THRESHOLD OF FINANCIAL DEVELOPMENT AND CURRENCY DEVALUATION THAT STIMULATES STOCK MARKET RETURNS

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Abstract

In this study, we endeavored to establish a threshold of financial sector development (FSD) and exchange rate devaluation (EXD) that stimulates stock market returns (SR) based on an analysis of 25 stock exchanges in the Middle East and North Africa (MENA) region. Threshold generalized autoregressive conditional heteroskedasticity (GARCH) regressions were estimated. Only the Istanbul Gold Exchange stock return was found fit for GARCH volatility analysis. However, results from threshold regression revealed that EXD does have significant threshold effects on SR and when EXD falls lower than its threshold of 19.69 percent, FSD had an increased influence on SR by 11.8 percent. The effects of EXD and FSD on SR are greater when the FSD level is beyond the threshold value of 23.45 percent. FSD below thresholds of 23.5 percent, and 51.1 percent would be insignificant in predicting SR. Lagged SR within an economy below the FSD threshold of 50.59 percent will negatively affect SR. By and large, our results reveal that FSD cannot influence returns of stock on their exchange floors given the devaluation of local currencies beyond the threshold value of 19.69 percent. Future studies could extend our threshold regression framework to allow for endogenous threshold variables.

Keywords: Threshold Effects, Financial Development, Exchange Rate Devaluation, MENA Region, Stock Market Returns, GARCH Volatility

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1. INTRODUCTION

Stock markets are the avenue for investments in different regions. Investors put capital into the markets hoping for returns on their investments (Iyoha et al., 2022). Returns are an offshoot of the overall performance of the stock market. Stock market returns (SR) are theoretical compensations of risks for investors. However, macroeconomic indices could influence returns because the stock market is a part of the financial sector of an economy. Amid these merits, Yartey (2008) states that the liquidity available in the stock market causes high information asymmetry and distortion of reports in a bid to discourage investors from short-term commitments that would have a downturn on the economy. As much as the stock market has been raised as a catalyst for economic growth and development, Okeya and Dare (2020) raise specific indices in the macro economy to assert direct or indirect influence on the market's operations. They opine that strategies relating to financial depth are fundamental to recording tremendous growth in stock markets both in developing and emerging economies. The availability of credit and other attributes of financial development would mean growth in economic activities as surplus units move resources to deficit units for investment. Financial development would also mean increased efficiency in the financial market comprising the stock market itself and other players. The study holds apriori expectation that financial development would improve market efficiency and cause stock prices to reflect information. In addition, Patro et al. (2014) raised that the incessant movements of capital and growth in international trade have positioned the exchange rate as a major determinant of profitability and stock prices. The exchange rate can influence the stock market because future net cash flows are subjected to exchange rate variations. In import-dependent economies like many economies in Africa, exchange rate devaluation (EXD) will mean more local currency units are needed to purchase imports than were needed before the devaluation. Zubair (2013) explains that importing firms in the period of devaluation will have lower stock prices from falling firm value. EXD may also affect stock prices in that devaluation will have an immediate change in firm value and profitability. Devaluation would affect a firm's day-to-day operations, which may, in turn, influence its share price.

Furthermore, African economies are generally characterised by the depreciating value of local currencies to the international standard currency, the United States (US) dollar. Differences, however, exist in the extent of decline and volatility recorded in currency value in respective countries. The constant fall in the value of local currencies implies that investments outside a country require more local currency units. Furthermore, investors may find investments in less volatile currencies more attractive than local investments or foreign investments in countries adversely affected by EXD. The preferential interest of investors in raised is attributable to perceived currency risks. This study seeks to provide evidence on how financial development and EXD will influence SR. More importantly, the study provides results on stock returns in low and high economic conditions.

The objective of this study was to ascertain the threshold of financial sector development (FSD) and EXD that can positively influence SR in the Middle East and North Africa (MENA) region. The relevant question becomes, how significant is FSD in predicting stock returns in stock markets of the MENA region given a designated EXD threshold? To what extent does EXD impact stock returns in MENA stock marked by a determined FSD threshold? The sample of countries whose stock exchange markets covered by the study includes: Lebanon, Bahrain, Malta, Iran, Israel, Jordan, Morocco, Kuwait, Qatar, Oman, Palestine, Saudi Arabia, Syria, Cyprus, Tunisia, United Arab Emirates, Türkiye, Iraq, Egypt, and Algeria. These are countries that belong to the same geographical region, the MENA. All countries in the MENA region are middle-income countries with emerging stock exchange markets.

Previous research focused attention on the relationships between the stock market and economic growth. Some of these researchers include Bello (2022), Lakshmanasamy (2021), Erasmus et al. (2021), Adoms et al. (2020), Grbić (2020), Ibrahim and Mohammed (2020), Akintola and Cole (2020), Anderu (2020), Angaye and Frank (2020), Algaeed (2020), Akpokerere and Okoroyibo (2020), Asteriou and Spanos (2019), Abina and Lemea (2019), Acha and Akpan (2019), Alam and Hussein (2019), Bui and Doan (2021), Bello et al. (2019), Hossin and Islam (2019), Jacob and Umoh (2019), Kuna et al. (2019), Botev et al. (2019), Agu (2018), and Araoye et al. (2018). A few panel studies have examined the effect of FSD on SR in developed countries and other developing countries. However, there has been no panel study that researched a group of MENA countries with emerging stock exchange markets. Hence, the key contributions of this study to policymakers, government functionaries, and most importantly, market investors are as follows. Firstly, the study provides empirical findings regarding the effects of FSD and EXD on SR, and also, the threshold of FSD and currency devaluation that can positively influence SR in the MENA region. By obtaining non-linear threshold impact as regards the contribution of devaluation and FSD on stock market return, the study is important to policymakers. Additionally, by thresholding the exogenous covariates we contributed empirics of the threshold regression framework upholding that SR in the MENA region perhaps behave differently when the values of FSD and devaluation of currencies exceed a certain threshold. In particular, the study establishes the significance of the threshold of FSD in predicting stock returns in stock markets of the MENA region given an empirically founded EXD threshold. In what follows, the study determines the threshold of EXD that favorably impacts stock returns in MENA stock given a determined FSD threshold.

Another significance of this paper is that we do not use the traditional quantity aggregate of money supply/gross domestic product (GDP) ratio as a proxy variable for FSD, rather, we utilized the ratio of securities market debts calculated as the overall total amount owed in short-term debt securities markets, bond and equity to broad money in circulation. With this ratio, we provided a direct structural measure of a country's level of financial development; we added to the empirical literature of monetization indicators as well as the balance between all financial intermediaries (including banks and financial houses) and securities markets in the financial system; and also, we provided a measure of savings in an economy which rises in response to enhanced price signaling that is signified through positive real interest rates. Accordingly, this paper becomes the first of empirical studies to have applied the ratio of securities market outstanding (SED) to broad money in circulation (BMC) as a measure of FSD.

The structure of this paper is as follows. Section 2 reviews the conceptual, theoretical, and empirical summaries of past works on financial development, EXD, and SR. These works are synchronized to fit study themes. Section 3 raises a theoretical framework backing up likely findings of the study's findings and data sources, study models, and analytical tools used. The next Section 4 contains descriptive statistics, unit root tests, co-integration tests and other inferential statistics specified in the methodology section. The section rounded off with policy implications of analytical outputs for a better connection with the real phenomenon. The last Section 5 contains clearly stated study results, recommendations and conclusions.

2. LITERATURE REVIEW

2.1. Theoretical literature review

The International Monetary Fund (IMF, 2018) defines FSD as a state in which financial instruments, financial intermediaries, and financial markets within an economy promote key financial sector functions by ensuring an easier interplay of information, transaction costs, and enforcement of defining policies and regulations. It is stated that financial development is pivotal to economic development through the pooling and allocation of capital, savings, and inflows of foreign investments. A country that scores high in financial development would have less poverty and inequality rates and record faster economic growth. The recorded growth is spurred by small and medium-scale enterprises' access to finance, which reduces unemployment rates and increases economic activities. Beyond efficient financial intermediation is the presence of superior policies that support growth in the financial market, whether money or capital markets (Yusuf et al., 2020). FSD has been measured using different measures as spelled out in the World Bank's global financial development database. The database measures financial development using stock-to-GDP ratios, financial depth, domestic credit to the private sector as a percentage of GDP, banking efficiency, and stability. The database measures financial development by the state financial markets and financial institutions in countries and regions worldwide.

The theoretical discussion centers on the McKinnon and Shaw (M-S) theory (McKinnon, 1973; Shaw, 1973) which highlights the role of FSD in the economic growth of all emerging economies. These hinge on the narrowing of diffusion in the social rate of return to existing and new investment (McKinnon, 1973) and the reduction of fragmentation in financial markets. According to market fragmentation produces negative returns on investment. According to M-S theory, positive real interest rates stimulate larger financial savings. Hence, with liberalization, investments with positive real interest rates would be undertaken, financial intermediation would rise, and there would be an escalation of monetization of transactions in the economy. Consequently, as the financial system develops with advanced stock or securities markets guidelines and regulations, the range of price diffusion drops to eliminate information asymmetry; and facilitate additional growth of the market over time into markets for financial instruments, such as derivatives (Beck et al., 2001). Nevertheless, whenever excessive transaction costs; and information asymmetry persist, real returns on investments are diffused. According to Lynch (1996), financial sector reforms/deregulation spawn demand for effective risk management, eradication of consolidated controls over prices, liberalization of exchange rates and nominal interest rates, as well as resource delivery that reduces price diffusion. This is achieved through a link of markets across space and time rather than some kind of equilibrating resource flows (Beck & Levine, 2004). M-S theory of FSD provoked a debate on the role of the financial sector deepening in economic development that elicited contributions from Dornbusch and Reynoso (1989), Beck et al. (2000), Arestis et al. (2001), Bekaert et al. (2001), Beck and Levine (2002, 2004), and Christopoulos and Tsionas (2004) among other researchers. All contributions disfavored financial sector liberalization. The traditional theory of exchange rates supports that exchange rates significantly affect stock prices because they affect the value of firms on the exchange floor, especially when these values in local currencies are converted to foreign currency bases. In turn, returns expected by investors in such firms get eroded as the value of market capitalization drops from devalued currencies. In another case, an exporting firm might increase firm value with devaluation, especially when inputs are locally sourced and outputs exported (Zubair, 2013). For Patro et al (2014), devaluation will significantly impact asset prices so much that the cash flows of corporate market participants and the value of future equity returns. Overall, this effect becomes aggregate in the stock market influencing overall stock market performance and returns. Economic theory also suggests exchange rates and stock prices share a causal relationship.

2.2. Empirical literature review

The empirical literature is subdivided into three namely, the literature between financial depth and the stock market, and the literature regarding exchange rate volatility and currency devaluation policy on stock markets. And finally, a tread of literature that focused on the impact of a pandemic on stock markets. On the first stride of literature, we provide the following laconic review. Attah-Botchwey et al. (2022) reported that the financial depth of sub-Saharan African countries positively impacted the SR of those countries. Okeya and Dare (2020) examined the relationship between financial deepening and the development of the Nigerian stock market. The study employed stationarity, co-integration, vector autoregression (VAR), and vector error correction model (VEC) models on relevant data. Study data included financial sector contribution to the GDP ratio, banking sector liquidity, and stock market capitalization from 1981 to 2019. Results revealed a long-run positive effect of financial deepening on the Nigerian stock market but significance was absent in the short run. Yusuf et al. (2020) studied the effect of financial deepening (a measure of financial development) on SR in Nigeria from 1985 to 2018. Financial deepening was measured by broad money supply and credit to the private sector. These proxies were analyzed against SR in Granger causality, VAR, and VEC models. Results confirmed that money supply is a positive and significant enhancer of SR in Nigeria, but credit to the private sector was insignificant. Unidirectional causality was also found from financial deepening to SR. Similarly, Alenoghena et al. (2014) uphold that financial depth positively influenced market returns in Nigeria. Asal (2012) explored the nonlinear effects of financial development on stock returns amongst other measures of the economic performance of the euro-area. The study employed the generalized method of moments (GMM) model on panels that consisted of eleven countries from the euro-area and five others from non-euro countries with data from 1989 to 2011. Financial development had volatility, and bank loans to private enterprises were proxies. The study, in addition, modeled the threshold effect of rising public debt. Results indicated a negative association between banking development and volatility of stock returns.

The exchange rate refers to the units of a local currency required to purchase currencies of other countries. Studies by Dabor et al. (2023), Umoru, Effiong, Umar, Okpara, Iyaji et al. (2023), and Umoru (2013) have all expressed the exchange rate as a highly sensitive variable that predicts the direction and speed of economic activities. The sensitivity of exchange rates and their intoxicating movements or volatilities in international relations has made it a point of study. Furthermore, its stability (rise and fall) is stated to influence growth in reserves holdings, government spending, money demand, investment, and national output. Umoru, Effiong, Okpara et al. (2023) executed the Markov-regime switching estimations, on the nexus between oil and exchange rates markets and found significant coefficients of devaluation and high transition probabilities which negatively affected oil returns. Umoru, Effiong, Umar, Okpara, Ugbaka et al. (2023) executed the nonlinear autoregressive distributed lag (NARDL) methodology to unravel the reactions of market returns to changes in exchange rates and oil prices in emerging stock markets. The author established that for every 1% devaluation shock, returns contracted considerably by 1.015% and 2.191% for Egypt and Nigeria whereas, and rose in Tunisia, Morocco, and Tanzania by 0.118%, 0.176%, and 1.145%, respectively. Javangwe and Takawira (2022) using the autoregressive distributed lag (ARDL) model to analyze South African quarterly data from 1980Q1 to 2020Q4 stressed that exchange rate policies influence stock market performances and thus, make investments and portfolio managers continuously monitor these exchange rates. The study sought to achieve its objective of examining the relationship between exchange rate behavior and the stock market in the country. A long-term relationship was found between the variables though this relationship was found to be negative. In the short term, the relationship is positive. The research findings by Javangwe and Takawira (2022) and Jameel and Teng (2022) found that current market volatility had varying impacts on market returns in Sri Lanka. Nusair and Olson (2022) found that interconnection runs from stock markets to exchange rate markets in selected G7 countries.

Özbey et al. (2016) studied the Istanbul Stock Exchange and its response to the exchange rate valuation of the local currency, the Turkish lira-US dollar. Monthly frequency data from 2009M1 to 2015M11 were retrieved and subjected to generalized autoregressive conditional heteroskedasticity (GARCH) analysis. It was found that EXD had a positive effect on the risk of investments in the market and a negative one on expected returns. In other words, as the value of the lira falls to the dollar, the riskiness of securities rises, and investors in the stock exchange begins to expect less from their investments. Aside from the study of the positive research findings obtained by Özbey et al. (2016) as regards the effect of devaluation on the stock market, Korsah and Fosu (2016) investigated the influence of the depreciation of Ghana cedis on stock market capitalization. Quarterly data from 1990 to 2013 were used. The results revealed a negative relationship between exchange rates and stock market capitalization in the short and long run. Patro et al. (2014) studied the reactions of different stock markets to currency devaluations. Daily data from twenty-seven countries were employed and particular attention was paid to periods of devaluation announcements. The results revealed that devaluation anticipations affect stock markets and cause significant negative abnormal returns even before devaluation occurs, continuing for 30 days. After a year, however, negative abnormal returns return to equilibrium and become positive. Zubair (2013) examined the causal relationship between the stock market index and exchange rates in Nigeria. Johansen's co-integration test and Granger causality were used on the 2001M1 to 2011M12 data. The results revealed the absence of causality from the exchange rate to the stock market index. Yousuf and Nilsson (2013) tested the impact of exchange rates on the performance of the Swedish stock market. The study employed the GARCH (1,1) model and Pearson's correlation to determine the spill-over effect and correlation between exchange rate movements and SR using data from 2003 to 2013. The study found a low correlation between exchange rates and stock returns. For Rahman and Uddin (2009), EXD was weak in predicting stock market performance using monthly data from 2003M1 to 2008M6. The study cut across stock markets in Bangladesh, Pakistan, and India.

Some studies focused on the impact of a pandemic on stock returns. These studies include Zhang et al. (2020) who reported the adverse effect of the pandemic on stock returns. Adenomon et al. (2020) found a declining effect on market returns in Nigeria due to the pandemic. Consistently, Adenike (2022) found a significant negative impact of COVID-19 on SR in Nigeria. The spread of the COVID-19 pandemic negatively affected stock returns in G7 countries (Tan et al., 2022). Agyei et al. (2022) also reported that COVID-19 resulted in a significant difference in the relationship between exchange rate and stock returns. Other studies that reported losses in banks' financial statements of account and the stock markets because of the adverse effects of the pandemic on market returns included, Gunay (2021), Song et al. (2022), Tan et al. (2022), Xiang et al. (2022), Yang et al. (2022), Lahmiri and Bekiros (2021), Marshal et al. (2020) for Nigeria, Ayodele et al. (2020), Rehman et al. (2021) for the G7 stock markets, Chien et al. (2021) for the US, Europe, and China, Tiwari et al. (2021) for the US, So et al. (2021) for Asia-pacific financial market, Setiawan et al. (2021), Verma et al. (2021), Yousfi et al. (2021), Insaidoo et al. (2021), Abuzayed et al. (2021), Bouri et al. (2022), Malik et al. (2022) for the BRIC (Brazil, Russia, India, China, South Africa) countries, Safiyanu et al. (2020) for stock markets of the US, Nigeria, and China. Based on an analysis of the effect of COVID-19, Sansa (2020) found a negative impact on stock returns in the US and Chinese financial markets. Related studies include Lelissa (2020) for banks in Ethiopia, Wakode, (2020), Adegboye et al. (2020), Demirgüç-Kunt et al. (2021), Aifuwa et al. (2020) for Nigeria, Xinhua (2020) for China, Saif-Alyousfi (2022), Baker et al. (2020), Zhang et al. (2020), Al-Awadhi et al. (2020), Wang et al. (2020), Shehzad et al. (2020), Sharif et al. (2020) for the US economy, Bash and Alsaifi (2019), Rahman et al. (2021) for Australia, Ahmar and del Val (2020) for the Spanish stock market, Anh and Gan (2021) for Vietnam stock exchange, Alfaro et al. (2020), Giglio et al. (2020), and Lee et al. (2019).

3. METHODOLOGY AND DATA

This study examines trends of related information limited to FSD and exchange rate positions and how these influence stock returns. In particular, the study investigates how effects of financial development in predicting stock returns in stock markets of the MENA region given a threshold EXD, and also, the extent to which devaluation impacts stock returns in MENA stock following an established FSD threshold. Threshold models have wide applicability in different areas of economic analysis. The underlying modeling framework upholds that an economy may perhaps behave differently when the values of a given variable exceed a certain threshold. In other words, different econometric modeling could apply when values are below a threshold than when the same exceeds the threshold. Hence, threshold models follow the fundamental modeling structure of regime-switching models (RSM) where different models apply to different intervals of values of some variables (Qian et al., 2018, Atem et al., 2017). There are alternative methods for estimating threshold regressions. These comprise, instrumental variable estimation techniques such as the two-stage least squares or two-step GMM estimation of linear index threshold regression model with endogeneity, regime-switching regression method, methodology for estimating sample splitting threshold models, wave-length regression method, probit, logit, and normal panel least-squares regressions, conventional ordinary least squares (OLS) method that utilizes an iterative search procedure, in a resolve to minimize the sum of squares, frequency domain regression, Monte Carlo interquartile range estimation method, least square dummy variable method, maximum likelihood estimator, a bootstrap method for threshold interval, etc. The threshold autoregressive (TAR) estimation method model is estimated in this paper for the advantage of unfolding both the conditional variance and mean due to regimes as established by threshold parameters. The TAR model credited to Tong (1990) and Hansen (1996) is given by Eq. (1).

$$\sigma_t = \varphi + \theta_1 \varphi_{t-1} + b_1 \sigma^2{}_{t-1} + \gamma_1 u^2{}_{t-1} D_{t-1} \tag{1}$$

where, $\theta_1 \varphi_{t-1}$ is an autoregressive conditional heteroskedasticity (ARCH) term, $b_1 \sigma^2{}_{t-1}$ is GARCH term, b_1 — the impact of good news, $D_t = 1$ if $u_t < 0$; $D_t = 0$ if $u_t \geq 0$, γ — is asymmetry (threshold) term: $\gamma > 0$ — state of asymmetry, $\gamma \leq 0$ — state of symmetry, $b_1 + \gamma_1$ — the impact of bad news within the stick market. Thus, the threshold effects regression becomes as specified here.

$$SR_t = \begin{cases} \beta_0 + \beta_{11} SR_{t-1} + \beta_{12} EXD + \beta_{13} FSD + \varepsilon_i; & where\ EXD < \gamma \\ \beta_0 + \beta_{21} SR_{t-1} + \beta_{22} EXD + \beta_{23} FSD + \varepsilon_i; & where\ EXD \geq \gamma \end{cases} \tag{2}$$

$$SR_t = \begin{cases} \beta_0 + \beta_{11} SR_{t-1} + \beta_{12} FSD + \beta_{13} EXD + \varepsilon_i; & where\ FSD < \gamma \\ \beta_0 + \beta_{21} SR_{t-1} + \beta_{22} FSD + \beta_{23} EXD + \varepsilon_i; & where\ FSD \geq \gamma \end{cases} \tag{3}$$

where, γ — unknown threshold value to be derived from regression estimation; *EXD, FSD* — threshold variables; βs are threshold coefficients. To test for the robustness of our threshold regression estimates, we applied, carried out, and implemented structural vector autoregressive (SVAR) model estimation based on the following equations.

$$\Phi_O SR_t = \zeta + \lambda t + \Phi_1 SR_{t-2} + \Phi_2 FSD_{t-2} + \Phi_3 EXD_{t-2} + \varepsilon_t \tag{4}$$

$$\Phi_O FSD_t = \zeta + \lambda t + \Phi_1 FSD_{t-2} + \Phi_2 SR_{t-2} + \Phi_3 EXD_{t-2} + \varepsilon_t \tag{5}$$

$$\Phi_O EXD_t = \zeta + \lambda t + \Phi_1 EXD_{t-2} + \Phi_2 SR_{t-2} + \Phi_3 FSD_{t-2} + \varepsilon_t \tag{6}$$

where, Φ_1, Φ_2, Φ_3 are (m × m) matrices, Φ_O — is a non-singular (m × m) matrix of contemporaneous coefficients. A variable definition is such that *EXD* stands for exchange rate devaluation, *FSD* is financial development, and *SR* is stock market returns in %. The global financial development database of the World Bank was the source of data on financial development. The study employed data from quarterly series from 1975Q1 to 2022Q4.

Going forward in this study, we evaluated the effect of the exogenous threshold variables, namely, *FSD* and *EXD*. *FSD* was measured by using the ratio of SED/BMC. We calculated SED as the totality of the amount owed in short-term debt securities markets, bonds, and equity. BMC was calculated as the sum of savings or short-term bank deposits, money-market deposits and fund shares, and debt securities with a 2-year maturity date. We calculated percentage devaluation with currencies of all the countries in our sample by subtracting the pre-devaluation exchange rate against the US dollar from the devalued exchange rate. That is, given a pre-devaluation exchange rate of 380 units of local currency, and a post-devaluation rate is 420 units of local currency, this gives a difference of 40 units of the local currency on the US dollar. Dividing 40 by the pre-devaluation exchange rate, we divided 40 by 380 which is 0.105, indicating a 10.5% devaluation. The study thus holds the following *apriori* assumption: *EXD* will cause negative impacts on stock returns from eroded investors' confidence in the value of future returns. Financial development is also expected to hurt stock returns because access to finance will improve living standards and reduce the occurrences of abnormal stock returns as information asymmetry will reduce. Table 1 below provides a list of stock markets covered by the study. These are all emerging stock markets of countries with middle income in the same region.

Table 1. Stock markets in the MENA region

City/country of location	*Stock exchange*	*Description*
Lebanon	BSE	Beirut Stock Exchange
Bahrain	BSE	Bahrain Stock Exchange
Bahrain	BFX	Bahrain Financial Exchange
Malta	Borza Malta	Malta Stock Exchange
Iran	TSE	Tehran Stock Exchange
Israel	TASE	Tel Aviv Stock Exchange
Morocco	BVC	Casablanca Stock Exchange
Jordan	ASE	Amman Stock Exchange
Kuwait	KSE	Kuwait Stock Exchange
Qatar	DSM	Qatar Exchange
Oman	Muscat	Muscat Securities Market
Palestine	PEX	Palestine Exchange
Saudi Arabia	TADAWUL	Saudi Stock Market
Syria	DSE	Damascus Securities Exchange
Cyprus	CSE	Cyprus Stock Exchange
Tunisia	TUNINDEX	Tunis Stock Exchange
Dubai	DFM, DGCX, NASDAQ	Dubai Financial Market, Dubai Gold and Commodities Exchange, NASDAQ Dubai
Abu Dhabi	ADX	Abu Dhabi Securities Exchange
Türkiye	ISE	Istanbul Stock Exchange
Türkiye	IAB	Istanbul Gold Exchange
Iraq	ISX	Iraq Stock Exchange
Egypt	EGX	Egyptian Exchange
Algeria	SGBV	Algiers Stock Exchange

4. RESULTS AND DISCUSSION

The Moroccan Casablanca Stock Exchange (CSE) had the highest stock returns at 20.6% for the period among others while the Turkish Istanbul Gold Exchange had the lowest average returns at 5.7%. *FSD* was highest at 158.3794 in the Istanbul Gold Exchange followed by Bahrain Financial Exchange (BSE) at 104.3628, respectively. The least financial stock market as revealed by the summary figures in the panel of countries in the MENA region is the Iraq Stock Exchange. The *EXD* rate was highest at 576.4165 in the Dubai Financial Market (DFM). The stock market with the lowest standard deviation of return of 0.41512 is the Kuwait Stock Exchange (KSE).

Table 2. Summary statistics (Part 1)

Stock market	*Variable*	*Mean*	*Minimum*	*Maximum*	*Std. dev.*	*Kurtosis*
Lebanon, BSE	*SR*	10.41094	21.4811	78.0168	10.23993	3.438131
	FSD	13.57354	5.073565	18.0271	3.521693	3.097933
	EXD	18.44016	0.754214	104.3628	1.50335	10.89838
Bahrain, BSE	*SR*	10.00656	20.1021	72.7153	2.30191	4.20458
	FSD	75.9417	43.40375	16.3065	19.10171	1.809259
	EXD	3.29325	9.13601	117.32327	7.066004	2.227249
Bahrain, BFX	*SR*	7.804084	17.2738	10.7497	20.26719	2.989789
	FSD	53.77598	26.48124	157.63803	13.66685	1.944243
	EXD	0.301369	13.1227	16.15462	6.156736	3.500378
Malta, Borza Malta	*SR*	10.23923	12.5143	43.06364	15.37049	2.480175
	FSD	54.01702	45.93822	67.5453	6.353442	2.083025
	EXD	4.237566	9.37412	115.2003	6.978275	2.069662
Iran, TSE	*SR*	11.74382	49.4881	47.5984	30.89187	2.16189
	FSD	10.83625	6.1744	19.6256	3.441039	3.412363
	EXD	18.11874	5.77236	121.9049	2.70431	22.92328
Israel, TASE	*SR*	13.92299	17.5553	86.65642	2.37012	4.565028
	FSD	24.29177	9.685511	39.0898	9.101441	1.754673
	EXD	6.103919	21.7789	219.9157	8.58762	5.463684
Morocco, BVC	*SR*	20.57779	38.1963	34.6911	1.04581	3.292189
	FSD	38.88269	24.02463	54.9314	11.17332	1.462273
	EXD	7.155322	6.73648	177.2033	17.21104	12.2153

Table 2. Summary statistics (Part 2)

Stock market	*Variable*	*Mean*	*Minimum*	*Maximum*	*Std. dev.*	*Kurtosis*
Jordan, ASE	*SR*	5.50299	33.1843	149.0543	23.15278	2.437204
	FSD	27.35907	21.68163	36.69933	4.225164	2.6
	EXD	2.732851	8.24388	216.49836	6.189094	2.570041
Kuwait, KSE	*SR*	9.06626	32.7451	14.9462	0.41512	2.667092
	FSD	51.2307	45.9815	60.76512	3.7132	3.243637
	EXD	6.4088	13.604	318.0526	9.7493	2.306767
Qatar, DSM	*SR*	11.2892	20.4161	44.6896	15.4774	2.71263
	FSD	60.7162	50.1275	70.38358	4.9964	2.844611
	EXD	6.8457	28.2335	224.0567	12.7814	3.544173
Oman, Muscat	*SR*	5.69562	12.4936	37.50465	14.1966	3.018368
	FSD	9.25293	2.9182	1.61354	4.1285	1.523544
	EXD	8.6348	3.1352	362.44165	12.4538	14.83827
Palestine, PEX	*SR*	6.7862	10.3870	22.7843	30.3689	1.2389
	FSD	10.1839	4.3901	9.36828	2.3780	3.27691
	EXD	15.2382	7.6302	410.2910	19.3629	4.10937
Saudi Arabia, TADAWUL	*SR*	10.3730	6.2891	7.81601	8.2912	8.7152
	FSD	13.3768	11.2781	14.8338	2.3950	2.8739
	EXD	14.6523	5.6930	424.7849	10.6289	1.17972
Syria, DSE	*SR*	13.5468	10.5624	20.65781	12.3692	4.6055
	FSD	16.5425	12.4525	13.1472	2.0373	1.8590
	EXD	15.2356	9.5847	6.5382	10.7935	2.7858
Cyprus, CSE	*SR*	16.4768	11.3691	23.6785	18.4890	4.6592
	FD	12.4709	4.5680	6.27801	2.4801	2.4032
	EXD	7.50241	10.6708	362.4165	11.4538	4.8927
Tunisia, TUNINDEX	*SR*	6.9562	12.4319	33.5025	10.1866	3.0468
	FD	6.21293	2.94364	12.6134	4.0215	5.1234
	EXD	7.50648	3.5897	560.4165	13.4538	16.2097
Dubai, DFM	*SR*	8.69562	12.4238	35.0465	16.1686	2.1548
	FD	9.21183	2.4329	12.6134	4.1285	5.5234
	EXD	10.50248	3.9752	576.4165	14.4538	4.3250
Dubai, DGCX	*SR*	6.69261	12.4858	30.5046	12.1686	6.1836
	FD	12.2528	2.9034	15.1354	5.12155	4.5576
	EXD	9.50348	3.9230	462.4165	1.45538	24.3567
Dubai, NASDAQ	*SR*	8.69242	12.4129	32.0223	4.16826	13.0435
	FSD	10.2493	2.9782	16.6135	2.11585	11.5094
	EXD	12.5048	3.2645	516.4162	3.46538	10.3217
Abu Dhabi, ADX	*SR*	13.2562	12.4652	30.5024	10.1626	0.01 60
	FSD	6.27193	2.9431	14.6354	6.5935	1.52357
	EXD	18.5282	3.9142	223.2361	10.4528	2.83682
Türkiye, ISE	*SR*	15.6962	12.4308	19.50465	12.1676	0.90116
	FSD	19.2033	2.9478	39.61354	30.1305	12.52346
	EXD	8.50247	8.1578	320.4216	20.4729	13.1689
Türkiye, IAB	*SR*	5.69562	10.4236	37.2465	11.1861	1.01768
	FSD	9.18231	2.9482	158.3794	21.12375	2.59814
	EXD	8.11038	3.9138	327.44165	12.4957	1.87957
Iraq, ISX	*SR*	5.65938	12.4689	36.2365	10.16862	3.01489
	FSD	9.80123	2.9784	1.3786	19.1495	1.526231
	EXD	8.56348	4.7902	262.3830	15.45273	14.83750
Egypt, EGX	*SR*	11.0257	12.8901	37.34720	12.168261	3.015679
	FSD	9.21593	2.0982	14.1362	2.123785	1.576810
	EXD	8.50634	3.9135	327.4989	10.67538	14.85723
Algeria, SGBV	*SR*	9.67802	12.4936	37.5347	19.17896	3.05980
	FSD	9.21860	2.10982	14.3798	4.12145	1.522361
	EXD	8.54656	3.91352	562.5876	13.45238	4.07956

Source: Authors' estimation.

Table 3. Unit root results

Null: Unit root (assumes common unit root process)				
Test	***FSD***		***EXD***	***SR***
	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**
Levin, Lin, & Chu t*	-1.75970 (0.04)	-7.97200 (0.00)	-9.39203 (0.00)	-8.26240 (0.00)
Breitung t-stat	-1.09680 (0.14)	-5.34311 (0.00)	-7.05672 (0.00)	-5.08628 (0.00)
Im, Pesaran, & Shin W-stat (IPS W-test)	-2.86419 (0.00)	-9.70298 (0.00)	-7.40777 (0.00)	-4.72273 (0.00)
ADF-Chi-square	40.3436 (0.01)	117.759 (0.00)	88.2330 (0.00)	71.7145 (0.00)
PP-Chi-square	29.1074 (0.14)	163.031 (0.00)	83.2119 (0.00)	88.4232 (0.00)

*Note: * Significance at 5% level. ADF — Augmented Dickey-Fuller, PP — Phillip Perron test.*
Source: Authors' estimation.

The table above contains the results of five unit-root tests used to determine the integration order of study variables. All tests showed stationarity at a level for *EXD* and *SR* at the 95% confidence interval. The Breitung test, however, had *FSD* stationary at first differencing. The presence of unit roots in study variables necessitated the co-integration test. Panel co-integration results as reported in Table 4 below based on the panel Rho, ADF and PP-Fisher statistics indicate a co-integrating relationship among financial development, stock returns and *EXD*.

Table 4. Panel co-integration results

Measure	*Statistic*	*Weighted statistic*
V-statistic	-2.397782 (0.9918)	-3.943556 (1.0000)
Rho-statistic	-1.056014 (0.1455)	-1.659408** (0.0485)
PP-statistic	-4.715124** (0.0000)	-6.808190** (0.0000)
ADF-statistic	-4.887371** (0.0000)	-7.108297** (0.0000)
Group statistics		
Rho-statistic	0.726326 (0.7662)	
PP-statistic	-6.343849** (0.0000)	
ADF-statistic	-6.836639** (0.0000)	

*Note: ** Significance at 5% level.*
Source: Authors' estimation.

In threshold GARCH analysis, we reported the following ARCH effects in Table 5 as a pre-diagnostic test for GARCH family models. According to Table 5, all but the stock return of the Istanbul Gold Exchange could have volatility tested with the threshold GARCH. The results are presented in Table 5.

Table 5. ARCH effects (Part 1)

Stock market	*Variable*	*Obs. * R-squared*	*Prob. Chi-square (1)*
Lebanon, BSE	*SR*	0.7956	0.3724
	FSD	0.0921	0.8416
	EXD	0.1868	0.6811
Bahrain, BSE	*SR*	0.0024	0.8248
	FSD	0.2279	0.6334
	EXD	0.0054	0.9409
Bahrain, BFX	*SR*	0.2787	0.2583
	FSD	0.0103	0.9191
	EXD	0.6814	0.4091
Malta, Borza Malta	*SR*	0.0027	0.9894
	FSD	1.71984	0.1897
	EXD	2.82535	0.0928
Iran, TSE	*SR*	1.18212	0.1396
	FSD	1.01923	0.0195
	EXD	0.04868	0.8252
Israel, TASE	*SR*	0.03131	0.8595
	FSD	0.17875	0.6727
	EXD	0.424315	0.5148
Morocco, BVC	*SR*	0.17048	0.4321
	FSD	0.90512	0.3416
	EXD	1.145325	0.2845
Jordan, ASE	*SR*	0.704469	0.4013
	FSD	0.000617	0.9802
	EXD	0.64198	0.4047
Kuwait, KSE	*SR*	2.706446	0.0999
	FSD	0.101538	0.7589
	EXD	0.028869	0.8651
Qatar, DSM	*SR*	0.96723	0.3181
	FSD	0.26633	0.634
	EXD	0.02148	0.8836
Oman, Muscat	*SR*	1.3309	0.4936
	FSD	0.1396	0.1402
	EXD	0.0257	0.8736
Palestine, PEX	*SR*	1.2356	0.0383
	FSD	0.2683	0.3451
	EXD	0.0328	0.348
Saudi Arabia, TADAWUL	*SR*	0.2361	0.2984
	FSD	0.2534	0.4807
	EXD	1.2350	0.09342
Syria, DSE	*SR*	0.0349	0.73495
	FSD	0.1576	0.5691
	EXD	0.5879	0.6582
Cyprus, CSE	*SR*	0.2038	0.78943
	FSD	0.0137	0.49901
	EXD	0.0147	0.8952
Tunisia, TUNINDEX	*SR*	1.3429	0.35701
	FD	2.4950	0.4769
	EXD	0.0231	0.1823

Table 5. ARCH effects (Part 2)

Stock market	*Variable*	*Obs. * R-squared*	*Prob. Chi-square (1)*
Dubai, DFM	*SR*	0.2359	0.7469
	FSD	0.2381	0.17920
	EXD	0.0092	0.1894
Dubai, DGCX	*SR*	0.1265	0.1837
	FSD	0.4891	0.5791
	EXD	0.9123	0.7559
Dubai, NASDAQ	*SR*	0.7236	0.9472
	FSD	0.5781	0.4579
	EXD	0.1546	0.2671
Abu Dhabi, ADX	*SR*	1.0389	0.5698
	FSD	1.5683	0.7895
	EXD	2.480	0.6593
Türkiye, ISE	*SR*	0.04131	0.6420
	FSD	0.6276	0.6849
	EXD	0.0037	0.3736
Türkiye, IAB	*SR*	19.4201**	0.000
	FSD	0.0298	0.3683
	EXD	0.00365	0.2645
Iraq, ISX	*SR*	0.0045	0.9488
	FSD	1.3890	0.3642
	EXD	2.3751	0.0320
Egypt, EGX	*SR*	0.0980	0.7582
	FSD	0.0032	0.9271
	EXD	0.7935	0.4746
Algeria, SGBV	*SR*	0.4891	0.1267
	FSD	0.9346	0.1374
	EXD	0.5792	0.9713

*Note: ** Significance at 5% level.*
Source: Authors' estimation.

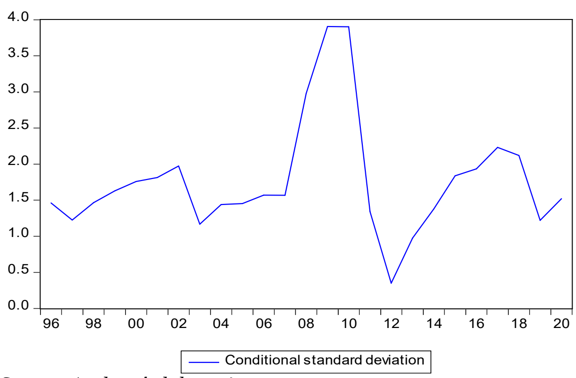
Table 6 reports volatility estimated with threshold GARCH. The constant in the mean equation reveals the average stock return of the Istanbul Gold Exchange at 2.47%. The one-year lagged value of the stock return of the Istanbul Gold Exchange is found to predict its current value significantly in a direct relationship. For the variance equation, both the ARCH term (0.2307) and the GARCH term (0.8173) are significant. While the ARCH was significant at 5%, the GARCH term passed significance at 1% respectively. Asymmetric volatility measured by the threshold term was 0.9197. The significance of the positive threshold coefficient portrays the presence of asymmetric behavior at the Istanbul stock exchange. In effect, the positive coefficient reveals that stock returns at the Istanbul Gold Exchange do respond differently to bad news. In other words, reaction returns when the good or bad news hits the Istanbul Gold Exchange differs considerably. There is also persistence in the volatility of stock returns at the Istanbul Gold Exchange (persistence > 1). In effect, there is the presence of volatility clustering.

Table 6. Stock return Istanbul Gold Exchange

Mean equation	***C***	***SR(-1)***		
	2.4789 (0.1049)	0.7701** (0.0000)		
Variance equation	***C***	***ARCH term***	***GARCH term***	***Threshold term***
	0.949 (0.563)	0.2307** (0.0005)	0.8173 (0.0000)	0.9197 (0.0006)
Post-estimation diagnostics	***Persistence***	***Heteroscedasticity***	***Autocorrelation***	***Likelihood stat.***
	1.048	0.7974 (0.3719)	p > 0.05	-48.792

*Note: ** Significance at 5% level.*
Source: Authors' estimation.

Figure 1. Volatility graph — stock returns at Istanbul Gold Exchange



Source: Authors' elaboration.

Table 7 below contains estimates of the threshold regression with *EXD* as a threshold variable in different estimated models. It expresses the existence or non-existence of a threshold relationship between *EXD* and *SR* as a result of influences of currency devaluation and financial development in the model. The static model was first estimated. Its peculiarity is that it takes out the lagged value of the dependent variable — *SR*. In this model, *EXD* had a threshold of 19.69 and was significant with a p-value of 0.0021 which is lesser than 0.05. Accordingly, SR is -134.4 when *EXD* and *FSD* are null as depicted by the constant term. Examining the variables with *_b* suffixes representing values in the first regime where *EXD* is less or equal to the threshold value. Lower levels of *EXD* strongly predicted *SR* as revealed by the coefficient of 3.399 (with a significant z-value) which is lesser than the threshold value of 19.69. This is also found to be significant. Within the *EXD* threshold, financial development is also a determinant of *SR* with a significant positive effect (11.779; p-value = 0.04). In the threshold relationship between *EXD* and *SR*, a percentage rise in financial development explains an 11.779 unit rise in stock returns. Beyond the *EXD* threshold limit, however, financial development and exchange rate are insignificant in the model.

In the dynamic model, the *EXD* threshold value is 13.109. Below the threshold of 13.109, past values of *SR* are indirect predictors of current *SR* with a coefficient of 0.620. This implies that a percentage increase in past value causes an increase of 0.620 in *SR* for the current period. However, this is not significant with a p-value greater than 0.05, i.e., 0.675. *FSD* shows a direct relationship of a 7.869% increase in *SR* for a percentage rise in *FSD*. This is found to be significant in the model ($p < 0.05$). Higher levels of *EXD* weakly predicted *SR* at 2.009 (with insignificant z-value). In the higher regime which is when *EXD* rises above 13.109, the past value of *SR* becomes a positive predictor of current *SR* with a coefficient of 10.14, and it is significant in the model. Coefficients of *FSD* and *EXD* are also seen to increase in magnitude to 14.369 and 13.647 respectively, though insignificance is maintained. When *EXD* however goes above 19.69, and 13.109 the effects of both variables weaken in the prediction of stock returns as we find no significance in higher boundary estimates (*FSD_d* and *EXD_d*).

The previous models assumed the complete efficiency of the economy. However, the reality is characterized by inefficiency, thus kinks are introduced into the model to account for such inefficiencies. The third model showed that at the kink or discontinued point in *EXD*, the threshold value for *EXD* is 12.242 with a p-value above 0.05. At kink, a unit change in *EXD* accounts for a 3.033 increase in *SR* before taking an opposite turn though the effect is insignificant *t*. On the prior side before the kink point, lagged *SR* value had a strong positive effect of 0.077 on *SR* ($p < 0.05$). *FSD* in this model significantly and negatively influenced the threshold relationship between *EXD* and *SR*. Also, a unit rise in *FSD* will cause *SR* to weaken by 14.423 units. Exchange rate as an independent variable in the same vein negatively associates with *SR* with a coefficient of -2.058 but this is not found to be significant.

The last model had the threshold variable exempted from the model to reduce covariates showing that at the kink or discontinued point in *EXD*, the threshold value for *EXD* is -1.214 with a p-value above 0.05. At kink, a unit change in *EXD* accounts for a significant -3.738 in *SR* before the reversal in slope after kink. On the prior side before the kink point, lagged *SR* and *FSD* values had weak negative effects of -0.236 and -9.385, respectively, on *SR* ($p > 0.05$). *FSD* in this model significantly and positively influenced the threshold relationship between *EXD* and *SR* such that a percentage rise in *FSD* causes *SR* to rise by 14.423 percent. Exchange rate as an independent variable in the same vein positively associates with *SR* with a coefficient of 2.058 but this is not found to be significant. The significant slope value reveals a rapid change in slope as variations in exchange rate move from larger to smaller values. From the models, *EXD* does have significant threshold effects on *SR* and when *EXD* falls lower than its threshold of 19.69%, *FSD* had an increased influence on *SR* by 11.8%.

Table 7. Threshold estimations for exchange rate devaluation (*EXD*)

Variables	***Model 1 (Static)***	***Model 2 (Dynamic)***	***Model 3 (Kink with threshold variable)***	***Model 4 (Kink without threshold)***
Threshold value (*r*)	19.69* (3.604) 0.0021	13.109* (10.07) 0.0000	12.242 (0.22) 0.828	-1.214 (-0.18) 0.860
lagSR_b	-	0.620 (0.012) 0.672	0.077* (50.103) 0.0000	-0.236 (-0.09) 0.931
FSD_b	11.777** (2.99) 0.007	7.869** (4.122) 0.0012	14.423** (2.16) 0.031	-9.385 (-1.89) 0.059
EXD_b	3.3998** (3.169) 0.0051	2.009** (2.765) 0.0045	2.058 (0.72) 0.470	-
lagSR_d	-	10.149* (10.247) 0.0000	-	-
FSD_d	1.721 (0.42) 0.6741	14.369 (1.129) 0.2331	-	-
EXD_d	-2.056 (-0.58) 0.5632	13.647 (0.02) 0.9852	-	-
Kink slope	-	-	3.033 (1.23) 0.218	-3.738** (-2.97) 0.003
Constant_d	-134.43 (-1.01) 0.312	-659.86 (-0.88) 0.381	-	-

*Note: z-statistics in parentheses followed by p values. ** Significance at 5% level.*
Source: Authors' estimation.

Financial development was also used as a threshold variable to determine its threshold effects as shown in Table 8 below. The static model had *FSD* with a threshold value of 23.45% found to be significant ($p < 0.05$). When *FSD* is in the lower regime which is lower than or equal to 23.45%, *FSD* had a positive and significant influence of 31.466 on *SR* while *EXD* had an insignificant but positive influence of 0.055 on stock returns. In the high regions above the level of *FSD* threshold, *FSD* refused to switch to a negative sign and rather, maintained positivity with a significant effect of 39.16% on stock returns. In the same light, the magnitude of the effect of *EXD* increases to 0.579 and becomes significant. In other words, the effects of *EXD* and *FSD* on *SR* are greater when the *FSD* level is beyond the threshold value of 23.45%.

In the dynamic model, the threshold value rises to 51.05%. In this model, the lagged value of *SR* had a negative relationship of -1.509 with the present value of *SR*, but this is found to be insignificant. *FSD* also has a positive and significant effect of 1.562 on stock returns, and *EXD* becomes significant with a coefficient of 0.085. Beyond threshold levels of *FSD* and *EXD* maintain positive values with larger magnitudes (19.815 and 11.329, respectively) than when *FSD* was below the threshold. However, the lagged value of stock returns reverses and has a positive effect of 4.219 on stock returns as opposed to the negative effect of -1.509 in the low region of the threshold.

In applying the kink option highlighted in the previous section, the threshold value of *FSD* shrinks to 50.59% ($p < 0.05$) as a way of taking into account inefficiencies in the economy that could cause drastic changes in variation patterns. The kink slope value was -28.864 ($p < 0.05$) revealing that at the point of discontinuity in the relationship curve of *FSD* and *SR*, *FSD* would negatively affect *SR* by 28.864 units. The lagged value of stock returns in this model is a significant predictor of stock returns continuously (1.259, $p < 0.05$). *FSD* is seen to have a positive effect of 15.05 on *SR* while *EXD* had a positive effect of 0.109. Both variables were found to be significant predictors in the regression relationship.

When the threshold variable is not used as an independent variable, the threshold of *FSD* is 54.33% ($p < 0.05$). The regression kink is -10.307 ($p < 0.05$) revealing that at the point of discontinuity in the smoothness of the relationship curve, *SR* is affected by a -10.307 percentage change for a percentage change in *FSD*, given the threshold. Stock returns in the previous lagged period significantly influence its current value positively (coefficient at 0.779). *EXD* exerts a significant negative predictor of current stock returns at -0.91. The results reveal that *FSD* had a significant threshold effect on *SR*. However, *FSD* below thresholds of 23.5%, and 51.1% would be insignificant in predicting *SR*. Lagged *SR* within an economy below the *FSD* threshold of 50.59% will negatively affect *SR*.

Table 8. Threshold estimations for financial sector development (*FSD*)

Variables	*Model 1 (Static)*	*Model 2 (Dynamic)*	*Model 3 (Kink with threshold variable)*	*Model 4 (Kink without threshold)*
Threshold value (*r*)	23.457** (2.35) 0.019	51.059 (0.93) 0.350	50.59** (7.12) 0.000	54.333** (5.54) 0.000
lagSR_b	-	-1.509 (-0.70) 0.485	-1.259** (-2.59) 0.010	0.779 (1.91) 0.057
FSD_b	31.466 (1.19) 0.5765	1.562 (1.229) 0.6734	15.05 (1.427) 0.4651	-
EXD_b	0.055 (0.07) 0.946	0.085* (12.04) 0.0000	0.109* (16.578) 0.0000	-0.910 (-1.31) 0.190
lagSR_d	-	4.219 (1.06) 0.288	-	-
FSD_d	39.16* (11.2256) 0.0000	19.815* (10.133) 0.0034	-	-
EXD_d	0.579** (2.5301) 0.0021	11.329 (0.7252) 0.474	-	-
Kink slope	-	-	-28.864** (-2.48) 0.013	-10.307** (-3.882) 0.000
Constant_d	-1047.721 (-1.382) 0.167	691.78 (0.215) 0.837	-	-

*Note: z-statistics in parentheses followed by p values. ** Significance at 5% level.*
Source: Authors' estimation.

To ascertain the robustness of our threshold GARCH results, we carried out some structural VAR model analysis beginning with the determination of optimal lag length and found that our results are robust to alternative SVAR model specifications.

Table 9. VAR optimal lag selection

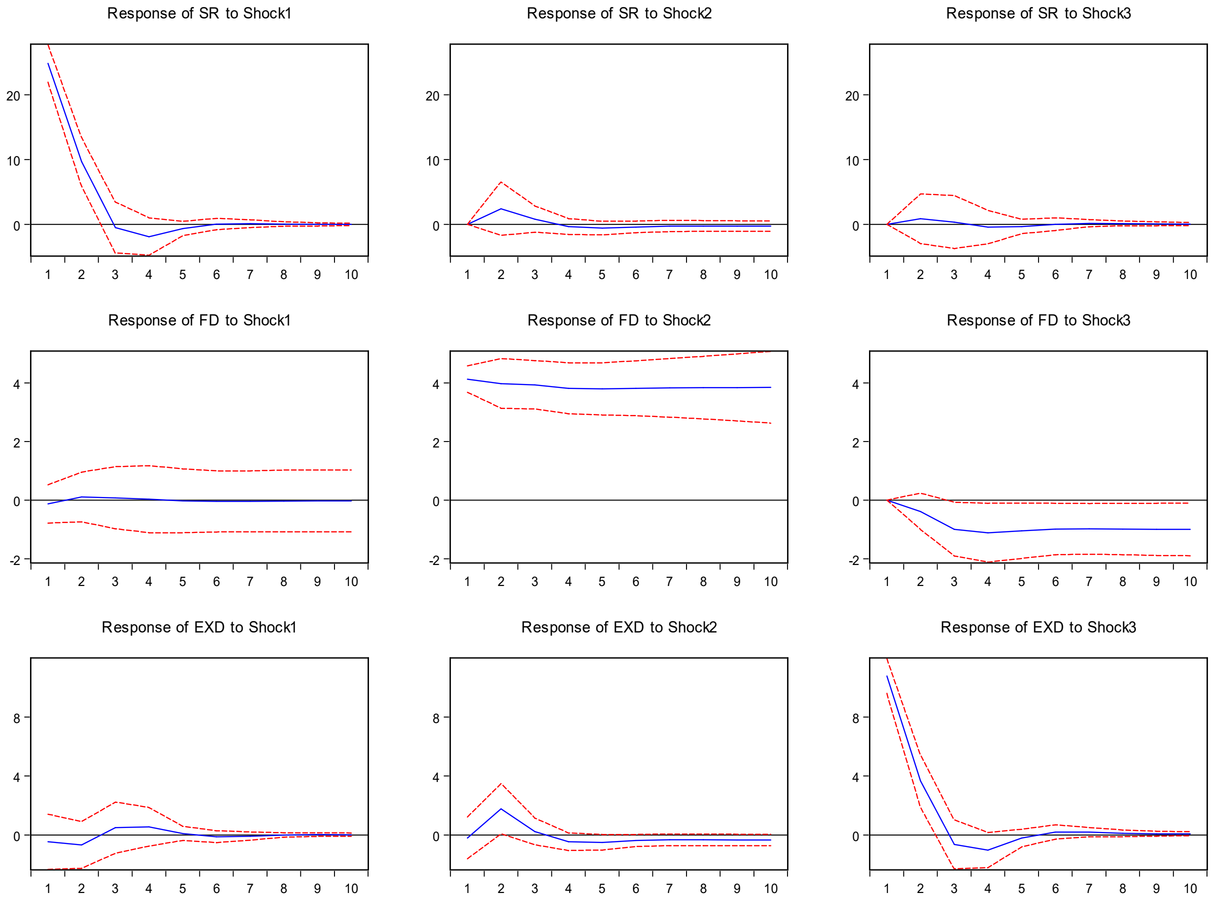
Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-2154.407	NA	53554384	26.30984	26.36654	26.33286
1	-1850.060	593.8476	1460727.0	22.70805	22.93487*	22.80013
2	-1834.848	29.12596*	1354323.0*	22.63229*	23.02922	22.79343*
3	-1829.995	9.113002	1425013.0	22.68287	23.24992	22.91307
4	-1826.104	7.165217	1517450.0	22.74517	23.48234	23.04443

*Note: * Significance at 5% level. AIC — Akaike information criterion, LR — Likelihood ratio, FPE — Final predict error, SC — Schwarz criterion, HQ — Hannah-Quinn information criterion.*
Source: Authors' estimation.

The above table specifies the optimal lag length as lag 2 as suggested by the FPE, AIC, SC, and HQ. All other tests specified lag 2 as the optimal lag. This indicates that the SVAR (2) specification is the parsimonious model for this study. The impulse response function graphs (Figure 2) for stock returns to innovations within itself reveal that shocks from previous stock returns would cause stock returns to go in a negative direction in the short run (till the third period). After the third period, stock returns begin to return to equilibrium and maintain a stable rate. In other words, abnormal returns function only in the short term before the market dynamics adjust for normal stock returns. For changes in financial development, returns respond slightly in the second year and quickly journey back to equilibrium. However, stock returns do not react strongly to innovations as found in the weak rise in the second year revealing stability of stock returns when other things are held constant.

FSD maintains an equilibrium state even when innovations occur in stock returns. In other words, movements in stock returns do not influence *FSD*. This implies that increasing values of traded shares on African stock exchanges do not transform into financial development. In the same vein, falling stock returns would not influence the *FSD* in an economy ceteris paribus. *FSD* however responds significantly to its contemporaneous shocks. The behavior of financial development is such that a return to an equilibrium position is not envisaged. Rather, *FSD* variations have their effect in the long run. This effect is reversed when financial development reactions to innovations in *EXD* are examined. Shocks that emanate from *EXD* cause *FSD* to go on a downward sprawl till the third period and then remain constant without returning to previous values or equilibrium. For *EXD*, its impulse response to internal innovations is an initial negative response in the short run before stability in subsequent long-run periods. Responses to *FSD* are swift but only in the short run as a return to equilibrium begins in the short run. The response is at the first positive, before returning to equilibrium. In response to variations in *SR*, *EXD* rises in the second period and stabilizes to a place of equilibrium.

Figure 2. Response functions



Source: Authors' elaboration.

In terms of post-estimation SVAR Results, the absence of serial correlation at lag 2 (Table 10) which was the optimal length used for the VAR model confirmed the robustness of the results.

Table 10. VAR residual serial correlation LM test results

Lag	*LR stat*	*Rao's F-stat*	*Prob.*
1	5.878624 (0.752)	0.652307 (0.752)	0.7520
2	6.411345 (0.698)	0.711864 (0.698)	0.6982
3	6.375531 (0.702)	0.707857 (0.702)	0.7018

Source: Authors' estimation.

Linking the threshold and SVAR results, the research findings are further discussed as follows. The lagged value for *SR* was found to be a significant predictor of current *SR* in an inverse direction within the *FSD* threshold regression kink model. The SVAR analysis supports the autoregressive significance as it revealed that stock returns were largely exogenous with *SR* revealing a negative response to shocks from variations from its lagged values. The threshold results, however, address specifics on the extent to which *SR*(-2) can be considered a significant variable in predicting *SR*, even amid economic inefficiencies. *EXD* had minimal influence on *SR* in the SVAR supporting the absence of significance in *EXD* estimates. The results were not significantly different even when threshold regions were set. *FSD* had significant threshold values about *SR*. Overall, the study takes up Model 3 as the most viable model in the threshold model options. Volatility estimations did not show the volatility of study indices or asymmetric effects. From structural VAR estimates, *EXD* is affected by financial development in the short run. However, *EXD* has a long-run and negative impact on *FSD*. In other words, when a currency falls increase, it weakens *FSD* in that economy, hence, the state of economies of many African states. To improve *FSD*, the government has to stimulate demand for local currencies to increase and reduce devaluation, which will in turn promote *FSD*. *FSD* positively influences stock returns in the short run but reverses to equilibrium after the second year.

Past values of stock returns were found to be the main predictor of stock returns. Therefore, investors can forecast portfolio returns with a level of precision from past occurrences on the exchange floors. It can also be deduced that African stock markets function largely independently of the local economies in which they exist. Nevertheless, in specific thresholds of macroeconomic indicators, past *SR* may not be viable forecasting variables for future returns. Past *SR* will be dependable at levels below 50.59% level of financial development as a threshold. Descriptive statistics showed that stock exchanges in Morocco, Namibia, Egypt, Tunisia, and South Africa, which were larger than thresholds, will have weak evidence of the past values of stock values influencing current stock markets. Other stock exchanges with less financial development rates can have investors determine the direction in which stock returns will take from the behavior of past returns. *EXD* in threshold limits of 12.2%, did not affect the predictability power of past values of stock returns.

When *EXD* is below its threshold value of 19.96%, *FSD* hurts *SR*. However, at rates above 19.96%, *FSD* would be weak in predicting *SR*. From the descriptive statistics, the stock markets examined have *EXD* maximum values of over 20.6% revealing that *FSD* can only influence returns of stock on their exchange floors given 19.96% or above devaluation of local currencies. Past *SR* cannot also be used to predict present values in these markets. Overall, investments in African stock markets may be weakened by the low explanatory power of past levels of stock returns to predict expected returns because local currencies are constantly weakening against standard foreign currencies. However, the weakening exchange rates increase the predictability power of *FSD* indices in influencing stock returns. Therefore, the expansionary effect of devaluation will support the volatility persistence of stock returns through the level of *FSD*.

5. CONCLUSION

This study uses the SVAR model to determine responses of endogenous variables, financial development, EXD, and stock returns to innovative structural shocks. This study employed the SVAR, threshold GARCH, and threshold regressions to examine impulse responses, volatility, and threshold effects of specified variables. The study found that financial development has a significant and negative predictor of stock returns in African stock markets. In the specification of a 50.56% threshold for FSD, previous stock returns were found to significantly and negatively determine current returns, but financial development itself and EXD are insignificant. Higher devaluations would make stock returns unpredictable. By and large, our results reveal that financial development cannot influence returns of stock on their exchange floors given the devaluation of local currencies beyond the threshold value of 19.69%. Consequently, investments in the Türkiye Istanbul Exchange and other exchanges with weaker than 23.5% financial development would cause more predictability of stock returns, which is against the theory of random walk. Within a specified threshold of FSD at 50.56%, past values of stock returns were the major determinant of current stock returns and were found to have a negative effect. We are recommending that structural policies should be formulated to encourage foreign investments to increase local currency demands needed to reduce devaluation rates. Given the fact that our study evaluated the effects of exogenous threshold variables, the estimations in this paper are limited by our assumption of a kink restriction at the threshold point. Future researchers should focus attention on the continuity or discontinuity of the threshold point to estimate the threshold parameter value of asymptotic normality using instrumental variable estimation techniques such as the two-step GMM estimation of linear index defined by endogenous threshold variables based on an inverse Mills ratio bias correction.

REFERENCES

1. Abina, A. P., & Lemea, G. M. (2019). Capital market and performance of Nigeria economy (1985–2017). *International Journal of Innovative Finance and Economics Research, 7*(2), 51–66. https://seahipaj.org/journals-ci/june-2019/IJIFER/full/IJIFER-J-6-2019.pdf
2. Abuzayed, B., Bouri, E., Al-Fayoumi, N., & Jalkh, N. (2021). Systemic risk spillover across global and country stock markets during the COVID-19 pandemic. *Economic Analysis and Policy, 71*, 180–97. https://doi.org/10.1016/j.eap.2021.04.010
3. Acha, I. A., & Akpan, S. O. (2019). Capital market performance and economic growth in Nigeria. *Noble International Journal of Economics and Financial Research, 4*(2), 10–18. https://www.napublisher.org/pdf-files/NIJEFR-166-10-18.pdf
4. Adegboye, O. A., Adekunle, A., & Gayawan, E. (2020). Early transmission dynamics of novel coronavirus (COVID-19) in Nigeria. *International Journal of Environmental Research and Public Health, 17*(9), Article 3054. https://doi.org/10.3390/ijerph17093054
5. Adenike, T. E. (2022). The impact of COVID-19 on the Nigerian financial market performance. *Journal of Sustainable Development in Africa, 24*(1), 111–122. https://jsd-africa.com/Jsda/2022%20V24%20No1%20Spring/PDF/THE%20EFFECT%20OF%20COVID%2019%20ON%20THE%20NIGERIAN%20FINANCIAL%20MARKET%20PERFORMANCE%20-%20JSDA.pdf
6. Adenomon, M. O., Maijamaa, B., & John, D. O. (2020). *On the effects of COVID-19 outbreak on the Nigerian stock exchange performance: Evidence from GARCH models.* Preprints. https://www.preprints.org/manuscript/202004.0444/v1
7. Adoms, F. U., Yua, H., Okaro, C. S., & Ogbonna, K. S. (2020). Capital market and economic development: A comparative study of three sub-Saharan African emerging economies. *American Journal of Industrial and Business Management, 10*(5), 963–987. https://doi.org/10.4236/ajibm.2020.105065
8. Afzal, N., & Hossain, S. S. (2011). An empirical analysis of the relationship between macroeconomic variables and stock prices in Bangladesh. *Bangladesh Development Studies, 44*(4), 95–105. https://bids.org.bd/uploads/publication/BDS/34/34-4/05Afzal&hossain.pdf
9. Agu, B. O. (2018). Economic growth and capital market development in Nigeria an appraisal. *Economic Research, 2*(4), 27–38. https://doi.org/10.29226/TR1001.2018.28
10. Agyei, S. K., Bossman, A., Asafo-Adjei, E., Asiamah, O., Adela, V., & Adorm-Takyi, C. (2022). Exchange rate, COVID-19, and stock returns in Africa: Insights from a time-frequency domain. *Discrete Dynamics in Nature and Society*, Article 4372808. https://doi.org/10.1155/2022/4372808
11. Ahmar, A. S., & del Val, E. B. (2020). SutteARIMA: Short-term forecasting method, a case: COVID-19 and the stock market in Spain. *Science of The Total Environment, 729*, Article 138883. https://doi.org/10.1016/j.scitotenv.2020.138883
12. Aifuwa, H. O., Musa, S., & Aifuwa, S. A. (2020). Coronavirus pandemic outbreak and firms performance in Nigeria. *Management and Human Resource Research Journal, 9*(4), 15–25. https://www.researchgate.net/publication/341152260_Coronavirus_Pandemic_Outbreak_and_Firms_Performance_in_Nigeria
13. Akintola, A. F., & Cole, A. A. (2020). Capital market and economic growth in Nigeria (1984–2015). *IOSR Journal of Humanities and Social Science, 25*(4, Series 6), 38–46. https://www.iosrjournals.org/iosr-jhss/papers/Vol.%2025%20Issue4/Series-6/G2504063846.pdf
14. Akpokerere, O. E., & Okoroyibo, E. E. (2020). Capital market performance as a panacea for economic growth in Nigeria. *International Business Research, 13*(2), 1–12. https://doi.org/10.5539/ibr.v13n2p1
15. Alam, M. S., & Hussein, M. A. (2019). The impact of capital market on the economic growth in Oman. *Financial Studies, 2*, 116–129. https://www.econstor.eu/bitstream/10419/231680/1/1670515435.pdf
16. Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance, 27*, Article 100326. https://doi.org/10.1016/j.jbef.2020.100326
17. Alenoghena, R. (2014). Capital market, financial deepening and Nigeria's economic growth: Empirical evidence. *Journal of Economic & Financial Studies, 2*(4), 43–52. https://doi.org/10.18533/jefs.v2i03.69
18. Alfaro, L., Chari, A., Greenland, A. N., & Schott, P. K. (2020). *Aggregate and firm-level stock returns during pandemics, in real-time* (NBER Working Paper No. 26950). National Bureau of Economic Research (NBER). https://www.nber.org/system/files/working_papers/w26950/w26950.pdf
19. Algaeed, A. H. (2020). Capital market development and economic growth: An ARDL approach for Saudi Arabia, 1985–2018. *Journal of Business Economics and Management, 22*(2), 388–409. https://doi.org/10.3846/jbem.2020.13569
20. Anderu, K. S. (2020). Capital market and economic growth in Nigeria. *Jurnal Perspektif Pembiayaan dan Pembangunan Daerah, 8*(3), 295–310. https://doi.org/10.22437/ppd.v8i3.9652
21. Angaye, P. E. G., & Frank, B. P. (2020). Capital market development and economic growth in Nigeria. *American Journal of Business Management, 3*(7), 58–63. https://www.aijbm.com/wp-content/uploads/2020/07/H375863.pdf
22. Anh, D. L. T., & Gan, C. (2021). The impact of the COVID-19 lockdown on stock market performance: Evidence from Vietnam. *Journal of Economic Studies, 48*(4), 836–851. https://doi.org/10.1108/JES-06-2020-0312
23. Araoye, F. E., Ajayi, E. O., & Aruwaji, A. M. (2018). The impact of stock market development on economic growth in Nigeria. *Journal of Business and African Economy, 4*(1), 1–15. https://www.iiardjournals.org/get/JBAE/VOL.%204%20NO.%201%202018/THE%20IMPACT%20OF%20STOCK.pdf
24. Arestis, P., Demetriades, P. O., & Luintel, K. B. (2001). Financial development and economic growth: The role of stock markets. *Journal of Money, Credit, and Banking, 33*(1), 16–41. https://doi.org/10.2307/2673870
25. Asal, M. (2012). Non-linear growth impacts of financial development in the euro area. *International Journal of Economics and Finance, 4*(12), 23–38. https://doi.org/10.5539/ijef.v4n12p23
26. Asteriou, D., & Spanos, K. (2019). The relationship between financial development and economic growth during the recent crisis: Evidence from the EU. *Finance Research Letters, 28*, 238–245. https://doi.org/10.1016/j.frl.2018.05.011

27. Atem, F. D., Qian, J., Maye, J. E., Johnson, K. A., & Betensky, R. A. (2017). Linear regression with a randomly censored covariate: Application to an Alzheimer's study. *Journal of the Royal Statistical Society Series C: Applied Statistics, 66*(2), 313–328. https://doi.org/10.1111/rssc.12164
28. Attah-Botchwey, E., Awadzie, D. M., & Agbenyezi, W. (2022). Financial deepening and stock market performance in selected sub-Sahara African countries. *Journal of Economics, Finance, and Accounting, 9*(1), 30–38. http://doi.org/10.17261/Pressacademia.2022.1543
29. Ayodele, T. D., Akinyede, O. M., & Ojedele, M. I. (2020). *Corona virus (COVID-19) pandemic and the Nigerian financial market.* http://doi.org/10.2139/ssrn.3656284
30. Baker, S. R., Bloom, N., Davis, S. J., Kost, K. J., Sammon, M. C., & Viratyosin, T. (2020). *The unprecedented stock market impact of COVID-19* (NBER Working Paper No. 26945). National Bureau of Economic Research (NBER). https://www.nber.org/system/files/working_papers/w26945/w26945.pdf
31. Balagobei, S., & Bandara, D. R. N. K. K. (2022). Impact of macroeconomic variables on stock market performance: Evidence from Sri Lanka. *Wayamba Journal of Management, 13*(1), 28–45. https://doi.org/10.4038/wjm.v13i1.7551
32. Barnor, C., & Waife, E. A. (2015). Financial sector openness and stock market development in Ghana. *Research Journal of Finance and Accounting, 6*(24), 80–88. https://www.researchgate.net/publication/287939421_Financial_openness_and_stock_market_development_in_Ghana
33. Bash, A., & Alsaifi, K. (2019). Fear from uncertainty: An event study of Khashoggi and stock market returns. *Journal of Behavioral and Experimental Finance, 23*, 54–58. https://doi.org/10.1016/j.jbef.2019.05.004
34. Baumol, W. J. (1965). *The stock market and economic efficiency.* Fordham University Press.
35. Beck, T., & Levine, R. (2002). Industry growth and capital allocation: Does having a market- or bank-based system matter? *Journal of Financial Economics, 64*(2), 147–180. https://doi.org/10.1016/S0304-405X(02)00074-0
36. Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance, 28*(3), 423–442. https://doi.org/10.1016/S0378-4266(02)00408-9
37. Beck, T., Demirgüç-Kunt, A., & Levine, R. (2001). The financial structure database. In A. Demirgüç-Kunt & R. Levine (Eds.), *Financial structure and economic growth: A cross-country comparison of banks, markets, and development.* The MIT Press. https://doi.org/10.7551/mitpress/3001.003.0005
38. Beck, T., Levine, R., & Loayza, N. (2000). Finance and the sources of growth. *Journal of Financial Economics, 58*(1–2), 261–300. https://doi.org/10.1016/S0304-405X(00)00072-6
39. Bekaert, G., Harvey, C. R., & Lundblad, C. (2001). Emerging equity markets and economic development. *Journal of Development Economics, 66*(2), 465–504. https://doi.org/10.1016/S0304-3878(01)00171-7
40. Bello, A. H., Folorunsho, A. I., & Alabi, O. O. (2019). A study on Johansen co-integration approach in analyzing the relationship between the capital market on the economic growth in Nigeria. *FUW Trends in Science & Technology Journal, 4*(2), 560–568. https://www.ftstjournal.com/Digital%20Library/42%20Article%2045.php
41. Bello, U. (2022). Impact of capital market performance on economic growth in Nigeria: A systematic review. *Journal of Global Economics and Business, 3*(10), 47–67. https://doi.org/10.31039/jgeb.v3i10.49
42. Bodie, Z., Kane, A., & Marcus, A. J. (2011). *Investments and portfolio management.* McGraw-Hill/Irwin.
43. Botev, J., Égert, B., & Jawadi, F. (2019). The nonlinear relationship between economic growth and financial development: Evidence from developing, emerging and advanced economies. *International Economics, 160*, 3–13. https://doi.org/10.1016/j.inteco.2019.06.004
44. Bouri, E., Naeem, M. A., Nor, S. M., Mbarki, I., & Saeed, T. (2022). Government responses to COVID-19 and industry stock returns. *Economic Research-Ekonomska Istraživanja, 35*(1), 1967–1990. https://doi.org/10.1080/1331677X.2021.1929374
45. Brown, S. J. (2011). The efficient markets hypothesis: The demise of the demon of chance? *Accounting & Finance, 51*(1), 79–95. https://doi.org/10.1111/j.1467-629X.2010.00366.x
46. Bui, T. N., & Doan, T.-T. T. (2021). The impact of stock market development on economic growth: A GMM approach. *Investment Management and Financial Innovations, 18*(3), 74–81. http://doi.org/10.21511/imfi.18(3).2021.07
47. Chien, F. S., Sadiq, M., Kamran, H. W., Nawaz, M. A., Hussain, M. S., & Raza, M. (2021). Co-movement of energy prices and stock market return: Environmental wavelet nexus of COVID-19 pandemic from the USA, Europe, and China. *Environmental Science and Pollution Research, 28*, 32359–32373. https://doi.org/10.1007/s11356-021-12938-2
48. Christopoulos, D. K., & Tsionas, E. G. (2004). Financial development and economic growth: Evidence from panel unit root and co-integration tests. *Journal of Development Economics, 73*(1), 55–74. https://doi.org/10.1016/j.jdeveco.2003.03.002
49. Dabor, A. O., Umoru, D., Eguasa, B. E., Atarere, L. O.-I., Odu, V. C., & Eloho, A. R. (2023). Cash crop output and foreign currency exchange rate in Nigeria: A vector error correction model analysis. *Journal of Agriculture and Crops, 9*(2), 187–198. https://arpgweb.com/pdf-files/jac9(2)187-198.pdf
50. Demirgüç-Kunt, A., & Levine, R. (Eds.). *Financial structure and economic growth: A cross-country comparison of banks, markets, and development.* MIT Press. https://doi.org/10.7551/mitpress/3001.001.0001
51. Demirgüç-Kunt, A., Pedraza, A., & Ruiz-Ortega, C. (2021). Banking sector performance during the COVID-19 crisis. *Journal of Banking & Finance, 133*, Article 106305. https://doi.org/10.1016/j.jbankfin.2021.106305
52. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366a), 427–431. https://doi.org/10.1080/01621459.1979.10482531
53. Dornbusch, R., & Reynoso, A. (1989). *Financial factors in economic development* (NBER Working Paper No. 2889). National Bureau of Economic Research (NBER). https://doi.org/10.3386/w2889
54. Erasmus, E. G., Nkiru, O. A., & Ifeanyi, O. G. (2021). Capital market indicators and economic growth in Nigeria. *European Journal of Accounting, Finance, and Investment, 7*(4). https://www.researchgate.net/publication/351359978_CAPITAL_MARKET_INDICATORS_AND_ECONOMIC_GROWTH_IN_NIGERIA
55. Ferreira, M. E., Dias, J., & Serafim, J. (2022). *Stock market and economic growth: Evidence from Africa* (REM Working Paper No. 0228-2022). Research in Economics and Mathematics (REM). https://rem.rc.iseg.ulisboa.pt/wps/pdf/REM_WP_0228_2022.pdf

56. Giglio, S., Maggiori, M., Stroebel, J., & Utkus, S. (2020). *Inside the mind of a stock market crash* (NBER Working Paper No. 27272). National Bureau of Economic Research (NBER). http://doi.org/10.2139/ssrn.3619683
57. Grbić, M. (2020). Stock market development and economic growth: The case of the Republic of Serbia. *Post-Communist Economies, 33*(4), 484–499. https://doi.org/10.1080/14631377.2020.1745566
58. Gunay, S. (2021). Comparing COVID-19 with the GFC: A shockwave analysis of currency markets. *Research in International Business and Finance, 56*, Article 101377. https://doi.org/10.1016/j.ribaf.2020.101377
59. Hansen, B. E. (1996). Inference when a nuisance parameter is not identified under the null hypothesis. *Econometrica, 64*(2), 413–430. https://doi.org/10.2307/2171789
60. Hossin, M. S., & Islam, M. S. (2019). Stock market development and economic growth in Bangladesh: An empirical appraisal. *International Journal of Economics and Financial Research, 5*(11), 252–258. https://arpgweb.com/pdf-files/ijefr5(11)252-258.pdf
61. Ibrahim, U. A., & Mohammed, Z. (2020). Assessing the impact of capital market development on economic growth: Evidence from Nigeria. *IOSR Journal of Economics and Finance, 11*(2), 1–15. https://www.researchgate.net/publication/360317270_Assessing_the_Impact_of_Capital_Market_Development_on_Economic_Growth_Evidence_from_Nigeria
62. Insaidoo, M., Arthur, L., Amoako, S., & Andoh, F. K. (2021). Stock market performance and COVID-19 pandemic: Evidence from a developing economy. *Journal of Chinese Economic Foreign Trade Studies, 14*(1), 60–73. https://doi.org/10.1108/JCEFTS-08-2020-0055
63. International Monetary Fund (IMF). (2018). *The Bali FinTech agenda* (IMF Policy Paper). https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/10/11/pp101118-bali-fintech-agenda
64. Iyoha, A.-O. I., Ohiokha, G., Umoru, D., Akhor, S. O., & Igele, G. A. (2022). Target capital structure for managerial decision making: Dynamics and determinants. *Investment Management and Financial Innovations, 19*(3), 322–334. http://doi.org/10.21511/imfi.19(3).2022.27
65. Jacob, A. O., & Umoh, O. J. (2019). Effects of capital market development and economic growth in Nigeria from 1981–2018. *International Journal of Economics and Business Administration, 5*(2), 125–130. https://www.researchgate.net/publication/356412826_Effects_of_Capital_Market_Development_and_Economic_Growth_in_Nigeria_from_1981-2018
66. Jameel, A. L. M., & Teng, K. L. L. (2022). Exchange rate volatility and its impact on the stock market in different structural break periods: The context of Sri Lanka. *Academy of Entrepreneurship Journal, 28*(1S). https://www.abacademies.org/articles/exchange-rate-volatility-and-its-impact-on-the-stock-market-in-different-structural-break-periods-the-context-of-sri-lanka-13276.html
67. Javangwe, K. Z., & Takawira, O. (2022). Exchange rate movement and stock market performance: An application of the ARDL model. *Cogent Economics & Finance, 10*(1), Article 2075520. https://doi.org/10.1080/23322039.2022.2075520
68. Korsah, P., & Fosu, P. (2016). The effects of exchange rate movements on stock market capitalization in Ghana. *Journal of Applied Economics and Business Research, 6*(4), 312–327. http://aebrjournal.org/uploads/6/6/2/2/6622240/joaebrdecember2016_312_327.pdf
69. Kuna, A.-U. I., Hassan, A. I., & Ibrahim, A. (2019). Capital market performance and economic development in Nigeria. *Scholars Bulletin, 5*(12), 723–731. https://saudijournals.com/media/articles/SB_512_725-733.pdf
70. Lahmiri, S., & Bekiros, S. (2021). The effect of COVID-19 on long memory in returns and volatility of cryptocurrency and stock markets. *Chaos, Solitons & Fractals, 151*, Article 111221. https://doi.org/10.1016/j.chaos.2021.111221
71. Lakshmanasamy, T. (2021). The causal relationship between capital market performance and economic growth: A vector error correction model estimation. *Indian Journal of Applied Business and Economics Research, 2*(1), 99–119. https://arfjournals.com/image/72774_7_lakshmanasamy.pdf
72. Lee, Y.-C., Lu, Y.-C., & Wang, Y.-C. (2019). Corporate social irresponsibility, CEO overconfidence, and stock price crash risk. *Applied Economics Letters, 26*(14), 1143–1147. https://doi.org/10.1080/13504851.2018.1540835
73. Lelissa, T. B. (2020). *The impact of COVID-19 on the Ethiopian private banking system.* http://doi.org/10.2139/ssrn.3624944
74. Lynch, D. (1996). Measuring financial sector development: A study of selected Asia-pacific countries. *The Developing Economies, 34*(1), 1–27. https://doi.org/10.1111/j.1746-1049.1996.tb00727.x
75. Malik, K., Sharma, S., & Kaur, M. (2022). Measuring contagion during COVID-19 through volatility spillovers of BRIC countries using diagonal BEKK approach. *Journal of Economic Studies, 49*(2), 227–242. https://doi.org/10.1108/JES-05-2020-0246
76. Marshal, I., Nkwadochi, K. C., & Oriakpono, A. E. (2020). COVID-19 pandemic, global trade wars, and impact on the Nigeria economy. *Academic Journal of Current Research, 7*(5), 71–82. https://www.researchgate.net/publication/342000276_COVID-19_PANDEMIC_GLOBAL_TRADE_WARS_AND_IMPACT_ON_THE_NIGERIA_ECONOMY
77. McKinnon, R. I. (1973). *Money and capital in economic development.* Brookings Institution.
78. Nnanna, S. M. (2014). *Money, banking, and finance: Theory and practice.* Hudson Jude Nigeria Publishers.
79. Nusair, S. A., & Olson, D. (2022). Dynamic relationship between exchange rates and stock prices for the G7 countries: A nonlinear ARDL approach. *Journal of International Financial Markets, Institutions, and Money, 78*, Article 101541. https://doi.org/10.1016/j.intfin.2022.101541
80. Ogbebor, P. I., & Siyanbola, T. T. (2018). Financial development and economic nexus in Nigeria: The role of the stock market. *International Journal of Research Methodology of Social Sciences, 4*(4), 29–47. https://zenodo.org/records/2545010
81. Okeya, I. O., & Dare, D. F. (2020). Financial deepening and stock market development: Evidence from Nigeria. *International Journal of Research and Review, 7*(6), 329–342. https://www.ijrrjournal.com/IJRR_Vol.7_Issue.6_June2020/IJRR0045.pdf
82. Özbey, F., İşcan, E., & Traş, M. F. (2016). How do exchange rate movements affect stock prices? The case of Turkey. In *Proceedings of the 22nd International Academic Conference.* International Institute of Social and Economic Sciences. https://doi.org/10.20472/IAC.2016.022.040
83. Patro, D. K., Wald, J. K., & Wu, Y. (2014). Currency devaluation and stock market response: An empirical analysis. *Journal of International Money and Finance, 40*, 79–94. https://doi.org/10.1016/j.jimonfin.2013.09.005

84. Qian, J., Chiou, S. H., Maye, J. E., Atem, F., Johnson, K. A., & Betensky, R. A. (2018). Threshold regression to accommodate a censored covariate. *Biometrics, 74*(4), 1261–1270. https://doi.org/10.1111/biom.12922
85. Rahman, M. L., & Uddin, J. (2009). Dynamic relationship between stock prices and exchange rates: Evidence from three South Asian countries. *International Business Research, 2*(2), 167–174. https://doi.org/10.5539/ibr.v2n2p167
86. Rahman, M. L., Amin, A., & Al Mamun, M. A. (2021). The COVID-19 outbreak and stock market reactions: Evidence from Australia. *Finance Research Letters, 38*, Article 101832. https://doi.org/10.1016/j.frl.2020.101832
87. Rahman, M., & Mustafa, M. (2017). Financial deepening and stock market returns: Panel data analyses for selected developed and developing economies. *International Journal of Monetary Economics and Finance, 10*(1), 96–109. https://doi.org/10.1504/IJMEF.2017.081287
88. Raza, S. A., & Jawaid, S. T. (2014). Foreign capital inflows, economic growth and stock market capitalization in Asian countries: An ARDL bound testing approach. *Quality & Quantity, 48*(1), 375–385. https://doi.org/10.1007/s11135-012-9774-4
89. Rehman, M. U., Kang, S. H., Ahmad, N., & Vo, X. V. (2021). The impact of COVID-19 on the G7 stock markets: A time-frequency analysis. *The North American Journal of Economics and Finance, 58*, Article 101526. https://doi.org/10.1016/j.najef.2021.101526
90. Safiyanu, B. D., Isa, M., & Lawan, I. I. (2020). *Impact of COVID-19 on the Nigerian stock exchange market* (MPRA Working Paper No. 110408). Munich Personal RePEc Archive (MPRA). https://mpra.ub.uni-muenchen.de/110408/1/MPRA_paper_110408.pdf
91. Saif-Alyousfi, A. Y. H. (2022). The impact of COVID-19 and the stringency of government policy responses on stock market returns worldwide. *Journal of Chinese Economic Foreign Trade Studies, 15*(1), 87–105. https://doi.org/10.1108/JCEFTS-07-2021-0030
92. Sansa, N. (2020). The impact of COVID-19 on the financial markets: Evidence from China and USA. *Electronic Research Journal of Social Sciences and Humanities, 2*(2), 29–39. https://www.eresearchjournal.com/wp-content/uploads/2020/03/3.-impact-COVID-19-on-FMarkets.pdf
93. Setiawan, B., Abdallah, M. B., Fekete-Farkas, M., Nathan, R. J., & Zeman, Z. (2021). GARCH (1, 1) models and analysis of stock market turmoil during COVID-19 outbreak in an emerging and developed economy. *Journal of Risk Financial Management, 14*(12), Article 576. https://doi.org/10.3390/jrfm14120576
94. Sharif, A., Aloui, C., & Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. *International Review of Financial Analysis, 70*, Article 101496. https://doi.org/10.1016/j.irfa.2020.101496
95. Shaw, E. S. (1973). *Financial deepening in economic development.* Oxford University Press.
96. Shehzad, K., Xiaoxing, L., & Kazouz, H. (2020). COVID-19's disasters are perilous than the global financial crisis: A rumor or fact? *Finance Research Letters, 36*, Article 101669. https://doi.org/10.1016/j.frl.2020.101669
97. So, M. K. P., Chan, L. S. H., & Chu, A. M. Y. (2021). Financial network connectedness and systemic risk during the COVID-19 pandemic. *Asia-Pacific Financial Markets, 28*, 649–665. https://doi.org/10.1007/s10690-021-09340-w
98. Song, R., Shu, M., & Zhu, W. (2022). The 2020 global stock market crash: Endogenous or exogenous? *Physica A: Statistical Mechanics and its Applications, 585*, Article 126425. https://doi.org/10.1016/j.physa.2021.126425
99. Tan, X., Ma, S., Wang, X., Zhao, Y., Wang, Z., & Xiang, L. (2022). The dynamic impact of COVID-19 pandemic on stock returns: A TVP-VAR-SV estimation for G7 countries. *Frontiers in Public Health, 10*, Article 859647. https://doi.org/10.3389/fpubh.2022.859647
100. Tiwari, A., So, M. K. P., Chong, A. C. Y., Chan, J. N. L., & Chu, A. M. Y. (2021). Pandemic risk of COVID-19 outbreak in the United States: An analysis of network connectedness with air travel data. *International Journal of Infectious Diseases, 103*, 97–101. https://doi.org/10.1016/j.ijid.2020.11.143
101. Tong, H. (1990). *Non-linear time series: A dynamical system approach.* Oxford University Press. https://doi.org/10.1093/oso/9780198522249.001.0001
102. Twerefou, D. K., Abbey, E., Codjoe, E. A., & Ngotho, P. S. (2019). Impact of stock market development on economic growth: Evidence from selected sub-Saharan African countries. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 67*(4), 1071–1083. https://doi.org/10.11118/actaun201967041071
103. Umoru, D. (2013). Monetary models and exchange rate determination: The Nigerian evidence. *International Journal of Development and Management Review, 8*(1), 172–197. https://www.ajol.info/index.php/ijdmr/article/view/91311
104. Umoru, D., Effiong, S. E., Okpara, E., Eke, R. I., Iyayi, D., Nwonu, C. U., Obomeghie, M. A., Tizhe, A. N., & Eshemogie, K. (2023). Oil-exchange rate volatilities and returns nexus [Special issue]. *Corporate Governance and Organizational Behavior Review, 7*(2), 325–337. https://doi.org/10.22495/cgobrv7i2sip11
105. Umoru, D., Effiong, S. E., Umar, S. S., Okpara, E., Iyaji, D., Oyegun, G., Iyayi, D., & Abere, B. O. (2023). Exchange rate volatility transmission in emerging markets. *Corporate & Business Strategy Review, 4*(2), 37–47. https://doi.org/10.22495/cbsrv4i2art4
106. Umoru, D., Effiong, S. E., Umar, S. S., Okpara, E., Ugbaka, M. A., Otu, C. A., Ofie, F. E., Tizhe, A. N., & Ekeoba, A. A. (2023). Reactions of stock returns to asymmetric changes in exchange rates and oil prices. *Corporate Governance and Organizational Behavior Review, 7*(3), 42–56. https://doi.org/10.22495/cgobrv7i3p4
107. Verma, P., Dumka, A., Bhardwaj, A., Ashok, A., Kestwal, M. C., & Kumar, P. A. (2021). A statistical analysis of the impact of COVID-19 on the global economy and stock index returns. *SN Computer Science, 2*, Article 27. https://doi.org/10.1007/s42979-020-00410-w
108. Wakode, S. (2020). Efficacious scrutinizing of COVID-19 impact on banking using credit risk metrics. *International Journal of Finance and Banking Research, 6*(3), 51–56. https://doi.org/10.11648/j.ijfbr.20200603.13
109. Wang, D., Li, P., & Huang, L. (2020). *Volatility spillovers between major international financial markets during the COVID-19 pandemic.* http://doi.org/10.2139/ssrn.3645946
110. Wilson, H. (2020, June 29). COVID-19: Stock trading in the new normal. *Raconteur.* https://www.raconteur.net/finance/stock-trading-covid
111. World Bank. (n.d.). *Financial development.* https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-development
112. Xiang, L., Ma, S., Yu, L., Wang, W., & Yin, Z. (2022). Modeling the global dynamic contagion of COVID-19. *Frontiers in Public Health, 9*, Article 809987. https://doi.org/10.3389/fpubh.2021.809987

113. Xinhua. (2020, March 22). China financial market remains stable and COVID-19 impact. *China Daily*. https://www.chinadailyhk.com/article/125145
114. Yang, Y., Li, L., & Jiang, J. (2022). The impact of COVID-19 pandemic on emerging country stock markets: Evidence of the value effect. *Emerging Markets Finance and Trade, 58*(1), 70–81. https://doi.org/10.1080/1540496X.2021.1973423
115. Yartey, C. A. (2008). *The determinants of stock market development in emerging economies: Is South Africa different?* (IMF Working Paper No. WP/08/32). International Monetary Fund (IMF). https://doi.org/10.5089/9781451868944.001
116. Yousfi, M., Dhaoui, A., & Bouzgarrou, H. (2021). Risk spillover during the COVID-19 global pandemic and portfolio management. *Journal of Risk Financial Management, 14*(5), Article 222. https://doi.org/10.3390/jrfm14050222
117. Yousuf, A., & Nilsson, F. (2013). *Impact of exchange rates on Swedish stock performances: Empirical study on USD and EUR exchange rates on the Swedish stock market* [Degree project]. Umeå School of Business and Economics. http://www.diva-portal.se/smash/get/diva2:635634/FULLTEXT01.pdf
118. Yusuf, I. A., Mesagan, E. P., & Amadi, A. N. (2020). Effect of financial deepening on stock market returns in the case of military and democratic post-SAP regimes in Nigeria. *Bizecons Quarterly, 6*, 3–21. https://www.researchgate.net/publication/338397516_Effect_of_Financial_Deepening_on_Stock_Market_Returns_The_Case_of_Military_and_Democratic_Post-SAP_Regimes_in_Nigeria
119. Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters, 36*, Article 101528. https://doi.org/10.1016/j.frl.2020.101528
120. Zubair, A. (2013). Causal relationship between the stock market index and exchange rate: Evidence from Nigeria. *CBN Journal of Applied Statistics, 4*(2), 87–110. https://www.cbn.gov.ng/out/2014/sd/causal%20relationship%20between%20stock%20market%20index%20and%20exchange%20rate_evidence%20from%20nigeria.pdf