Stock Market Development and Economic Growth: Empirical Evidence from Nepal

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This article examines causal relationship between stock market development and economic growth in Nepal for the period 1994-2011, using unit root test, co-integration, and vector error correction models and developing NEPSE composite index as an indicator of stock market development. The finding suggests that stock market development has significantly contributed to the economic growth in Nepal. In this perspective, a refined policy measures should be adopted to strengthen and improve the role of stock market in order to expedite and maintain the strong growth of the economy.

Introduction

The role of capital in economic growth has been unequivocally accepted throughout the world. The provision of capital through stock market has markedly contributed in accelerating the pace of economic growth. Stock market development is a robust vehicle that supports resource allocation and spurs economic growth through various channels. Following mechanisms have been advanced in this connection:

In order to facilitate the business organization and the economy to harness their human, material, and management resources for optimal output,

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effective mobilization and allocation of funds is a must. A well-developed stock market boosts up saving and efficiently allocates capital to productive investments, which leads to an increase in the rate of economic growth. Stock markets contribute to the mobilization of domestic savings through the issuance of equity securities. Hence, companies acquire perpetual, non-debt, equity capital for development on the one hand and avoid over-reliance on debt financing, thus improving corporate debt-to-equity ratio *(*Bagehot, 1962). More efficiently mobilized savings cause capital accumulation which industries tap to finance large projects needed for expanding and modernizing industrial and commercial concerns via equity issues (Levine and Zervos, 1996; Adjasi and Biekpe, 2006). By pooling resources on larger projects, which would otherwise have difficulty accessing finance, stock markets can mobilize savings and spur the rate of investment (Greenwood and Smith, 1997). If capital resources are not provided to those economic areas, especially industries where demand is growing and which are capable of increasing production and productivity, the rate of expansion of the economy often suffers. Furthermore, the stock market is supposed to encourage savings by providing households with an additional instrument which may better help them to manage their risk preferences and liquidity needs (Leigh, 1997). When the stock market goes up, people feel wealthier and they tend to spend more. When the stock market falls, they feel poorer and crunched by debt run up during the good times, so they slash their spending (Ruggiero, 2001). The stock market serves as a genuine tool in the mobilization and allocation of savings among competing uses which are critical to the growth and efficiency of the economy (Alile, 1984).

Stock market liquidity, the ability to trade equity easily, is crucial for economic growth. Without a liquid stock market, many profitable long-term investments, which require a long-run commitment of capital, would not be undertaken because savers would be unwilling to renounce control of their savings for long periods. A liquid equity market allows savers to sell their shares easily, quickly and inexpensively, thereby permitting firms to have permanent access to capital on favorable terms. By facilitating longer-term and more profitable investments, a liquid market improves the allocation of capital and

enhances prospects for long-term economic growth. Liquidity lowers the cost of the foreign capital essential for development, increases investor incentive to acquire information on firms and improve corporate governance, thereby facilitating growth (Kyle, 1984; Holmstrom and Tirole, 1993; Neusser and Kugler, 1998; Bencivenga et. al., 1996;).

A third link between of stock market development on the economy is that the presence of stock markets would mitigate the principal agent problem, thus promoting efficient resource allocation and growth (Adjasi and Biekpe, 2006). As the stock price is the mirror of a firm's performance, weakening corporate governance would be reflected as a fall in share price. In such a situation, management would have a disincentive to work in their personal interests if their compensation is tied to stock performance (Jensen and Murphy, 1990). By exerting a continuous and strict control over the management of firms, stock markets provide proper incentives for managers to make investment decisions and positively affect the average return on investments (Diamond and Verrecchia, 1982; Laffont and Tirole, 1988; Scharfstein, 1988).

A strong stock market can generate, promote and acquire more information about firms, the innovative activity of entrepreneurs, the aggregate state of technology or their consequences also plays important role in the investment decisions, thereby promoting efficient resource allocation, improving the productivity of capital and achieving better growth (Caporale et al, 2004; Atje and Jovanovic, 1993; Grossman and Stiglitz, 1980; Allen, 1993:81-108). A new stock exchange can increase economic growth by aggregating information about firms' prospects, thereby directing capital to investment with returns (Greenwood and Jovanovic, 1990; King and Levine, 1993). Based on such accurate and improved information, the organization makes investment decisions through intelligent profit projections which improve resource allocation and promote economic growth.

Moreover, stock markets play a key role in allocating capital to the corporate sector, which will have a real effect on the economy on aggregate. A well functioning financial sector channels limited resources from surplus units to

deficit units and in so doing providing an efficient allocation of resources, thereby resulting in economic growth (Majid, 2007:140-141).

Another channel through which stock markets may positively affect capital accumulation and economic growth is the improvement of risk diversification through international financially integrated markets. The role of equity markets in providing portfolio diversification, enabling individual firms to engage in specialized production is bound to result in efficiency gains (Acemoglu and Zilibotti, 1997; Capasso, 2006). An increase in the degree of international integration of stock markets reduces the level of average investment risk through diversification and leads to a shift in the global portfolio from safe low-yield projects to riskier high-yields projects. By facilitating risk diversification through internationally integrated stock markets and increasing the array of possible investments, stock markets can augment the rate of investment in diversified portfolios (Saint-Paul, 1992; Obstfeld, 1994). This shift boosts economic growth by inducing capital mobility, productivity and saving rates.

Stock exchange serves the purpose of trading ownership rights in firms that may increase productivity growth. The creation of a stock exchange can increase economic growth by lowering the costs of exchanging ownership rights in firms, an important part of some institutional stories of economic growth (North, 1981). A new stock market can also increase economic growth by reducing holdings of liquid assets and increasing the growth rate of physical capital in the long run (Bencivenga et al, 1996). Lastly, diverse equity ownership creates a constituency for political stability, which, in turn, promotes growth (Perotti and van Oijen, 1999).

Nepal is encircled by and confronting with the problems of state of underdevelopment, turbulent socio-political situation preventing economic growth, and economic policy of globalization and liberalization, demanding global standards of economic behavior. Inadequate capital availability and its ineffective use is the crux of the problems of economic development. Stock market plays important role both by making provision of capital and encouraging its effective use for economic growth. Most of the countries of the world heavily

depend on the stock market to manage economic development of the country. Although relationship between stock market development and economic growth has been almost unequivocally established by various authors and studies, yet whether economic development of Nepal triggers the development of stock market or the development of stock market augments the development is not validated in Nepal. Paucity of research endeavors and materials in the Nepalese context based on sound statistical tools is markedly felt by the researchers, academicians and practitioners, which provide the ground to undertake this study. So it remains an important and burning topic of study and discussion at present. In the context, this study has been undertaken to assess the contribution of Nepalese Stock Market in the economic growth of Nepal.

Stock Market Development in Nepal

Securities market in Nepal began with the floatation of shares by Biratnagar Jute Mills Ltd 1936 and Nepal Bank Ltd in 1937. The introduction of Company Act, 1964 and the first issuance of government bond by Nepal Rastra bank on behalf of the government in 1964 were other landmarks in the development of stock market. The history of Nepal stock exchange began with the establishment of Securities Marketing Centre in 1976 under Industrial Policy 1974 in order to facilitate the trading of government securities. It was converted into Securities Exchange centre in 1984 under the Securities Exchange Act 1984, which started listing and trading corporate securities in from that year. It was converted into Nepal Stock Exchange Ltd (NEPSE) in 1993 under the stock market reform program. The central objective of NEPSE is to enhance markability and liquidity of corporate securities by providing trading floor through market intermediaries and facilitating and regulating trading activities. Out of the total authorized capital of Rs 50 million, Rs 34.91 million is subscribed of which 58.67 percent is owned by Nepal government, 34.60 percent by Nepal Rastra Bank, 6.13 percent by Nepal Industrial Development Corporation and 0.60 percent by members of the exchange. Before conversion into stock exchange, it was the only stock market institution undertaking the job of brokering, underwriting, managing public issue, market making for government bonds and other financial services. As an apex regulator in the

country, Securities Board of Nepal (SEBON) was incepted in 1993 under Securities Exchange Act 1984, which has currently been operating under Securities Related Act 2007, to act as an advisor of the government for the development of stock market, regulate the activities of securities markets and securities business persons and protect the interests of securities investors. The performance of stock market development is depicted in Table 1 and portrayed in Figure 1 and 2.

Fig.1: Trends in Stock Market Development Indicators in Nepal

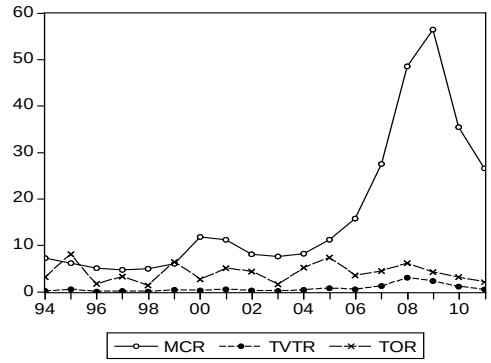

Fig. 2: Trends in Stock Market Development Indicators in Nepal

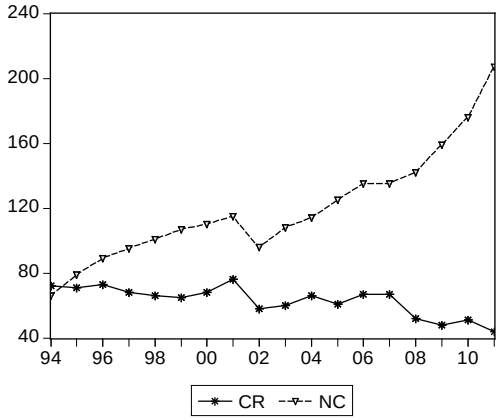

Table 1: Stock Market Development in Nepal

Year	MCR	TVTR	TOR	NC	CR
1994	7.24	0.23	3.18	66	0.72
1995	6.17	0.50	8.13	79	0.71
1996	5.14	0.09	1.75	89	0.73
1997	4.71	0.15	3.28	95	0.68
1998	4.93	0.07	1.42	101	0.66
1999	6.03	0.38	6.38	107	0.65
2000	11.77	0.32	2.68	110	0.68
2001	11.21	0.57	5.06	115	0.76
2002	8.06	0.36	4.44	96	0.58
2003	7.66	0.13	1.63	108	0.60
2004	8.27	0.43	5.18	114	0.66
2005	11.19	0.82	7.35	125	0.61
2006	15.84	0.56	3.56	135	0.67
2007	27.57	1.24	4.49	135	0.67
2008	48.49	3.02	6.23	142	0.52
2009	56.41	2.38	4.23	159	0.48
2010	35.52	1.12	3.14	176	0.51
2011	26.53	0.55	2.06	207	0.44

Notes: MCR = Market Capitalization Ratio. TVTR = Total Value Traded Ratio. TR = Turnover Ratio. NC = Number of Listed Companies in NEPSE .CR=Market Concentration Ratio.
Source: Author's Calculations based on Data from SEBON and Ministry of Finance.

Various measures are used as indicators of stock market development. The first indicator is Market Capitalization Ratio which measures the size of the

stock market. It is calculated by dividing the value of market capitalization by GDP. As can be seen from Table 1, although the average market capitalization ratio is only 16.82 during the period 1994 - 2011, which is very low compared to the ratio of developed stock markets where this ratio is greater than 100, it has been increasing from 7.24 in 1994 to 56.41 in 2009 and declined to 26.53 in 2011. Low stock market capitalization ratio indicates that stock market is yet to show its impact on the economic activities of the country.

As a market liquidity indicator, Total Value Traded Ratio, which is expressed as the total value of shares traded in the stock market as a percentage of GDP, measures how easily securities can be bought and sold. As the Table shows, the average ratio is well below 1 during the period 1994 to 2011 except for the period 2007-2010, which is very low compared to the ratio of developed stock markets where this ratio is greater than 40. Low ratio indicates illiquid markets in Nepal in Nepal and so such trading is more costly and difficult.

The next measure of stock market development is Turnover Ratio which is the total value of shares traded divided by the average market capitalization during the specific period. As the Table shows, the average Turnover Ratio is 4.12 during the period 1994 to 2011, which is very low compared to the ratio of developed stock markets where this ratio is greater than or very close to 100. A low turnover ratio may indicate high transaction costs and relative difficulty in buying and selling of shares. The country can grow fast by increasing turnover ratio even though market capitalization is very low. .

As an indicator of stock market development, Number of listed companies, which specifies the number of all companies listed in NEPSE at any point in time, reveals a clear picture of the stock market size in the economy because the size of stock market increases with the increases in the number of listed companies. In Nepal, the number of companies listed on NEPSE increased from 66 in 1994 to 207 in 2011. Despite the increase in the number of companies, only about 12 percent of the companies registered on Office of the Company Register as public limited companies are listed on NEPSE during the 15 year period (KC, 2010). This indicates that firms tend to avoid stock market as an alternative source of long-term capital.

Taken together these ratios i.e., Market Capitalization Ratio, Total Value Traded Ratio and Turnover Ratio, indicate that stock market in Nepal is very small relative to its economy and highly illiquid and stock market in Nepal is yet to make its presence felt in the national economy (KC, 2010).

A country's stock market is considered highly concentrated if few large companies dominate it. High concentration is not desirable as it adversely affects liquidity in the stock market. Concentration in a stock market is measured by computing the share of ten largest stocks to total market value of shares. As shown in the Table, the average concentration ratio is 0.63, indicating that the market value of shares of ten largest companies account for 63 percent of the total market value which is very high compared to the concentration ratio of 0.2 of countries with developed stock markets. Countries with family owned, closed enterprises and limited number of listed companies have high concentration ratio.

Review of Literature

Several empirical studies have been conducted on the relationship between stock market development and economic growth with varying results. Bencivenga and Smith (1992) have stated that a new stock market can increase economic growth by reducing holdings of liquid assets and increasing the growth rate of physical capital, at least in the long run.

Levine and Zervos (1996) examine empirical association between stock market development and long-run economic growth, using pooled cross-country time-series regression of forty-one countries from 1976 to 1993. The finding revealed a strong correlation between overall stock market development and long-run economic growth, implying a positive relationship between stock market development and economic growth.

Demirguc-Kunt and Maksimovic (1996) investigated the relationship between stock market development and financing choices of firms, using data from thirty developed and developing countries from 1980-1991. They discovered that initial improvements in the functioning of a developing stock market produce a higher debt-equity ratio for firms and thus more business for

banks, while for stock market that are already developed, further development leads to a substitution of equity for debt financing.

Furthermore, using data from 44 industrial and developing countries from 1976 to 1993, Demirguc-Kunt and Levine (1996) investigate the relationship between stock market development and financial intermediary development. They find that countries with better – developed stock markets also have better developed financial intermediaries. Thus, they conclude that stock market development goes hand-in-hand with financial intermediary development.

Osinubi (1998) examines whether stock market promotes economic growth in Nigeria between the period 1980 and 2000, using regression analysis. The study confirms that there exist positive but statistically insignificant relationship between the economic growth and the measures of stock market development. This, in essence, means that the effect of stock market on economic growth is weak and insignificant. This is in line with Alile's (1984) assertion that the Nigerian stock market contribution to gross fixed capital formation was very minimal fluctuating between 2.9 percent and 15.3 percent between 1971 and 1980.

Filer, Hanousek and. Campos (1999) examines the relationship between stock market development and economic growth using Granger causality tests for 70 countries for varying time periods beginning in 1985 and ending in 1997. They find little relationship between stock market activity and future economic growth, especially for the lower income countries.

Agarwal (2001) examines the relationship between stock market development and economic growth using a time series cross-section data for nine African countries from 1992-1997, using simple correlation between some stock market variables and investment. The result suggests a positive relationship between several indicators of the stock market performance and economic growth.

Beck and Levine (2001) investigates the impact of stock markets and banks on economic growth, using a panel data set for the period 1976-98 and

applying recent GMM techniques developed for dynamic panels. On aggregate, they found that stock markets and banks positively influence economic growth.

Obamiro (2005) investigated the role of the Nigerian stock market in the light of economic growth. The author reported that a significant positive effect of stock market on economic growth. He suggested that government should create more enabling environment so as to increase the efficiency of the stock market, and to attain higher economic growth.

Ted et. al. (2005) examined the empirical association between stock market development and economic growth in India. The authors found no evidence of association between the Indian stock market development and economic growth in the entire period they studied. Whereas the authors found support for the relevance of stock market development in economic development during pre-liberalization, they discovered a negative relationship between stock market development and economic development for the post liberalization period.

G.C. and Neupane (2006) examine the existence of causality relationship between stock market and economic growth in Nepal based on the time series data for the year 1988 to 2005, employing Granger causality test and using an equally weighted single indicator of three stock market development indicators; the average of ratios of market capitalization to GDP, annual turnover to GDP and the annual turnover to market capitalization. The study finds the long-run integration and causality of macroeconomic variables and stock market indicators even in a small capital market of Nepal, implying that the stock market plays significant role in determining economic growth and vice versa.

Shahbaz et al (2008) suggested that there is a long run relationship between stock market development and economic growth for Pakistan. Stock market development was found to be an important factor that enhances economic growth. The authors also discovered a feedback relationship between stock market development and economic growth in the long run. However, in the short run, the causality runs only from stock market development to economic growth.

Nurudeen, (2009) examines the relationship between stock market development and economic growth in Nigeria by employing the error-correction method. It was shown that stock market development (market capitalization) contributes positively to economic growth. The recommendations therein include among others- removal of impediments to stock market development in the form of tax, legal and regulatory barriers; improvement of the trading system in order to increase the ease with which investors can purchase and sell shares; development of the nation's infrastructure so as to encourage firms to grow and increase the ease with which they raise capital or funds on the stock market; employment of policies that will increase the productivity and efficiency of firms as well encourage them to access capital on the stock market; enhancement of the capacity of the Nigeria Security and Exchange Commission to facilitate the growth of the stock market, restore the confidence of stock market participants and safeguard the interest of shareholders by checking sharp practices of market operators (particularly speculators) and strengthening the capacity of the Nigeria's security and exchange commission to check the activities of stock market speculators.

Ezeoha et al (2009) investigated the nature of the relationship that exists between stock market development and the level of investment (domestic private investment and foreign private investment) flows in Nigeria. The authors discovered that stock market development promotes domestic private investment flows, thus suggesting the enhancement of the economy's production capacity as well as promotion of the growth of national output.

Seetanah (2009) examine the complex linkages between stock market development, bank development and economic growth for the case of 27 developing countries studies over a period of 15 years (1991-2007), employing rigorous panel VAR procedures. The analysis demonstrated that stock market development is an important ingredient of growth, but with a relative lower magnitude as compared to the other determinants of growth, particularly with banking development.

Nowbutsing and Odit, (2009) examines the impact of stock market development on growth in Mauritius utilizing a time series econometric

investigation over the period 1989 -20067. They analyzed both the short run and long run relationship by constructing an Error Correction Model. They found that stock market development positively affected economic growth in Mauritius both in the short run and long run.

Adamopoulos (2010) examines the long-run relationship between stock market development and economic growth for Germany for the period 1965-2007, applying the Johansen co-integration analysis and a Vector Error Correction Model based on the classical unit roots tests. The results of Granger causality tests indicated that there is a unidirectional causality between stock market development and economic growth with direction from stock market development to economic growth.

Sililo (2010) investigated the directional link between stock market development and economic growth in Zambia for the period 2002-2009, using Toda and Yamamoto Causality Test and Granger causality test. The results of the Toda and Yamamoto approach support the demand following hypothesis that economic growth causes stock market development. The Granger Causality test results lend support to the independent view that stock market development and economic growth are independent of each other. The study implies that the Zambian stock exchange could help promote further economic growth in the country and should therefore be integrated in the whole economic system.

Ake and Ognaligui (2010) investigate relationship between Douala stock exchange and Cameroonian economic growth, using Granger-Causality tests for 2006-2010. Their findings suggest that there is no relationship between Douala stock exchange and economic growth for Cameroon. Their results do not match with the other research findings confirming a positive relationship between stock market development and economic growth.

Oskooe (2010) investigates the relationship between stock market performance and economic growth in Iran by conducting causality tests. Findings imply the causality link between economic growth and stock price fluctuations in the long run and bilateral causality running between share prices and economic growth in the short run. Therefore, it can be inferred that the level

of real economic activity is the main factor in the movement of stock prices in the long run and stock market plays a role as a leading economic indicator of future economic growth in Iran in the short run.

Vazakidis and Adamopoulos (2010) explore the causal relationship between stock market development and economic growth of France for the period 1965-2007, using a VECM. The estimated coefficient of error correction term found statistically significant with a negative sign, which confirmed that the economic growth caused stock market development in France. Therefore, the inference of this study was that economic growth has a positive effect on stock market development while interest rate has a negative effect on stock market development.

According to KC. (2010), stock market in Nepal is undeveloped and has failed to show significant impact on the overall national economy of the country. Small market size has made it vulnerable to manipulation and price rigging. Low turnover ratio and value-traded ratio to volatility, and high concentration ratio indicate that stock market in Nepal is highly illiquid and risky. Investors tend to avoid stock market because they cannot invest in securities according to their risk-return preference.

Joshi (2010) examines the relation between stock market development and economic growth in Nepal for period of mid July 1994 to mid July 2008 by using Karl Pearson correlation. The study finds that stock market development is not significantly associated with economic growth during mid July 1994 to mid July 2000 while there is a positive relation between stock market development and economic growth during mid July 2000 to mid July 2008.The findings indicate that stock market has positive contribution to economic growth in Nepal.

Sahu and Dhiman (2011) made an attempt to explore the causal relationship between stock market indicators and macro economic variables of India by using both correlation and Ganger Causality regression techniques for the period 1981 to 2006. The findings of this study reveal that there is no causal relationship between stock market indicator i.e. sensex of Bombay stock

exchange and real gross domestic product of India despite they being highly correlated. Therefore it is concluded that BSE SENSEX cannot yet be called as an "indicator" of India's growth and development.

Materials and Methods

This paper has employed annual time series data for the period 1994-2009. The data related to market capitalization ratio, number of listed companies, total value traded, and turnover ratio are collected from various annual reports of securities board of Nepal and the data related to per capita GDP and GDP deflator is collected from the economic survey, Ministry of Finance, Government of Nepal.

Unit Root Test

Up to the present days, regression analysis based on time series data assumes that most macroeconomic time series are stationary. But it is now a well-known fact that most macroeconomic time series are non-stationary (Dickey-Fuller, 1979; Gujarati, 1995:729). In such a case, applying standard regression models to non-stationary data is inappropriate because of the possibility of obtaining spurious relationship, which makes hypothetical test results unreliable. Hence, to avoid a spurious relationship, detecting the stationary or non-stationary of time series is crucial. For this purpose, Phillips-Perron unit root test has been conducted on each variable. The Phillips-Perron test (Phillips and Perron, 1988) gives robust estimates in comparison with the ADF test. Hence, Phillips-Perron test has also been used in addition to the conventional ADF test. The test detects the presence of a unit root in a series, say Y_t, by estimating,

$$\mathbf{\Delta Y_t = \alpha + \rho * Y_{t-1} + e_t} \qquad \mathbf{\ldots (2)}$$

The PP test is the t-value associated with the estimated coefficient of ρ^*. The series is stationary if ρ^* is negative and significant.

Johansen Co-integration Test

After confirming the non-stationary of time series in their levels, the next step is the investigation of presence of cointegration between GDP and Saving. It is used to ascertain the long run relationship between GDP and Saving. For this purpose, Johansen cointegration procedure has been utilized (Johansen, 1988; Johansen and Juselius, 1990). Cointegration and Error Correction techniques are suitable for investigating the statistical relationship among non-stationary data and help exploring the dynamics of short run changes and the long run equilibrium relationship of time series variables.

Then, hypothesis of existence of zero cointegration vector (r=0) and more than respectively tested with the likelihood ratio test statistics (λ_{trace}) and maximal eigenvalue test ($\lambda_{\max}$). The likelihood ratio test statistic (trace test) is computed as:

$$\lambda_{trace} = -n\sum_{i=r+1}^{k}\ln(1-\lambda i)$$

In this case the null hypothesis that there are r cointegrating vectors against the alternative of more than r cointegrating vectors is tested and when accepted which trace statistic is lower than critical value suggested with Johanson and Juselius. Other test is maximal eigenvalue test which us following:

$$\lambda_{\max} = -n\ln(1+\lambda_{r+1}) r = 0,1,...,k-1$$

This statistic tested for all the null hypothesis of r cointegrating vectors against the alternative of r+1 cointegrating vectors. When existence of r cointegrating vector is accepted that maximal eigenvalue statistic is lower than critical value. Then it has been suggested that the likelihood ratio test statistics and maximal eigenvalue test deterministic presence or absence the long run relationship between variables in model.

A composite index is used in this study as an indicator of stock market development (Argrawall and Tuteja, 2007; Nyong (1997; Shrestha and Bhandari,

2008: 163) A composite index **means** a grouping of indexes which are averaged together to form a product representative of an overall market over time. It is a broad-based index of prices of all listed shares and each stock is weighted according to its share in the total market capitalization. Since the weighting of each stock constantly shifts with changes in the stock's price and the number of shares outstanding, the index fluctuates in line with the price move of the stocks. The NEPSE Composite index is a market capitalization-weighted grouping of all stocks listed on the NEPSE which measures the performance of the common stocks listed on the NEPSE. The current value of the NEPSE Composite Index is always expressed in relation to the base year (1994 =100).

Since there is much variation among business cycles in duration and magnitude, causes and consequences, the contributions of specific factors differ over time. So, composite indexes designed to describe and predict economic growth and fluctuations generally work better over time than do their individual indicators. Thus, the composite index of leading indicators helps predict changes in the economy (McGuckin, Ozyildirim and Zarnowitz, 2000). The composite stock market index is used as a proxy for the stock market development as this index better represents the stock exchange market than other financial indices (Nieuwerburgh, Buelens and Cuyvers, 2006; Shan, 2005; Vazakidis, 2006; Vazakidis. and Adamopoulos, 2009).

The composite index of overall stock market development may be constructed as follows:

$$\text{NEPSE Composite Index} = \frac{TMC_1}{TMC_0} = \frac{\sum(Shares \times \text{Price}_1)}{\sum(Shares \times \text{Price}_0)} \times \text{Base Value}$$

Where
TMC is Total Market Capitalization or Market Value of all Listed Shares in NEPSE
1 denotes current Year.
0 indicates Base Year.
Total market capitalization = ∑ (price × shares issued)
Base Value is 100.
TMC_1 is ∑ (Current price × shares issued in the Current Year)
TMC_0 is ∑ (Base price × shares issued in the Base Year)]

Vector Error Correction Model

Vector Error Correction Model is used to determine short run and long run causality. If the variables are co-integrated or if the null hypothesis of no co-integration is rejected, the residuals from the equilibrium regression can be used to estimate the error correction term. If there is one or more than one cointegrating vectors between variables, one can use error correction model for testing Granger causality. Simple contemporaneous correlation based tests assume that the causation is unidirectional—from Saving to GDP. This is, as a matter of fact, unrealistic since the causation may even be bi-directional given the level and degree of economic structure. A necessary precondition to causality testing is to check the cointegrating properties of the variables under consideration, since standard tests for causality are not valid if there exists cointegration (Granger, 1988). Standard tests for causality (i.e.Granger/Sims tests) are only valid if the original time series, from which growth rates are obtained, are not cointegrated. So, the relevant error correction term is included in the standard causality tests, if the variables are found to be cointegrated. The error correction model for these variables can be written as:

$$\mathbf{\Delta Y_t} = \alpha_1 + \rho_1 \mathbf{z_{t-1}} + \sum_{i=1}^{p} \beta_i \mathbf{\Delta Y_{t-i}} + \sum_{j=1}^{q} \delta_j \mathbf{\Delta S_{t-j}} \quad \mathbf{\ldots (5)}$$

$$\mathbf{\Delta S_t} = \alpha_2 + \rho_2 \mathbf{z_{t-1}} + \sum_{i=1}^{p} \beta_i \mathbf{\Delta Y_{t-i}} + \sum_{j=1}^{q} \delta_j \mathbf{\Delta S_{t-j}} \quad \mathbf{\ldots (6)}$$

Where, z_{t-1} is an error correction term, representing the long run relationship. If both coefficients (ρ_1 and ρ_2) are significant, this will suggest the bi-directional causality. But, if only ρ_1 is significant, this will suggest a unidirectional causality from S to GDP, implying that gross domestic saving drives economic growth toward long run equilibrium. If only ρ_2 is significant, this will suggest a unidirectional causality from GDP to S, implying that economic growth drives gross domestic saving toward long run equilibrium. The ECM allows for the finding that gross domestic saving cause economic

growth as long as the error correction term ρ_1 carries a significant coefficient with a negative sign.

Results and Discussion

At the outset, Phillips-Perron Unit Root Test is used to test the null hypothesis of unit root. The results of the ADF Unit Root statistic for Gross Domestic Product (GDP) and Stock Market Development (NEPSE Composite Index) of Nepal are presented in Table 2.

Table 2: Phillips-Perron Unit Root Test Statistic

Variables	Form	t-Statistic	Prob
Real GDP	Level	-1.967838	0.2966
	First Difference	-3.546614	0.0204
NEPSE Composite Index	Level	-1.916035	0.3177
	First Difference	-4.494980	0.0125

Source: Author's Calculations based on Data from SEBON and Ministry of Finance.

Since the computed Phillips-Perron test statistics of GDP and NEPSE Composite Index as an indicator of Stock Market Development are higher than any of these MacKinnon Critical values at level forms, the null hypothesis that these variables exhibit a unit root cannot be rejected. Phillips-Perron test does not reject the null hypothesis of unit root for GDP and NEPSE Composite Index in the level form and rejects the null hypothesis in the first difference form of the series. Because of the presence of unit root in the variables, they are non-stationary implying no statistically meaningful relationship between them. However, after first

differencing, the null hypothesis of unit root is rejected in all of the cases since the Phillips-Perron test statistic is smaller than MacKinnon critical values. That is, the first differenced GDP and NEPSE Composite Index do not exhibit a unit root, meaning that these variables are stationary. The results show that one could not reject the null hypothesis of unit root (non-stationarity) for both variables in level forms. The first differences of GDP and NEPSE Composite Index are stationary indicating that these variables are integrated of the first order I (1). Hence, Phillips-Perron test have shows that all the variables have unit root in level forms and no unit root in the first difference.

Having determined the non-stationary of time series in their levels, and they are also of the same order of integration I (1), Johansen procedure has been applied to ascertain whether GDP and NEPSE Composite Index are cointegrated or not, assuming linear deterministic trend in data. Because in the case of nonstationarity in the time series data, the most appropriate procedures are cointegration and error-correction models. The results of the Johansen cointegration tests are presented in Table 3:

Table 3: Johansen Cointegration Test

Eigen Value	Trace Value	Ho	H1	Max-Eigen Statistic	Ho	H1
0.680049	19.30101*	r = 0	r ≥ 1	18.23339**	r = 0	r = 1
0.06454	1.067621	r ≤ 1	r ≥ 2	1.067621	r ≤ 1	r = 2

Note: * indicates significance at 1 percent level and ** indicate significance at 5 percent level. Trace test indicates 1 cointegrating equation(s) at 1% level and Max-Eigen test indicates 1 cointegrating equation(s) at 5% level.

Source: Author's Calculations based on Data from SEBON and Ministry of Finance.

The null hypothesis of no cointegration between NEPSE Composite Index and GDP is rejected since both Trace and Max-Eigen statistics are larger than the critical values at 1 percent significance level. In other words, for cointegrating regression, NEPSE composite index = f (GDP), one can reject the null hypothesis r = 0 against the alternative hypothesis r = 1 since both Trace and Max-Eigen statistics are larger than the critical values at 1 percent significance level but cannot reject the null $r \leq 1$ against the alternative r = 2 since both Trace and Max-Eigen statistics are less than the critical values even at 1 percent level. The fact that the presence of cointegration between NEPSE Composite Index and GDP suggest (i) that there is a long run equilibrium relationship between the two time series and (ii) the existence of causality in at least one direction. All this indicates that GDP and NEPSE Composite Index is cointegrated, which is sufficed to indicate that stock market development bear a long run equilibrium relationship with economic growth in Nepal.

After confirming that GDP and NEPSE Composite Index are cointegrated in Nepal, it is appropriate to find out the direction of causality between them through estimating the Vector Error Correction Model. The results of the Vector Error Correction estimates are presented in Table 4.

Table 4: Vector Error Correction Estimates

Economic Growth (DGDP)			NEPSE Composite Index (Dcompi)		
Z_{t-1}	ΔGDP(-1)	ΔGDP(-2)	Z_{t-1}	ΔCompi(-1)	Δ Compi(-2)
-0.29025*	0.03347	-0.09362	1.28121	-4.6840	-2.51704
[-4.1413]	[3.3531]	[-4.7467]	[0.6923]	[-0.9267]	[-0.50804]

Figures in parenthesis indicate t-values.
* indicates significance at 1 percent level (table value of t = 2. 898).
Source: Author's Calculations based on Data from SEBON and Ministry of Finance.

The significance of the error correction coefficient (Z_{t-1}), which is determined by the t-ratio given below the coefficient, with a negative sign indicates Granger causality in at least one direction. The results show that the error correction term in the economic growth equation is statistically significant with a correct negative sign, indicating that stock market development has significantly strengthened economic growth in Nepal. However, the error correction in the stock market development equation is not significant and a wrong positive sign, which indicates that economic growth has not significantly supported stock market development in Nepal. The error correction term of economic growth equation is significant and of stock market development equation is not significant, which indicates the absence of bi-directional causality between economic growth and stock market development in Nepal. The uni-lateral causal relationship could be attributed to the low income level of the economy, the poor savings culture of the investing public, and the insufficient number of companies listed on the floor of the market. Thus, it can be inferred that stock market development has increased economic growth in Nepal. So, the government should make an attempt to prioritize stock market development.

Concluding Remarks

Stock market in Nepal promoted economic growth of the Nepalese economy. Since stock market is a vehicle for economic growth in our context, the stock market should be integrated into the whole economic system of the country while designing economic policies. The key policy implication is that the country requires a well-built and enabling stock market in order to accelerate and maintain strong growth of the economy. Hence, meaningful efforts are required on the part of the government to ensure well-organized and competent operation of stock market because the more efficient the market, the more possibility it will attract investors.

The government should remove impediments to stock market development in the form of tax, legal and regulatory barriers because they are sometimes disincentives to investment, should invest more and develop the nation's infrastructure in order to create an enabling environment for businesses to grow, increase the productivity and efficiency, and the rate of returns of firms, should employ appropriate trade policies that promote the inflow of international capital and foreign investment so as to enhance the production capacity of the nation, and should strengthen the capacity of the Nepal Stock Exchange so as to check and prevent sharp practices by market operators in order to safeguard the interest of shareholders. Moreover, the Nepal Stock Exchange should improve the trading system in order to increase the ease with which investors can purchase and sell shares, thus guaranteeing liquidity on the stock market. Besides, stock market reformation policies may give a further support to the economy and may act as a key enabler and catalyst of economic growth.

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