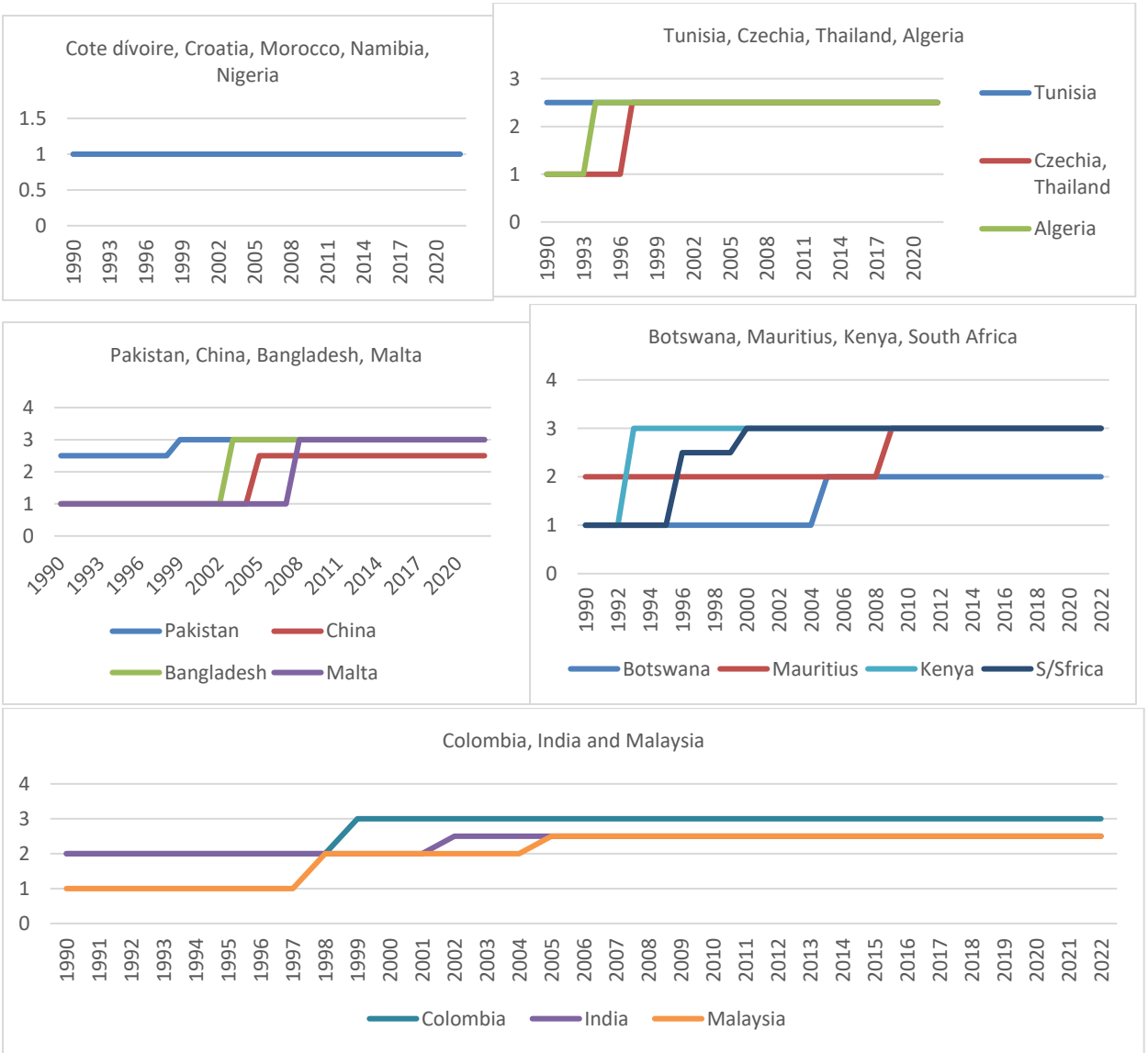

Figure 1: Plots of exchange rate regimes per country

Figure 2 below demonstrates that Algeria's market capitalization falls below a billion dollars appears to have increased all through the study period. Noticeable rise in capitalisation rates is found in the 2000s with different plateaus at different periods. Namibia's market capitalization experienced growth at the initial periods till the 2000s when it declined steadily and slowly up till 2015 when a short-term spike was noticed till 2017 before recorded decline in subsequent years. Mauritius' market capitalization demonstrates highly uneven fluctuations with a positive trend on the average. Established in 1989, the market's all-time-low was in 2001 when the Automated Trading System was inaugurated to enhance the efficiency of trading operations. A shape spike was also noticed in 2005 when the market became an active member of the World Federation of Exchanges. Highest value in the period was in 2018 at $9.85 billion. Malta Market Capitalization accounted for 4.350 USD billion in Dec 2022, compared with a percentage of 4.809 USD bn in the previous year For Malta, earliest available statistics was in 2000 and the highest value was US$5.6billion. The data hit a historic high of 5.6 billion USD in 2007 and an all- time low of 1.3 billion USD in 2001. Botswana had fluctuations per time with values between US$8billion and US$11billion. Cote d'Ivoire had the highest values in this category with US$12.5billion capitalisation value in 2017 and 2015 and 2017. Tunisia had its all-time high in 2010 at US$10.7billion and its least value in 1998 at US$2.2billion. For this category, growth is observed in these country-based markets from 2007. The 2007 fiscal year also marks an entry into the global financial crises that arose from the mortgage sector. Fluctuations were also found to be very undulating showing high volatility across markets. The rise in capitalisation rates between 2.5% in Algeria to 99.8% in Cote d'Ivoire conform to the positions of developed exchanges such as the Nasdaq with a 8.9% growth rate (**CNBC, 2007**).

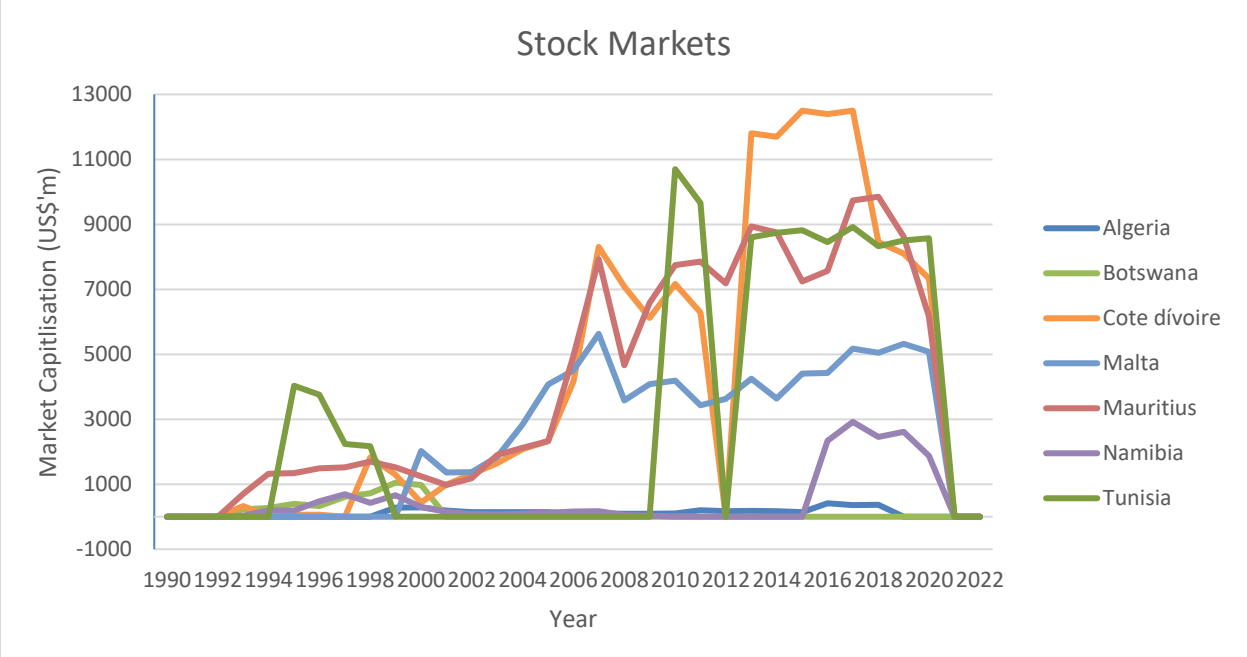

Figure 2: Trends chart of stock prices of emerging stock markets I

Figure 3 contains the largest group of markets sampled. China's market capitalization shows a significant upward trend over the years. The values have consistently increased, reflecting the country's robust economic growth and the development of its financial markets. The growth is particularly pronounced in the 2000s and continues into the 2010s. Colombia's market capitalization shows positive trends, with consistent growth over the years. China also has the largest statistics given the exponential growth in its economy with its rivalry with the United States on economic power moving from the West. Next largest market found was India, with its highest point being about six times less than China's. The same trade pattern was also found, but with a lower intensity. Malaysia's market capitalisation also demonstrates a positive trend, with noticeable growth in the 2000s. This may be attributed to economic reforms and increased investor confidence during that period. India's market capitalization also exhibits a positive trend, although the growth rate might vary across different periods. The values generally show an upward trajectory, indicating the expansion of India's financial markets and the overall economic development. Indonesia's market capitalization has shown consistent

growth over the years. The values increase steadily, reflecting the country's economic development and participation in global financial markets. South Africa's market capitalization exhibits a positive trend with periods of growth, especially in the 2000s. However, there appears to be some fluctuation in the 2010s, possibly influenced by economic factors and market dynamics. Like the first chart, the same pattern is observed in the trends with marked fluctuations and growth in market capitalisation values across countries. As with the first group, growth is observed in these country-based markets from 2007.

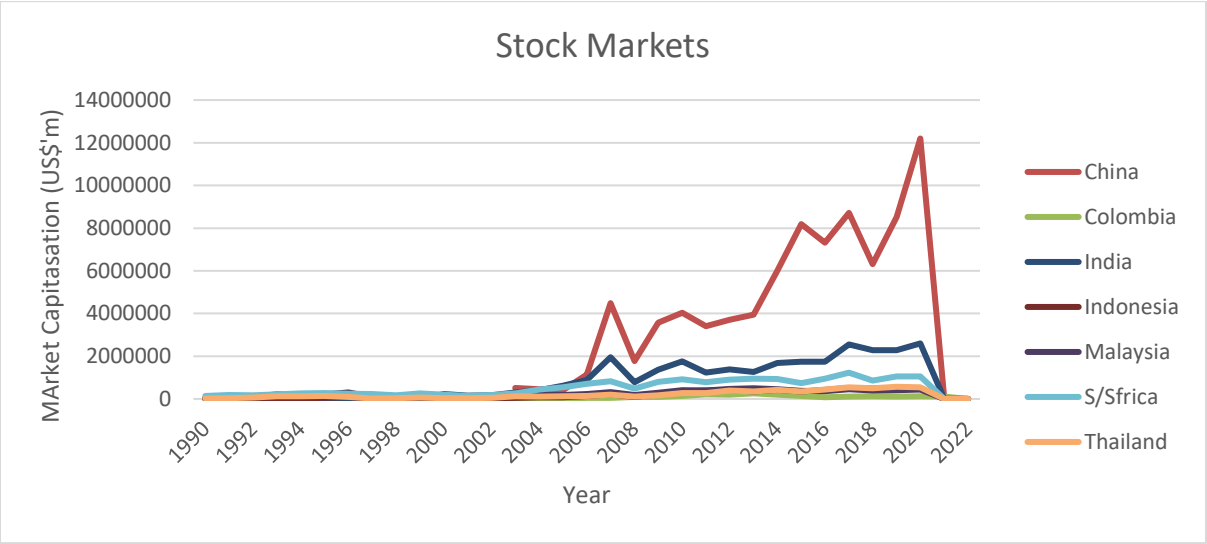

Figure 3: Trends chart of stock prices of emerging stock markets II

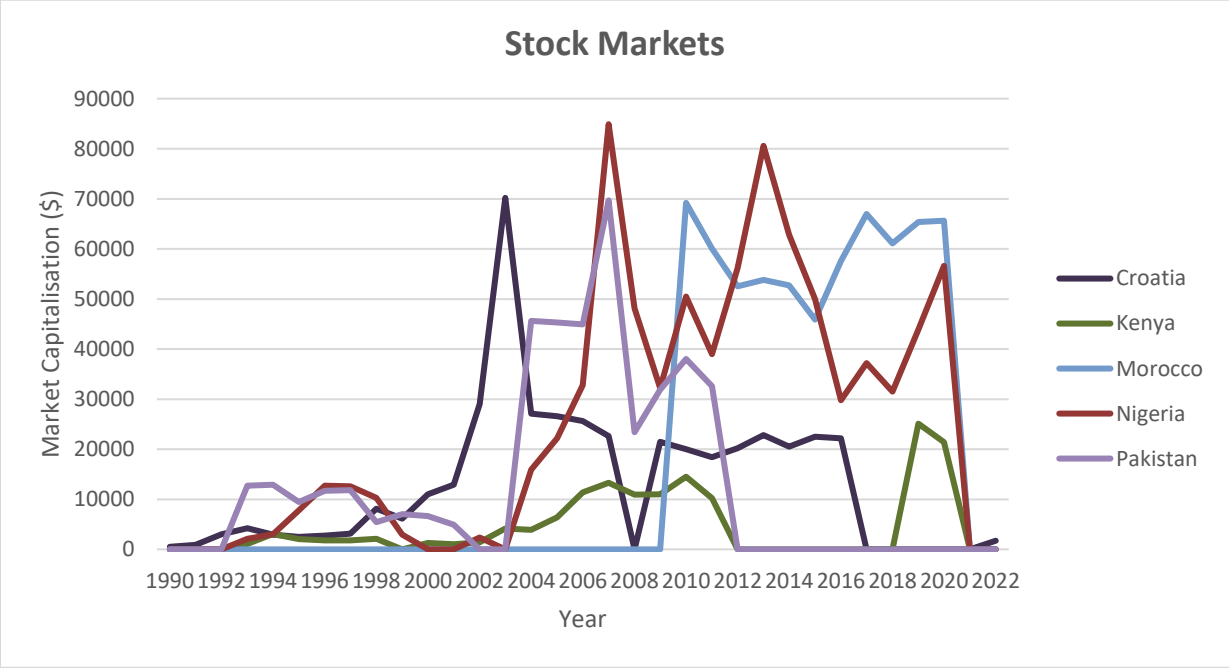

Figure 4: Trends chart of market stock prices of emerging stock markets III

In Figure 4, Croatia's market capitalization appears to have increased over the years, with noticeable growth in the 2000s. However, there seems to be some fluctuation in the later years, which may be influenced by economic factors. Nigeria's market capitalization shows growth, particularly in the 2000s. However, there seems to be some fluctuation in the 2010s. This could be influenced by factors such as changes in oil prices (given Nigeria's reliance on oil exports) and economic policies. Morocco's market

capitalization exhibits growth over the years, with noticeable increases in the 2000s. The values show some fluctuation in the 2010s, potentially influenced by economic factors. Kenya's market capitalization shows growth, particularly in the 2000s. The values increase steadily, indicating economic development and increased participation in financial markets. Overall, majority of the countries had significant gains in market capitalization from 2007 upwards, which might be attributed to global economic development and increasing involvement in financial markets. Economic policy, commodity prices, and global economic uncertainty may all have an impact on 2010s fluctuations.

As shown in Figure 5, HIV cases for Botswana had 24,000 HIV cases per 1,000,000 residents. South Africa, Namibia and Kenya followed with 12,360; 14,680; and 10,810 HIV cases per million of the population. The least number of cases recorded through the period were 10 per million. Malaysia and Thailand were the only countries that were leptokurtic distributions.

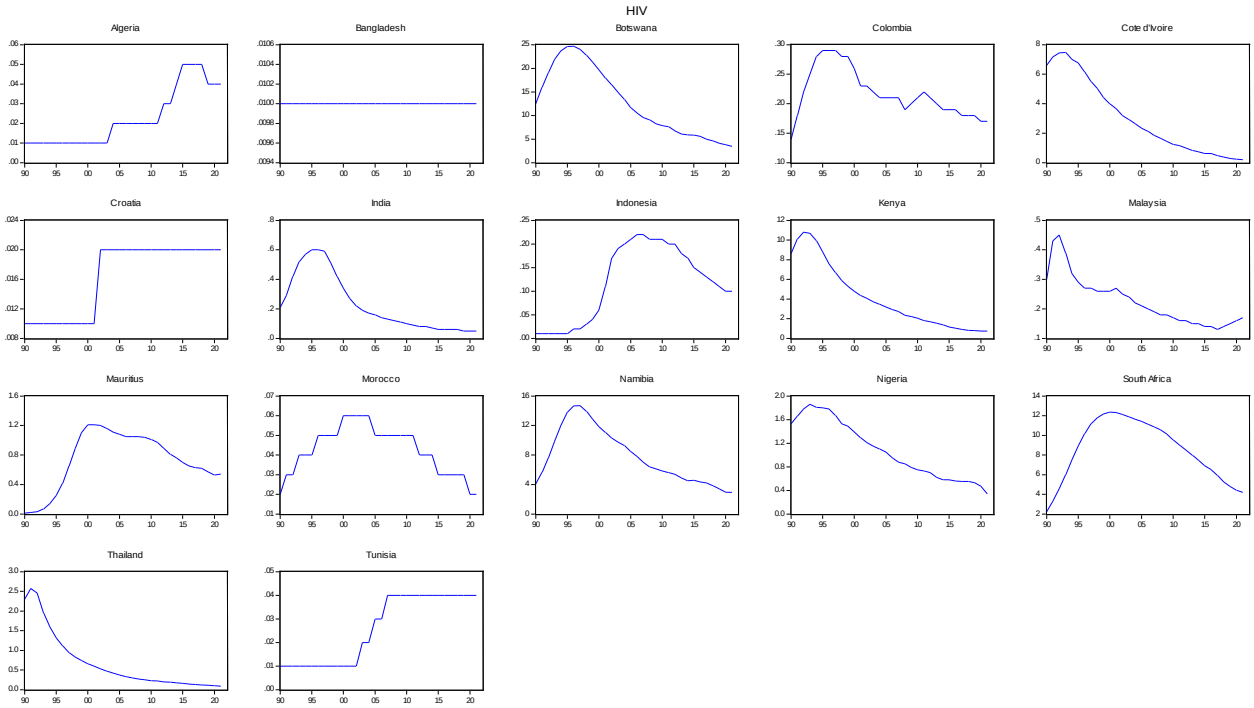

Figure 5: HIV charts for developing countries
Source: Authors' estimation using the Eviews 10

Table 1shows that the Mean case of covid-19 in sampled developing countries was 26,860 cases. Deaths attributable to covid-19 averaged 329. The distributions did not follow normal distribution (k>3).

Table 1: Descriptive statistics of covid-19 variables for developing countries

Measures	COVID-19	
	COVID_C	COVID_D
Mean	26860.3	329.302
Maximum	233413.6	3085.33
Minimum	43.276	0.0510
Std. Dev.	48012.9	593.73
Kurtosis	9.4907	10.358

Source: Authors' estimation using the Eviews 13

The conditional variance graphs of Figure 6 reveal weak persistence for across the sampled developing economy. Only few periods are observed to have similar volatility magnitudes follow one another. The charts are also found to display more tranquil states with a few spikes. Thus, stock markets in developing

markets are not prone to experience as many reactions to pandemics or other market news compared with developed market
.

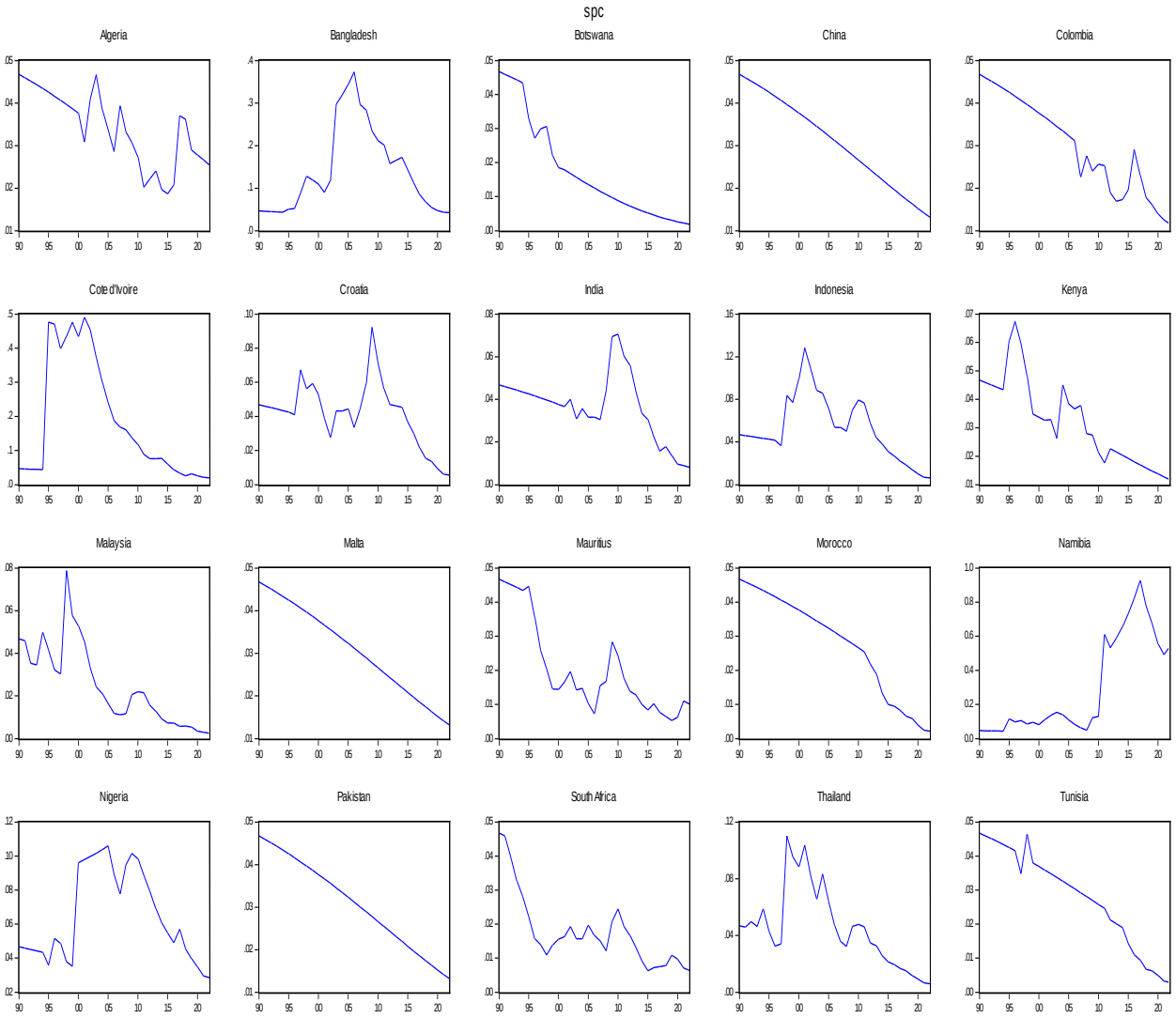

Figure 6: Volatility graphs for stock prices of emerging stock markets
Source: Authors' estimation using the Eviews 13

Stock prices alone exhibited ARCH effects while stock returns had no ARCH effect. When ARCH effects are absent, regression emerges as a preferable alternative for specifying the model. After conducting a correlated Hausman test and finding an insignificant chi-statistic, a random panel effects regression was selected for predicting stock returns and the results are reported in Table 2 below. The constant value, 9.5551, indicates returns in scenarios unaffected by exchange rate regimes or pandemics. The coefficient for the exchange rate regime is positive at 0.3280 and significant at the 5% level. This suggests that a one-unit adjustment in regime (for instance, transitioning from fixed to pegged regimes or pegged to floating regimes) corresponds to a 0.3280% adjustment in stock returns. Furthermore, HIV has a coefficient of -0.0731, indicating an insignificant inverse relationship between HIV prevalence and stock returns in developed countries. This implies that a higher incidence of HIV cases among the population correlates with declining stock returns. Similarly, COVID cases show an inverse relationship with stock returns, although the coefficient (-0.1344) is statistically insignificant within the 95% confidence interval. Conversely, COVID deaths are positively related to returns with a significant coefficient of 0.1807. These results suggest that investors in developed markets react more significantly to increases in COVID cases compared to pandemic-related deaths. The overall model is statistically

significant at the 5% level, with an F-statistic of 19.382. The adjusted R-squared value of 16.14% indicates that the model explains 16.14% of the variation in stock returns in developed countries.

Table 2: Random panel regression for stock returns of emerging stock markets

Mean Equation	
Constant	9.5551** (0.306)
Regime(EXPRS)	0.3280** (0.056)
HIV	-0.0731 (0.214)
COVID_C	-0.1344 (0.176)
COVID_D	0.1807*** (0.000)
Hausman Test	6.3569 (0.1740)
Adjusted R^2	0.2614
F	19.382 (0.015)
N	1354

Source: Authors' estimation using the Eviews 13

The Markov switching model's result in Table 3 shows that exchange rate regime options have a direct influence on stock prices in developed countries during periods of rising market prices. The derived coefficients for exchange rate regimes in high and low stock-pricing periods are 0.7468 and 1.4469, respectively, and they are both statistically significant at the 5% level. In high volatility periods, a unit modification to functional exchange rate regimes causes a 1.4469-unit adjustment in stock market prices. In periods of lower volatility, developing nations have a 0.7468 units shift in stock prices when exchange rate regimes are changed per unit. Analysis of the error variance for each regime highlights greater stability in models predicting countries with lower volatility (regime 1) compared to those in regime 2 (0.8594< 1.6815). The coefficient for the non-switching regressor, HIV and Covid deaths, are -0.0306 and -1.0606, indicating an indirect but significant impact of pandemic indicators on stock price determination in developing countries ($p<.05$) across both Markov regimes. COVID cases were nevertheless found to have a positive association with rising prices at a significant level. The P11-C ratio of 2.3984 indicates that developing nations under low-volatility economy tend to stick around rather than move to high volatility regimes. This is confirmed by consistent transition probabilities, with a 91.7% chance of these nations continuing in their current state. The P21-C score of 1.4431 indicates a lower likelihood of these nations in high volatility markets transitioning to more stable eras with a probability of only 3%.

Table 3: Markov model estimation for stock prices of emerging stock markets

Terms	Coefficient	Low market volatility	High market volatility
		0.7468** (0.127)	1.4469** (0.059)
Regime-Specific Error Variance		0.8594** (0.082)	1.6815** (0.049)
Common			
	HIV	-0.0306** (0.007)	-0.0939*** (0.003)
	COVID_C	1.5354** (0.279)	-0.0139*** (0.000)
	COVID_D	-1.0606*** (0.003)	-0.0061*** (0.001)
	P11-C	2.3984** (0.350)	1.8943*** (0.000)
	P12-C	1.4431**	1.0387***

		(0.351)	(0.047)
Auto/Partial Correlation test		P>0.05	P<0.05
Constant expected durations		12.0061	32.2842
Constant transition probabilities			
Regime 1		0.9167	0.0833
Regime 2		0.0309	0.9690

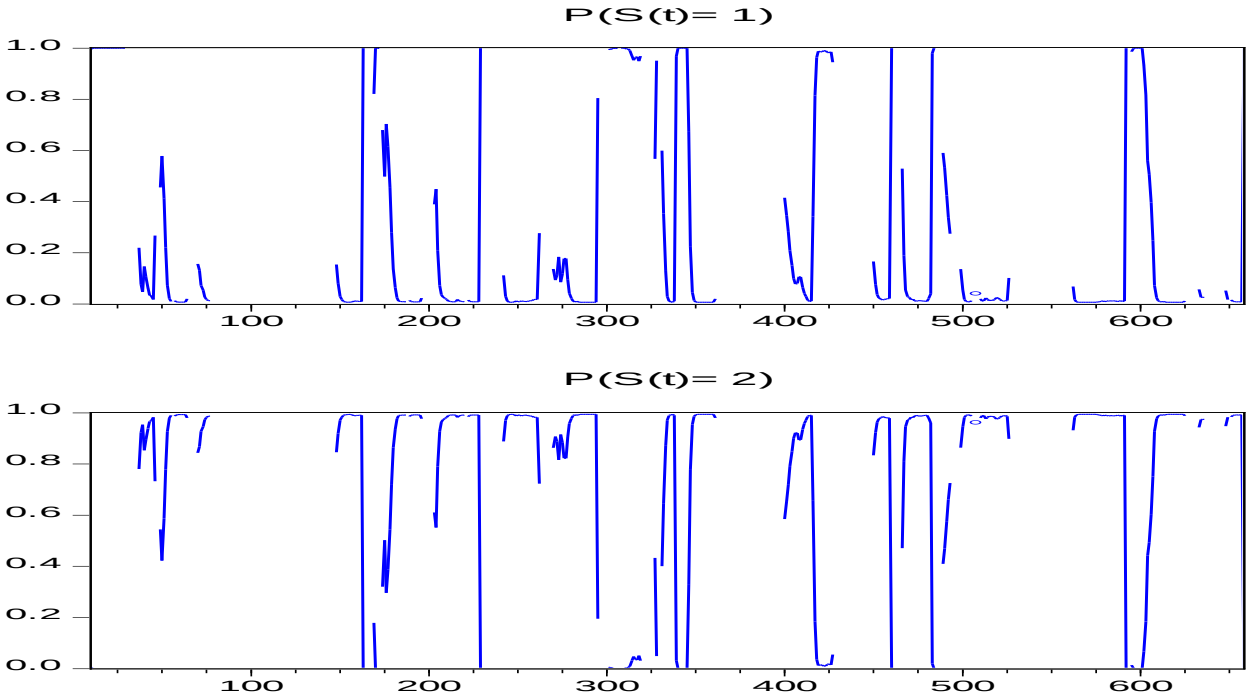

Figure 7: Markov switching filtered regime probabilities for stock prices of emerging stock markets
Source: Authors' estimation using the Eviews 10

According to Table 4, COVID cases and deaths have significant negative impact on stock returns with coefficients of -0.0049 and -0.0402 for the low market volatile era while for the highly volatile market era, the values were -0.2015 and -0.0148 respectively. HIV had a negative coefficient of -0.0029 and -0.0113 with insignificant t- values, indicating a weak adverse influence on stock returns. The results confirm that across both regimes, pandemics did not significantly destabilize stock returns in developing countries; HIV pandemic was insignificant, regardless of the exchange rate regime operational in that country. In the era of rising stock market prices, the exchange rate regime had a coefficient of 0.0554, while regime 2 had a coefficient of 0.6239. Both coefficients were found to be significant at the 5% level of error and positive too, confirming direct effects of exchange rate regime choices on stock returns in developing countries. More explicitly, the coefficient 0.6239 confirms that for developing countries operating in eras of heightened volatility, a 1% adjustment in the pattern of currency-defining rate systems will cause a corresponding adjustment in returns by 0.62%. In the same vein, coefficient 0.0322 for regime 1 confirms that developing economies experiencing low market fluctuations will have a 0.05% adjustment in stock returns if the currency-defining rate system adjusts by 1% in the same direction. The error variance of each regime revealed higher stability of models predicting countries in lower stock market prices (regime 12) than the prediction models in regime 2 (-1.0895< 1.0185).

For probability-connected values (P11-C and P1-C), the Markov estimation is both positive (2.4374 and 1.3974). The constant Markov transition probabilities reveal that in relation to stock returns, the probability that markets in developing economies will remain in regime 1 is 91.9%, while the probability that these markets will switch to regime 2 is 8%. Relatively, P21 at 1.3974 confirms that developing countries in regime 2 have a higher probability to switch to regime 1 than to remain in the highly volatile state (regime 2). This is supported by the likelihood of conversion from the regime 2 state to the regime 1 state at 80.2%, while maintaining the regime 2 for those already in that state is 19.8%. In terms of duration, the average period for which stock market returns remain in the first state (regime 1) is 12 years and 5 months. In the second regime, markets will last up to an average of 1 year and 2 months

.

Table 4: Markov model estimation for stock returns for developing countries

Variables	Low market volatility	High market volatility
Exchange rate regime	0.0554*** (0.002)	0.6239** (0.05)
Regime-Specific Error Variance	-1.0895** (0.061)	1.0185** (0.147)
Common		
HIV	-0.0029 (0.244)	-0.0113 (0.398)
COVID_C	-0.0049 (0.089)	-0.2015*** (0.003)
COVID_D	-0.0402 (0.061)	-0.0148*** (0.000)
P11-C	2.4374** (0.279)	2.344*** (0.000)
P21-C	1.3974 (0.932)	1.562*** (0.000)
Auto/ Partial Correlation test	P>0.05	P<0.05
Constant expected durations	12.443	1.247
Constant transition probabilities		
Regime 1	0.9196	0.0803
Regime 2	0.8017	0.1982

Source: Authors' estimation using the Eviews 10

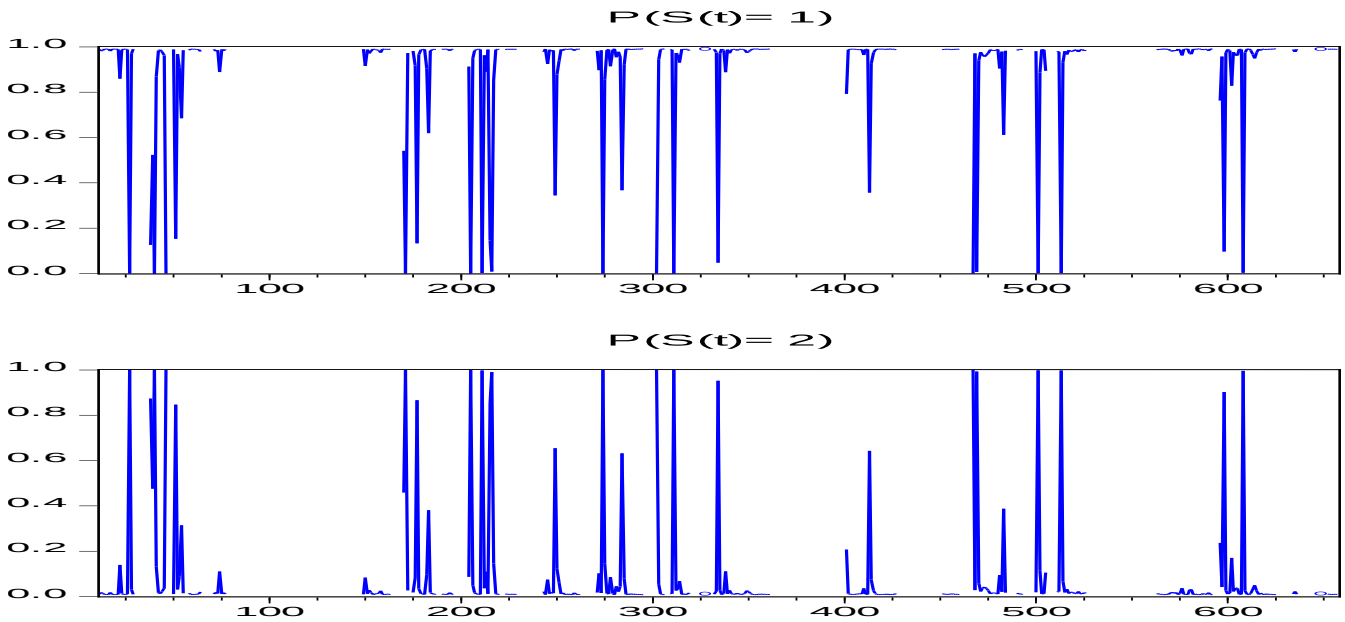

Figure 8: Markov Switching Filtered Regime Probabilities for Stock Returns
Source: Authors' estimation using the Eviews 10

Table 5: Ramsey Reset test for stock price for developing countries

Log (SP) - Regime, HIV, Covid-C, Covid-D, C	QLR L-statistic QLR Lambda-statistic	4.6435(0.03) 4.6241(0.03)
Log (SP) Log(SP(-1)) Regime, HIV, Covid-C, Covid-D, C	QLR L-statistic QLR Lambda-statistic	1.2826(0.26) 1.2811(0.26)

Source: Authors' estimation using the Eviews 10

The Ramsey RESET test was carried out on different specifications of stock price estimations. The results of Table 5 reveal that the first model showed misspecifications with statistics of 4.6435 and 4.6241 ($p<.05$). This led to the introduction of another variable, a one-period lagged stock price into the model. Ramsey TEST coefficients of the expanded model, 1.2826 and 1.2811 reveal the absence of misspecifications ($p>.05$).

In Table 6, the intercept values are found to occur in ascending order from the 10thquantile to the last quantile considered from -0.375 to 1.1625. These values represent the expected stock prices without considering any other factors across different percentiles. In the first 10th percentile, the stock price is -0.375 when all other factors are zero. Within this percentile, the exchange rate regime has a positive effect, 0.0538 but it's not statistically significant. Similarly, COVID parameters and HIV pandemic are also found to have significant impact on stock prices. The new variable, the lagged value of stock prices, stands out on the table with significance found in every quantile although the influence is not found to be uniformly steep to any direction across the quantiles. Across the 20th percentile, exchange rate regime has a positive coefficient of 0.0292, but this is found to be insignificant in the equation. HIV pandemic is also significant at -0.0037 COVID variables also do not hold significance in the model with reported cases. However, lagged stock prices impact current stock prices significantly at 5% with a coefficient of 0.9987. The 30th percentile followed the same pattern of the 20th percentile in terms of significance, although the magnitudes of the variables adjusted. The intercept -0.0599, depicts the stock price when all other factors are null. Exchange rate regime exhibits a positive coefficient of 0.0254, although it lacks statistical significance in the equation. Similarly, the presence of the HIV pandemic maintains an inverse trend with -0.0019 as coefficient with significance.

Also, the COVID-related variables prove still significant in the model. The third quantile column which houses the 30th percentile had the stock price stand at

10. 339 in the absence of the model's independent variables, a reduction in intercept values for initial percentiles. Within this percentile, the exchange rate regime displays a positive and significant coefficient of 0.123, depicting that exchange rate regime influences the prices of stocks that fall within this percentile. The results depict that a change in exchange rate regime representation, will occur alongside a similar directional change of 0.123 in stock prices. Similarly, the HIV pandemic exhibits a positive coefficient, 0.2780 passed statistical significance. COVID cases also had a negative but insignificant coefficient, -0.1275, while COVID death had a significant and positive coefficient, 0.3339. The 40th percentile equation has a constant value of -0.0195 depicting the stock price in developing countries when other variables are not considered. Within this percentile, exchange rate regime shows an insignificant and positive coefficient of 0.0116, suggesting that the exchange rate regime is not influential in determining prices of stocks within this percentile. Furthermore, the coefficient for the HIV pandemic turns positive from the 40th percentile although it maintains its insignificance at 0.0017. COVID cases as a variable, is insignificant at 5% level of error with a coefficient of -0.0091. Fatalities from COVID maintain a negative but statistically insignificant relationship with stock prices at -0.0154 as the coefficient.

In the median equation, the constant value is -0.0137, representing the stock price in developing countries when no other variables are considered. Within this percentile, the coefficient for the exchange rate regime is positive but not statistically significant at 0.0078, suggesting that the exchange rate regime does not significantly influence stock prices in this percentile. HIV pandemic, COVID cases and COVID deaths are all significant predictors with coefficients, 0.0024, -0.0034 and -0.0169 respectively. For the 60th percentile equation, the constant value, 0.0497 represents the stock price in developing countries when other factors are not taken into account. Within this percentile, the exchange rate regime exhibits a coefficient of 0.0152, which is positive but statistically insignificant. This suggests that the exchange rate regime does not significantly influence stock prices within this percentile. Pandemic parameters and lagged stock prices were the significant variable for stock prices in developing countries with a coefficient of 1.0013 at the 60thquantile. Apart from the 505h and 60thquantile coefficients, all other coefficients of the HIV variable passed significance at the 5% level. The 70th percentile equation holds similar significance distributions across the variables with a significant and positive coefficient for lagged stock prices (0.9909) and the intercept (0.2156), and insignificant exchange rate regime (0.0158), significant HIV (-0.0024), significant COVID cases (-0.0269), and significant COVID deaths (-0.0165) variables. By the 80th percentile or fifth quintile, the effect of COVID cases had become significant in the model in an inverse patter with a negative coefficient of -0.0483. This implied that more COVID cases at this percentile influenced investors' reactions as stock prices begin to dwindle and vice versa for a drop in COVID cases. Other variables also maintain significance state- HIV and COVID deaths are significant ($p<.05$) with coefficients of -0.0021 and -0.0174. Lagged stock price is significant with a coefficient of 0.9598 and the intercept value rises to 0.632. The last quantile had exchange rate regime and HIV remain significant with coefficients of 0.0293 and -0.0013 respectively. COVID cases (-0.071) and associated deaths (-0.013) were both negative and significant. The quantile slope equality test was conducted to ascertain whether coefficients vary across different quantiles of the dependent variable. The results indicate that the coefficients of the independent variables remain consistent across various segments of the developing population given a Wald statistic of 1.8755, with $p > 0.05$. This suggests that the impact of both regimes and pandemics does not significantly differ across different segments of the developed population. Additionally, the symmetric quantiles test was performed, supporting the null hypothesis that the conditional distribution of the dependent variable is symmetric around the median (Wald statistic = 0.0037, $p > 0.05$).

Table 6: Quantile estimates for stock prices in developing countries

Variables	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
SP(-1)	1.0044**	0.9987**	0.9946**	0.9996**	1.0048**	1.0013**	0.9909**	0.9598**	0.9164**
	(0.0189)	(0.0109)	(0.0084)	(0.0077)	(0.008)	(0.009)	(0.0157)	(0.0206)	(0.0181)
EXPRS	0.0538	0.0292	0.0254	0.0116	0.0078	0.0152	0.0158	0.0202	0.0293**
	(0.044)	(0.0201)	(0.0225)	(0.0188)	(0.0185)	(0.018)	(0.0208)	(0.0272)	(0.027)
HIV	-0.0021**	-0.0037**	-0.0029**	0.0174**	0.0024	0.0020	0.0024**	-0.0021**	-0.0013**

	(0.0005)	(0.0005)	(0.0003)	(0.0026)	(0.0027)	(0.0023)	(0.0001)	(0.0003)	(0.0006)
COVID_C	-0.0611**	-0.0383	-0.0193	0.0091	-0.0034**	-0.0137**	-0.0269**	-0.0483**	-0.071**
	(0.0001)	(0.0214)	(0.0244)	(0.0278)	(0.0286)	(0.0278)	(0.0257)	(0.0237)	(0.0219)
COVID_D	-0.0269**	-0.0176**	-0.0041**	-0.0154	-0.0169	-0.0160	-0.0165	-0.0174*	-0.013**
	(0.0007)	(0.0001)	(0.0009)	(0.0193)	(0.019)	(0.0192)	(0.0185)	(0.0176)	(0.0208)
C	-0.375**	-0.1580	-10.0599	-0.0195	-0.0137	0.0497	0.2156	0.632**	1.1625**
	(0.15)	(0.1084)	(0.0804)	(0.0786)	(0.081)	(0.0877)	(0.1447)	(0.1923)	(0.1646)
	Quantile Slope Equality Test (Wald): 91.75 **								
	Symmetric Quantiles Test (Wald): 22.89								

Source: Authors' estimation using the Eviews 10

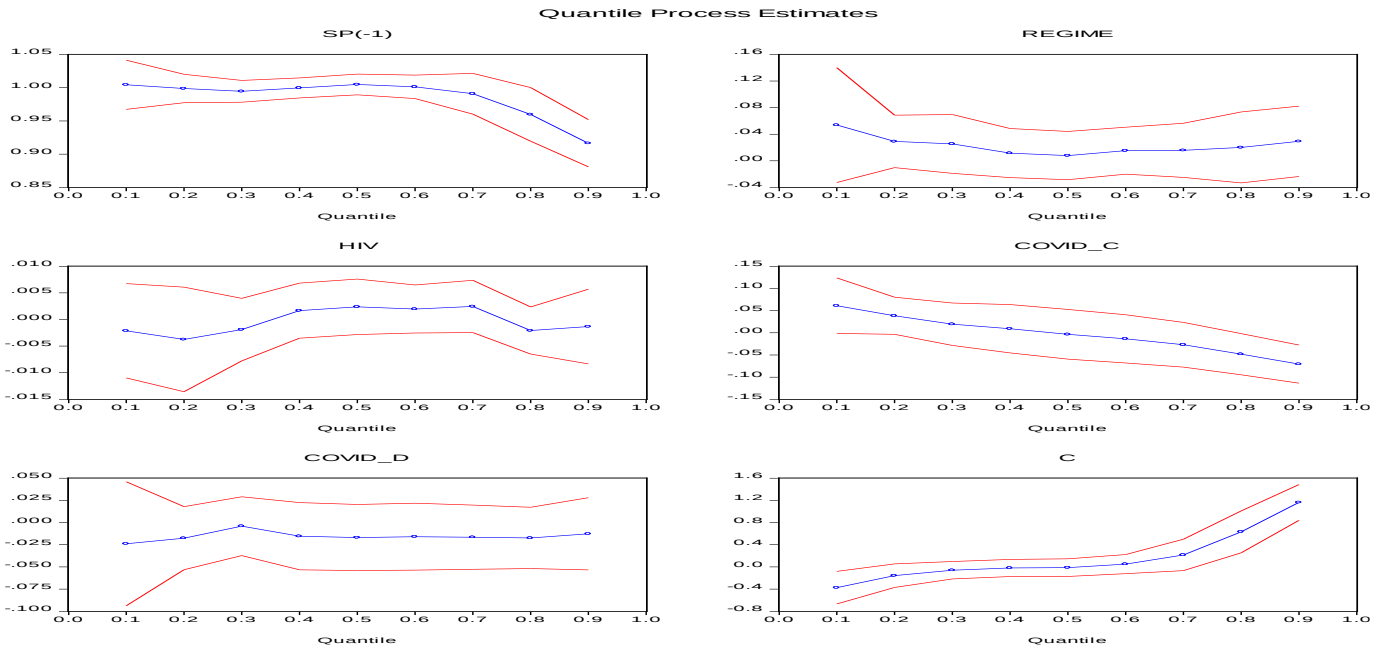

Figure 9: Quantile estimate plots for stock prices of developing countries
Source: Authors' estimation using the Eviews 10

Table 7: Ramsey Reset test for stock returns in developing countries' stock markets

SR- Regime, HIV, Covid-C, Covid-D, C	QLR L-statistic QLR Lambda-statistic	0.8015(0.37) 0.8010(0.37)

Source: Authors' estimation using the Eviews 10

The Ramsey test as a pre-diagnostic test in this study produced outcomes that were not found to be significant within the 95% confidence interval for each of the dual models estimated. This is reported in Table 7 below. The non-significant results provide confidence in the adequacy of the model's specification, suggesting that the estimated coefficients are reliable and can be interpreted with greater certainty, allowing for more robust conclusions to be drawn from the analysis

Table 8 reports the quantile estimates for stock returns in developing countries. In the initial model, which includes COVID parameters, the intercept values across the quintiles were found to be negative and insignificant values. It implied that stock returns when all

other variables are zero were estimated to be losses of 0.144, 0.198, and 0.128 at the 40th, 50th, and 60th percentiles, respectively. Results for the 20th and 80th percentiles were inconclusive as standard errors were unable to be generated. Regarding the impact of COVID statistics, the coefficients were positive and statistically insignificant across all quantiles for developing countries. HIV also exhibited a mix of positive and negative coefficients across the shown quintiles, although all had no significance in the explanatory model. Exchange rate regimes were also not found to impact stock returns significantly, and this was homogeneous across quantiles. Taking out COVID parameters in another model, the intercept values are negative up to the third quantile and positive for the other two. The significance found in the values is only in the 20th and 80th percentiles. For the 20th percentile, market participants record losses of 0.284 when HIV and exchange rate regime measures are null, while market participants have a 0.504% gain on investments when other terms within the model are null ceteris paribus. Other variables are insignificant in the model and reflect that the model may not be of good fit in predicting stock returns.

For the remaining three quantiles, all values were significant and positive. The coefficients for each of the quantiles, 17.14, 17.73, and 17.75, confirm the proximity of values across different positions within the developing countries' distribution. For exchange rate regimes, coefficients are also positive, confirming a direct relationship between exchange rate regimes and stock prices in developing countries. However, the magnitudes of effects vary across the quantiles of the population. For the 40th percentile, the coefficient, 2.726, confirms that the adjustment of exchange rate regimes from one system to another will cause the values of stocks in the local capital markets to rise by 2.726 units. However, this effect is not found to be significant for countries that fall within this quantile. For other countries in the median percentile, there is a higher influence, as depicted by a rise in coefficient value from the 40% percentile by 0.268 (2.994). Not only was a difference found in magnitude, but significance became relevant with p less than 0.05. Therefore, regime adjustments from fixed to managed float or managed float to floating exchange regimes will cause stock prices to rise by 2.994 units. The coefficient of the 60th percentile ascends further by 0.011 (3.005) while maintaining significance at the 5% level of significance. This result depicts that adjustments in exchange rate regimes will cause a commensurate 3.005 unit change in stock prices. The COVID-19 and HIV pandemics are inconsequential in the adjustments that occur in stock prices across developing economies, as depicted by the t statistics and corresponding p values ($p > 0.05$) across all computed quantiles. The post-estimation exercise suggests that the influence of both regimes and pandemics does not significantly differ across different segments of the developing country population at 8.871 at a probability value that exceeds 0.05. Additionally, the symmetric quantiles test was performed, and it corroborates the null hypothesis that the conditional distribution of the dependent variable is symmetric around the median with a Wald statistic of 11.133, with $p > 0.05$.

Table 8: Quantile estimates for stock returns in developing countries' stock markets

Variables	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
EXRS	0.087**	0.0548	0.0449	0.0236	0.0365	0.0380	0.0065	-0.0440	-0.2728
	(0.0422)	(0.0371)	(0.0402)	(0.0393)	(0.0423)	(0.0419)	(0.0499)	(0.0672)	(0.1392)
HIV	-0.0034**	-0.0075**	-0.003**	-0.004	-0.006**	-0.0061	-0.0090	-0.0017**	-0.0044**
	(0.0001)	(0.0003)	(0.0006)	(0.0065)	(0.007)	(0.0066)	(0.0066)	(0.0068)	(0.0107)
COVID_C	0.1172**	-0.0764**	0.0413	0.0201	-0.0054	-0.0332	-0.0780	-0.139**	-0.1318
	(0.0499)	(0.0008)	(0.0593)	(0.0665)	(0.0691)	(0.0687)	(0.0644)	(0.0577)	(0.5669)
COVID_D	-0.045**	-0.032**	-0.012**	-0.034**	-0.042**	-0.039**	-0.0413**	-0.069**	-0.173**
	(0.0001)	(0.0002)	(0.0002)	(0.0006)	(0.0002)	(0.0004)	(0.0001)	(0.0399)	(0.2366)
C	-0.5946**	0.087**	-0.2266	-0.0484	0.0479	0.1512	0.4021**	0.8151**	1.9146**
	(0.1408)	(0.1142)	(0.1211)	(0.1183)	(0.1278)	(0.1305)	(0.1673)	(0.2235)	(0.583)
	Quantile Slope Equality Test (Wald): 71.68 **								
	Symmetric Quantiles Test (Wald): 27.11								

Source: Authors' estimation using the Eviews 13

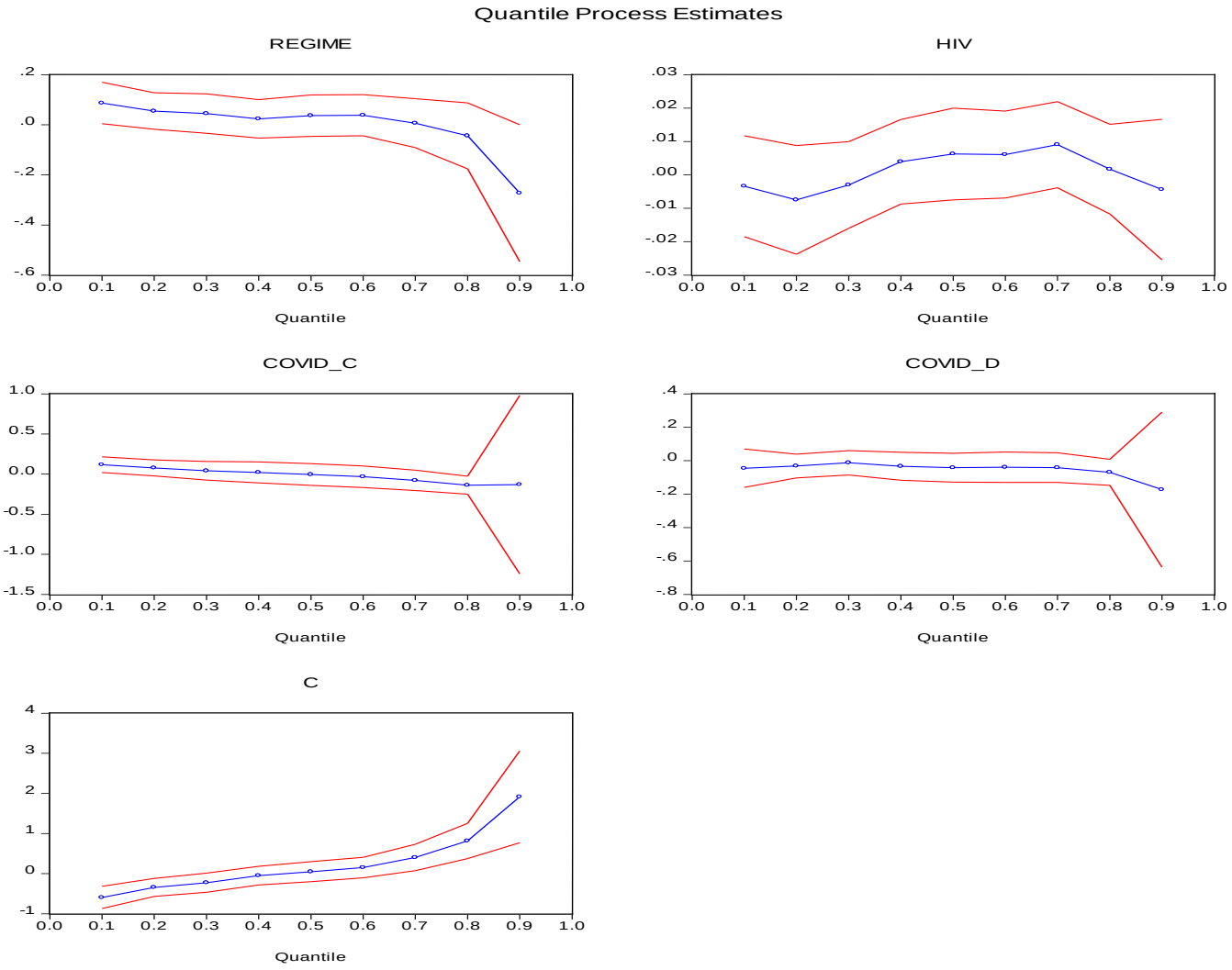

Figure 9: Quantile estimate plots for stock returns of developing countries' stock markets
Source: Authors' estimation using the Eviews 13

4.1. Discussion

Emerging markets did not have volatility persistence. The result could be from the lower trading volumes and liquidity of emerging markets compared with their established markets, resulting in fewer price movements and smaller changes in stock prices. Limited investor engagement can decrease trading activity and limit price fluctuations, which contributes to low volatility. Developing economies may see better macroeconomic stability, resulting in a more predictable investment climate with less volatility in stock prices. Government action in financial markets, such as capital limitations and regulatory oversight, can help reduce volatility. The structure of emerging stock markets, including trading techniques, laws, and infrastructure, can have an influence on volatility by reducing the efficiency of price discovery and information transmission. Limited information transparency and disclosure regulations in developing markets might reduce market efficiency and lead to lower volatility. Foreign investors' impact, especially in emerging markets, can reduce volatility by stabilizing market movements or damping frequent price variations.

Foreign aid conditions and government fiscal and monetary policies in developing nations can assist in stabilizing financial markets during pandemics by imposing capital controls, trade restrictions, and stimulus programs. This can reduce excessive volatility and provide investors with a sense of stability. Developing countries may have less integration with global financial markets, making them less vulnerable to sudden shifts in investor mood and external shocks. Economic resilience in emerging nations can serve to minimize the impact of pandemics on economic fundamentals while also contributing to lower stock market volatility. Government assistance in the form of fiscal and monetary policies

can boost investor confidence and stock market stability. The nature of emerging stock markets, which includes reduced liquidity, fewer institutional investors, and less complex trading methods, may lead to decreased volatility during pandemics. Furthermore, investors in emerging markets may have a longer investment horizon and a preference for holding onto investments during times of uncertainty, focused on fundamental variables such as economic growth prospects and corporate profit potential, which can reduce short-term stock price changes and contribute to lower volatility during pandemics.

For developing economies, the significant and direct impact of exchange rate regimes on stock prices in periods of both high and low volatility depicts that exchange rate regimes play a crucial role in shaping stock market dynamics in developing countries regardless of the state of the economic turbulence. While fixed exchange rate regimes may provide stability during times of uncertainty, they can also trigger market crises and cause stock prices to fall.

Exchange rate regimes were not significant in predicting stock prices of emerging stock markets covered by the study. According to the study, investors in emerging nations may not see changes in exchange rate regimes as important factors influencing stock values, which might be owing to market stability, investor confidence, or the prominence of other economic indicators. The study also concerns the efficacy of exchange rate interventions in affecting stock market dynamics in these economies. Global trade patterns, commodity prices, and international investor mood may have a greater impact on stock values in emerging countries than domestic exchange rate rules. The market may also demonstrate resilience, as these markets may be less vulnerable to exchange rate swings than other economic indicators or external shocks. Investors in emerging economies may focus more on domestic economic factors or sector-specific criteria rather than being strongly impacted by exchange rate swings.

On the other hand, exchange rate regimes had significant impacts on stock returns. Such influence could be explained by the fact that exchange rates influence company profitability, arbitrage opportunities, and other economic factors. In a fixed exchange rate regime, a country's central bank pegs its currency to another currency or a basket of currencies, hence influencing stock returns through currency risk. Companies that rely largely on exports or imports are vulnerable to currency fluctuations, which can result in reduced revenues and stock values. Arbitrageurs can profit from differences between the pegged rate and the market rate by purchasing equities in nations with discounted currencies and selling them in countries with overvalued currencies. In a floating exchange rate system, currency prices are decided by supply and demand in the foreign exchange market, which influences stock returns via macroeconomic variables such as interest rates, inflation, and economic growth. Arbitrage possibilities develop when exchange rates diverge from their basic values due to market inefficiencies or speculative activity, allowing investors to acquire inexpensive equities in one nation while selling overpriced stocks in another.

In developing nations, pandemics had significant influence on stock prices, confirming the lack of resilience capacity on the part of investors in these regions. This validates the findings of Hailu & Varul (2021), where it was reported that daily infection cases of COVID-19 on the stock market were significant but more significant among developed countries. They also noted that the exchange rate has a significant negative impact on both developed and developing countries stock markets. Nevertheless, the lack of a substantial association between these regimes and stock returns in developing economies as depicted by quantile regression results implies that other factors, such as the stability of the macroeconomic system, political stability, and global economic conditions, may have a greater influence on stock market returns. In efficient markets, stock prices reflect all available information, including knowledge regarding exchange rate regimes, making it impossible for investors to consistently outperform the market only on this basis. The non-significance found may thus be a reflection of the inefficiency that characterizes stock markets in developing countries. In emerging nations, global market trends and investor mood have a greater effect on stock price behavior than domestic rules or regulations. Investors in these nations may not see exchange rate regimes as important predictors of future stock returns, instead concentrating on other factors such as company profitability, industry developments, or the regulatory environment.

The significant influence of pandemics on stock returns in developing countries indicates that stock market participants in these regions failed to demonstrate resilience to the economic impact of pandemics, such that regardless of the disruptions caused by health crises, they perceive these markets as robust or capable of recovering quickly from adverse shocks. Specifically, investors in developing economies, all things being equal, ought to respond differently to pandemics than investors in rich countries. They ought to take a longer-term view, concentrating on underlying variables like economic development potential rather than the short-term swings generated by pandemics. As a result, the direct influence of pandemics on stock

returns may have been curtailed or restricted to result in an inconsequential stimulus. While pandemics can have far-reaching economic consequences, the impacts may differ across sectors of the economy. Certain industries, such as healthcare or technology, may profit from increased demand during pandemics, while others, such as hospitality, may suffer reductions like in the COVID period. Sectoral diversification may decrease the net influence on stock returns, resulting in an inconsequential overall connection. Pandemic-related initiatives by the government and central banks can have an impact on stock market behavior. Stimulus measures, monetary easing, or fiscal policies targeted at minimizing the economic impact of pandemics can boost investor confidence and enhance stock prices, canceling out negative impacts on stock returns and resulting in an inconsequential correlation.

Quantile regressions for stock prices for developing countries had a new variable introduced, the lagged value of stock prices, which mopped up significance across all the quantiles. COVID cases and deaths were inversely related to stock prices in the last percentile (90th). Developing countries had stock returns that showed weak interactions with exchange rate regimes except for the 10th percentile. COVID-19 cases were a positive and significant predictor in the 10th percentile, in consonance with Markov estimated outcomes. COVID deaths were negative predictors in the 80th and 90th percentiles, matching Markov estimations. HIV in quantile estimation showed significance across all quantiles. Regression results revealed that exchange rate regime and COVID deaths are direct predictors of stock returns, HIV infections are inversely related to returns, and COVID cases had an insignificant impact on the returns in developing nations.

5. Conclusion

The study employed econometric tools to explore the dynamics that occur within exchange rate regimes, stock markets, and pandemics across developing nations for the period 1990 to 2022. The findings presented highlight the importance of considering both exchange rate regimes and pandemics as critical factors influencing stock price movements. The empirical analysis unveiled significant insights into the interconnectedness of these variables and their implications for financial market investors, policymakers, and market participants. This research revealed that exchange rate regimes and pandemics can act as amplifiers or mitigators of one another's effects on stock prices. Stock prices in developing countries are significantly affected by exchange rate regimes in both circumstances of turbulence and tranquility in the economy and stock market as a whole. HIV cases and COVID deaths had negative impacts on stock prices, confirming that pandemic occurrences weakened the prices of securities. However, COVID cases were directly associated with stock prices, implying that rising cases of COVID in developing nations occurred alongside rises in stock prices. The responses of stock markets in terms of prices of securities to exchange rate policies may be further influenced by the backdrop of a pandemic. This interdependence underscores the need for a holistic decision-making approach in view of market diagnosis, and risk evaluation in a globalized world. Furthermore, the study underscores the importance of adaptive financial and economic strategies during periods of crisis. Policymakers, investors, and financial institutions need to navigate the challenges posed by exchange rate fluctuations and pandemics with resilience and foresight to guarantee stability and resilience in financial markets.

Exchange rate regime is a significant predictor of stock returns in developing countries in periods of economic turbulence and economic tranquility. However, there is no significant impact of pandemics on these returns. By way of contribution, the study tested for asymmetry, persistence, and clustering and hence established the presence of volatility in stock indicators. Institutional and individual investors in developing markets should carefully assess risk appetites and implement appropriate risk management strategies to protect their portfolios during periods of heightened volatility. Policy makers and regulatory authorities in developing groups cannot adopt a one-size-fits-all or unitarian policy during pandemic periods. Instead, they are to take into consideration the size of their capital markets (aggregate market capitalization), the persistence present in the market, and investors reactions to pandemic trends to channel properly tailored action plans and initiatives to absorb economic shocks that arise from pandemics and exchange rate regimes. Pandemic representations were only in quantitative measures and restricted to reported cases and deaths. Hence, other indices, such as financial aid by international organizations and government relief for alleviation of the devastating effects of the pandemic, may be included in models to better reflect pandemic circumstances in future studies. Volatility transmission could be ascertained between commodity and oil markets, amidst regimes and pandemic interactions.

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