



The Nexus Between Gross Domestic Product, Stock Market and Trade Openness: Evidence from Nepal

Rajan Phaju 

Lecturer, Khwopa College,
Bhaktapur, Nepal
rajanphaju@yahoo.com

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Abstract

Background: The development of the stock market has a significant positive impact on economic growth and helps to effectively funnel savings and investment into the economy in ways that allow for the accumulation of capital. Stock market serves a crucial economic purpose by bringing investors and savers together. Similarly, trade openness increases efficiency in both static and permanent way. Ultimately it makes positive contribution in economic development. The causal relationship between the gross domestic product, the NEPSE index, and trade openness has been examined.

Objective: To find out long run and short run relationship and the causal relationship among gross domestic product, Nepal stock exchange and trade openness, and whether there is causal relation among variables or not.

Method: An Autoregressive distributed lag (ARDL) model is used in the analysis. The Engle Granger causality test, which demonstrates the direction of causality between the variables is also used. From the year 1994 to 2021 samples are taken.

Results: Bound Test shows there is long run relationship among variables. Similarly, there is unidirectional causal relationship between gross domestic product and the Nepal stock market index.

Implication: The results show that there is no meaningful relationship between GDP and trade openness. It is suggested that trade barriers be lowered and that international trade be promoted by reducing and simplifying processes. The reason for this must be low export quantities. Therefore, government must take action in this sector to encourage export and displace import. Additionally, the outcome demonstrates that there is no relationship between trade openness and the stock market. For Nepal's stock market to accept global investors, its regulations must be changed.

Keywords: GDP, Trade Openness, NEPSE, ARDL, Granger Causality,

Paper Type: Research

JEL Classification: E01, F10, G12

Introduction

One of the most active industries that significantly contribute to an economy's prosperity is the stock market. The stock market's growth rate reflects the economy's growth rate increase. In all cases it is found out the long-run equilibrium relationships among the real GDP and stock market indices (Kulhánek, 2012). The development of the stock market has a significant positive impact on economic growth and helps to effectively funnel savings and investment into the economy in ways that allow for the accumulation of capital. It serves a crucial economic purpose by bringing investors and savers together. However there are several theoretical and empirical research that look into the causal relationship between financial development and economic growth because the debate on this topic is still very active. The primary goal is to examine the relationship between the capital market and gross domestic product.

In view of the restricted, inconsistent, and ambiguous findings of other research, this study aims to investigate whether or not the stock market and trade openness play a part in the process of economic growth in Nepal. Most of the researches consider stock market development and openness to international trade are important policy options for reducing poverty in develop The claim is that trade openness and financial development promote economic growth, which in turn raises the income of the poor and lowers poverty. Therefore, for financial development and trade openness to reduce poverty, there must be positive spillover effects from these two macroeconomic factors to economic growth. Numerous theoretical and empirical studies have examined the causal links between growth and commerce as well as between finance and growth. Without identifying a particular solution, research has generally concentrated on the direction of causality between these macro factors. Miller (1998), on the other hand, expresses a completely different viewpoint in this regard. Similarly, Lucas (1988) asserts that the growth literature has 'over-stressed' the significance of finance in economic growth. Despite these divergent viewpoints, the researches on the finance-growth nexus are expanding. However, such opinions regarding the part that finance plays in economic expansion are widely acknowledged in this subject.

A stock exchange is a business that offers stock brokers and traders the ability to trade stocks, bonds, and other securities through "trading" facilities. The issuance and redemption of securities and other financial instruments are also made possible through stock exchanges. It has long been understood that trade openness has a significant impact on economic expansion. Therefore, the the stock market may have an impact on GDP both directly through the normal channels of consumption and indirectly through its impact on trade openness.

According to Levine and Zervos (1996) the stock market is essential for promoting long-term economic development because it makes capital accumulation, effective intertemporal resource allocation, and technological innovation possible. In particular they emphasize the advantages of the stock market's existence for investment and growth. It means while the stock market may influence the GDP, the latter may also influence the stock market.

Most studies to date that have looked at the connection between trade openness and GDP agree that there is a positive causal association between the two. Trade openness strongly suggests that economic development and other macroeconomic factors are stimulated by trade openness through both investment and technological ties, if unidirectional causality exists between trade openness and GDP. Trade openness and GDP would have a reinforcing causal link if these variables have a bidirectional causal relationship. In this regard, Sbia (2014) is of view that trade openness is Granger caused by economic growth.

Review of Literature

Because of the level impact, not the rate effect, traditional growth theorists held that there is no relationship between stock market expansion and economic growth. Singh (1997) argued in a

similar manner that stock markets are not essential institutions for attaining high levels of economic development. Due to its vulnerability to market failure, which frequently manifests in the volatile nature of stock markets in many developing nations, many people consider the stock market as an agent that harms economic progress. Therefore, the “wealth effect” and the standard assessment model of stock prices offer a theoretical justification for stock prices to be used as an indication of output (Comincioli, 1996). However, according to the wealth effect, variations in stock prices are what affect the real economy. According to Nikmanesh (2016), the impact of trade openness on the volatility of the stock markets in Singapore and the Philippines was insignificant during the whole sample period. Kim et al. (2010a) demonstrate that there was a favorable long-run association between trade openness and financial growth with a negative short-run relationship for comparatively low-income or high-income countries. However, Lim et al. (2011) find no evidence of a link between stock market efficiency and the degree of financial openness.

The idea that the development of the stock market and economic growth has a long-term association is supported by facts, in contrast to the conventional wisdom. For developing nations, however, there are few studies that test this concept. In contrast, Pardy (1992), in his landmark work, maintained that capital markets in less developed nations are able to mobilize domestic savings and allocate funds more effectively. The two-way causation between financial development and economic growth was investigated by Luintel and Khan in 1999.

Levine and Zervos (1996) assessed the growth of the stock market using various measures, and they hypothesized a strong statistically significant association between the initial growth of the stock market and subsequent economic expansion. In their studies of the stock market-growth nexus, Filer et al. (2000) and Tuncer and Alovsat (2001) found a positive casual association between stock market growth and economic activity. According to Chen et al. (2004), there is a connection between stock returns and output growth, and stock return rates are a leading predictor of production growth. Similar to this, Siliverstovs and Duong (2006) found that the economic sentiment indicator, which the stock market uses to express expectations, has some predictive value for actual economic activity. According to Spears (1991), economic expansion was sparked by financial intermediation in the early stages of development. Similar to this, Atje (1993) came to the conclusion that stock markets have long-term effects on economic growth and that stock markets manipulate economic growth through a variety of channels, including liquidity, risk diversifications, information gathering about companies, corporate governance, and savings mobilization (Levine & Zervos 1996).

It is well known that stock markets, thanks to their liquidity, make it possible for businesses to quickly get crucial money, facilitating capital allocation, investment, and growth. In countries categorized as higher middle-income economies, Adjasi and Biekpe (2005) revealed a considerable beneficial influence of stock market development on economic growth. Economic development was projected by stock market movements, and causality can only be established for real variables. More particular, there is a strong causal relationship between market capitalization and economic growth. Many investigations, including those by Tuncer and Alovsat (2001) backed the idea that stock markets drive economic expansion. Stock markets can significantly accelerate economic development when the financial or banking sectors are operating at peak efficiency (Beck & Levine, 2003). Likewise, in the regard of relationship between trade openness and economic growth, Menyah (2014) is of view that there is still very little evidence to support the idea that financial development drives economic growth in South African nations, despite attempts to liberalize trade and financial development.

Adhikary (2015) investigates the linkage between FDI, trade openness, and economic growth rate in Nepal using the vector error correction (VEC) model. The study reveals that a long-run equilibrium relationship exists between variables. Besides, trade openness and FDI have a dynamic positive effect on the GDP per capita growth rate in Nepal. This study documented trade openness as a significant positive stimulus to the economic growth rate in Nepal. The linkage between FDI, trade openness, and

economic growth rate is found to be integrated in the long-run.

The VEC based Granger causality test indicates that a unidirectional short-term causal flow runs between FDI, trade openness, and GDP per capita growth rate. This implies that least developed economies such as Nepal should reduce tariff and non-tariff barriers to trade to attract more foreign direct investment and to promote economic growth as well. Another reason could be embedded in other economic variables, such as persistent negative trade balance and weak financial stability of Nepal.

The study suggests that Nepal should adopt more liberalized trade policy to attract foreign capitals and to ensure stable economic growth rate. In addition, Nepal should encourage both import-substitution and export-led investment to reduce its persistent negative trade balance.

Hassan & Islam (2005) try to find out whether financial development and openness to international trade can play any positive role in reducing poverty in Bangladesh through their growth enhancing effect. The paper does not find any causal relationship between trade openness and growth, and financial development and growth. Trade openness and growth, and growth and financial development are independent. That is trade openness and financial development that do not have any causal impact on economic growth; conversely growth does not have any causal impact on trade and financial development. However, evidence is found to support finance-trade nexus.

The relationship between trade openness and economic growth has been extensively investigated by Keho (2017) using Autoregressive Distributed Lag bounds test to cointegration. It is found that trade openness has positive effects on economic growth both in the short and long run. Furthermore, they reveal a positive and strong complementary relationship between trade openness and capital formation in promoting economic growth.

The results confirm the existence of a long-run relationship between economic growth, and trade openness. It was found that capital and openness to trade have positive impacts on economic growth both in the short and long run. Furthermore, we found positive and strong complementarity between trade openness and capital formation in promoting economic growth. Therefore, the results of the study validate the trade-led growth hypothesis in the case of Cote d'Ivoire.

The study by Sbia et al. (2014) examine the connection between trade openness and economic growth in the case of the UAE over the years 1975Q1–2011Q4. The unit properties of variables in the presence of structural breaks have been tested. By accounting for structural discontinuities in the series, the ARDL bounds testing method is used to analyze the cointegration. The causal link between the variables is also investigated using the VECM Granger causality technique. The empirical results support the cointegration between the series' existence. They discover that trade openness has a favorable effect on economic expansion.

A study looks into the long-term effects of trade openness on economic growth. Using the paradigm proposed by Mankiw et al., we test for a long-run link and the expanded production function by include financial development as a further factor of economic growth (1992). The outcomes support the series' cointegration. Trade openness fosters economic growth over the long term. The VECM Granger causality test supports the growth-led-trade theory. The creative accounting strategy is used to examine the causation as well (IAA). According to research, trade openness, financial development, labor, and capital formation all contribute to economic growth and sustain it over the long term. Although Pakistan's commercial openness has a long-term favorable influence on economic growth.

According to Shahbaz (2012), the spread of sophisticated technology contributed by the developed world and spillover effects from free trade encourage economic growth. The findings demonstrate the long-term beneficial and significant complementarity between trade openness and labor as well as financial development and labor. This demonstrates how important human capital is to the growth of the financial sector and the economy. The amount of economic growth brought on by trade openness and financial development depends on the availability of skilled workers in the nation.

Research gap

Study on the connection between trade openness, stock market and economic growth has exploded since existing researches were not able to definitively establish which of these three variables is causally related. In light of all of this, the current study uses the ARDL model to examine the causal link between trade openness, GDP, and the index of the stock exchange in Nepal. The nature of the relationship between the nation's stock market, economic progress, and trade openness must thus be examined. Even though Nepal has adopted a strategy of liberalization since the restoration of democracy in 1993, adequate economic progress has not been found there, and there is a paucity of study on the subject. The objective of this study is to fill the aforementioned empirical gap.

Model Estimation:

$$\Delta \text{LnGDP} = \alpha_0 + \alpha_1 t + \sum_{i=1}^m \alpha_2 + \Delta \text{LnGDP}_{t-i} + \sum_{i=0}^m \alpha_3 \Delta \text{LnTO}_{t-i} + \sum_{i=0}^m \alpha_4 \Delta \text{NEPSE}_{t-i} + \alpha_5 \text{LnGDP}_{t-i} + \alpha_6 \text{LnTO}_{t-i} + \sum_{i=0}^m \alpha_7 \text{NEPSE}_{t-i} + \eta_i$$

Where,

LnGDP is real gross domestic product

LnTO is trade openness

NEPSE is index of Nepal stock exchange

't' is time trend variable,

η_i is error term in the model.

The first part of both equations with α_2 , α_3 , α_4 represents the short-run dynamics of the models whereas the second part with α_5 , α_6 , α_7 represent the long-run phenomenon. The null hypothesis in the equation is $\alpha_5 = \alpha_6 = \alpha_7 = 0$, which means the non-existence of the long-run relationship and vice versa, which means the non-existence of the long run relationship and vice versa. Through the significance of a joint test and the use of the sum of lags of the model's explanatory variables, the Wald test examines short-run causality. The diagnostic test and the stability test are used to evaluate the ARDL model's goodness of fit. The diagnostic test looks at the model's serial correlation, normalcy, and heteroskedasticity. The cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals are used to conduct the stability test (CUSUMsq). Examining the prediction error of the model is another way of ascertaining the reliability of the ARDL model.

Hypothesis:

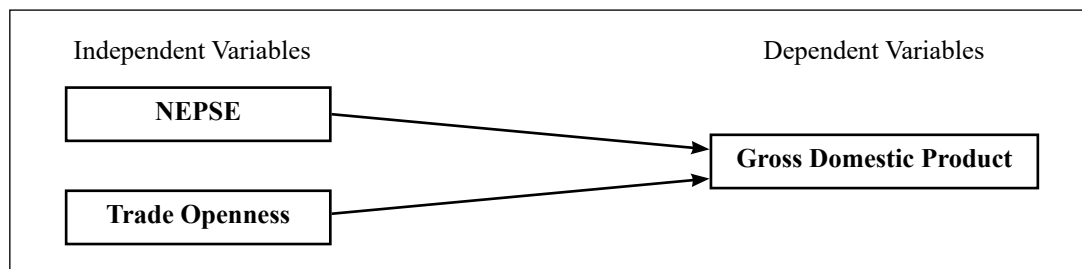
Hypothesis (H1): There is bi-directional causal relationship between GDP and NEPSE

Hypothesis (H2): There is bi-directional causal relationship between GDP and Trade openness

Hypothesis (H3): There is long run relationship between economic growth, trade openness and stock market.

Conceptual Framework

The efficiency of resource allocation brought about by trade openness policies, the attraction of foreign direct investment, the availability of cutting-edge technology to boost domestic production, the development of economic and financial integration, and an increase in total factor productivity would be the ways that trade openness fosters economic growth.

Figure 1 Relationship between Nepal Stock Market, Trade Openness and Gross Domestic Product

Research Method

The Autoregressive Distributed Lag model is used. o analysed data. Using data from 1994 through 2021, the long- and short-term relationships between the NEPSE index, GDP, and trade openness were analyzed. This goal for the NEPSE index is accomplished using data 28 samples. The choice of the model in time series studies is actually an art rather than a quantitative science. In this study, all the data were obtained from the websites of the Nepal's Finance ministry and central bank.

Followings are the variables used in the study.

GDP (Gross Domestic Product) : It is defined as gross domestic product.

TO (Trade openness) : It is the total volume of trade (exports plus imports) as a percentage of gross domestic product.

NEPSE (Nepal Stock Exchange) : It represents over all capital market in Nepal

Data Analysis and Result

Stationarity Check of all variable:

The Autoregressive Distributed Lag (ARDL) model is applied to examine the data using annual data from the years 1994 to 2021, the long and short term relationships between the Nepal stock market, represented by the NEPSE index, the GDP, and trade openness are analyzed.

NEPSE index and GDP growth are two of the three variables that are stationary at the initial difference, whereas trade openness is stationary at the level. Because the variables are mixed at the order of integration, we employ the autoregressive distributed lag model (ARDL).The choice of the model in time series studies is actually an art rather than a quantitative science.

We search for the relationship between variables over the long and short terms. To achieve this, the ARDL procedure's bound test is used. If the calculated F-statistics are higher than the upper bound critical value, we reject the null hypothesis that there is no cointegration and come to the conclusion that the variables are in a steady state of equilibrium. We cannot rule out the null hypothesis of no cointegration if the obtained F-statistics are smaller than the lower bound critical value. The result is inconclusive if the estimated F-statistics fall within the lower and upper bound critical values. After discussing the theoretical model for the ARDL technique, we used the Pesaran et al (2001) procedure to look into whether there was a long-run relationship for each variable using an unrestricted error correction model, as follows in relation to our problems:

Empirical Model Specification and Estimation Techniques

Autoregressive Distributed Lag Model

The fact that the ARDL can be used regardless of whether the underlying regressors are purely I(0), solely I(1), or mutually co-integrated is one of the reasons it is preferred. This approach uses the

well-known Wald or F-statistic in a generalized Dickey-Fuller type regression to test the relevance of lagged values of the variables being considered in an error correction model (ECM) for conditional unrestricted equilibrium (Pesaran, et al., 2001). The ARDL strategy should be used as well since, compared to other cointegration strategies, it is more reliable and performs better for small sample sizes (Devkota & Paija, 2020).

To examine co-integration relationships among macroeconomic variables, econometric approaches are widely used in the literature on economics. There are numerous examples of univariate co-integration technique, such as Engle-Granger (1987). The maximum likelihood co-integration strategy has been fully explained by numerous instances of the multivariate co-integration technique from Johansen (1988) and Johansen & Juselius (1990). The recently proposed Autoregressive Distributed Lag (ARDL) method is now available (Pesaran and Shin, 1995). The ARDL approach to cointegration is preferred to other traditional cointegration approaches like Engle and Granger (1987), according to more recent studies.

The dependent variable's lagged value is included as an explanatory variable in the autoregressive distributed lag model together with the regressors' current values. Unlike a VAR model, the ARDL model makes use of both endogenous and exogenous variables. It is necessary to do a test for the unit root to make sure that no variables of order 2 are integrated.

A distributed-lag model is a dynamic model in which a regressor's effect 'x' on 'y' happens gradually rather than abruptly. When there is only one explanatory factor and a linear relationship, the model can be expressed as follows:

$$\Delta Y_t = \beta_0 + \beta_1 t + \beta_2 Y_{t-i} + \beta_3 \sum_{i=1}^m \Delta Y_{t-i} + \mu_i$$

Where, μ_i is the white noise error term.

The fact that estimate is possible even when the explanatory variables are endogenous is one of the key benefits of the ARDL technique. Endogeneity is also less of a problem if the ARDL model is free of residual correlation. According to Pesaran and Shin (1995), the necessary delays in the ARDL model are corrected for endogeneity as well as residual correlation. The key advantage of ARDL over single equation cointegration analysis, such as that of Engle and Granger (1987), is that ARDL can distinguish between dependent and explanatory variables while Engle and Granger suffer from endogeneity issues. Pesaran and Shin (1995) claim that another benefit of the ARDL method is that it consistently produces asymptotically normal estimates of the long-run parameters regardless of whether the variables are I(0), I(1), or mutually integrated.

The Granger causality

By measuring how well the signal in the seed region can predict the signal in the target region, Granger causality quantifies the amount of effective connection between two regions (Granger, 1969). It may be thought of as directed functional connection. Granger causality is a quantifiable notion of directed impact or causation for time series data, defined using temporal precedence and predictability. If we can more accurately forecast the values of x by using past values of variable y, assuming that all other pertinent information, such as variable z, is taken into consideration, then variable y causes variable x.

$$GDP = \sum_{i=1}^n \beta_1 GDP_{t-i} + \sum_{i=1}^n \beta_2 NEPSE_{t-i} + \beta_3 \sum_{i=1}^n \beta_2 TO_{t-i} + \varepsilon_{1t}$$

$$TO = \sum_{i=1}^n \delta_1 TO_{t-i} + \sum_{i=1}^n \delta_2 GDP_{t-i} + \sum_{i=1}^n \delta_3 NEPSE_{t-i} + \varepsilon_{2t}$$

$$NEPSE = \sum_{i=1}^n \eta_1 NEPSE_{t-i} + \sum_{i=1}^n \eta_2 GDP_{t-i} + \eta_3 \sum_{i=1}^n \eta_3 TO_{t-i} + \varepsilon_{3t}$$

Where, GDP is gross domestic product proxied by economic growth, TO is trade openness proxied by ratio of export plus import and GDP, and NEPSE is proxied by capital market development.

Stationarity Check of all variables

The question of whether or not variables are stationary was investigated using the Augmented Dickey Fuller test. Table 1 displays the outcomes of the stationarity tests. In contrast to trade openness, which is stationary at level, NEPSE and GDP variables are found to be non-stationary at level data but become stationary at first difference. The ARDL model combines endogenous and exogenous factors, and no variables of order 2 are integrated. This allows us to employ the ARDL model in this study.

Stationarity Tests

Table 1

Variables	P-value at level	P-value at first difference
LnNEPSE	0.999	0.0013
LnGDP	0.999	0.0102
LnTO	0.0271	0.0000

Source: Authors' computation

Lag Selection

Akaike information criteria are utilized for lag selection. In accordance with AIC, the gross domestic product is chosen with three lags, but the Nepal stock exchange index is chosen with four lags. The choice of two lags for trade openness is similar.

Model specification:

$$\text{LNGDP} = C(1)*\text{LNGDP}(-1) + C(2)*\text{LNGDP}(-2) + C(3)*\text{LNGDP}(-3) + C(4)*\text{LNTO} + C(5)*\text{LNTO}(-1) + C(6)*\text{LNTO}(-2) + C(7)*\text{LNNEPSE} + C(8)*\text{LNNEPSE}(-1) + C(9)*\text{LNNEPSE}(-2) + C(10)*\text{LNNEPSE}(-3) + C(11)*\text{LNNEPSE}(-4) + C(12)$$

Value substituted in the Model:

$$\text{LNGDP} = 0.78*\text{LNGDP}(-1) + 0.46*\text{LNGDP}(-2) - 0.40*\text{LNGDP}(-3) + 0.23*\text{LNTO} - 0.20*\text{LNTO}(-1) - 0.14*\text{LNTO}(-2) + 0.04*\text{LNNEPSE} + 0.08*\text{LNNEPSE}(-1) - 0.016*\text{LNNEPSE}(-2) + 0.014*\text{LNNEPSE}(-3) + 0.08*\text{LNNEPSE}(-4) + 0.26$$

Short run Analysis of Model

Since the coefficient of LnTO is 0.23, an increase in trade openness of 1 percent will result in a short-term GDP growth of 0.23 percent. Similar to this, the NEPSE coefficient is 0.045, which suggests that when the NEPSE index rises one point in the short term, GDP will rise by 0.04 percent. R-squared is quite high at 0.99, which is a positive indicator for the model. Similarly, the p-value for the F-statistic is 0%, which is less than 5%. It also demonstrates the importance of the model. Overall, it is safe to say that the model was correctly fitted.

Long Run Analysis of Model

Bound Test

We utilize a bound test to see whether there is a long-term relationship between the variables. The following table displays the results of the bound test.

Table 2 Bound Test

Test Statistic	Value	K
F-statistic	5.212181	2
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

Source: Authors' computation

According to the table, the lower bound is 3.79 and the upper bound is 4.85 for a 5% critical value. F-statistic in this case is 5.21. If the F-statistic value exceeds the upper bound value, there is a long-term link between the variables, according to the recommended guidelines. Similar to this, if the F-statistic value lies between the lower bound and upper bound, it is said to be inconclusive and that there is no long-run link. Therefore, since the F-statistic value in our result is higher than the upper bound, it may be confidently inferred that the variables are related over the long term. As noted in table no. 2.

Table 3 Long run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNT0	-0.759033	0.782749	-0.969702	0.3513
LNNEPSE	1.366836	0.096475	14.167828	0.0000
C	1.725218	2.688829	0.641624	0.5332

The P-value of trade openness (TO) is not significant because it is greater than 5%, however, the P-value of NEPSE is significant because it is lower than 5%. Therefore, it is believed that when the capital market experiences a one percent positive movement, the long-term GDP growth rate is 1.36 percent. So it can be safely concluded that the stock market and GDP are closely related.

Short run analysis

Table 4 Short run

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-0.062927	0.264123	-0.238248	0.8157
D(LNGDP(-2))	0.405107	0.250526	1.617024	0.1318
D(LNTO)	0.230863	0.106024	2.177467	0.0501
D(LNTO(-1))	0.144682	0.108689	1.331162	0.2079
D(LNNEPSE)	0.047034	0.035952	1.308242	0.2153
D(LNNEPSE(-1))	0.016648	0.045358	0.367043	0.7200
D(LNNEPSE(-2))	-0.014487	0.047549	-0.304678	0.7658
D(LNNEPSE(-3))	-0.083451	0.039470	-2.114286	0.0561
CointEq(-1)	-0.156274	0.045944	-3.401380	0.0053

With the exception of $CointEq(-1)$ which is a long run adjustment, all the variables are short run coefficients. Since the p-value is less than 5%, which indicates that the model is adjusted monotonically, the coefficient is negative and significant.

Pairwise Granger Causality Test

To investigate the direction of causation of the series in the model, a pairwise Granger causality test was also performed. Table presents the findings for the relevant factors.

Table 5 Pairwise Granger Causality Test

Null Hypothesis	Obs	F-Statistic	Prob.
LNNEPSE does not Granger Cause LNGDP	26	1.39013	0.2710
LNGDP does not Granger Cause LNNEPSE		10.1092	0.0008
LNT0 does not Granger Cause LNGDP	26	0.71862	0.4990
LNGDP does not Granger Cause LNT0		0.36625	0.6977
LNT0 does not Granger Cause LNNEPSE	26	0.82601	0.4515
LNNEPSE does not Granger Cause LNT0		0.29656	0.7464

Source: Author's computation

At a 5% level of significance, the pair-wise Granger causality test result in Table suggests that as p-value of less than 5 percent null hypothesis ‘LNGDP does not Granger Cause LNNEPSE’ is rejected which means stock market is influenced by gross domestic product. There isn't a two-way causal relationship between the variables. Unexpectedly, even trade openness has no effect on GDP.

Sensitivity analysis

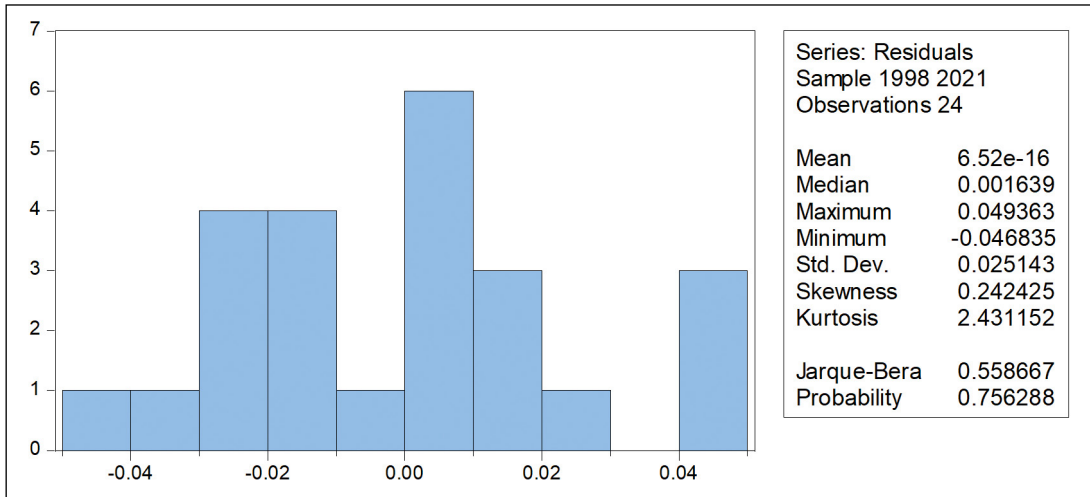
Serial correlation and autoregressive conditional heteroskedasticity diagnostic tests are carried out. These tests demonstrate that the short run model successfully passes each diagnostic test in the preliminary stage. The findings also showed that there is no evidence of white heteroskedasticity or serial correlation across variables because the functional form of the model is properly described. In the short-run model, autoregressive conditional heteroskedasticity is likewise absent.

Normality Test

Normality of Residual

The residual must be normally distributed in order to be model fitted. The Jarque-Bera test is used to determine whether the residual is normal, as shown in figure no. 4. The null hypothesis in this test is “residual is regularly distributed.” The Jarque-Bera probability value that corresponds to this is 0.76, or greater than 5%. Since the null hypothesis is accepted, the residual must be regularly distributed for the model to be considered sound. The \bar{X} of the index is positive, indicating the fact that price has increased over the period. The descriptive statistics shows that the returns are positively skewed, indicating that there is a low probability of earning returns which is $>\bar{X}$. The K of the series is >3 , which implied that the index is narrow tailed and followed a normal distribution and is further confirmed by Jarque-Bera test statistic. The probability of Jarque-Bera is 0.756, or higher than 5%. The fact that the null hypothesis, that the residual is regularly distributed is accepted is encouraging for the model.

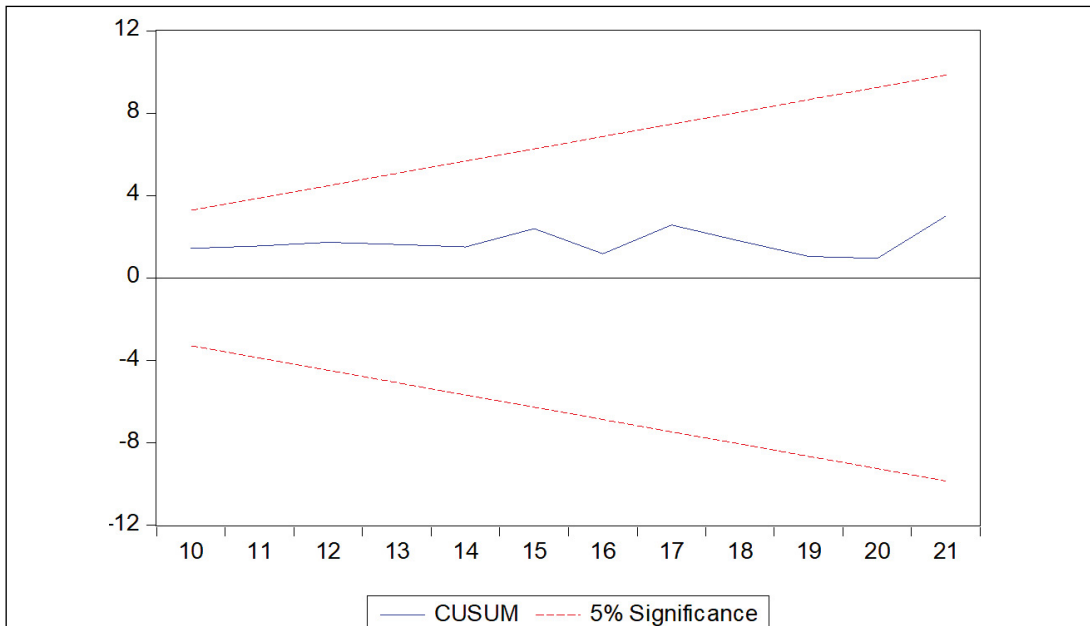
Figure 2 Residual Normal Distribution



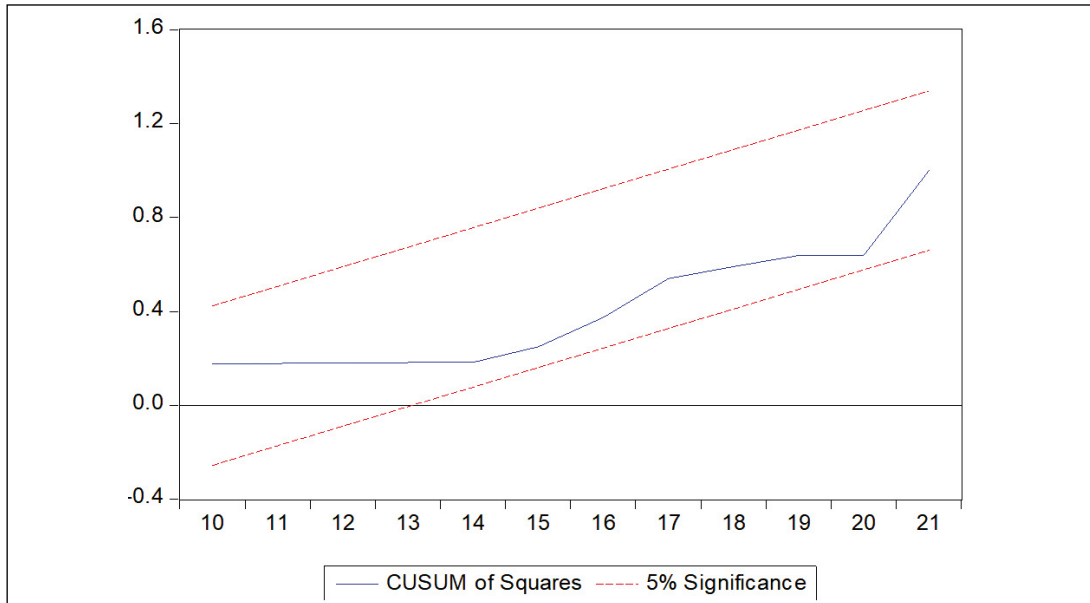
Stability Test

Recursive estimation is used to conduct stability tests. It is claimed that the model is stable. The equations’ short-run movements and long-run parameter stability are both present. We used the cumulative sum (CUSUM) and cumulative sum squares (CUSUMSQ) tests suggested by Borensztein et al. as a basis for the test (1998). The stability of the long-run coefficients has been tested using the same methodology by Pesaran et al. (2001).

Figure 3 Stability Test (CUSUM)



As can be seen in the figure, a blue line with a significance level of 5% crosses across the region between the dotted red lines, indicating that residual variances are stable. Therefore, it is safe to say that the model is stable.

Figure 4 Stability Test (CUSUMsq)

The crucial limits of CUSUMsq statistics are not crossed, confirming the stability of the co-efficient and the long-term correlations between the variables.

Serial Correlation Test

We utilize the Breusch-Godfrey Serial Correlation LM Test to determine whether the model contains serial correlation.

Table 6 Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.157512	Prob. F (1,11)	0.1699
Obs*R-squared	3.935416	Prob. Chi-Square (1)	0.0473

Source: Authors' computation

The null hypothesis is rejected since the measured R-squared value is 0.0473. It denotes the existence of serial correlation, which is bad for the best model.

Heteroskedasticity Test

The Breusch-Pagan-Godfrey test is used to determine whether or not the model exhibits homoskedasticity.

Table 7 Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.553192	Prob. F(11,12)	0.8319
Obs*R-squared	8.075298	Prob. Chi-Square (11)	0.7065

Source: Author's Calculation

Considering that the p-value is 0.70, or greater than 5%, the null hypothesis is accepted. "There is no heteroskedasticity" is the null hypothesis in this case. It means there is homoskedasticity, which is good sign for the model.

Economic and Policy Implications

Our empirical findings demonstrate that trade openness, the stock market, and the GDP are all positive in the long run, outweighing each other. The findings also support the notion that the growth of the stock markets is positively influenced by the GDP. A framework for policy that supports stock markets must be developed by the government of Nepal, from a policy standpoint. Therefore, the development of the stock market would be assisted by the establishment of more trustworthy money transfer services and bank branches. The financial system would enhance GDP as a result of a rise in the stock market. This will increase the stock market's liquidity and guarantee that the most amount of credit is available. Greater credit availability to the economy's productive sectors would boost GDP. The need for government action to promote export is another policy need. The precautions would include making sure the transaction goes smoothly. They can do this by enacting rules that encourage saving to make stock market investments. To support stock markets, the government may establish investment vehicles such as mutual funds.

Conclusion

This study looks at the long- and short-term connections between Nepal's GDP, stock market, and trade openness. Our findings also support the notion that both in the short and long terms, the stock market has a favorable impact on GDP. However, the findings show that trade openness has little impact on GDP. Similar to how stock market influences GDP.

Using annual time series data from 1994 to 2021, the current study studied the dynamic relationship between Nepal's stock market development, trade openness, and gross domestic product. For the purpose of determining the integrating order of the variables used in the study, we used the autoregressive distributed lag (ARDL) model. Long-run causal linkages are investigated using ARDL bound testing techniques combined with Engle-Granger causality, while short-run dynamics are recorded using ARDL Granger-Causality tests. Our results indicated that there is a long-run association between stock market growth and GDP for Nepal after establishing order of integration. The results are strong and convincing, showing that the growth of the stock market is a crucial component in the machine of global economic progress. The long-term unidirectional correlation between Nepal's stock market growth and GDP is confirmed using Engle-Granger causality estimation.

According to the findings, there is no significant correlation between GDP and trade openness. By decreasing and streamlining processes, it is proposed to lower trade barriers and promote global commerce. According to Granger-causality results, economic growth and trade openness as well as stock market and trade openness are unrelated. This means that trade openness have no direct effects on economic growth. Small export volumes must be the cause of this. The result also shows that there is no connection between trade openness and the stock market. The policy relevance of this finding would be to consider stock market and trade openness. Government must thus take action in this area in order to promote export and replace import. The policies of the Nepal stock market have to be reformed in order to welcome foreign investors. Nepal should place greater emphasis on stock market development if trade is to have a significant impact on economic progress. Stock market development not only fosters economic growth through capital creation but also trade activity by lowering the cost of financial resources, luring in foreign direct investment, and speeding up the development of cutting-edge technology.

Although findings are the encouraging, the study has certain limitations. First off, secondary time series data are the only ones that limit it. Trade has been used in empirical analysis at the aggregate level. Second, not all influencing factors can be taken into account. Therefore, adding other pertinent variables to the system of equations would be a beneficial expansion of this research that would serve to clarify the various ways that trade influences economic growth. Thirdly, from 1994 to 2021, it only

has 28 years' worth of yearly data. Results would be more trustworthy if quarter data were supplied. Fourth, the study only employs the ARDL and Granger Causality Test. Results would explain more accurately if additional econometric approaches were applied.

Conflict of Interest

Author declare no conflict of interest.

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