

**Empirical Analysis of Macroeconomic Determinants of Stock Market Performance:
Evidence from the Nepal Stock Exchange using an ARDL Model**

Krishna Bahadur Thapa¹, PhD and Ganga Prasad Chamlagain²

¹Principal Author

Lecturer

Faculty of Management

Nepal Commerce Campus, Kathmandu, TU, Nepal

Email: krishnasambin@gmail.com/ krishna.thapa@ncc.tu.edu.np

Co-author

Lecturer

Faculty of Management

Mahendra Multiple Campus, Dharan, TU, Nepal

Email: chaulagaingp@gmail.com

<https://doi.org/10.3126/dristikon.v15i1.77123>

Abstract

The objective of this research is to assess the empirical analysis of macroeconomic factors with the stock market performance. This study employs an Auto-Regressive Distributed Lag (ARDL) model to analyze the determinants of the Nepal Stock Exchange (NEPSE) index from September 2012 to June 2024, utilizing 139 observations with a maximum of four lags. The study includes NEPSE as the dependent variable and key macroeconomic indicators, including lending interest rates (LIR), consumer price index (CPI), and 91-day Treasury bill rates (TB91), as explanatory variables. The optimal model, ARDL (1, 1, 0, 1), is selected based on the Akaike Information Criterion (AIC). The results reveal a strong persistence in the NEPSE index, as evidenced by the significant coefficient of the lagged dependent variable ($\text{NEPSE}_{(-1)} = 0.97, p < 0.01$), indicating that past values significantly influence current values. Lending interest rates exhibit a dynamic effect, with a negative immediate impact ($-148.42, p < 0.01$) and a positive lagged effect ($124.38, p < 0.01$), reflecting short-term challenges and long-term adjustments. CPI shows a negative but statistically insignificant relationship with NEPSE ($-3.74, p = 0.51$), suggesting minimal direct influence. TB91 demonstrates mixed effects, with an immediate negative impact (-14.39) and a lagged positive effect (16.26), both statistically insignificant. The model exhibits strong explanatory power, with an R-squared value of 0.96 and an F-statistic ($592.88, p < 0.01$), confirming overall significance. The Durbin-Watson statistic (2.00) indicates no significant autocorrelation.

Keywords: stock market performance, auto-regressive distributed lag (ardl), landing interest rate, treasury bills-91 (t-bills-91)

Introduction

The Nepal Stock Exchange (NEPSE) is an essential part of Nepalese financial market. It serves as an indicator of the country's stock market performance. The activities of stock market show the overall economic health of the nation (Naik & Padhi, 2012). Understanding the economics factors that affect the performance of stock market is important for investors, policymakers, and the researchers (AL- Shubiri, 2010). The stock market performance, as represented by NEPSE index, is influenced by various macroeconomic variables that impact its short-term and long-term performance. This study analyzes the relationship between stock market performance and macroeconomic indicators: the lending interest rate (LIR), the consumer price index (CPI), and the 91-day treasury bill rate (TB91).

This research paper is driven by a strong interest in exploring the dynamics of the Nepalese stock market performance. Such types of investigation in Nepalese context remains relatively under-examined in existing financial research. By examining the influence between stock market performance and macroeconomic determinants with the lagged values, analyzing long-term relationships is crucial in the field of research areas. The research aims to fill important gaps in the existing knowledge. This provides a valuable opportunity for the researcher to make a meaningful contribution to the field of financial economics, especially in the context of emerging markets like least developed Nepal. This study supports to policy decisions, improve investment strategies, and deepen the understanding of how economic indicators interact with stock market behavior.

The critical analyzing of stock market performance is an important for the financial market and economic growth. The study (Rjoub, 2017) findings showed that asset quality, management quality, earning, size, money supply and interest rate are significantly reacted to stock price performance. The study (Bhatta & Mishra, 2021) revealed a weak but significant impact of stock market returns on GDP growth. The study of (Thapa, 2023) revealed that exchange rates significantly influence stock market dynamics, while consumer prices, money supply, and remittances have insignificant impact. However, the extent to which macroeconomic variables such as lending interest rates (LIR), treasury bill rates (TB91), and consumer price index (CPI) impact on stock market performance remains unclear. The stock market performance exhibits strong momentum of historical values on the significantly affecting current levels (Eita, 2019). Even though, macroeconomic factors show diverse effects—some are statistically significant, and others are insignificant. In this context, this study raises important questions about the relative influence of these variables, their short-term versus long-term effects. Furthermore, it analyzes the dynamics shaping stock market performance in Nepal. Addressing these gaps is essential for investors, policymakers, and researchers. This study aims to understand how the stock market behaves with the macroeconomic determinants.

This research focuses on the relationship between macroeconomic variables—namely lending interest rates (LIR), consumer price index (CPI), and 91-day treasury bill rates (TB91)—and the performance of the Nepal Stock Exchange (NEPSE) from September 2012 to June 2024. By employing an Auto-Regressive Distributed Lag (ARDL) model, the study aims to analyze both the short-term and long-term effects of these macroeconomic variables on stock market performance.

Despite the increasing importance of stock markets in Nepal, the impact of macroeconomic factors on stock market performance remains under-researched. While previous studies have explored similar relationships in other markets, their findings are mixed, and their applicability to the Nepalese market remains unclear. This research seeks to fill this gap by empirically analyzing how lending interest rates, inflation, and treasury bill rates influence NEPSE's performance, exploring the nuances of their immediate and delayed effects.

The primary objective of this research is to assess the relationship of macroeconomic factors on the stock market performance. It analyzes the degree of market momentum. The aims of this study to analyze both the short-term and long-term effects of lending interest rates (LIR) on the NEPSE index, exploring their dynamic impact over time. Moreover, the study examines the relationship between inflation, represented by the consumer price index (CPI), and the NEPSE index to understand how inflationary pressures affect stock market performance. Additionally, this study determines the role of 91-day treasury bill rates (TB91) in influencing stock market with considering both immediate and future effects.

This study conducts within the limited scopes, variables, model, and market specificity. The study uses data from September 2012 to June 2024, which may not fully capture all relevant macroeconomic shocks or stock market changes beyond this period. Other macroeconomic factors such as exchange rates, money supply, and foreign direct investment are not considered, which may influence stock market performance. The ARDL model used in this research may not account for all complexities in stock market behavior, and the results may be sensitive to the model specification and lag structure. The findings may not be applicable to other stock exchanges or financial markets outside of Nepal, especially in more developed economies. There is limited empirical research that directly investigates the influence of lending interest rates, CPI, and treasury bill rates on the performance of the Nepal Stock Exchange.

The study has reviewed relevant theories and develops hypotheses based on previous research. Which supports to describe a research design and statistical techniques. This research performs data analysis using various tests and models, and interprets empirical findings to understand stock market dynamics influenced by macroeconomic factors in Nepal. Based on the research questions and objectives, the following research hypotheses can be developed for

empirical research on stock market performance and macroeconomic factors:

H₁: Lagged NEPSE index values have significant influence the current NEPSE index values.

H₂: Lending interest rates (LIR) have significant effect, either immediate or lagged, on the NEPSE index.

H₃: Consumer Price Index (CPI) have significant impact the NEPSE index.

H₄: Treasury Bill rates (TB91) have significant immediate or lagged effect on the NEPSE index.

The relationship between stock markets performance and macroeconomic determinants have been a subject of ongoing discourse lacking a unified theoretical framework.

Acknowledged, however, is the significant influence of economic indicators on the stock market performance? Numerous methodologies explored the impact of factors such as CPI, LIR, and TBills-91 on the stock market performance. The theoretical foundation traced back to the 1950s, with subsequent studies adding depth into this study understanding.

The association between stock market performance and macroeconomic factors do not have a unified theoretical framework. However, various economic indicators are acknowledged to influence stock market behavior. Thapa (2023b) found that exchange rates significantly impact stock market performance, while factors like consumer prices, money supply, and remittances have an insignificant influence in the Nepalese context. The study of Thapa (2023a) revealed that while GDP has no long-term impact on the Nepalese Stock Market performance. It does influence stock market movements in the short term. Bhatta & Mishra (2021) found significant relationships with real income, savings rate, and financial intermediary development. Abu Hussin et al. (2012) showed that the Malaysian stock market index has a co-integrating relationship with macroeconomic variables. The study highlights significant interactions with reserves and industrial production. Shrestha & Bhatta (2018) found a weak yet significant relationship between stock market returns and GDP in Nepal. It suggested institutional limitations in forecasting GDP with stock prices. Rjoub (2017) highlighted those earnings, asset quality, management quality, and size significantly affect stock price performance, with bidirectional causality observed in some variables.

Naik & Padhi (2012) revealed a long-run equilibrium between the stock market index and macroeconomic variables. It showed that stock prices are influenced by money supply, interest rate, and industrial production. AL-Shubiri (2010) analyzed microeconomic factors in the Amman Stock Exchange. The study found significant relationships between stock prices and net asset value per share, GDP, and other economic factors. Thapa (2019) exposed that dividend, and earnings per share positively affect stock market performance, whereas interest rates and price-to-earnings ratios negatively influence it. Shrestha & Bhatta (2018) examined a methodological framework for time series analysis by addressing

the challenges of trends and structural breaks in economic data, with a case study on Nepal's money–price relationship. Rjoub (2017) found that asset quality, management quality, and earnings significantly affect stock prices, with the market responding negatively to economic crises. Eita (2019) examined that in Namibia, economic activity and money supply positively impact stock prices. However, inflation and interest rates have a negative effect. Hussin et al. (2012) found that Islamic stock market performance in Malaysia are co-integrated with macroeconomic variables and influenced by industrial production and consumer price indices. Rahman et al. (2009) exhibited significant long-term relationships between the Malaysian stock market and macroeconomic variables such as money supply, interest rates, and industrial production. Hiransha et al. (2018) revealed that CNN outperforms other deep learning models in predicting stock prices. It exhibited that market dynamics in NSE data can predict NYSE stock prices.

Kelotra & Pandey (2020) developed a stock market prediction model using Deep-ConvLSTM optimized by Rider-MBO, achieving high accuracy with insignificant prediction errors. Jermisittiparsert et al. (2019) found that financial performance of an institution like current ratio, quick ratio, and return on assets significantly determine stock prices in the ASEAN region. Shrestha & Bhatta (2018) addressed the difficulties in selecting methods for time series analysis due to the unique properties of such data, offering a robust framework for testing results. Naik & Padhi (2012) examined the relationship between BSE Sensex and macroeconomic factors. The study disclosed a long-run equilibrium with positive correlations to money supply and industrial production, but negative ones with inflation.

Research Materials and Methods

This study adopted quantitative research methodology with the time series data. It employed the Auto-Regressive Distributed Lag (ARDL) model to analyze the relationship between the Nepal Stock Exchange (NEPSE) index. The sources of data from NEPSE, NRB, SEBON, World Bank, and listed company financial statements. The study used monthly data spanning from September 2012 to June 2024, total 139 observations after adjustments. The observations gathered by applying a judgmental sampling method, ensuring relevance and significance of selected macro variables. This study employed quantitative analysis to understand the factors that affect the performance of the stock market. Data analysis employed on the Excel, and Eviews- 12 for time series regression analyses. The study used inferential statistics to explore long-term and impact between macroeconomic variables and the stock market performance. Through an econometric model, it examines how selected macroeconomic indicators influence stock prices, aiming to gauge their impact and their relationship. The ARDL approach was chosen due to its flexibility in handling variables of different integration orders. The ARDL model is suitable for analyzing both short- and

long-term relationships.

$$NEPSE_t = \beta_1 NEPSE_{t-1} + \beta_2 LIR_t + \beta_3 LIR_{t-1} + \beta_4 CPI_t + \beta_5 TB91_t + \beta_6 TB91_{t-1} + C + \epsilon_t$$

This study examines the factors influencing the Nepal Stock Exchange (NEPSE) index using the Auto-Regressive Distributed Lag (ARDL) model. The dependent variable is the NEPSE index, while the explanatory variables include the Lending Interest Rate (LIR), Consumer Price Index (CPI), and 91-day Treasury Bill Rate (TB91). The optimal model, ARDL (1, 1, 0, 1), includes one lag for NEPSE and LIR, no lag for CPI, and one lag for TB91.

The study uses an econometric technique called the auto-regression distributed lag (ARDL) model to examine the relationship between Stock market and macroeconomic variables in time series data. To estimate the unknown parameters in a linear regression model, the study also utilizes a method called Ordinary Least Squares (OLS). OLS works by finding the best-fitting line that minimizes the sum of the squared differences between the actual values of the dependent variable (Stock market) in the dataset and the values predicted by the linear function. By applying these methods, the study aims to test the hypothesis and draw conclusions about the relationship between Stock market and macroeconomic variables. Based on the research objectives, here is a suggested sequential order for the research tools are employed such as stationary tests, lag selection criteria, and auto-regression distributed lag (ARDL) model.

Results and Discussion

The ARDL model table analyzes the dependent variable NEPSE over a sample period from September 2012 to June 2024. The model uses 139 observations after adjustments. The analysis was conducted with a maximum of 4 lags for the dependent variable. This model included automatic lag selection based on the Akaike Information Criterion (AIC). This ARDL (Auto-Regressive Distributed Lag) model examines the NEPSE index (Nepal Stock Exchange) as the dependent variable. This study applies the key macroeconomic variables as explanatory factors: LIR (lending interest rate), CPI (consumer price index), and TB91 (91-day treasury bill rate) and a fixed regressor C (constant). The RDL model evaluating 500 potential models, the optimal model selected is ARDL (1, 1, 0, 1).

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
NEPSE(-1)	0.97	0.03	29.50	0.00
LIR	-148.42	48.01	-3.09	0.00
LIR(-1)	124.38	46.07	2.70	0.01
CPI	-3.74	5.66	-0.66	0.51
TB91	-14.39	10.53	-1.37	0.17
TB91(-1)	16.26	10.30	1.58	0.12
C	337.86	195.75	1.73	0.09
R-squared	0.96	Akaike info criterion		12.52
Adjusted R-squared	0.96	Schwarz criterion		12.67
F-statistic	592.88 (0.00)	Durbin-Watson stat		2.00

Equation

$$\text{NEPSE} = 0.98 \cdot \text{NEPSE}(-1) - 148.42 \cdot \text{LIR} + 124.38 \cdot \text{LIR}(-1) - 3.74 \cdot \text{CPI} - 14.39 \cdot \text{TB91} + 16.26 \cdot \text{TB91}(-1) + 337.86$$

The coefficient of NEPSE (-1) is 0.97. The high t-statistic (29.5) and significance level ($p = 0.0000$) confirm a highly significant association. It demonstrates strong determination in NEPSE. It means the past values of NEPSE heavily influence the current values of NEPSE. The above equation showed that 1-unit increase in the lagged NEPSE index results in approximately a 0.97 unit increase in the current NEPSE index, holding other variables constant. This suggests strong persistence in the index values. The coefficient of lending interest rate is -148.42 (current) and lagged coefficient: 124.37. Both are statistically significant ($p = 0.0024$ and $p = 0.0078$). The immediate effect of lending rates on NEPSE is negative. It indicates that higher rates reduce stock market performance, likely due to increased borrowing costs. However, the lagged effect is positive, implying that after an adjustment period, the market adapts, and higher rates may reflect positive expectations (e.g., economic growth). This suggests that rising in the lending interest rate negatively affects the NEPSE index in the short-run, likely due to increased borrowing costs. Though, past interest rate climbs may signal future economic adjustments, leading to a delayed positive effect in the long-run. The above equation shows that 1-unit increase in the current lending interest rate decreases the NEPSE index by 148.41 units. Similarly, 1-unit increase in the lagged lending interest rate increases the NEPSE index by 124.38 units. This suggests that the effect of lending rates is dynamic and changes over time.

The coefficient of CPI is -3.73. This shows negative impact but insignificant relationship ($p = 0.5107$). It suggests that CPI (as a measure of inflation) has limited direct impact on NEPSE within the sample period. The Consumer Price Index (CPI) has an insignificant effect on NEPSE in the model. The above equation showed that 1-unit increase in the CPI leads to a 3.73 unit decrease in the NEPSE index, indicating a negative relationship between inflation (proxied by CPI) and stock market performance. The

coefficients of TB91 are -14.39 (current) and 16.26 (lagged). The immediate effect of TB91 is negative, but the lagged impact turns positive. Both are statistically insignificant ($p = 0.17$ and $p = 0.12$). This suggests that short-term treasury bill might not have a direct influence on the stock market index. The coefficient of constant is 337.85. The above equation showed that 1-unit increase in the current Treasury bill rate decreases the NEPSE index by 14.39 units. Similarly, 1-unit increase in the lagged Treasury bill rate increases the NEPSE index by 16.26 units. This indicates a nuanced, time-dependent relationship between short-term interest rates and the stock market. The constant term is marginally significant, representing the baseline level of NEPSE when all other variables are zero. The R-squared (0.96) indicates the model explains 96.4% of the variance in NEPSE. It reflects strong explanatory power. As well as Adjusted R-squared (0.96) remains high. It confirms the model's strength. Durbin-Watson statistic (1.99) has close to 2, suggesting no significant autocorrelation in the residuals. F-statistic (592.87, $p = 0.00$) reflects the model is statistically significant overall. Akaike Information Criterion (12.51) and Schwarz Criterion (12.66) used for model comparison. It suggests an efficient fit for the chosen model.

The research findings align with and differ from previous research in several key areas. The significant impact of interest rates, particularly the dual effects of LIR (negative in the short term and positive in the long term), consists with (Naik & Padhi, 2012), who found that interest rates influence stock prices. Similarly, the strong persistence of stock market performance, where past values shape future trends, supports earlier findings by (Shrestha & Bhatta, 2018), who highlighted the importance of historical trends and momentum effects in stock market performance. However, differences arise regarding inflation and treasury bill rates (TB91). This study found CPI and TB91 to have weak and insignificant effects on stock market performance. This contrasts with (Abu Hussin et al., 2012) and (Rahman et al., 2009), who demonstrated significant relationships between stock market performance and consumer prices in Malaysia. Similarly, the partial relevance of TB91 differs from findings by (Thapa, 2019), who addressed interest rates' negative impact on stock market performance.

Conclusion

The primary objective of this research is to assess the empirical analysis of macroeconomic factors on the stock market performance. This study used a quantitative methodology with time series data. The ARDL model was employed to analyze NEPSE and its relationship with macroeconomic variables. The data sources included NEPSE, NRB, SEBON, the World Bank, and financial statements. Monthly data from September 2012 to June 2024 were used, covering 139 observations. The optimal model selected was ARDL (1, 1, 0, 1). The strong lagged value influence of stock suggests that historical trends are critical in determining future performance. It supports the importance of momentum

strategies in this market. The negative short-term and positive long-term impacts of LIR highlight the dual nature of monetary policy on stock markets performance. Inflation (CPI) has limited significance implies that inflationary pressures are not a primary driver of market performance, which might reflect a less mature market structure or other dominating factors. Treasury Bill Rates (TB91) has weak direct influence suggests that stock market performance may not be highly sensitive to short-term fixed-income market movements, though lag effects point to negligible reactions.

References

- Abu Hussin, M., Mohd. Hussin, M., Muhammad, F., & Awang, S. (2012). Macroeconomic variables and Malaysian Islamic stock market: a time series analysis. *The Journal of Business Studies Quarterly (JBSQ)*, 3(4), 1–13.
- AL- Shubiri, F. N. (2010). Analysis the Determinants of Market Stock Price Movements: An Empirical Study of Jordanian Commercial Banks. *International Journal of Business and Management*, 5(10), 137–147. <https://doi.org/10.5539/ijbm.v5n10p137>
- Bhatta, G. P., & Mishra, A. (2021). Stock Returns and Gross Domestic Product in Nepal. *SEBON Journal*, VIII(1), 1–19.
- Eita, J. H. (2019). Modelling Macroeconomic Determinants Of Stock Market Prices: Evidence From Namibia. In *The Journal of Applied Business Research* (Vol. 28, Issue 5). <http://www.cluteinstitute.com/>
- Kelotra, A., & Pandey, P. (2020). Stock Market Prediction Using Optimized Deep-ConvLSTM Model. *Big Data*, 8(1), 5–24. <https://doi.org/10.1089/big.2018.0143>
- Naik, P. K., & Padhi, P. (2012). The impact of Macroeconomic Fundamentals on Stock Prices revisited: An Evidence from Indian Data. *MPRA Paper*. <https://ideas.repec.org/p/pramprapa/38980.html>
- Rahman, A. A., Zahirah, N., Sidek, M., & Tafri, F. H. (2009). Macroeconomic determinants of Malaysian stock market. *African Journal of Business Management*, 3(3), 95–106. <http://www.academicjournals.org/AJBM>
- Shrestha, M. B., & Bhatta, G. R. (2018). Selecting appropriate methodological framework for time series data analysis. *Journal of Finance and Data Science*, 4(2), 71–89. <https://doi.org/10.1016/j.jfds.2017.11.001>
- Thapa, K. B. (2019). Influencing Factors of Stock Price in Nepal. *NCC Journal*, 4(1), 113–120. <https://doi.org/10.3126/nccj.v4i1.24744>
- Thapa, K. B. (2023). Macroeconomic Determinants of the Stock Market in Nepal: An Empirical Analysis. *NCC Journal*, 8(1), 65–73. <https://doi.org/10.3126/nccj.v8i1.63087>