Unveiling the Dynamics: Exploring the Relationship between Emerging Stock Market Prices and Macroeconomic Indicators through ARDL Analysis

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ABSTRACT

Using a panel ARDL model, this study examines the relationship between stock prices and prices in other marketplaces. Examining data for 19 emerging market nations from January 2004 to December 2022, the study investigates how gold prices, interest rates, exchange rates, and inflation affect stock prices. With the exception of gold, the data show a persistently negative association between the variables in the long run. Short-term impacts are negligible overall, with the exception of gold's drawbacks. The 2008 global financial crisis had a short- and long-term negative impact on emerging market stock markets. The COVID-19 epidemic first caused stock market returns to decline, but eventually these effects reverse. In order to promote long-term growth in stock markets, this study emphasizes the significance of prudent fiscal policies meant to lessen government domination in financial markets and solid monetary policies centered on price stability.

Keywords: *Emerging stock markets, gold prices, exchange rate, inflation, interest rate, ARDL*

JEL Codes: C58; D53; E44

1. INTRODUCTION

Stock markets, which are the main institutional structure of capital markets, play an important role in economies. They fulfill certain functions, such as contributing to economic development through the mobilization of savings and investments (Levine, R., 1997), facilitating price discovery (Fama, 1970), providing liquidity (Demirgüç et al., 1996), reducing the cost of capital (Rajan and Zingales, 1998), and enabling the diversification risk (Markowitz, H., 1952). Additionally, stock markets serve as a barometer of economic health by reflecting the marketplace's expectations about real economic activity (Schwert, 1990). Furthermore, organized stock markets provide discipline in the marketplace by forcing companies to abide by the standards of corporate governance (Shleifer and Vishny, R., 1997). In the case of emerging markets, the stock markets serve an additional role beyond what has been previously described. As they are economies in need of foreign capital, the stock markets in those countries contribute to the channeling of foreign capital into viable projects that may contribute to the development of financial markets and the economic growth of the countries. Several studies provided evidence on how foreign capital inflows in the form of portfolio investment can enhance market liquidity, reduce the cost of capital, deepen the stock markets, and thereby contribute to the economic growth of emerging markets (Bekaert and Harvey, 2000; Sahay et al., 2015; Kim and Signal, 2000; Henry, 2000; Durham, 2003).

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Given the crucial role that stock markets play in emerging markets, the determinants of a sound and well-functioning capital market have been a research topic within finance and economics literature since the emergence of modern financial markets (Casssis, 2010). Especially the linkages between stock markets and the basic macroeconomic indicators, such as inflation, interest rate, and exchange rates, as well as major alternative asset classes, have essential theoretical and practical ramifications. From a theoretical standpoint, comprehending the relationship between stock markets and macroeconomic indicators aids in understanding the market frictions that prevent markets from achieving efficiency (Mishkin & Eakins, 2018), as well as the transmission mechanism that channels monetary policy decisions to the real economy through the capital markets (Fama, 1981). Understanding the interrelations between stock markets and macroeconomic indicators provides useful information to investors in shaping their investment strategies and to policymakers in making them take more informed and effective policy decisions from a practical point of view (Chen et al., 1986; Liu et al., 2021).

The main motivation and objective of this study are to investigate the relationship between emerging stock markets and macroeconomic indicators. The literature includes studies on various aspects of the interaction between stock markets and macroeconomic variables, as well as some other commodities, such as gold. Studies have examined the correlation between stock markets and gold prices (Hood and Malik, 2013; Arfaoui and Ben Rejeb, 2017; Pandey, 2018; Singhal et al., 2019; Ibrahim, 2012), exchange rates (Lee & Wang, 2015; Arfaou and Ben Rajeb, 2017; Olugbenga, 2012), the inflation rate (Fama, 1981; Chatrath et al., 1996; Rapach, 2002; He, 2006; Valcarcel, 2012; Durai and Bhaduri, 2009; Areli Bermudez Delgado et al., 2018), and interest rates (Apergis Despite some exceptions, those studies' results generally find a negative relationship between stock prices and those variables.

Despite the various perspectives on the subject, it remains valuable to explore certain aspects of emerging markets. First and foremost, the specific characteristics of emerging markets, such as different corporate governance practices as suggested by Claessens and Yurtoglu (2013) or different levels of financial development among them as suggested by Bekaert and Harvey (2003), may lead to different relationships between stock markets and macroeconomic indicators. Secondly, there are differences not just among the emerging markets but also between emerging and developed markets (Chari and Henry, 2004; Kim and Singal, 2000). Therefore, comprehending the distinctions between emerging and developed markets can aid in comprehending the varying stages of development in these markets and their level of integration with the global financial system. Finally, because globalization, technological progress, and changes in regulations are all causing financial markets to change quickly, it is important to keep studying how capital markets and the rest of the economy are connected. This is especially important in emerging markets (Beck et al., 2020), where new financial markets are constantly being created and how they affect economic growth. Given this dynamic nature, continuous research is essential to keep up with the changes and understand their implications for the relationship between stock markets and macroeconomic variables in emerging markets.

With this motivation in mind, the study makes a panel ARDL analysis to explore the impacts of gold prices, exchange rates, inflation rates, and interest rates on stock prices of emerging markets. The analysis also incorporates two dummy variables to investigate the impact of the 2008 Global Financial Crisis and the COVID-19 pandemic on stock prices. The sample is a monthly data set for 19 countries from MSCI Emerging Market Index, including Brazil, China, Colombia, the Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Kuwait,

Malaysia, Mexico, the Philippines, Pakistan, Poland, South Africa, Thailand, and Turkey, from January 2004 to December 2022.

The results of the study indicate the existence of a negative relationship between stock prices and macroeconomic indicators in the long run, while the short-term impacts are negligible overall. The study revealed a distinct correlation between gold prices and stock prices. While gold appears to be a hedge for stock market assets due to the negative association, the study revealed a positive correlation in the long run. The 2008 global financial crisis had a short- and long-term negative impact on emerging market stock markets. The COVID-19 epidemic first caused stock market returns to decline, but eventually these effects reversed.

There are three important contributions of the paper. First, the study employs a wide data set both in terms of date range and number of countries. The sample includes monthly data for 19 years in 19 countries. Reviewing the literature reveals that our study boasts one of the most comprehensive data sets.

Secondly, the analysis indicated a certain level of homogeneity among the emerging markets in terms of the relationship between the analysis variables. Interestingly, even when we perform a robustness check through sample splitting based on whether the countries are producing gold or not, the relationship between variables remains unchanged. Although we expect gold production to create heterogeneity among sample countries, the results show that the relationship between analysis variables remains relatively stable.

Finally, the study has implications for both investors and policymakers. For investors, the significant relationship between stock prices, macroeconomic variables, and gold provides insights into investment decisions. The study validates Liu et al.'s (2021) suggestion that macroeconomic stability is crucial for promoting a robust financial market environment in emerging markets, thereby promoting sustainable economic growth. Our findings demonstrate a positive long-term relationship between stock market development and reduced fluctuations in inflation and interest rates. From a monetary policy perspective, this requires a sound inflation-targeting policy to keep price levels stable (Levine and Zervos, 1998). In terms of fiscal policy, sustaining macroeconomic stability refers to reducing government budget deficits and borrowing needs (Blanchard and Fischer 1989). In other words, it refers to the government's prevention of fiscal dominance over domestic and foreign financial resources, which could eventually harm the development of financial markets and result in fewer resources for private sector investments (Sargent and Wallace, 1981).

The next section organizes the rest of the paper by providing a literature review and specifying research hypotheses. Following this section is a review of the literature on the topic, as well as the specification of the hypothesis. The section on methodology and data is followed by the testing of ARDL assumptions and the analysis results. The last chapter concludes with some implications for further research.

2. LITERATURE REVIEW AND SPECIFICATION OF RESEARCH HYPOTHESES

This section summarizes some significant findings from the literature on the connection between macroeconomic data and stock markets. We have conducted a separate analysis of the literature for each macroeconomic variable. We have also carefully examined the literature on the COVID-19 era and the global financial crisis of 2008. We include the study's hypothesis for each macroeconomic variable after summarizing the relevant research on that variable.

Academic research acknowledges the practice of incorporating hypotheses into the literature review. A number of academics support this method, claiming it facilitates a more coherent and smooth flow of ideas. According to Creswell (2014), for example, it is important to make the logical transition from literature to hypothesis plain and understandable by explicitly presenting hypotheses inside the literature review. This helps to integrate the research questions with current theories and findings. In order to securely establish hypotheses within pre-existing theoretical frameworks and thus increase the study's theoretical contribution and rigor, Eisenhardt (1989) addresses their integration within the framework of the literature review. According to Edmondson and McManus (2007), it is critical to match the research question's maturity with the research design. They also point out that incorporating hypotheses into the literature review can be particularly useful in emerging fields of study, where establishing the relevance and rigor of new hypotheses requires connecting them to previously published research. According to Bryman & Bell (2015), it is important to place hypotheses within the literature review because this will help to explicitly connect them to previous studies, giving them a theoretical underpinning and a clear justification.

2. 1. Gold prices and stock markets

The interaction between gold prices and stock markets has been the subject matter of academic debate for a long time. Given the relationship between those variables, studies in academia have usually provided controversial results. Several studies have proven that gold and stocks have an inverse relationship in normal times and market stress, making gold a hedge and a haven against stocks. For instance, Hood and Malik (2013), Arfaoui and Ben Rejeb (2017), and Pandey (2018) provide evidence for the negative relationship between gold and stocks.

However, there are studies that suggest otherwise. They discover a positive relationship exists between gold and stocks. For instance, a study by Al-Ameer et al. (2018) discusses the relationship between study the relationship between gold prices and the Frankfurt Stock Exchange (FSE) main index, DAX, using 12-year monthly data. They used three(3= analysis periods, namely pre-, during, and post-financial crises periods, to observe the change in the relationship. They found different results for each of the periods. Researchers found a positive relationship for the periods before (strong) and during (weak) financial crises, but a negative relationship for the post-financial crisis period. The study found a balanced positive relationship throughout the period. Singhal et al. (2019) find that gold prices have a positive impact on Mexico's stock prices. In Malaysia, researchers discovered a significantly positive relationship between gold and stocks (Ibrahim, 2012).

Based on the literature, we propose the following hypothesis:

H_1: An increase in global gold prices has a negative effect on emerging market stock prices.

2. 2. Exchange rates and stock markets

The literature has two broad arguments on the relationship between exchange rates and stock market prices (Lee and Wang, 2015), namely the traditional and portfolio approaches. The traditional approach suggests that if a nation's currency drops in value, residential manufacturers' exports will become more profitable, raising the stock prices of manufacturing firms; thus, weakening a nation's currency could increase stock prices in that nation. On the contrary, the portfolio approach suggests that increasing stock prices indicate a rise in

investors' demand for a country's assets. Consequently, the demand for the national currency will increase that will make it appreciate against foreign currencies. In terms of the relationship between exchange rates and stock prices, there are two basic and contradictory arguments. While the traditional approach to the issue asserts a positive correlation between exchange rates and stock prices, the portfolio theory posits that the relationship is negative.

The literature provides evidence for both cases. There are studies providing evidence for both perspectives. For instance, Arfaoui and Ben Rejeb (2017) argue that there is a negative relationship between the prices of gold, oil, and stocks and the value of US Dollar. The study explains this finding by referencing portfolio theory and analyzing the relationship between foreign investment flows and stock markets. This inflow would positively impact the US dollar; the dollar would appreciate, and the exchange rate would decrease. However, if gains in the stock market start to decline, in that case, these overseas investors will likely give up on their stock investments by selling them and converting their dollars into national currencies, leading to highly adverse consequences for the US dollar. This finding applies to all other currencies and stock markets around the world. This may be the most common way to understand the relationship between exchange rates and equity-market flows.

Dahir et. al. (2018) analyzes the dynamic relationships between exchange rates and stock returns in BRICS countries using wavelet analysis. Brazil and Russia show a positive relationship in the medium and long term, with exchange rates leading stock returns. The relationship is negative for India and South Africa, and there is no correlation for China.

We conducted the relationship between these variables from the Indian perspective under different periods: pre-, during, and post-global financial crises (Singh and Sharma, 2018). The study suggests a long-term relationship among the variables. A consistent negative correlation exists between USD-Rupee and the stock market, while crude oil and gold exhibit the opposite of this relationship.

Olugbenga (2012) investigated the short- and long-term impacts of exchange rates on Nigeria's stock market. While the exchange rate has a positive short-term impact on the stock market, it has a negative long-term impact.

Based on the results suggested in the literature, this study hypothesizes the following relationship between stock market prices and exchange rates:

H_2: Increases in exchange rates (depreciation of local currencies) have a negative effect on stock market prices.

2. 3. Inflation and Stock Markets

In his article dated 1981, Fama suggested a negative relationship between real returns on stocks and inflation. The literature on the relationship between an economy's general price level and stock prices suggests that the monetary neutrality principle holds in the long run. However, stock prices are usually considered inflation-sensitive in the short and medium term (Rapach, 2002; Li et al., 2010; and Valcarcel, 2012).

Areli Bermudez Delgado et al. (2018) discover that the Consumer Price Index (CPI) negatively affects the stock market index in the short run. However, in the long run, there is no relationship between the variables. In a study to assess the long-term reaction of real stock prices to a persistent inflation shock, Rapach (2002) employs data on 16 individual developed

countries and finds that an increasing pattern in inflation does not induce a prolonged actual decline in share prices in a significant number of developed countries. Valcarcel (2012) observes a weak correlation between US inflation and stock prices, and explains this relationship by highlighting the balancing impacts of monetary policy and fluctuations in financial asset demand. Chatrath et al. (1996) and Durai and Bhaduri (2009) analyze the relationship between inflation, stock prices, and output in the Indian context. Real output and inflation have an inverse relationship, whereas returns on stocks have a positive relationship. Inflation changes lag real output.

However, even when controlling the relationship between real output and inflation, the inverse relationship between inflation and stock returns persists (Chatrath et al., 1996). In the short and medium term, there exists an opposite relationship between inflation and the real return on stocks. However, long-term, the relationship between return on real stock and inflation depends on the individual relationship output has with each of them, as suggested by Fama (1981) and Durai and Bhaduri (2009).

Some studies in the literature do not or partially support the arguments above. For instance, Sekmen (2011) finds no relationship between stock markets and inflation. Similarly, Oxman (2012) also finds no relationship between inflation and stock returns from 1984–2009.
Based on the literature's suggested results, this study hypothesizes the following relationship between stock market prices and inflation:

H_3: In emerging markets, an inflationary environment causes a decrease in stock market prices.

2. 4. Interest Rates and Stock Markets

The relationship between stock prices and nominal interest rates reflects an investor's willingness to adjust his portfolio's composition between stocks and bonds. A rise (fall) in interest rates motivates investors to change their portfolio structure in favor (against) bonds (Apergis and Eleftheriou, 2002). An alternative explanation for the negative relationship between interest rates and stock prices is that a rise in interest rates decreases the value of potential dividend earnings, which would weaken stock prices. Low interest rates result in lower borrowing opportunity costs, while lower interest rates stimulate investment and market-induced economic activity (Andrieș et al., 2014). Empirical studies like Akbar et al. (2019) using Pakistani data and Kasman et al. (2011) using Turkish data also support the negative relationship between interest rates and stock market prices.

We state the following hypothesis regarding the correlation between interest rates and stock market prices:

H_4: An increase in interest rates leads to a decrease in emerging market stock prices.

2. 5. Global Financial Crisis, COVID-19 Pandemic, and Stock Markets

Globalization and the linkages between financial markets have resulted in crises having significant impacts on financial markets, regardless of their nature or where they emanate. Specifically, the GFC and COVID-19 have significantly impacted stock markets.

Njiforti (2015) investigated the GFC's shock on the Nigerian stock market. In the short and long run, the study found an adverse effect on the stock market. Similarly, Sakthivel et al. (2014) found that the GFC had an adverse effect on the stock market in India. Also, Ajlouni et al. (2012) investigate the effect of the GFC on the stock index in Jordan. The GFC had a negative impact on the Amman stock exchange, yet this negative impact eventually subsided. Iyke and Maheepala (2022) investigated the impact of COVID and the moderating role of monetary policy, using data from 23 emerging economies. They found that COVID had a negative effect on stock returns, and conventional monetary policy was unable to mitigate this adverse effect. Similarly, Kamal and Wohar (2023) examine the effect of COVID-related news and sentiments on stock returns in the UK, finding COVID-19 to have a significant negative impact on stock returns. Also, Caporale et al. (2022) investigated the effect of COVID on the stock returns of G20 countries and found COVID to have caused a reduction in the returns of stocks (Tetteh et al. 2022). Additionally, they discovered that COVID-19 was negatively impacting the stock markets of emerging economies. Celik et al. (2022) similarly investigated the impact of COVID on the European Union's stock prices, finding that COVID-19 adversely affected the EU's stock markets.

H_5: The global financial crisis had a negative impact on emerging market stock prices.

H_6: COVID-19 The pandemic had a negative impact on emerging market stock prices.

3. METHODOLOGY AND DATA

3.1. Methodology

The study utilizes panel data analysis to investigate the relationship between stock prices and gold prices, inflation, exchange rates, and interest rates. Using panel data has some advantages. First, as Brooks (2019) suggested, panel data enables dealing with more complex problems than possible with just time series or cross-sectional data. Second, the panel format adds variation to the data set, potentially reducing multicollinearity issues that could arise from analyzing the data as individual time series alone. Finally, heteroscedasticity is acceptable in panel data because there is heterogeneity among various individual units using different estimation techniques.

Our panel data can be considered a heterogeneous dynamic panel because the number of cross-sectional units (N) is smaller than the amount of time (T). We employ the General Autoregressive Distributed Lag (ARDL) method to analyze the relationship between stock market prices and macroeconomic indicators (Pesaran et al., 1999). Following Pesaran et al. (1999), the study utilizes the following general ARDL (p, q, q,…., q) model;

$$y_{it} = \sum_{j=1}^{p} \delta_{ij}\, y_{it-j} + \sum_{j=1}^{q} \beta'_{ij}\, X_{it-j} + \mu_i + \varepsilon_{it}$$

Where y_{it} denotes the dependent variable; X_{it} is a $(k \times 1)$ is the vector of explanatory variables that are allowed to be *I(0)* or *I(1)* or cointegrated; δ_{ij} is the coefficients of the lagged dependent variables called scalars; β_{ij} are (kx1) coefficient vectors; μ_i is the unit-specific fixed effects; i stands for individual units from 1 to N; t stands for the period from 1 to T; p, q are optimal lag orders; ε_{it} is the error term.

The above model is re-parameterized to structure the long- and short-run cointegration dynamic panel model.

$$\Delta y_{it} = \theta_i(y_{it-1} - \lambda'_i X_{it}) + \sum_{j=1}^{p-1} \xi_{ij}\, \Delta y_{it-j} + \sum_{j=1}^{q-1} \beta'_{ij}\, \Delta X_{it-j} + \mu_i + \varepsilon_{it}$$

Where θ_i is the group-specific speed of adjustment coefficient that is expected to be less than zero; λ'_i is the vector of long-run relationship, $(y_{it-1} - \lambda'_i X_{it})$ is the error correction term, ξ_{ij}, and β'_{ij} are the short-run dynamic coefficients.

3.2. Data and Variables

This study explores the relationships between stock market prices and certain macroeconomic indicators of emerging market countries: exchange rates, inflation rates, interest rates, and gold prices. We employ the emerging country list of the Morgan Stanley Capital International (MSCI) Emerging Market Index as of March 1st, 2022, using the index country membership tool (MSCI, 2022a), to determine the sample of the countries. This index includes countries based on their economic development, market accessibility, size, and liquidity (MSCI, 2022b). The study excludes Chile, Qatar, Peru, Taiwan, and the UAE, out of the 24 countries in the index, due to insufficient data availability or accessibility. The country sample ended up with 19 countries: Brazil, China, Colombia, the Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Kuwait, Malaysia, Mexico, the Philippines, Pakistan, Poland, South Africa, Thailand, and Turkey.

We choose countries' stock indices (STI) based on the representation and availability of data. The appendix includes a list of stock market indices utilized for each country. The Annual Consumer Price Index (CPI) measures inflation (INF) in accordance with a significant portion of the literature. The exchange rates (EXC) represent the price of dollars in terms of local currencies. We employ the interest rates (INT) reported by the International Monetary Fund's (IMF) International Financial Statistics as a proxy. We convert the global gold price (GOLD) into national currencies using the local currency exchange rates that represent all the variables. The panel data set includes monthly data on each variable for each country for the period between January 2004 and October 2022. We use investing.com as the data source for stock index and gold price data. On the other hand, we source the inflation, exchange rate, and interest rate data from the International Financial Statistics Database of the IMF.

To be used within the analysis, monthly changes are calculated for STI, GOLD, and EXC using the following formula.

$$Monthly\ Change\ in\ Asset\ Prices\ (\Delta y_{it}) = \ln y_{it} - \ln y_{it-1}$$

$\Delta(y_{it})$ stands for the monthly change in the variables of the stock market prices, gold prices, and exchange rate for country *i* during the month *of t.*

Using the same logic monthly inflation rate is calculated using the formula of.

$$Monthly\ Change\ in\ Inflation\ (\Delta INF_{it}) = \ln CPI_{it} - \ln CPI_{it-1}$$

The monthly difference in interest rates is calculated as follows;

$$Monthly\ Change\ in\ Interest\ Rates\ (\Delta INT)_{it=}\ INT_{it}\ -\ INT_{it-1}$$

After calculating the monthly changes in each variable, those returns on stocks, gold, exchange rate, and monthly differences in interest rates are converted into real terms using the monthly inflation rate. The main reason for this conversion is to avoid multicollinearity. For conversion, the following formula is used;

$$Real\ Monthly\ Return(y_{it}) = \frac{(1 + Monthyly\ Return\ (y_{it}))}{(1 + Montly\ Inflation\ Rate_{it})} - 1$$

From now on, all quantitative variables used within the analysis are real variables, and all the acronyms used represent the real change in variables. In addition to the dependent variable of STI and explanatory variables of GOLD, EXC, INF, and INT, the analysis includes two dummy variables for the global financial crisis of 2008 (GFC) and the COVID-19 periods. Furthermore, the data set also includes a categorical variable through which the counties are categorized based on whether they are gold-producing (GPC) or non-gold-producing (NGPC). Table 3.1 summarizes the variables;

Variables	Acronym
Monthly Real Return on Stock Market Price	RRSTI
Monthly Real Return on Gold	RRGOLD
Monthly Real Return on Foreign Exchange	RREXC
Monthly Real Difference in Interest Rate	RDINT
Monthly Rate of Inflation	INFRATE
Dummy for Global Financial Crisis	GFC
Dummy for COVID-19 Pandemic	COVID

Table 3.1 The Names and Acronyms of Variables Used in the Analysis

Given the variables for the analysis, the above re-parameterized model is adapted to our study using the formula below.

$$\begin{aligned}\Delta RRSTI_{it} = {} & \theta_i(RRSTI_{it-1} - \lambda'_i RRGOLD_{it} - \lambda'_i RREXC_{it} - \lambda'_i INFRATE_{it} \\ & - \lambda'_i RDINT)_{it}) \\ & + \sum_{j=1}^{p-1} \xi_{ij}\, \Delta RRSTI_{it-j} + \sum_{j=1}^{q-1} \beta'_{ij}\, \Delta RRGOLD_{it-j} + \sum_{j=1}^{q-1} \beta'_{ij} \Delta RREXC_{it-j} \\ & + \sum_{j=1}^{q-1} \beta'_{ij} \Delta INFRATE_{it-j} + \sum_{j=1}^{q-1} \beta'_{ij} \Delta RDINT_{it-j} + \beta'_i\, GFC \\ & + \beta'_i COVID + \mu_i + \varepsilon_{it}\end{aligned}$$

4. EMPIRICAL ANALYSIS AND THE RESULTS

4.1. Descriptive analysis

Table 4.1 presents the summary statistics of the data. The statistics refer to the real monthly stock prices, gold, foreign exchange, and interest rate returns. In the analysis period, the average monthly real return on stock prices was 33 bps, 57 bps on gold, and -9 bps on the exchange rate, indicating real appreciation in local currencies against the dollar. The monthly average inflation rate is 42 bps, while the real monthly average difference across the sample is -131 bps. The leptokurtic distribution of the series positively skews all variables, except for

the real returns on STIs. The highly significant Jarque-Bera statistics confirm that the series has a non-normal distribution.

Variables	RRSTI	RRGOLD	RREXC	INFRATE	RDINTR
Mean	0.003375	0.005737	-0.000992	0.004272	-0.013154
Median	0.006127	0.001587	-0.003643	0.003243	-0.005067
Maximum	0.362980	0.672125	0.912908	0.135755	6.657062
Minimum	-0.898664	-0.294987	-0.186413	-0.033904	-5.600438
Std. Dev.	0.066921	0.048609	0.037071	0.007701	0.529627
Skewness	-1.026143	1.041628	4.488044	3.453212	1.133422
Kurtosis	14.31177	13.29331	94.34417	42.11175	38.29210
Jarque-Bera	23542.42	19645.78	1500583.	280979.3	222775.7
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	14.43004	24.52408	-4.239287	18.26169	-56.23488
Sum Sq. Dev.	19.14080	10.09856	5.873687	0.253481	1198.876
Observations	4275	4275	4275	4275	4275

Table 4.1 Pooled Sample Descriptive Statistics for the Variables

4.2. Testing for the assumptions of ARDL analysis

4.2.1. Testing for Multicollinearity among variables

Certain assumptions must hold for unbiased estimation of the coefficients of ARDL. First, the variables used in the analysis should have no multicollinearity among each other.

Variables	RRSTI	RRGOLD	RREXC	INFRATE	RDINTR
RRSTI	1				
RRGOLD	-0.1026	1			
RREXC	-0.2778	0.4446	1		
INFRATE	-0.0795	-0.0452	-0.1102	1	
RDINTR	-0.0778	0.0567	0.0699	0.1426	1

Table 4.2 Correlation analysis

The results of the correlation analysis in Table 4.2 shows a low linear relationship among the variables except that between the real returns of gold and the exchange rate. This is because exchange rates are used to convert global gold prices into local currencies. However, the effect of this conversion is mitigated by taking real changes in all variables into consideration. As a result of correlation analysis, we may conclude that there is no significant multicollinearity problem among variables.

4.2.2. Testing for Cross-Sectional Dependence

Common shocks and unobserved components may cause panel-data models to show significant cross-sectional dependence in their errors (Hoyos and Sarafidis, 2006). We need to conduct a cross-sectional dependence test to determine the appropriate tests for verifying the stationarity of the data series. We conduct the Lagrange multiplier (LM) test by Breusch and Pagan (1980), the cross-sectional dependence (CDlm) test by Pesaran (2004b), the cross-sectional dependence (CD) test by Pesaran (2004a), and the bias-adjusted CD test by Pesaran

et al. (2008) to determine the presence or absence of cross-sectional dependence. The results of these tests guide our choice of tests for the panel unit root.

Variables	Breusch, Pagan 1980	Pesaran 2004 CDlm	Pesaran 2004 CD	Bias-adjusted CD test
RRSTI	8366.879***	443.182***	84.281***	1998.962 ***
RRGOLD	13369.371***	713.686***	110.806***	1954.055***
RREXC	6416.061***	337.694***	71.939***	2038.833***
INFRATE	972.363***	43.333***	21.818***	1965.53***
RDINTR	423.426***	13.65***	9.476***	1954.628***

Table 4.3 Cross-sectional dependence
Notes:
* Implies the rejection of the null of no cross-section dependence at the 10% level.
** implies the rejection of the null of no cross-section dependence at the 5% level.
*** implies the rejection of the null of no cross-section dependence at the 1% level.

Table 4.3 summarizes the results of the cross-sectional dependence tests. The null hypothesis of no cross-sectional dependence is rejected in all the tests. Depending on these results, a test that is suitable for cross-sectional dependence is selected for stationarity analysis.

4.2.3. Testing for the stationarity of the variables

The Breitung test proposed by Breitung and Das (2005) is suitable for our data because it considers the availability of cross-sectional dependence. Table 4.4 displays the stationarity test results for the Breitung test for variables at levels and also for the first differences. The null hypothesis that variables have unit roots is rejected for all variables at 1% significance level. So, data series can be considered as stationary.

Variables	Breitung	Breitung + Trend
RRSTI	-18.0114***	-16.4705***
RRGOLD	-15.5354***	-16.8077***
RREXC	-24.0835***	-23.5722***
INFRATE	-21.7792***	-14.9177***
RDINTR	-14.8024***	-12.9075***
DRRSTI	-36.3210***	-17.2429***
DRRGOLD	-16.1740***	-24.1674***
DRREXC	-47.8670***	-30.5451***
DINFRATE	-19.8064***	-12.9155***
DRDINTR	-20.9858***	-20.0052***

Table 4.4 Panel Unit Root Test for Variables at Levels and for the First Differences
Notes:
For the Breitung test, the null hypothesis is that panels have unit roots, and the alternative hypothesis is that panels are stationary. *Implies that statistics are significant at the 10% level of significance.
** implies that statistics are significant at the 5% level of significance.
*** implies that statistics are significant at the 1% level of significance

4.2.4. Testing for Cointegration

Before conducting the ARDL model, we conduct a cointegration test to determine whether a long-run relationship exists between the variables under study. For this purpose, the error-correction–based cointegration test that considers cross-sectional dependence for panel data developed by (Westerlund, 2007) is employed.

	Statistic	p-value
Variance ratio	-4.3372	0.0000

Table 4.5 Westerlund Panel Tests of Cointegration

Table 4.5 displays the result of the Westerlund cointegration test. The null hypothesis of no cointegration is rejected at 1% significance level. This result indicates the existence of panel cointegration, giving a green light for estimating an ARDL panel model.

4.3. Selecting the Appropriate Approach to Predict the Parameters

In ARDL analysis, determining the proper approach to calculate the parameters of the equation is of particular importance. To predict the parameters of this model, Pesaran (1999) suggested two alternative estimation methods, namely the Mean Group (MG) and Pooled Mean Group (PMG) approaches. While MG works well if all the intercepts and coefficients are allowed to vary across units, PMG will be preferable if the slope of the long-run equation is homogeneous across units of analysis. A third technique uses dynamic fixed effects (DFE) that hold under the assumption of a homogeneous slope. The Hausmann test is conducted to decide which estimation technique to use.

Ho: PMG is efficient					Ho: PMG is efficient				
	Coefficients					Coefficients			
Variable	(b)	(B)	(b-B) Difference	S. E	Variable	(b)	(B)	(b-B) Difference	S. E
	MG	PMG				PMG	DFE		
GOLD	-0.1367	-0.0273	-0.1094	0.0937	GOLD	-0.0273	-0.0381	0.0108	0.2364
LEX	-0.8964	-0.7238	-0.1726	0.1206	LEX	-0.7238	-0.5661	-0.1576	0.3358
INF	-2.5391	-1.9016	-0.6375	0.3625	INF	-1.9016	-1.6830	-0.2185	1.5761
INT	-0.0143	-0.0076	-0.0068	0.0094	INT	-0.0076	-0.0041	-0.0034	0.0208
chi2 (4) = 6.94					chi2 (4) = 0.31				
prob>chi2 = 0.1393					prob>chi2 = 0.9893				

Table 4.6 Hausman (1978) Test

The result of the Hausman test shown in Table 4.6 shows that the null hypothesis of PMG method is efficient cannot be rejected at significance levels of neither 1% nor 5%. This is a sign that PMG is the proper estimator to use.

4.4. The Estimation of ARDL Parameters using the PMG Approach

Given the results of the Hausman test, the estimations for the parameters of the ARDL model are predicted using E-views software. There are three different model selection methods with automatic lag selection methods in E-views, namely, Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn (HQ) criterion. While E-views uses an ARDL (3, 3, 3, 3, 3, 3, 3) model to predict the parameters considering AIC, ARDL (1, 1,

1, 1, 1, 1, 1) models is selected when the SIC and HQ are considered. The model that selected the optimal lag using AIC is considered for the primary analysis. The model with AIC is considered because the level of information provided by the AIC model is much higher than the models that employed SIC and HQ.

Table 4.7 summarizes the coefficients for the ARDL model for the whole sample. First of all, the error correction term (ECT) is negative and highly significant, a sign of the existence of a long-term relationship between stock prices, gold, exchange, inflation, and interest rates. The speed of disequilibrium adjustments is 96%, and the constant (μ_i) is also significant and 1%.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
RRGOLD	0.137	0.042	3.265	0.001
RREXC	-0.662	0.057	-11.582	0.000
INFRATE	-2.313	0.261	-8.86	0.000
RDINTR	-0.016	0.003	-5.20	0.000
GFC	-0.004	0.002	-1.688	0.040
COVID	0.007	0.002	2.823	0.004
Short Run Equation				
COINTEQ01	-0.963	0.023	-41.947	0.000
D(RRSTI(-1))	-0.106	0.024	-4.439	0.000
D(RRSTI(-2))	-0.084	0.014	-6.030	0.000
D(RRGOLD)	-0.131	0.034	-3.88	0.000
D(RRGOLD(-1))	-0.153	0.033	-4.62	0.000
D(RRGOLD(-2))	-0.051	0.025	-2.03	0.0425
D(RREXC)	-0.146	0.091	-1.616	0.106
D(RREXC(-1))	-0.103	0.087	-1.194	0.233
D(RREXC(-2))	-0.045	0.038	-1.189	0.234
D(INFL_RATE)	0.117	0.214	0.546	0.585
D(INFL_RATE(-1))	-0.393	0.239	-1.643	0.100
D(INFL_RATE(-2))	-0.004	0.164	-0.026	0.979
D(RDINTR)	0.002	0.006	0.412	0.680
D(RDINTR(-1))	0.005	0.008	0.657	0.511
D(RDINTR(-2))	-0.003	0.004	-0.732	0.464
D(GFC)	-0.034	0.009	-3.780	0.000
D(GFC(-1))	0.021	0.008	2.793	0.005
D(GFC(-2))	-0.033	0.008	-4.062	0.000
D(COVID)	-0.025	0.008	-3.195	0.001
D(COVID(-1))	-0.081	0.011	-7.597	0.000
D(COVID(-2))	-0.155	0.020	-8.090	0.000
C	0.0102	0.002	6.259	0.000
Root MSE	0.055999	Mean dependent var		0.000350
SD dependent var	0.090734	S.E. of regression		0.059002
Akaike info criterion	-2.863076	Sum squared resid		13.40602
Schwarz criterion	-2.232230	Log likelihood		6543.826
Hannan-Quinn criteria.	-2.640212			

Table 4.7 Estimation results of the ARDL model on real return on stock prices for the whole sample

* Note: p-values and any subsequent tests do not account for model selection

Regarding the long-term relationships, the real return on gold positively affects the real returns on stock prices. On the other hand, the real return on the exchange rate, inflation rate, and real difference in monthly interest rate has a negative impact on the returns GFC, and covid dummies have all significant and negative impacts on stock prices. While the dummy for the global financial crisis turns out to be significantly negative, the long-run impact of COVID-19 seems to be positive.

In the short term, the real stock returns are affected by their first and second lags negatively. The effect of real return on gold has a negative impact on real stock returns, pointing out to the role gold as a portfolio diversifier for stocks in the short run. However, the coefficients of real monthly return on foreign exchange, inflation rate, and real difference in interest rates, together with those of their lagged values, are insignificant. In other words, the short-term effect of macroeconomic indicators on stock prices' real returns is insignificant. The global financial crisis and COVID-19 dummies, as well as their lagged values, have a significant and negative impact on stock prices.

According to the analysis results, the first hypothesis suggesting a negative relation of gold prices to stock market prices is partially supported. Gold prices are moving in the same direction together with stock market prices in the long run, which is in line with the conclusions of the studies such as Al-Ameer et al. (2018), Singhal et al. (2019), and Ibrahim (2012). The analysis provides supportive evidence for the hypothesis for the short term. Gold prices and that gold can be a hedge against stock prices. This finding conforms with that of Hood and Malik (2013), Arfaoui and Ben Rejeb (2017), and Pandey (2018). Even the lagged values of the change in real returns on gold have a negative effect on the changes in real returns in stock market prices.

The second hypothesis of the analysis proposes that exchange rates have a negative effect on stock prices. This hypothesis is also partially supported. According to the analysis, the real returns in exchange rates have a negative impact in the long run. In other words, the depreciation of a national currency against the US dollar may indicate a trend of decline in the national stock market prices for long time periods. In the short run, the coefficients of the lagged value of changes in real exchange returns are still negative but statistically insignificant at the 5% level. The findings provide long-term support for portfolio theory, as Lee and Wang (2015) suggest. The significant long-run relationships between exchange rates and stock prices align with studies such as Singh and Sharma (2018) and Olugbenga (2012).

Our analysis's third hypothesis focused on the relationship between inflation and stock market prices. The proposed negative relationship is partially supported for the long run. As with the exchange rates, inflation is also negatively related to real returns on stock prices in the long run. The coefficient of inflation rate in the long run equation is-1.8, indicating that a 1% increase in inflation rate is expected to lead to an average 1.8% decrease in real returns of stock prices. On the other hand, the short-term coefficients of lagged values of the difference in inflation rate are insignificant. So, there is not enough evidence to argue that the relationship between the inflation rate and real returns on stock prices is negative in the short run. The findings of the study seem to contradict most of the literature, which argues that inflation has a negative impact on stock prices in the short run but is irrelevant in the long run (Rapach, 2002; He, 2006; and Valcarcel, 2012; Areli Bermudez Delgado et al., 2018;)). However, the

results support the findings of the study and comply with Sekmen (2011) and Oxman (2012) as far as the short run is considered.

Based on the results suggested within the literature, this study hypothesized the relationship between stock market prices and interest rates as a negative relationship. The results indicated that this negative relationship does hold for the long term. In the short term, the change in real monthly returns on stock prices is independent of the real changes in interest rates. The long-term relationship shows that when interest rates rise, stock returns fall and vice versa. This finding conforms with that of Akbar et al. (2019).

The GFC and covid dummies are significant in the short and long term at the 1% level. The GFC dummy negatively affects stock prices in both the short and long term, with only the first lag showing a positive impact in the short term. The finding on GFC conforms with that of (Njiforti, 2015) and (Sakthivel et al., 2014). COVID-19 dummy has highly significant impacts on stock prices in the short and long term with different directions- negative in the short term and positive in the long term. The finding of this study on the adverse impact of COVID-19 conforms with the results of Iyke and Maheepala (2022), Kamal and Wohar (2023), and Çelik et al. (2022). When financial crises occur, negative news will immediately have an impact on the short term.

4.5. Robustness Check

In order to conduct a robustness check of the analysis for the whole analysis, the sample is divided into two groups based on the criteria whether the countries are gold producing counties (GPCs) or non-gold producing countries (NGPCs). The countries that are included in each sub-sample are listed in Table 4.8. The reason for dividing the sample was to control for the possible impact and dominance of gold on the economies as well as on the stock markets of the gold producing countries. In other words, gold production might be a source of heterogeneity that might change the results of the analysis. In fact, sample splitting is a common method for testing the robustness of empirical findings, particularly in financial research. This method allows researchers to evaluate the consistency of associations across various subgroups, revealing the sample's heterogeneity (Stock & Watson, 2003; Wooldridge, 2015). Angerist and Pischke (2008) argue that sample splitting should be used as a robustness check to account for potential heterogeneity and ensure results are not influenced by specific sub-samples. There are studies in the literature which employed this method (Fama and French, 1993; Jegadeesh and Titman, 1993). Gold production is also used as a key economic component to split samples, examining its role as a hedge and safe haven in financial analysis (Baur and Lucey, 2010; Van Hoang et al. (2016).

Gold Producing Countries	Non-Gold Producing Countries
Brazil	Czechia
Canada	Greece
Columbia	Hungary
Egypt	Indonesia
India	Korea
Mexico	Kuwait
Philippines	Malaysia
Russia	Pakistan
South Africa	Thailand
Turkey	

Table 4.8 Gold producing countries vs. non-gold producing countries

The results of the ARDL analysis for both groups are presented in the appendix in Tables B.1 and B.2, respectively. The E-views software produced an ARDL (2, 4, 4, 4, 4, 4, 4) model for Gold-Producing Countries (GPCs) and ARDL (2, 3, 3, 3, 3, 3, 3) model for Non-Gold-Producing Countries (NPCs) based upon AIC. Like the analysis for the whole sample, the error correction terms for both subsamples are significantly negative, showing the mean-reverting behavior of real return on stock prices in the long term. The size of the error correction terms is -0.94 and -1.001 for GPCs and NPCs, respectively. The constants are also significant and close to the constant for the whole sample.

In terms of the long-run equation, the results for GPCs align with the analysis findings for the whole sample. The real return on gold is positively; real return on exchange, inflation rate, real difference in interest rate, and global financial crisis dummy is negatively related to the real returns on stock prices. The long-run impact of COVID-19 is the only difference, and it has no significant effect on GPCs.

The short-run analysis shows a negative relationship between the real return on gold and stock market prices across the entire sample. Gold is a short-term hedging asset for stocks. Unlike the analysis for the whole sample, the second and third lags of real return on the exchange rate are significantly negatively related to the stock market prices. This result is in line with our hypothesis. The effect of the inflation rate is insignificant as it is for the whole sample analysis. As with the exchange rate, real difference in interest rate is also negatively related to real stock returns. One interesting observation is that, in the short run, the global financial crisis appears insignificant in the case of GPCs. Given the long-term significant and negative impact, this result suggests that the spread of the global financial crisis to GPCs was gradual. In the short run, the COVID-19 dummy has a negative effect on real stock price returns, consistent with the analysis of the whole sample.

The long-term real returns on gold do not affect the real returns on the stock prices of NPCs. This indicates that while stock markets in gold-producing countries have a positive long-term relationship with gold prices, this relationship is negligible for non-gold-producing countries. The strong correlation between the financial markets in emerging gold-producing countries and the performance of gold in global markets may explain this. On the other hand, the real return on an exchange rate, inflation rate, and real difference in interest rate are negatively related to the real returns on stock prices in the long term. Unlike previous analyses, the GFC

dummy is insignificant to NPCs. COVID-19 has a positive long-term effect on the real returns of NPC stock prices.

Finally, the short-run analysis for NPCs indicates that real return on gold is negatively related to stock returns. Although the long-term impact of gold prices on stocks seems negligible, they can serve as a hedging tool in the short term. The coefficients are insignificant compared to the real return on the exchange rate, inflation rate, and real difference in interest rates. The short-run impacts of both the global financial crisis and COVID-19 are significant and negative.

In conclusion, the robustness check result demonstrates that, when repeated across two subsamples based on whether the countries are producing gold or not, the analysis for the entire sample is largely consistent.

The findings of all analyses for the whole sample and for the subsamples where the countries are grouped based upon the criteria of whether they are producing gold or not are summarized on the Table 4.9.

Variables	Whole Sample		Gold Producing Countries		Non-Gold Producing Countries	
	Long Run	Short Run	Long Run	Short Run	Long Run	Short Run
DRRSTI(-1)	Insignificant	Negative	Insignificant	Negative	Insignificant	Negative
RRGOLD	Positive	Negative	Positive	Negative	Insignificant	Negative
RREXC	Negative	Insignificant	Negative	Negative	Negative	Insignificant
INFRATE	Negative	Insignificant	Negative	Insignificant	Negative	Insignificant
RDINTR	Negative	Insignificant	Negative	Negative	Negative	Insignificant
GFC	Negative	Negative	Negative	Negative	Insignificant	Negative
COVID	Positive	Negative	Insignificant	Negative	Positive	Negative
ECT	Negative	NA	Negative	NA	Negative	NA
CONSTANT	Positive	NA	Positive	NA	Positive	NA

Table 4.9 Summary of the Results of ARDL Analysis on Real Return on Stock prices

5. CONCLUSION AND IMPLICATIONS FOR FURTHER RESEARCH

The capital market plays a crucial role in an economy's ability to allocate resources effectively and efficiently. Stock exchanges, the primary institutional framework of capital markets, are essential for resource distribution, liquidity provision, and price discovery, all of which promote economic growth. Emerging nations, particularly those with international investors, have greater significance as stock markets provide access to these markets through portfolio investments. Understanding how stock markets interact with the rest of the economy is essential.

A panel ARDL analysis was conducted to investigate the effects of gold prices, currency rates, inflation rates, and interest rates on stock prices. The study used a monthly data collection spanning 19 emerging markets and 19 years from 2004 to the end of 2022. The findings showed a long-term negative association between stock prices and macroeconomic indicators, with a clear relationship between stock and gold prices. Although there is a short-term negative correlation that makes gold seem like a hedge for stock market assets, the analysis found a long-term positive correlation.

The study made three significant contributions: it uses a large data set, suggesting a considerable degree of uniformity among emerging economies, and maintaining a constant link between the analytic variables. This highlights the importance of macroeconomic stability in fostering a resilient financial market milieu in developing economies, thereby advancing sustainable economic expansion. The study also highlights the need for monetary policy to adopt a sound inflation-targeting strategy to maintain stable price levels and prevent fiscal domination over domestic and international financial resources.

The study has some limitations and implications for further research. First, the study employs a holistic perspective on stock markets. Studies using the data considering sectoral stock market indexes may develop the results further. In addition, the study took a sample of nineteen emerging markets as a pool and made the analysis accordingly. Although the results of the robustness check are generally in line with those of the first analysis, the results for individual countries might be different depending on some country-specific factors. As a final limitation, the study uses ARDL, that is a linear model technique. Non-linear models might be employed to investigate different types of interlinkages between variables.

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APPENDIX

A. List of Country Indices used for Analysis

Table A.1.
List of market indices used for Analysis

Country	Stock Exchange	Index
Brazil	Brazil Stock Market	Bovespa
China	Shanghai Stock Exchange	Shanghai Index
Colombia	Financial Times Stock Exchange Colombia	FTSE Colombia
Czech Republic	Prague Stock Exchange	PX INDEX
Egypt	Egyptian Exchange	EGX 30
Greece	Athens General Composite	ATG
Hungary	Budapest Stock Exchange	BUX
India	Bombay Stock Exchange	BSE Sensex
Indonesia	Jakarta Stock Exchange Composite Index	IDX
Korea	Korea Composite Stock Price Index	KOSPI
Malaysia	Bursa Malaysia Kuala Lumpur Composite Index	FTSE BM KLCI
Mexico	Bolsa Mexicana de Valores Índice de Precios y Cotizaciones	BMV IPC
Pakistan	Karachi Stock Exchange	Karachi 100
Philippines	Financial Times Stock Exchange Philippines	FTSE Philippines
Poland	Warszawski Indeks Giełdowy	WIG 20
Russia	Moscow Exchange	MOEX Russia Index
South Africa	Johannesburg Stock Exchange	South Africa's Top 40
Thailand	Stock Exchange of Thailand	SET index
Turkey	Borsa Istanbul	BIST 100

B. Results of robustness check

Table B.1
Estimation results of the ARDL model on real return on stock prices for gold producing countries (GPCs)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Long Run Equation				
RRGOLD	0.224	0.062	3.608	0.000
RREXC	-0.543	0.080	-6.789	0.000
INFRATE	-1.632	0.357	-4.574	0.000
RDINTR	-0.014	0.003	-4.204	0.000
GFC	-0.007	0.004	-1.930	0.054
COVID	0.004	0.003	1.204	0.229
Short Run Equation				
COINTEQ01	-0.955	0.038	-25.011	0.000
D(RRSTI(-1))	-0.045	0.031	-1.444	0.149
D(RRSTI(-2))	-0.071	0.019	-3.566	0.000
D(RRGOLD)	-0,101	0,031	-3,222t	0,001
D(RRGOLD(-1))	-0,114	0,032	-3,496	0,001
D(RRGOLD(-2))	-0,017	0,042	-0,402	0,688
D(RRGOLD(-3))	-0,021	0,047	-0,442	0,658
D(RREXC)	-0.224	0.129	-1.734	0.083
D(RREXC(-1))	-0.211	0.126	-1.665	0.096
D(RREXC(-2))	-0.118	0.054	-2.134	0.033
D(INFRATE)	-0.341	0.342	-0.999	0.318
D(INFRATE(-1))	-0.435	0.339	-1.283	0.199
D(INFRATE(-2))	-0.233	0.265	-0.881	0.378
D(INFRATE(-3))	0.015	0.006	2.340	0.019
D(RDINTR)	0.013	0.008	1.852	0.064
D(RDINTR(-1))	0.009	0.002	4.496	0.000
D(RDINTR(-2))	-0.341	0.342	-0.999	0.317
D(RDINTR(-3))	-0.435	0.339	-1.283	0.199
D(GFC)	-0.024	0.016	-1.517	0.130
D(GFC(-1))	0.017	0.010	1.726	0.085
D(GFC(-2))	-0.021	0.013	-1.663	0.096
D(COVID)	-0.034	0.011	-3.168	0.002
D(COVID(-1))	-0.070	0.011	-6.413	0.000
D(COVID(-2))	-0.149	0.033	-4.532	0.000
C	0.011	0.001	7.739	0.000
Root MSE	0.057	Mean dependent var		0.001
S.D. dependent var	0.089	S.E. of regression		0.060
Akaike info criterion	-2.779	Sum squared resid		7.278
Schwarz criterion	-2.204	Log likelihood		3352.231
Hannan-Quinn criter.	-2.569			

Table B.2
Estimation results of the ARDL model on real return on stock prices for non-gold producing countries (NGPCs)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Long Run Equation				
RRGOLD	0.036	0.054	0.667	0.5047
RREXC	-0.827	0.077	-10.757	0.000
INFRATE	-2.411	0.343	-7.0198	0.0000
RDINTR	-0.049	0.008	-5.947	0.000
GFC	-0.002	0.003	-0.611	0.541
COVID	0.012	0.003	3.613	0.0003
Short Run Equation				
COINTEQ01	-0.954	0.038	-25.011	0.000
D(RRSTI(-1))	-0.045	0.031	-1.445	0.149
D(RRSTI(-2))	-0.0713	0.019	-3.566	0.000
D(RRGOLD)	-0.156	0.050	-3.106	0.002
D(RRGOLD(-1))	-0.202	0.038	-5.281	0.000
D(RRGOLD(-2))	-0.094	0.036	-2.609	0.0092
D(RREXC)	-0.124	0.154	-0.799	0.424
D(RREXC(-1))	-0.094	0.155	-0.607	0.544
D(RREXC(-2))	-0.0779	0.069	-1.123	0.261
D(INFRATE)	0.386	0.299	1.289	0.198
D(INFRATE(-1))	-0.491	0.289	-1.695	0.090
D(INFRATE(-2))	0.122	0.195	0.624	0.533
D(RDINTR)	0.009	0.008	1.222	0.222
D(RDINTR(-1))	0.008	0.015	0.576	0.5647
D(RDINTR(-2))	-0.0104	0.007	-1.442	0.149
D(GFC)	-0.048	0.008	-6.077	0.000
D(GFC(-1))	0.022	0.011	1.871	0.062
D(GFC(-2))	-0.049	0.009	-5.543	0.000
D(COVID)	-0.018	0.0109	-1.698	0.089
D(COVID(-1))	-0.097	0.019	-5.139	0.000
D(COVID(-2))	-0.169	0.018	-9.309	0.000
C	0.007	0.003	2.479	0.013
Root MSE	0.054	Mean dependent var		0.0001
S.D. dependent var	0.092	S.E. of regression		0.057
Akaike info criterion	-2.969	Sum squared resid		5.981
Schwarz criterion	-2.404	Log likelihood		3210.799
Hannan-Quinn criteria	-2.762			