

Financial market uncertainty and the macro economy: the role of governance and institutional quality

Economia

89

Rexford Abaidoo

*Department of Business Management and Accounting,
University of Maryland Eastern Shore, Princess Anne, Maryland, USA, and*

Elvis Kwame Agyapong

*Department of Finance, Ghana Institute of Management and Public Administration,
Accra, Ghana*

Received 28 February 2023

Revised 25 August 2023

Accepted 20 January 2024

Abstract

Purpose – The study examines the impact of macroeconomic risk and volatility associated with key macroeconomic indicators on financial market uncertainty; and the extent to which governance and institutional structures moderate such relationships.

Design/methodology/approach – The study employs data from 33 countries in Sub-Saharan Africa (SSA) for the period between 1996 and 2019. Variable derivation techniques such as the generalized autoregressive conditional heteroskedasticity (GARCH) for deriving volatility data, and the principal component analysis (PCA) for index construction were employed. The data is examined using the two-step system generalized method of moments (TS-SGMM) technique.

Findings – Empirical results suggest that macroeconomic risk and exchange rate volatility heighten financial market uncertainty among economies in the sub-region. Further empirical estimates show that institutional quality and government effectiveness have a negative moderating effect on the nexus between macroeconomic risk, inflation uncertainty, GDP growth, exchange rate, and financial market uncertainty.

Practical implications – The key macroeconomic conditions with the propensity to foment financial market uncertainty are worth monitoring with adequate buffers to mitigate their impacts on the financial market.

Originality/value – Compared to related studies, this study focuses on uncertainty associated with financial markets among emerging economies in sub-Saharan Africa (SSA) instead of the performance of the financial markets or specific financial market indicators such as the stock market; and the extent to which a host of macroeconomic conditions influence such uncertainty. For instance, Abaidoo and Agyapong (2023) focused on the impact of macroeconomic indicators or conditions on the performance of the financial market and the efficiency of financial institutions respectively instead of the uncertainty or risk associated with the financial market as pursued in the current study. This differing approach is pursued with the goal of proffering

JEL Classification — C33, C36, E02, E44

© Rexford Abaidoo and Elvis Kwame Agyapong. Published in *Economia*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>

Conflict of interest statement: We the authors of this manuscript (Rexford Abaidoo, and Elvis Kwame Agyapong) wish to state that we have no conflict of interest whatsoever, either financially or otherwise in the design and development of this manuscript. The manuscript was developed solely by the two authors with resources that are publicly available with no restrictions or obligations.

Author contributions: The manuscript concept, structure, the underlying methodology were developed by Prof. Rexford Abaidoo. Prof. Rexford Abaidoo also wrote the introduction. Mr. Elvis Kwame Agyapong worked on the literature review, statistical tests, and empirical findings. The final document was thoroughly reviewed by Prof. Rexford Abaidoo before final submission.



Economia
Vol. 26 No. 1, 2025
pp. 89-107
Emerald Publishing Limited
e-ISSN: 2358-2820
p-ISSN: 1517-7580
DOI 10.1108/ECON-02-2023-0034

appropriate strategies for policy makers towards assuaging the financial market risk (uncertainty) due to macroeconomic dynamics. We further examine how the various fundamental relationships may be moderated by effective governance and institutional quality.

Keywords Financial market uncertainty, GMM model, Governance and institutional quality, Macroeconomic risk, Uncertainty

Paper type Research paper

1. Introduction

Like most markets and institutions, financial markets across the globe are mostly characterized by extreme performance volatilities and operational uncertainties, which are often a reflection of dynamics in the macroeconomic environment within which they operate. These volatile and uncertain conditions are sometimes triggered by how economic agents (investors, consumers, and governments) react to prevailing or anticipated events in the macroeconomic environment. For instance, negative economic news such as deteriorating or anemic gross domestic product (GDP) growth or job growth has the potential to send the financial market into a tailspin, leading to extreme volatility in returns or performance. Reviewed empirical evidence in this regard suggests a significant association between performance dynamics among financial markets and the ebbs and flows of the macro economy within which they operate (see [Subrahmanyam & Titman, 2013](#); [Segal, Shaliastovich, & Yaron, 2015](#); [Benhabib, Liu, & Wang, 2016](#); [Arayssi & Fakihi, 2017](#); [Chiu, Harris, Stoja, & Chin, 2018](#); [Arayssi, Fakihi, & Kassem, 2019](#); [Chomicz-Grabowska & Orlowski, 2020](#); [Pflueger, Siriwardane, & Sunderam, 2020](#)). For instance, [Pal and Mittal \(2011\)](#), in their review of the nexus in question showed that the capital market indices in general are dependent on macroeconomic variables in the Indian economy. Additionally, [Czapkiewicz, Jamer, and Landmesser \(2018\)](#) concluded that long-term interest rate plays a significant role in the interrelationships between the Polish market and the developed markets of Germany, Britain, France, and Italy. From this succinct review of the related literature, it is evident that a significant relationship exists between the operational dynamics of the financial market and prevailing macroeconomic conditions. The present study, however, brings a different perspective to this proven nexus.

Compared to related studies that have reviewed the relationship between segments of the financial markets such as the stock market and conditions in the macro economy, this study focuses on uncertainty associated with the entire financial market among emerging economies in sub-Saharan Africa (SSA), and the extent to which a host of macroeconomic conditions influence such condition. In contrast to studies such as [Abaidoo and Agyapong \(2023\)](#) and [Abaidoo and Agyapong \(2023\)](#) for instance that respectively focused on performance of the financial market and efficiency of financial institutions, the current study is rather designed to offer policy recommendations that specifically targets how to alleviate financial markets risk (uncertainties) emanating from the general macroeconomy. The study focuses on the sub-region of SSA because of its unique macroeconomic dynamics. Compared to other geographical locations of the globe, SSA is noted for or mostly characterized by anemic growth and significant fluctuations in key macroeconomic indicators. Again, the sub-region is plagued with underdeveloped financial markets that are susceptible to extremes and uncertainties in regional and global markets. Financial market uncertainty, the dependent variable of focus in this study, defines a condition of heightened risk in operational dynamics and performance among financial markets. This risk is measured by the conditional volatility associated with the performance of the financial market among economies in the sub-region. This study is characterized by three main features, which distinguish it from the related ones in the literature. First, compared to approaches adopted in most studies, the current study

rather focuses on volatility associated with financial markets instead of financial market performance which is often examined in most existing studies. Secondly, the empirical inquiry examined in this study goes further to examine potential moderating behaviors of institutional quality and effective governance on the nexus in question among economies in the sub-region. The examination of the moderating effects of the noted variables has been influenced by empirical findings alluding to the importance of effective governance and institutions in the performance of economies in the sub-region (SSA). The third unique feature of the study is the examination of hitherto unexamined conditions or variables in our inquiry. Two variables, macroeconomic risk, and institutional quality variables are unique to this study. The variables are indexes constructed specifically for this study using the PCA procedure; the underlying variables involved in the construction of these indexes are also significantly different from what has been used occasionally in related studies.

In addition to the features noted above, it is also important to point out that a significant number of key explanatory variables examined are also econometric constructs, formulated specifically for this study. For instance, variables such as macroeconomic uncertainty, inflation uncertainty, and exchange rate volatility, among others, are not readily found in any database; these variables are generated in this study using the GARCH econometric procedure. Thus, by design, this study's approach is oriented towards examining specific interactions that are not readily found in the present literature according to reviewed studies; and addresses specific research gaps based on relatively unique variables and conditions employed. The rest of the study is structured as follows; Section two reviews the related literature focusing on the theoretical and related empirical works; this is followed by the methodology, data and empirical analysis, and the conclusion section in that order.

2. Literature review

2.1 Theoretical overview

Financial market fluctuations have been theoretically discussed from the perspective of information flow and dynamics, and how the market reacts to such information. To this end, the efficient market hypothesis (EMH) is highlighted as the significant theory explaining critical interactions examined in the study. According to [Shiller \(1988\)](#), the EMH avers that asset prices at any point in time “efficiently incorporate all public information” about fundamental economic factors that rationally influence the movement in prices of securities. This implies that asset prices on financial markets, all things being equal, reflect prevailing economic and non-economic information available to investors and other market participants at any point in time. Following this doctrine, this study's inquiry revolves around one of the central theories in economics – the rational choice theory. According to [Askari, Gordji, and Park \(2019\)](#), the rational choice theory postulates that influenced by personal interests, economic agents tend to make optimal choices based on all prevailing and relevant information. The rational choice theory surmises that investment choices among financial markets made by investors and other economic agents ultimately reflect critical information about economic trends, both prevailing and expected and other environmental considerations. This doctrine of choice optimization based on pertinent prevailing and anticipated information is further emphasized by [Vriend \(1996\)](#), who echoed the importance of information in maximizing one's utility or choice. This implies that investors and other economic agents tend to make rational choices based on prevailing macroeconomic indicators, especially in times of significant fluctuations among such indicators; this condition has the potential to influence the financial market and its risk profile all other factors held constant.

2.2 Empirical review

Empirical works on the subject matter under review have mostly concentrated on examining the determinants of stock price or stock market volatility instead of the financial market as a whole. In this scope, several studies have identified various factors as influencing stock prices or market volatility. For instance, in an earlier work submitted by [Errunza and Hogan \(1998\)](#), monetary and real macroeconomic factors were identified as significant in influencing stock market volatility for the European market. Again, in another earlier study, [Binder and Merges \(2001\)](#) identified price level volatility, riskless interest rate, the ratio of expected earnings to revenue, and risk premium on equity as significant determinants of stock market volatility. For the Association of South-East Asian Nations-5 (ASEAN-5) countries, [Thampanya, Wu, Nasir, and Liu \(2020\)](#) concluded that monetary policy plays a more significant role in stock market volatility as compared to fiscal policies. In a related study, [Corradi, Distaso, and Mele \(2012\)](#) also found the business cycle to be significantly influential in explaining stock market volatility. In another study that focused on the Association of Southeast Asian Nations (ASEAN) plus three other countries (China, Japan, and Korea), [Shi, Ahmed, and Paramati \(2021\)](#) found that institutional freedom factors and macroeconomic variables have a significant influence on stock market development and price volatility in the long-run and short-run respectively. This conclusion implies that aside from macroeconomic factors, institutional structures could also play a significant role in stock market performance; a scenario, that is consistent with the focus of this study; hence the approach adopted in this study, where the possible moderating impact of institutions and governance are assessed. [Trinh, Nguyen, Nguyen, and Ngo \(2020\)](#) evaluated the determinants of government bond yield volatility in Vietnam from July 2006 to December 2019. Among the factors found to affect the bond yield market in the study include base rate, foreign interest rate, stock market returns, public debt, fiscal deficit, and current account balance. [Touny, Radwan, and Alayis \(2021\)](#) also verified the determinants of stock market volatility for the Middle East region from 1996 to 2016 using a feasible generalized least square (FGLS) estimator. Results of the study showed that inflation, corruption, turnover ratio, and stock market capitalization exert a significant positive impact on stock market volatility, whilst economic growth, stock market returns, and financial freedom have negative effects on stock market returns.

The relationship between macroeconomic instability and volatility of stock markets has also received significant attention in recent times. From the African continent, [Uhumwangho \(2022\)](#) used data from sixteen stock markets to examine the factors that affect volatility from 2013 to 2019. Results from GMM estimates revealed that macroeconomic instability and financial liquidity factors influence the volatility of stock markets among the selected economies in the study. The study specifically showed that macroeconomic instability positively influences volatility; on the other hand, stock market liquidity, money supply growth, and remittances from diaspora exert a negative impact on stock market volatility. In an earlier work, [Adjasi \(2009\)](#) examined the effect of macroeconomic uncertainty on stock price volatility in the Ghanaian economy. The study revealed that cocoa price and interest rate volatilities increase stock price volatility, whilst volatility associated with gold prices, oil prices, and money supply reduces stock price volatility. Similarly, for the South African economy, [Chinzara \(2011\)](#) evaluated how systematic risk associated with the macroeconomy transmits to stock market volatility. Results from the analyses showed that macroeconomic uncertainty exerts a significant influence on stock market volatility; further results indicated that financial crises result in increased spate of volatility in the financial market. The effect of exchange rate volatility on stock market volatility was the subject of inquiry by [Kennedy and Nourzad \(2016\)](#) for the United States economy from January 1, 1999, to January 25, 2010. Results from the study revealed that exchange rate volatility exerts a significant positive effect on the volatility of the stock market. [Nikmanesh and Nor \(2016\)](#) also examined the relationship between the

volatility of macroeconomic factors and stock market volatility in Malaysia and Indonesia from 1998 to 2013. Results from seemingly unrelated regression (SUR) indicate that for both economies, macroeconomic volatility and trade liberalization significantly explain stock market volatility. In an earlier study, [Kearney and Daly \(1998\)](#) focused on verifying the causes of stock market volatility in the Australian economy. [Kearney and Daly \(1998\)](#) found inflation volatility and interest rate volatility to have a direct impact on stock market volatility, whilst volatilities of current account deficit, industrial production, and money supply were found to be indirectly associated with stock market volatility. For exchange rate volatility, the study found no evidence to suggest that the condition affects stock market volatility in the Australian economy, contrasting the results from [Kennedy and Nourzad \(2016\)](#) for the United States. Again, for the Indian economy, [Kumari and Mahakud \(2015\)](#) concluded that there exists a linkage between macroeconomic uncertainty and equity market volatility for the Indian economy from July 1996 to March 2013.

The above-reviewed theoretical concepts and empirical evidence suggest that macroeconomic instability may have significant and diverse effects on the critical elements of the financial market such as the stock market. It is also worth mentioning that most of the reviewed studies have generally centered on conditions influencing variability in stock market performance, a segment of the financial market as a whole. This current study, however, takes a different approach; in this approach, financial market uncertainty revolves around volatility associated with financial market development, which captures the general performance of the financial market among economies in terms of efficiency, depth, and access. This approach in our view presents a different perspective with a relatively much wider scope compared to studies focusing only on the stock market that dominates the literature.

3. Methodology

The study's methodological approach, description, and sources of data as well as the construction of key variables examined are presented in this section. We first discuss the sources of the data and provide a brief description of the key variables in the study, followed by variable derivation techniques applied in generating data points for some of the variables according to the objectives of the study. Finally, the various models that form the basis of empirical estimates examining key relationships in the study as well as a description of the panel estimation methodology are presented.

Data for the study were collected from three main sources; the World Development Indicators (WDI), World Governance Indicators (WGI), and the International Monetary Fund (IMF) databases on an annual basis from 1996 to 2019 for 33 countries in the sub-region of SSA. Data for financial market development was sourced from the IMF database, whilst gross domestic product (GDP) growth, consumer price inflation, exchange rate, foreign direct investment (FDI), trade, GDP (local currency), broad money (local currency), broad money growth, import price index, and export price index were compiled from the WDI database. To represent institutional and governance variables, data for government effectiveness, political stability, regulatory quality, voice and accountability, rule of law, and control of corruption were also compiled from the WGI for the relevant years and countries.

The financial market, the base variable from which the dependent variable (financial market uncertainty) is derived is a constructed index by the IMF that measures the degree of development of the financial market of an economy in terms of its efficiency, depth, and consumer/investor access. The exchange rate is also represented in the study as the rate of exchange of the local currency for the various countries to the US Dollar, whilst FDI is represented by the net inflow of foreign funds for investment in host countries. Trade, representing trade liberalization is measured as the total value of imports and exports as a

ratio of the total value of GDP. Again, financial liberalization is measured as the ratio of the value of broad money (local currency) in circulation to the value of GDP (local currency).

3.1 Deriving volatility data

The study examines the impact of macroeconomic risk on financial market uncertainty. As already mentioned in the introduction section, financial market uncertainty, the dependent variable representing the risk profile of the financial market is derived using the GARCH procedure. The variable, financial market development in this process serves as the base variable from which the new variable is derived. The process employs a technique that focuses on obtaining the volatility or stochastic element associated with the variable to denote its uncertainty or volatility data. The study further constructs macroeconomic risk from volatility associated with various macroeconomic variables or indicators. The various macroeconomic variables (GDP growth, inflation, exchange rate, FDI, broad money growth, trade liberalization, export price index, and import price index) are subjected to a derivation process to obtain the volatility data. Taking a cue from [Abaidoo, Agyapong, and Boateng \(2021\)](#), volatility associated with the various macroeconomic variables are used in the construction of macroeconomic risk variable because such volatilities create conditions of uncertainty among economic agents such as investors; such uncertain condition has the potential to distort forecasts and expected earnings. An econometric procedure, GARCH is used to derive the data points in this regard. This econometric process has received significant patronage in the literature (see [Abaidoo & Agyapong, 2021](#); [Asamoah, Adjasi, & Alhassan, 2016](#); [Lee, 2010](#); [Fountas & Karanasos, 2007](#); [Asteriou & Price, 2005](#)). The GARCH (1,1) process used to derive the data points in reference is based on functions presented as [Equations \(1\) and \(2\)](#) below.

$$V_{k,t} = \alpha + \beta V_{k,t-1} + \mu_t \quad (1)$$

where $\mu_t \approx N(0, \delta_t^2)$

$$\delta_{k,t}^2 = \varkappa + \gamma \varepsilon_{k,t-1}^2 + \mathfrak{g} \delta_{k,t-1}^2 \quad (2)$$

[Equation \(1\)](#) is the mean equation, where V_k represents variable k (k denotes financial market development, GDP growth, inflation, exchange rate, FDI, broad money growth, trade liberalization, export price index or import price index), and the subscript t denotes the year ($t = 1996, \dots, 2019$). [Equation \(2\)](#) is the GARCH equation, where δ^2 represents volatility associated with the variable, subscript k denotes the variable in question, t is the year ($t = 1996, \dots, 2019$), $\varkappa$ is the intercept, γ denotes the coefficient of the ARCH term and $\mathfrak{g}$ represents the coefficient of the GARCH term. These variables, among others, are the subject of the inquiry in this study.

3.2 Macroeconomic risk and institutional quality indexes

An index, representing macroeconomic risk is estimated using the data points for volatility associated with key macroeconomic variables among the various countries over the study period. Among the key macroeconomic indicators used in constructing this index are volatilities associated with inflation, exchange rate, FDI, broad money growth, trade, import price, and export price. Similarly, an index representing institutional quality is also computed from the six governance and institutional variables as presented by the World Bank; these variables are government effectiveness, political stability, regulatory quality, voice and accountability, rule of law, and control of corruption respectively. This study employs the PCA (refer to [Sendhil, Jha, Kumar, & Singh, 2018](#); [Ahamed & Mallick, 2019](#); [Basel,](#)

Gopakumar, & Rao, 2020) in constructing these two indexes. The PCA technique generates weights for the various variables in question, which then form the basis for the construction of the index. According to Ahamed and Mallick (2019), the PCA process generates eigenvectors; these eigenvectors are assessed and the ones representing the significant portions of the variance of the respective variables are denoted as the weights. Portions of the variables with weaker contributions to the variance in the index being constructed are discarded, and those with significant contributions to the variable being constructed are used (Abdi & Williams, 2010). The PCA approach is superior in generating weights in the index constructing process compared to other processes such as reliance on expert opinion, assignment of equal weights, conjoint analysis, and linear regression methods (refer to Sendhil *et al.*, 2018; Basel *et al.*, 2020; Abaidoo & Agyapong, 2021).

The study follows the approach used by Kumar, Raizada, Biswas, Srinivas, and Mondal (2016) and Sendhil *et al.* (2018), where the data points for the various variables are subjected to a normalization process. This is done to standardize the data, because of different measurement scales. Equation (3) is used to normalize the data; a higher spate of volatility in the variable in question is expected to lead to an increased state of uncertainty in the financial market, consequently, the function for normalizing the data is presented below.

$$\mathcal{N}_{j,it} = \frac{Y_{j,it} - Y_{min_{j,i}}}{Y_{max_{j,i}} - Y_{min_{j,i}}} \quad (3)$$

According to Equation (3), N denotes the normalized datapoint, Y represents the datapoint, Y_{max} , and Y_{min} denote maximum and minimum datapoints respectively, whilst the subscript j represents the volatility variable in question. Additionally, the subscripts i and t denote the country and year respectively.

For the institutional quality index, since the underlying variables are presented in an equal scale of measurement, a data normalization process is not required. Equations (4) and (5) are therefore used in the construction of indexes for macroeconomic risk and institutional quality respectively.

$$MRisk_{it} = \sum_j^n \left((\mathcal{N}_{j,it} * W_{j,i}) \right) / \sum_j^n W_{j,i} \quad (4)$$

$$INSTQ_{it} = \sum_p^n \left((X_{p,it} * \omega_{p,i}) \right) / \sum_p^n \omega_{p,i} \quad (5)$$

From Equations (4) and (5), subscripts i and t denote the country and year respectively. $MRisk$ represents a macroeconomic risk, $INSTQ$ denotes the institutional quality, N is the normalized volatility data for macroeconomic variable j , W_j denotes PCA-derived weight for macroeconomic variable j , X_p represents institutional variable p and ω_p denotes PCA-derived weight for institutional variable p . Macroeconomic risk variable constructed, measures volatility induced risk in a macroeconomy; where a higher value indicates a heightened degree of macroeconomic risk and vice versa. On the other hand, the institutional quality index represents a state of improved governance and institutional structures, where a higher value indicates improved quality and vice versa.

3.3 Regression models and estimation technique

This section focuses on the functional models and panel estimation techniques employed in the study. The study conceptually argues that volatility associated with macroeconomic factors has the potential to affect the dynamics of the financial market; specifically, the risk

(uncertainty) profile of the financial market per the EMH and rational choice theory. Financial market uncertainty can therefore be defined as a function of instability in the macroeconomic environment within which such markets operate as well as other relevant factors. Equation (6) captures this function.

$$FMU = f(MUnc, Rf) \quad (6)$$

From Equation (6), *FMU* denotes financial market uncertainty, *MUnc* represents macroeconomic uncertainty and *Rf* is a set of relevant factors surmised to impact uncertainty associated with the financial market. Specifically, Equation (7) is presented to verify the impact of macroeconomic risk and uncertainty associated with relevant macroeconomic factors on financial market uncertainty among economies in SSA.

$$FMU_{it} = \omega + \alpha FMU_{it-1} + \gamma MRisk_{it} + \varrho VGDP_{it} + \delta VINFL_{it} + \lambda VEXR_{it} + \varphi GDPG_{it} + \varnothing CPI_{it} + y FDI_{it} + \psi TL_{it} + \Phi FL_{it} + \sigma INSTQ_{it} + \varepsilon_{it} \quad (7)$$

According to Equation (7), the subscripts *i* and *t* represent country and year respectively. *FMU*, financial market uncertainty is surmised to be impacted by uncertainty in the macroeconomy, denoted by *MRisk* (macroeconomic risk), *VGDP* (macroeconomic uncertainty), *VINFL* (inflation volatility), and *VEXR* (exchange rate volatility). The other relevant factors assessed include GDP growth, consumer price inflation, foreign direct investment, trade liberalization, financial liberalization, and institutional quality, represented by *GDPG*, *CPI*, *FDI*, *TL*, *FL*, and *INSTQ* respectively in Equation (7). ω is the intercept, whilst the coefficients of the explanatory variables are respectively denoted by $\alpha, \gamma, \varrho, \delta, \lambda, \varphi, \varnothing, y, \psi, \Phi$ and σ . ε_{it} is a composite error term comprising country-specific, time-specific, and residual terms.

Empirical analysis performed in this study further verifies the moderating roles of institutional quality and government effectiveness in the nexus between the various macroeconomic risk factors and financial market uncertainty using Equations (8) and (9) below.

$$FMU_{it} = \omega + \alpha FMU_{it-1} + \gamma MRisk_{it} + \varrho VGDP_{it} + \delta VINFL_{it} + \lambda VEXR_{it} + \varphi GDPG_{it} + \varnothing CPI_{it} + y FDI_{it} + \psi TL_{it} + \Phi FL_{it} + \sigma INSTQ_{it} + \beta (INSTQ_{it} * MR_{k,it}) + \varepsilon_{it} \quad (8)$$

$$FMU_{it} = \omega + \alpha FMU_{it-1} + \gamma MRisk_{it} + \varrho VGDP_{it} + \delta VINFL_{it} + \lambda VEXR_{it} + \varphi GDPG_{it} + \varnothing CPI_{it} + y FDI_{it} + \psi TL_{it} + \Phi FL_{it} + \sigma INSTQ_{it} + \beta (GE_{it} * MR_{k,it}) + \varepsilon_{it} \quad (9)$$

MR_k , according to Equations (8) and (9) represents macroeconomic risk variable *k*, *GE* denotes government effectiveness, whilst β is the coefficient of the interaction variables for both equations. The rest of the variables and symbols follow the definition given per the preceding equations.

This study employs the two-step system generalized method of moments (TS-SGMM) panel estimation technique in examining the various interactions captured in Equations (7), (8), and (9). Wooldridge (2001) alluded to the superiority of the GMM estimation methodology by arguing that the model controls for homoscedasticity, which has proven to be a bigger obstacle for other panel estimation techniques. According to Abaidoo *et al.* (2021), because the GMM can permit the inclusion of lagged dependent variables with no loss of efficiency and controls for unobserved effects and controls for endogeneity, it is a more robust estimator, which has been used extensively in the literature. Studies such as Beck, Levine, and Loayza (2000),

Fiordelisi and Molyneux (2010), and Abaidoo and Agyapong (2021), among others, have all attested to the superiority of the GMM estimation technique. Furthermore, the current study also uses the two-step variant of the system GMM because it is efficient in its estimations compared to the one-step; because the two-step procedure is associated with smaller asymptotic variance (Hwang & Sun, 2018). Apart from the usual coefficients results, the GMM estimation procedure also reports relevant tests that can be analyzed to ascertain and confirm the robustness of the model and the results thereof. Inferences made from the estimations can therefore be said to be valid and robust upon satisfying these accompanied post-estimation tests produced by the two-step system GMM procedure.

4. Data and empirical analysis

This section presents the analysis and interpretation of the results of descriptive statistics and the various empirical estimates. Table 1 shows the results of the descriptive statistics for the various variables used in the study. Results as shown in the table suggest that there exists a significant disparity in financial market uncertainty dynamics among the various countries in the sub-region (higher standard deviation for financial market uncertainty as compared to the mean). Similarly, the statistics from the volatility variables (GDP growth volatility, inflation volatility, exchange rate volatility), including the macroeconomic risk index indicate that the degree of instability among the various economies in the sub-region vary significantly. The negative average institutional quality index, and indeed for government effectiveness affirm the conventional assertion that economies in the sub-region are characterized by weak institutional and governance structures.

4.1 Multicollinearity and variable acceptability tests

Table 1 also features the results of the variance inflation factor (VIF), which verifies whether the underlying data employed in this study's empirical analysis suffer from issues of multicollinearity. The goal is to ensure that all the variables used for the various estimations meet the acceptability threshold, in order not to run the risk of analyzing false results. Relying on the recommendation of a maximum VIF of 10 for variable acceptability by Liao and Valliant (2012), it is evident that none of the variables has a VIF over 10. Thus, data employed in the study do not suffer from multicollinearity. This conclusion is further affirmed by the

Variables	Obs.	Mean	Std. Dev	Min	Max	p1	p99	Skew	Kurt	VIF
FMU	759	0.003	0.019	-0.003	0.199	-0.001	0.148	8.373	75.171	-
VGDP	759	0.007	0.062	0	1.635	0	0.068	24.427	638.355	1.17
VINFL	759	0.008	0.029	-0.012	0.322	-0.007	0.15	7.805	73.541	1.07
VEXR	759	0.025	0.05	0	0.752	0.001	0.29	6.737	70.514	1.14
MRisk	759	0.711	1.166	-6.658	8.966	-3.39	5.452	0.337	21.161	1.01
GDPG	754	0.051	0.077	-0.301	1.5	-0.088	0.238	9.989	175.642	1.01
CPI	712	0.07	0.07	-0.096	0.466	-0.028	0.329	1.924	9.006	1.19
FDI	750	0.047	0.106	-0.087	1.618	-0.034	0.498	8.1	92.424	1.10
TL	719	0.721	0.353	0.207	3.114	0.24	1.619	1.744	9.781	1.24
FL	741	0.286	0.2	0	1.153	0.064	1	2.004	6.963	1.61
INSTQ	660	-0.513	0.692	-3.751	1.332	-2.305	1.073	-0.272	4.579	1.43
GEFF	659	-0.63	0.582	-1.885	1.057	-1.666	0.882	0.63	3.027	-

Note(s): FMU = Financial Market Uncertainty, VGDP = Macroeconomic Uncertainty, VINFL = Inflation Volatility, VEXR = Exchange Rate Volatility, MRisk = Macroeconomic Risk Index, GDPG = GDP Growth, CPI = Consumer Price Inflation, FDI = Foreign Direct Investment, TL = Trade Liberalization, FL = Financial Liberalization, INSTQ = Institutional Quality Index, GEFF = Government Effectiveness

Source(s): Authors' developed table

Table 1.
Descriptive statistics

results of the pairwise correlation matrix presented in [Table 2](#). [Suzuki, Olson, and Reilly \(2008\)](#) assert that the correlation coefficient between a pair of explanatory variables should not exceed 0.85 for the acceptability of the variables. The results as shown in the table show that the data is devoid of the problem of multicollinearity because none of the correlation coefficients exceed the recommended 0.85.

4.2 Empirical analysis and discussion

This section analyzes the results of the empirical estimation evaluating the relationship between macroeconomic risk, uncertainty, and financial market uncertainty for the sub-region. From [Table 3](#), it is evident that at a 1% alpha level, the first lag of financial market uncertainty is positive and significant; this suggests persistence in financial market uncertainty among economies in the sub-region. In other words, the current year's conditions of uncertainty in the financial market contribute to further uncertainty for the subsequent year, holding all other factors constant. In column (1), we observe that macroeconomic risk and exchange rate volatility have significant positive effects on financial market uncertainty. This observation is consistent with the conclusion by [Uhunmwangho \(2022\)](#) and [Kennedy and Nourzad \(2016\)](#) for the African and United States economies respectively but contrasts [Kearney and Daly \(1998\)](#) on the impact of exchange rate volatility for the Australian economy. This result suggests that macroeconomic risk, occasioned by instability in key macroeconomic factors, and exchange rate volatility contribute to uncertainty among financial markets in the sub-region, all else held constant. This outcome is consistent with the rational choice theory, in that, investors and key stakeholders will incorporate information on such economic phenomenon into the decision-making process, ultimately leading to engagement in behaviors that foster uncertainty in the financial market. Results in column (1) of [Table 3](#) further show that macroeconomic uncertainty and inflation uncertainty have a significant negative influence on financial market uncertainty, contrary to the conclusion by [Kearney and Daly \(1998\)](#) and [Uhunmwangho \(2022\)](#). These outcomes suggest that volatile output growth and inflationary conditions somehow reduce the uncertainty associated with the financial market performance among economies in the sub-region. In other words, financial market performance becomes predictable in an environment characterized by volatile output growth and inflationary conditions. This outcome could be explained by the activities of speculators, especially foreign speculators who may find such levels of instability as an opportunity to pursue high returns on their investments, thereby making the dynamics of the financial market less volatile.

For the various control variables examined in the study, results from [Table 3](#) show that financial liberalization and GDP growth have a positive impact on financial market uncertainty; suggesting that liberalized financial system and output growth heighten uncertainty in the financial market among economies in the sub-region, all things being equal. On the other hand, foreign direct investment is found to have a negative effect on financial market uncertainty; suggesting that growth in inflow of foreign direct investment helps in minimizing financial market uncertainty among economies in the sub-region, all else held constant. Inflation and trade liberalization according to reported coefficient estimates have no significant statistical influence on financial market uncertainty. Again, in column (1), it is evident that institutional quality has a significant negative impact on financial market uncertainty. This outcome suggests that improved governance and institutional structures among economies in the sub-region augment efforts at reducing uncertainty associated with the financial markets.

Columns (2) to (5) of [Table 3](#) evaluate the moderating role of institutional quality in the nexus between macroeconomic risk, volatility associated with inflation, exchange rate, GDP growth, and financial market uncertainty among economies in SSA. The results in this regard show that institutional quality has a significant negative moderating influence on how macroeconomic uncertainty (GDP growth volatility), inflation volatility, exchange rate volatility, and

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) FMU	1.000											
(2) VGDP	-0.015	1.000										
(3) VINFL	-0.036	-0.007	1.000									
(4) VEXR	-0.026	0.006	0.112	1.000								
(5) MRisk	0.002	-0.018	0.001	-0.019	1.000							
(6) GDPG	-0.037	0.237	-0.023	0.027	-0.043	1.000						
(7) CPI	-0.030	-0.006	0.219	0.233	-0.044	-0.021	1.000					
(8) FDI	-0.015	0.273	-0.020	-0.037	-0.036	-0.062	0.002	1.000				
(9) TL	0.093	0.145	-0.038	-0.141	0.043	-0.062	-0.052	0.264	1.000			
(10) FL	0.213	-0.077	-0.107	-0.158	0.060	-0.084	-0.120	-0.038	0.276	1.000		
(11) INSTQ	0.143	0.032	-0.058	-0.089	0.068	0.065	0.005	-0.023	0.125	0.492	1.000	
(12) GEFF	0.192	-0.109	-0.116	-0.095	0.010	0.004	-0.004	-0.140	0.025	0.684	0.613	1.000
Note(s): FMU = Financial Market Uncertainty, VGDP = GDP Growth, VINFL = Inflation, FDI = Foreign Direct Investment, TL = Trade Liberalization, FL = Financial Liberalization, INSTQ = Institutional Quality Index, GEFF = Government Effectiveness												
Source(s): Authors' developed table												

Table 2.
Pairwise correlations

Table 3.
Macroeconomy and
financial market
uncertainty –
moderating role of
institutional quality

	(1) FMU	(2) FMU	(3) FMU	(4) FMU	(5) FMU
Lag 1 – FMU	0.965*** (132.25)	0.977*** (567.09)	0.993*** (238.58)	0.954*** (138.66)	0.961*** (119.71)
Macroeconomic uncertainty	-0.246*** (-3.74)	-0.120 (-0.80)	-0.0865* (-1.85)	-0.0609 (-1.50)	-0.189 (-1.26)
Inflation volatility	-0.0435* (-1.89)	0.00379 (0.06)	-0.0178* (-1.78)	0.0764 (1.23)	-0.0359 (-0.40)
Exch. rate volatility	0.0420*** (8.76)	-0.000693 (-0.23)	0.0213*** (6.16)	-0.0706 (-6.83)	-0.0469*** (-4.41)
Macroeconomic risk index	0.00166*** (3.51)	0.00424*** (10.11)	0.00227*** (4.05)	-0.000592 (-1.41)	0.00781*** (8.70)
GDP growth	0.0504*** (11.91)	0.0559*** (11.61)	0.0534*** (12.19)	-0.0455*** (-8.95)	0.0260*** (3.17)
Consumer price inflation	0.00518 (1.03)	-0.0208*** (-3.56)	-0.00200 (-0.49)	-0.00322 (-0.59)	-0.00548 (-0.99)
Foreign direct investment	-0.0175*** (-2.56)	-0.0188*** (-4.90)	-0.00512* (-1.71)	-0.0181** (-2.53)	0.00904 (1.04)
Trade liberalization	-0.000790 (-0.97)	-0.00673*** (-10.41)	-0.00443*** (-3.85)	0.0246*** (26.80)	-0.00381*** (-2.65)
Financial liberalization	0.0449*** (15.38)	0.0226*** (8.36)	0.0287*** (17.50)	0.00508*** (2.16)	0.0308*** (12.35)
Institutional quality index	-0.00417*** (-6.87)	0.00300 (1.54)	-0.00207*** (-2.11)	0.00219* (2.00)	-0.00171 (-1.02)
VGDP*InstQ		-0.258** (-2.62)			
VINFL*InstQ			-0.344** (-2.34)		
VEXR*InstQ				-0.0938*** (-10.37)	-0.00471*** (-6.97)
MRisk*InstQ					(continued)

	(1) FMU	(2) FMU	(3) FMU	(4) FMU	(5) FMU
Constant	−0.0171*** (−22.73)	−0.00166 (−0.88)	−0.00959*** (−25.93)	−0.0146*** (−11.06)	−0.0113*** (−6.62)
Observations	565	565	565	565	565
No. of countries	33	33	33	33	33
F-statistics	13691022.4	129439.6	2.02e+07	26635522.5	3127828.4
P-value	2.05e-100	7.98e-85	0.000	3.50e-105	9.18e-91
Instruments	42	48	43	41	50
AR(1) <i>p</i>	0.184	0.168	0.195	0.223	0.116
AR(2) <i>p</i>	0.900	0.789	0.598	0.504	0.296
Hansen <i>p</i>	0.850	0.995	0.990	0.966	0.972
Note(s): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. <i>t</i> -statistics in parentheses. FMU = Financial Market Uncertainty, VGDP = Macroeconomic Uncertainty, VINFL = Inflation Volatility, VEXR = Exchange Rate Volatility, MRisk = Macroeconomic Risk Index, INSTQ = Institutional Quality Index					
Source(s): Authors' developed table					

Table 3.

macroeconomic risk influence financial market uncertainty. These outcomes suggest that improved governance and institutional structures could assist in alleviating adverse effects that macroeconomic volatilities and risk have on the financial market, all things being equal. These results reemphasize the important role of improved governance and institutional structures in stabilizing activities in the financial market among economies in the sub-region of SSA.

Table 4 presents results evaluating the effect of government effectiveness in the relationship between macroeconomic risk, volatility associated with inflation, exchange rate,

	(1) FMU	(2) FMU	(3) FMU	(4) FMU
Lag 1 – FMU	0.992*** (424.19)	0.990*** (206.53)	0.959*** (148.61)	0.999*** (409.10)
Macroeconomic uncertainty	–0.805** (–2.35)	0.155** (2.50)	–0.0454 (–0.82)	0.188** (2.37)
Inflation volatility	–0.0120 (–0.14)	0.114 (0.71)	0.0787 (1.28)	0.0176 (0.40)
Exch. rate volatility	–0.00393 (–0.81)	–0.0433*** (–9.15)	–0.0422** (–2.46)	0.0161** (2.65)
Macroeconomic risk index	–0.00189*** (–3.13)	–0.00140*** (–3.11)	–0.00110** (–2.07)	–0.00492*** (–4.99)
GDP growth	0.0443*** (12.80)	0.0173*** (8.26)	–0.0428*** (–6.36)	0.0529*** (9.18)
Consumer price inflation	–0.0243*** (–6.15)	–0.00527 (–1.55)	–0.00494 (–0.89)	–0.00614 (–1.27)
Foreign direct investment	–0.0262*** (–5.70)	0.000707 (0.23)	–0.00807 (–1.01)	–0.00970** (–2.54)
Trade liberalization	–0.00527*** (–4.95)	–0.00192*** (–2.81)	0.0218*** (25.96)	–0.00463*** (–5.93)
Financial liberalization	0.0207*** (10.34)	0.0266*** (16.70)	0.00614 (1.55)	0.0219*** (11.02)
Institutional quality index	0.00848*** (8.07)	–0.000478 (–0.69)	0.000594 (0.62)	0.00395*** (3.30)
VGDP*GEFF	–0.771*** (–2.99)			
VINFL*GEFF		0.108 (0.74)		
VEXR*GEFF			–0.0549*** (–3.98)	
MRisk*GEFF				–0.00411*** (–3.18)
Constant	0.00381* (1.97)	–0.00538*** (–11.92)	–0.0137*** (–8.10)	–0.000920 (–0.68)
Observations	565	565	565	565
No. of Countries	33	33	33	33
F-statistics	8507041.3	44175478.5	4407765.3	35398048.7
P-value	1.69e-97	1.38e-108	4.51e-93	4.26e-107
Instruments	48	50	41	45
AR(1)p	0.134	0.198	0.201	0.140
AR(2)p	0.690	0.589	0.652	0.538
Hansen p	0.962	0.998	0.891	0.900

Table 4.
Moderating role of
government
effectiveness –
relationship between
uncertainty in the
macroeconomic
environment and
financial market
uncertainty

Note(s): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *t*-statistics in parentheses. FMU = Financial Market Uncertainty, VGDP = Macroeconomic Uncertainty, VINFL = Inflation Volatility, VEXR = Exchange Rate Volatility, MRisk = Macroeconomic Risk Index, INSTQ = Institutional Quality Index, GEFF = Government Effectiveness

Source(s): Authors' developed table

GDP growth, and financial market uncertainty among economies in SSA. Results per columns (1), (3), and (4) indicate that government effectiveness plays a significant negative moderating role on the effect of macroeconomic uncertainty (GDP growth volatility), exchange rate volatility, and macroeconomic risk on financial market uncertainty. These results imply that effective governance has the potential to reduce the negative impact that macroeconomic risk and volatility associated with the exchange rate and GDP growth have on the financial market, all things being equal. These findings further highlight the importance of good governance among economies in the sub-region. On the other hand, government effectiveness is found to have an insignificant impact on the relationship between inflation volatility and financial market uncertainty as shown in column (2).

Various empirical estimates presented in both [Tables 3 and 4](#) are associated with post-estimation tests that verify the robustness or otherwise of the two-step system GMM model employed in the study. For the overall model fitness, results of the F-statistics and their corresponding p-values indicate that the explanatory variables adequately explain variability in financial market uncertainty among economies in the sub-region. The post-estimation tests also include results of the p-values of the AR(2) which tests for the potential presence of serial correlation in the estimates. The objective is to ensure the non-existence of serial correlation in the estimated coefficients. At the 5% alpha level, we fail to reject the null hypothesis that no serial correlation exists in the error terms (p-value >0.05); we conclude therefore that the estimates are all free from serial correlation. Another significant test reported in [Tables 3 and 4](#) verifies the validity of the instruments used for the estimates. This is captured by the Hansen test; the tables present the p-values of the Hansen test. At the 5% alpha level, we fail to reject the null hypothesis (instruments used for the estimates are valid) and conclude that the instruments used are valid for each estimation reported. These tests therefore attest to and support the validity and robustness of the various results and the interpretations thereof.

5. Conclusion

The macroeconomic environment plays a significant role in growth dynamics among economies all over the globe (see 2015; [Mbulawa, 2015](#); [Chirwa & Odhiambo, 2016](#)). The current study adds to the dynamic impact of macroeconomic conditions with a specific focus on their influence on uncertainty in the financial market. Specifically, this study examines the effect of macroeconomic risk and uncertainty associated with key macroeconomic variables on financial market uncertainty among economies in the sub-region of SSA with data compiled from relevant sources from 1996 to 2019. Additionally, the analysis carried out further verifies the impact of governance and institutional structures on the nexuses between macroeconomic risk, uncertainty associated with key macroeconomic variables, and financial market uncertainty. Empirical analyses verifying surmised relationships in the study are carried out using the two-step system GMM modeling technique due to its robustness in panel data analysis.

Results from the study suggest that macroeconomic risk and exchange rate uncertainty heighten financial market uncertainty among economies in the sub-region. These outcomes suggest that variability in financial market uncertainty among economies in SSA reflects uncertainties and risk dynamics in the macro economy to some extent. On the other hand, output growth volatility and volatility in inflationary conditions are found to have a negative impact on financial market uncertainty. These results suggest that such conditions somehow reduce the uncertainty associated with financial markets among economies in the sub-region; these results may be due to the speculative behaviors of investors who often seek to capitalize on risk and uncertainty due to the high returns associated with such a risky investment environment. Speculative moves invariably reduce

uncertainty in the financial market from the perspective of such risk-averse investors. Reported results further show that institutional quality and government effectiveness have a significant negative moderating impact on how macroeconomic risk and volatility associated with noted macroeconomic variables influence financial market uncertainty in the sub-region. This suggests that improved governance and institutional structures could lessen the negative effects of macroeconomic risk and volatility associated with inflation, GDP growth, and exchange rate on financial market uncertainty.

Empirical estimates examined above add to the extant literature on the subject matter because of the approach adopted. For instance, the approach adopted in this study adds to the financial market dynamics discourse by focusing on how risk and uncertainty among macroeconomic variables influence uncertainty associated with the market compared to studies that mostly focus on conditions impacting financial market or stock market performance. Study-specific derived or constructed variables examined further introduce interactions that cannot be readily found in the existing literature. Study findings reviewed above, have significant implications for governance and macroeconomic policies among economies in the sub-region. For instance, policymakers and governments in the sub-region may take a cue from key findings of the study that support the implementation of measures with the potential to minimize financial market uncertainty. Specifically, governments and policymakers can pursue measures that promote good and effective governance since these conditions are found to help reduce the negative impact of macroeconomic risk and uncertainty on financial market fluctuations. Additionally, given the conclusion that adverse macroeconomic conditions worsen financial market uncertainty, policymakers can formulate policies geared toward ensuring macroeconomic stability to minimize pressures on the financial market. We further recommend that key macroeconomic conditions with the propensity to foment financial market uncertainties are worth monitoring with adequate buffers to mitigate their impacts on the financial market. Additionally, exchange rate volatility's adverse impact on the financial market uncertainty calls for the need for economies and policymakers to have substantial reserves as a buffer to counter such undesirable effects.

References

- Abaidoo, R., & Agyapong, E. (2021). Macroeconomic risk and political stability: Perspectives from emerging and developing economies. *Global Business Review*, 09721509211047650. doi: [10.1177/09721509211047650](https://doi.org/10.1177/09721509211047650).
- Abaidoo, R., & Agyapong, E. K. (2023). Macroeconomic risk, uncertainty and financial market development: Emerging markets perspective. *Global Business Review*, 09721509221145356. doi: [10.1177/09721509221145356](https://doi.org/10.1177/09721509221145356).
- Abaidoo, R., & Agyapong, E. K. (2023). Inflation uncertainty, macroeconomic instability and the efficiency of financial institutions. *Journal of Economics and Development*, 25(2), 134–152. doi: [10.1108/jed-09-2022-0166](https://doi.org/10.1108/jed-09-2022-0166).
- Abaidoo, R., Agyapong, E. K., & Boateng, K. F. (2021). Stability in the banking industry and commodity price volatility: Perspective from developing economies. *Journal of Economic and Administrative Sciences*, 39(4), 988–1012. doi: [10.1108/jeas-05-2021-0089](https://doi.org/10.1108/jeas-05-2021-0089).
- Abdi, H., & Williams, L. J. (2010). Principal component analysis. *Wiley interdisciplinary reviews: Computational Statistics*, 2(4), 433–459. doi: [10.1002/wics.101](https://doi.org/10.1002/wics.101).
- Adjasi, C. K. (2009). Macroeconomic uncertainty and conditional stock-price volatility in frontier African markets: Evidence from Ghana. *The Journal of Risk Finance*, 10(4), 333–349. doi: [10.1108/15265940910980641](https://doi.org/10.1108/15265940910980641).

- Ahamed, M. M., & Mallick, S. K. (2019). Is financial inclusion good for bank stability? International evidence. *Journal of Economic Behavior and Organization*, 157, 403–427. doi: [10.1016/j.jebo.2017.07.027](https://doi.org/10.1016/j.jebo.2017.07.027).
- Arayssi, M., & Fakih, A. (2017). Finance–growth nexus in a changing political region: How important was the Arab Spring?. *Economic Analysis and Policy*, 55, 106–123. doi: [10.1016/j.eap.2017.05.001](https://doi.org/10.1016/j.eap.2017.05.001).
- Arayssi, M., Fakih, A., & Kassem, M. (2019). Government and financial institutional determinants of development in MENA countries. *Emerging Markets Finance and Trade*, 55(11), 2473–2496. doi: [10.1080/1540496x.2018.1507907](https://doi.org/10.1080/1540496x.2018.1507907).
- Asamoah, M. E., Adjasi, C. K., & Alhassan, A. L. (2016). Macroeconomic uncertainty, foreign direct investment and institutional quality: Evidence from Sub-Saharan Africa. *Economic Systems*, 40(4), 612–621. doi: [10.1016/j.ecosys.2016.02.010](https://doi.org/10.1016/j.ecosys.2016.02.010).
- Askari, G., Gordji, M. E., & Park, C. (2019). The behavioral model and game theory. *Palgrave Communications*, 5(1), 1–8. doi: [10.1057/s41599-019-0265-2](https://doi.org/10.1057/s41599-019-0265-2).
- Asteriou, D., & Price, S. (2005). Uncertainty, investment and economic growth: Evidence from a dynamic panel. *Review of Development Economics*, 9(2), 277–288. doi: [10.1111/j.1467-9361.2005.00276.x](https://doi.org/10.1111/j.1467-9361.2005.00276.x).
- Basel, S., Gopakumar, K. U., & Rao, R. P. (2020). Broad-based index for measurement of development. *Journal of Social and Economic Development*, 22(1), 182–206. doi: [10.1007/s40847-020-00093-2](https://doi.org/10.1007/s40847-020-00093-2).
- Beck, T., Levine, R., & Loayza, N. (2000). Finance and the sources of growth. *Journal of Financial Economics*, 58(1-2), 261–300. doi: [10.1016/s0304-405x\(00\)00072-6](https://doi.org/10.1016/s0304-405x(00)00072-6).
- Benhabib, J., Liu, X., & Wang, P. (2016). Sentiments, financial markets, and macroeconomic fluctuations. *Journal of Financial Economics*, 120(2), 420–443. doi: [10.1016/j.jfineco.2016.01.008](https://doi.org/10.1016/j.jfineco.2016.01.008).
- Binder, J. J., & Merges, M. J. (2001). Stock market volatility and economic factors. *Review of Quantitative Finance and Accounting*, 17(1), 5–26. doi: [10.1023/a:1011207919894](https://doi.org/10.1023/a:1011207919894).
- Chinzara, Z. (2011). Macroeconomic uncertainty and conditional stock market volatility in South Africa. *South African Journal of Economics*, 79(1), 27–49. doi: [10.1111/j.1813-6982.2011.01262.x](https://doi.org/10.1111/j.1813-6982.2011.01262.x).
- Chirwa, T. G., & Odhiambo, N. M. (2016). Macroeconomic determinants of economic growth: A review of international literature. *South East European Journal of Economics and Business*, 11(2), 33–47. doi: [10.1515/jeb-2016-0009](https://doi.org/10.1515/jeb-2016-0009).
- Chiu, C. W. J., Harris, R. D., Stoja, E., & Chin, M. (2018). Financial market volatility, macroeconomic fundamentals and investor sentiment. *Journal of Banking and Finance*, 92, 130–145. doi: [10.1016/j.jbankfin.2018.05.003](https://doi.org/10.1016/j.jbankfin.2018.05.003).
- Chomicz-Grabowska, A. M., & Orlowski, L. T. (2020). Financial market risk and macroeconomic stability variables: Dynamic interactions and feedback effects. *Journal of Economics and Finance*, 44(4), 655–669. doi: [10.1007/s12197-020-09505-9](https://doi.org/10.1007/s12197-020-09505-9).
- Corradi, V., Distaso, W., & Mele, A. (2012). Macroeconomic determinants of stock market volatility and volatility risk-premiums. (12–18). Swiss Finance Institute Research Paper.
- Czapkiewicz, A., Jamer, P., & Landmesser, J. (2018). Effects of macroeconomic indicators on the financial markets interrelations. *Finance a Uver*, 68(3), 267–292.
- Errunza, V., & Hogan, K. (1998). Macroeconomic determinants of European stock market volatility. *European Financial Management*, 4(3), 361–377. doi: [10.1111/1468-036x.00071](https://doi.org/10.1111/1468-036x.00071).
- Fiordelisi, F., & Molyneux, P. (2010). The determinants of shareholder value in European banking. *Journal of Banking and Finance*, 34(6), 1189–1200. doi: [10.1016/j.jbankfin.2009.11.018](https://doi.org/10.1016/j.jbankfin.2009.11.018).
- Fountas, S., & Karanasos, M. (2007). Inflation, output growth, and nominal and real uncertainty: Empirical evidence for the G7. *Journal of International Money and Finance*, 26(2), 229–250. doi: [10.1016/j.jimonfin.2006.10.006](https://doi.org/10.1016/j.jimonfin.2006.10.006).
- Hwang, J., & Sun, Y. (2018). Should we go one step further? An accurate comparison of one-step and two-step procedures in a generalized method of moments framework. *Journal of Econometrics*, 207(2), 381–405. doi: [10.1016/j.jeconom.2018.07.006](https://doi.org/10.1016/j.jeconom.2018.07.006).

- Kearney, C., & Daly, K. (1998). The causes of stock market volatility in Australia. *Applied Financial Economics*, 8(6), 597–605. doi: [10.1080/096031098332637](https://doi.org/10.1080/096031098332637).
- Kennedy, K., & Nourzad, F. (2016). Exchange rate volatility and its effect on stock market volatility. *International Journal of Human Capital in Urban Management*, 1(1), 37–46.
- Kumar, S., Raizada, A., Biswas, H., Srinivas, S., & Mondal, B. (2016). Application of indicators for identifying climate change vulnerable areas in semi-arid regions of India. *Ecological Indicators*, 70, 507–517. doi: [10.1016/j.ecolind.2016.06.041](https://doi.org/10.1016/j.ecolind.2016.06.041).
- Kumari, J., & Mahakud, J. (2015). Relationship between conditional volatility of domestic macroeconomic factors and conditional stock market volatility: Some further evidence from India. *Asia-Pacific Financial Markets*, 22(1), 87–111. doi: [10.1007/s10690-014-9194-7](https://doi.org/10.1007/s10690-014-9194-7).
- Lee, J. (2010). The link between output growth and volatility: Evidence from a GARCH model with panel data. *Economics Letters*, 106(2), 143–145. doi: [10.1016/j.econlet.2009.11.008](https://doi.org/10.1016/j.econlet.2009.11.008).
- Liao, D., & Valliant, R. (2012). Variance inflation factors in the analysis of complex survey data. *Survey Methodology*, 38(1), 53–62.
- Mbulawa, S. (2015). Determinants of economic growth in Southern Africa development community: The role of institutions. *Applied Economics and Finance*, 2(2), 91–102. doi: [10.11114/aef.v2i2.782](https://doi.org/10.11114/aef.v2i2.782).
- Nikmanesh, L., & Nor, A. H. S. M. (2016). Macroeconomic determinants of stock market volatility: An empirical study of Malaysia and Indonesia. *Asian Academy of Management Journal*, 21(1), 161.
- Pal, K., & Mittal, R. (2011). Impact of macroeconomic indicators on Indian capital markets. *The Journal of Risk Finance*, 12(2), 84–97. doi: [10.1108/15265941111112811](https://doi.org/10.1108/15265941111112811).
- Pflueger, C., Siriwardane, E., & Sunderam, A. (2020). Financial market risk perceptions and the macroeconomy. *Quarterly Journal of Economics*, 135(3), 1443–1491. doi: [10.1093/qje/qjaa009](https://doi.org/10.1093/qje/qjaa009).
- Segal, G., Shaliastovich, I., & Yaron, A. (2015). Good and bad uncertainty: Macroeconomic and financial market implications. *Journal of Financial Economics*, 117(2), 369–397. doi: [10.1016/j.jfineco.2015.05.004](https://doi.org/10.1016/j.jfineco.2015.05.004).
- Sendhil, R., Jha, A., Kumar, A., & Singh, S. (2018). Extent of vulnerability in wheat producing agro-ecologies of India: Tracking from indicators of cross-section and multi-dimension data. *Ecological Indicators*, 89, 771–780. doi: [10.1016/j.ecolind.2018.02.053](https://doi.org/10.1016/j.ecolind.2018.02.053).
- Shi, Y., Ahmed, K., & Paramati, S. R. (2021). Determinants of stock market development and price volatility in ASEAN plus three countries: The role of institutional quality. *International Journal of Finance and Economics*, 26(1), 560–572. doi: [10.1002/ijfe.1804](https://doi.org/10.1002/ijfe.1804).
- Shiller, R. J. (1988). Causes of changing financial market volatility. In *Proceedings, Federal Reserve Bank of Kansas City* (pp. 1–32).
- Subrahmanyam, A., & Titman, S. (2013). Financial market shocks and the macroeconomy. *Review of Financial Studies*, 26(11), 2687–2717. doi: [10.1093/rfs/hht058](https://doi.org/10.1093/rfs/hht058).
- Suzuki, N., Olson, D. H., & Reilly, E. C. (2008). Developing landscape habitat models for rare amphibians with small geographic ranges: A case study of Siskiyou mountains salamanders in the western USA. *Biodiversity and Conservation*, 17(9), 2197–2218. doi: [10.1007/s10531-007-9281-4](https://doi.org/10.1007/s10531-007-9281-4).
- Thampanya, N., Wu, J., Nasir, M. A., & Liu, J. (2020). Fundamental and behavioural determinants of stock return volatility in ASEAN-5 countries. *Journal of International Financial Markets, Institutions and Money*, 65, 101193. doi: [10.1016/j.intfin.2020.101193](https://doi.org/10.1016/j.intfin.2020.101193).
- Touny, M. A., Radwan, M. A., & Alayis, M. M. H. (2021). Macro determinants of stock market volatility: Evidence from Middle East region. *Afro-Asian Journal of Finance and Accounting*, 11(3), 376–391. doi: [10.1504/aajfa.2021.115672](https://doi.org/10.1504/aajfa.2021.115672).
- Trinh, Q. T., Nguyen, A. P., Nguyen, H. A., & Ngo, P. T. (2020). Determinants of Vietnam government bond yield volatility: A GARCH approach. *The Journal of Asian Finance, Economics, and Business*, 7(7), 15–25. doi: [10.13106/jafeb.2020.vol7.no7.015](https://doi.org/10.13106/jafeb.2020.vol7.no7.015).

-
- Uhunmwangho, M. (2022). Determinants of stock market volatility in Africa. *African Journal of Economic Review*, 10(2), 136–151.
- Vriend, N. J. (1996). Rational behavior and economic theory. *Journal of Economic Behavior and Organization*, 29(2), 263–285. doi: [10.1016/0167-2681\(95\)00063-1](https://doi.org/10.1016/0167-2681(95)00063-1).
- Wooldridge, J. M. (2001). Applications of generalized method of moments estimation. *The Journal of Economic Perspectives*, 15(4), 87–100. doi: [10.1257/jep.15.4.87](https://doi.org/10.1257/jep.15.4.87).

Corresponding author

Rexford Abaidoo can be contacted at: rabaidoo@umes.edu

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com