Nexus between stock market capitalization and its Drivers: An ARDL model analysis

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Abstract

This paper aims to examine the nexus between the stock market capitalization and it drivers in Nepalese context using the Auto-regressive Distributed Lag (ARDL) approach using the secondary date from 1988/89 to 2018/19. The stock market capitalization is has used as dependent variable and macro-economic, company specific, stock market size, government policy, and political factors have been used as independent variables. It has reported the descriptive statistics, correlation analysis, data stationary, ARDL bound test of long-run relationship. The long-run relationships amongst the variables have been confirmed with the ARDL short-run dynamics and Error Correction Mechanism approaches. The results indicated that gross domestic product and interest rate are important macro-economic variables to explain the stock market capitalization, whereas the return on equity in the case of firm-specific variables. Moreover, both the government policy and political factors have found to influence the stock market capitalization in the context of Nepalese capital market. The findings suggest for a promotion of economic growth with low and stable interest rates, improve company’s return on equity, and implement supportive government policies with political stability to support the overall stability and growth of the country's stock market capitalization.

Keywords: Gross domestic product, Gross domestic savings, Interest rate, Return on equity, Size of stock market, Policy and political factors

Introduction

The study of factors affecting the stock market capitalization has gained global importance due to the realized roles of the stock market in consolidating scattered savings and mobilizing them in productive sectors for fostering sustainable economic growth and thereby improving the living standard of the people in society. Levine and Zervos (1998) argued that the stock market development could boost future economic growth. Due to the growing significance of the stock market in the country's economic growth, recent research has focused on identifying the key factors that influence the stock market's long-term development (EI-Nader & Alraimony, 2014; Akosah, 2016; Ho & Iyke, 2017; Tsaurai, 2018).

Lately, there has been a growing fascination within academic circles with unraveling the factors influencing stock market capitalization. Among the prominent theories is one that suggests a substantial impact from macro-economic forces. A stable macro-economic environment encourages business operations, which in turn leads to a higher demand for financial instruments (Gordon, 1959; Ross, 1976). The changes in country’s stock market are thought to be influenced by changes in economic activities and are taken as an indicator of future changes in real economic activity (Levine & Zervos, 1998).

Stock prices, on the other hand, are contingent on a company's performance and its potential for growth. As a company's performance improves and its rate of return increases, stock prices are expected to rise accordingly (EI-Wassal, 2013). Consequently, increasing stock prices are seen as an indication of investors' optimism regarding the company's future capacity to generate income and expand. Moreover, observing price fluctuations among common stocks provides valuable information for identifying potentially profitable investment opportunities (Gordon, 1959). Proponents also argued for institutional qualities as an important building block of stock market development. For example, they argue that the political factor can significantly influence the development of stock markets in emerging economies. The fluctuations in stock prices often correlate with the level of political instability, which, in turn, affects the country's economic outlook and investors' overall perceptions of its economic prospects (Ioannidis & Kontonikas, 2006; Yartey, 2008).

Numerous theoretical and empirical studies have provided evidence of a connection between stock market capitalization and the factors that influence it. However, the strength of these relationships differs significantly over time and country, even when employing the identical analytical approaches. Moreover, the disparity can also be attributed to the presence of various variables evaluated in the models and diverse institutional arrangements in each country. Therefore, this paper aims to investigate how macroeconomic, company-specific, and institutional factors collectively impact stock market capitalization, utilizing the most recent and up-to-date data available. The research would be valuable for developing a thorough understanding of the multifaceted factors that influence stock price movements and developing the appropriate regulatory policies to promote stable and effective capital market of the country. The rest of the section includes review of related literatures, methodology, results and discussions, conclusion, and implications.

Literature review

In recent times, academic circles have become increasingly interested in figuring out what drives stock market capitalization and the leading theories advocates the significant role of macro-economic forces in stock market. Gordon (1959) and Ross (1976), for example, in the classical theory asserted that the equity prices are linked to the macro-economic conditions. This is based on the idea that the growing economy generates demands for particular types of financial arrangements, and the financial system responds automatically to these demands. argued that a stable macro-economic environment encourages business operations, which in turn leads to a higher demand for financial instruments. Similarly, Robinson (1952) and Patrick (1966) in the demand following approach argued that the finance follows to the successful enterprises. The empirical evidences have exhibited the link between the macro-economic forces and the stock market performance. The changes in country's stock market are thought to be influenced by changes in economic activities such as the interest rate (Fama, 1981); trade-openness (Ferson & Harvey, 1997); the gross domestic product (Mankiw, 2006); and savings and investment (Yartey, 2008). In contrast, Levine and Zervos (1998) asserted that the stock market development predicts future economic activity of a country and considered as an indicator of future changes in real economic activity.

The profit situations of the companies, in other hand, signal the company's ability to distribute dividends which the investors perceive that the company uses the capital well to provide greater profit to result higher stock prices. An early study conducted by Ball and Brown (1968) investigated the relationship between accounting profits and stock prices of a sample of 261 companies listed on the New York Stock Exchange for the period from 1957 to 1965, the research found that the annual profits, and that the information contained in profits number have the greatest impact on stock prices compared with the effect of the rest of the information before the announcement of profits.Tangen (2003) concluded a positive association between corporate size and profitability, and the market value of the companies. Bekaert et al. (2001) contended that the listed companies measure the breadth of the stock market. Shepherd, (1972), and Surajit and Saxena (2009) also argued that the larger firms retain the economies of scale and other efficiencies. The larger sized firms perform a dynamic role in profit and market value because of their easy access to the capital market, diversification, management, and larger risk tolerance capacities as opposed to the small firms that perform worse than big companies and are exposed to lesser risk tolerance capacities and greater informational asymmetry and Heaton & Lucas (2000) asserted the company fundamentals in stock market fluctuations.

Proponents also argued for institutional qualities as an important building block of stock market development. EI-Wassal (2013), for example, claims that the appropriate institutional framework (such as regulations, market intermediaries, asset management, supervision and enforcement tools, trading payments and settlement process, etc.) is responsible on the stock market development. According to Ioannidis and Kontonikas (2006) and Yartey (2008), it was affirmed that a political factor as an important factor in the development of stock markets in emerging markets. The movement in prices of stocks largely vary with the political instability linking towards the country's economic prospects, and general investor perceptions of the country’s economic prospects. On the other hand, Levine (2006) advocated that the financial sector policy shapes financial institutions' incentives, which have a significant effect on capital allocation, income distribution, and the degree of prosperity, which are critical to driving economic growth. They argue that the erratic policies of the government distort the growth of the country’s stock market.

Research methodology

This study has employed descriptive and explanatory research designs to investigate the predictive power of some of selected factors to stock market capitalization from 1988/89 to 2018/19. The study has examined the predictive potential of macroeconomic, company-specific, political, and policy variables on the stock market capitalization in Nepal. It has used auto-regressive distributed lag model and the model has been re-parameterized into short-run dynamics and error correction mechanism to validate the long-run association among variables under interest.

Functional form and variables definition

Based on the economic theories discussed and the relevance of the variables investigated, this study has established a functional relationship between the dependent variables and independent variables:

SMCt = f(MEVt, CSVt, SSM, d1t, d2t) .... (1)

a. Stock market capitalization (SMC)

Stock market capitalization is the dependent variable, and the natural logarithm of real values of the market capitalization of companies listed at NEPSE (LN_MCAP) has been obtained multiplying the number of listed shares by the current market price. Because it is less arbitrary than other indicators, Garcia and Liu (1999) suggested that stock market capitalization is a reasonable proxy for stock market development.

b. Macro-economic variables (MEV)

The macro-economic variables consist of gross domestic product, gross domestic savings, and interest rate. The natural logarithm of real gross domestic product (LN_GDP) has been used to represent gross domestic product. Gross domestic product (GDP), according to Wooldridge (2009), is the most important and powerful indicator of economic output. Another macroeconomic variable is the interest rate (INT), which is calculated as the amount of interest paid on deposits as a percentage of all commercial banks' total deposits in real terms.

c. Company-specific variables (CSV)

The company specific variables are measured by total assets and return on equity of the commercial banks. Return on equity (ROE) Real net income earned by the company as a percentage of total net worth and a number of companies listed at NEPSE.

d. Size of stock market (SSM)

The size of the stock market (SSM) is provided by growth of number of listed companies. Number of listed companies (LISTCOM) Natural logarithm of the number of companies listed at NEPSE.

e. Event factors (d1 & d2)

The d1 and d2 represent the dummy for the political and policy variables, respectively. The d1 represents the dummy for political events that takes value 1 if the scenario is unfavorable; otherwise, 0. Similarly, d2 is the dummy for policy change event factor that takes value 1 if the scenario is favorable; otherwise, 0.

Unit root test

It is argued that the non-stationary time series provides misleading inferences in the relationship between the variables because it produces the effect of shock in the series permanently. The Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (1979) has been applied in this study to pursue the unit root tests of time series in equation 2.

$$\Delta Y_t = \alpha_1 + \beta_{1t} + \beta_2 Y_{t-1} + \sum_{i=1}^{m} \delta_i \Delta Y_{t-i} + \varepsilon_t \ldots\ldots (2)$$

Whereas α, β, and δ represent the parameters of respective variables applied in the study. The ε_t is the white noise error term and m is the maximum lag length of the series and it has been determined empirically.

The symbol Δ is a difference operator, Y_t is a time series variable where the null hypothesis is Y_t is a non-stationary series, i.e., H_0:β_2=0; against the alternative hypothesis of variable Y_t is stationary, i.e., H_1:β_2<0. The null hypothesis is rejected when β_2 is significantly negative (H_1:β_2 < 0). Alternatively, if the absolute calculated ADF statistics is higher than critical values as per suggestion by McKinnon (1996) or p-values is less than 5 percent; the null hypothesis (H0) is rejected in the favor of the alternative hypothesis, the series is said to be stationary and the time series is termed as integrated of order zero, I(0). However, non-rejection of the null hypothesis at level implies non-stationary series that suggest the conduct of the test on the difference of the series until stationary is reached and the null hypothesis is rejected. Table 1 presents the Augmented Dickey-Fuller (ADF) and Philips-Perron (P_P) tests results of unit root tests of the time series.

Table 1
Unit root tests

Null Hypothesis: Variable has got unit root					
Variables	**ADF Test**		**P_P Test**		**Order of Integration**
	Level	**First Difference**	**Level**	**First Difference**	
LN_MCAP	-1.185	-4.755*	-1.398	-5.996*	I(1)
LN_GDP	-0.288	-9.321*	0.306	-13.320*	I(1)
LN_GDS	-1.104	-6.196*	-0.275	-6.814*	I(1)
INT	-2.277	-5.731*	-2.277	-5.853*	I(1)
LN_TA	-0.918	-5.788*	-0.964	-5.787*	I(1)
ROE	-2.455	-4.348*	-2.287	-4.451*	I(1)
LISTCOM	-3.752*	-8.0436*	-3.734*	-12.589*	I(0)

'' represents the results at a 1 percent level of significance*

According to the results, the null hypothesis of each of the times series has got unit root has not been rejected at level form series in the case of both ADF and P_P test for all the time series taken under consideration except for growth rate of listed companies (LISTCOM). However, the efficiency has been improved when unit-roots for times series were performed at first difference so that the null is rejected in the favor of alternative hypothesis at a 5 percent level of significance. The unit root test results suggest the growth rate of listed companies is integrated of order 0, i. e., I(0), and the remaining time series are integrated of order 1, i.e., I(1).

Lag length selection criterion

Wooldridge (2006) argued that the lag selection could be quite empirical and largely depended upon the nature of time-series observations as too many lags caused to lose degrees of freedom and creates the insufficient number of observations for research models. It is suggested maximum order of lags of 2 in annual time series, however lag length for each of the variables need not be identical. The automatic lag selection procedure under the ARDL approach has been used with the EViews 10 software program to test the short-run and long-run causality within the given number of the maximum lag length of 2 for each of the dependent variables and regressors in order to avoid making the model selection criterion cumbersome. The dummies for political instability and policy variables considered the non-dynamic regressors rather they are assumed as fixed regressors.

ARDL bounds test for co-integration

The econometric theory argues that the two or more non-stationary (unit root) time series when integrated are unable to deviate from stable equilibrium in the long-run, and they are said to be co-integrated. This study has employed Auto-Regressive Distributed Lag (ARDL) technique (or ARDL bound testing) proposed by Pesaran and Shin (1999) and Pesaran et al. (2001) to determine the long-run relationship between the time series that are considered to be non-stationary individually. The literature suggests the co-integrated time series can only permit to re-parameterize the model into the short-run dynamics and error correction mechanism to validate the long-rung associations of variables of interest. The equation 3 presents the ARDL (p, q) bound test approach for two variables Y and X associated with p and q numbers of lags to establish a meaningful long-run relationship.

$$\Delta Y_t - \beta_0 + \sum_{i=1}^{P} \beta_{1i}\Delta Y_{t-i} + \sum_{i=0}^{q} \beta_{2i}\Delta X_{t-i} + \delta_1 Y_{t-1} + \delta_2 X_{t-1} + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where, δ_1 and δ_2, particularly, correspond to the coefficients of long-run relationship, and β_{1i} and β_{2i} are the coefficients corresponding to the short-run dynamics of the model. The F-statistics is carried out on the joint null hypothesis on the long-run coefficients (i.e., δ_1 and δ_2) of the lagged variables Y_{t-1} and X_{t-1} setting equal to zero (i.e., H_0: $\delta_1 = \delta_2 = 0$) as it implies there is no long-run association between variables X and Y against the alternative hypothesis asH_0 is not true. Pesaran et al. (2001) prescribe the two sets of lower bounds I (0) and upper bound I (1). The computed F-statistics value is compared with the lower bound critical value I (0) (assuming all variables under considerations are integrated of order zero) and upper critical value I (1) (assuming all variables under considerations are integrated of order one). Null hypothesis (H_0) of no co-integration is rejected, in the favor of the alternative hypothesis, if the F-statistics is greater than the upper bound critical value. Therefore, the F-statistics value lying between these two sets of critical values provides inconclusive results.

The ARDL bound test equation specifies in the form of an unrestricted error correction model (UECM) with the introduction of each of the long-run coefficients to identify the existence of a long-run relationship between stock market capitalization (LN_SMC_t) as dependent and its one period lag (LN_MCAP_{t-1}) the explanatory together with other variables considered in this study. Thee quation 4 represents the full ARDL bound test model applied to establish the long-run association among variables.

$$\begin{aligned}\Delta LN\_MCAP_t \quad - \quad C_0 \quad + \quad & \sum_{i=1}^{P} \beta_{1i}\Delta LN\_MCAP_{t-i} + \sum_{i=0}^{q} \beta_{2i}\Delta\, LN\_GDP_{t-i} + \sum_{i=0}^{r} \beta_{3i}\Delta\, GDS_{t-i} \\ & + \sum_{i=0}^{s} \beta_{4i}\Delta\, INT_{t-i} + \sum_{i=0}^{u} \beta_{5i}\Delta\, LN\_TA_{t-i} + \sum_{i=0}^{v} \beta_{6i}\Delta\, ROE_{t-i} + \sum_{i=0}^{w} \beta_{7i}\Delta\, LISTCOM_{t-i} \quad + \\ & \varphi_1 LN\_MCAP_{t-1} + \varphi_2 LN\_GDP_{t-1} + \varphi_3 LN\_GDS_{t-1} + \varphi_4 INT_{t-1} + \varphi_5 LN\_TA_{t-1} \\ & + \varphi_6 ROE_{t-1} + \varphi_7 LISTCOM_{t-1} + \eta_1 d_{1t} + \eta_2 d_{2t} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (4)\end{aligned}$$

Whereas Δ denotes the first difference operator, LN_MCAP_t represents the stock market capitalization that are translated into the natural logarithm of stock market capitalization (LN_MCAP). C_0 is a constant term, ($\beta_{1i} - \beta_{7i}$) represent ARDL short-run coefficients, (φ_1 - φ_7) denotes error correction long-run coefficients,η_1 andη_2 short-run coefficients for dummies inserted without being differentiated, and $\varepsilon_t$is disturbance term. Since the time series in this study is on an annual basis, the maximum numbers of lags (p, q, r, s, u, v, and w) of the differenced series are chosen equal to 2. The null of no-existence of long-run relationship is tested with the joint coefficients of the lag variables equal to zero, H_0:$\varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = \varphi_7 = 0$; against the alternative hypothesis of existence of long-run relationship, H_1:$\varphi_1 \neq \varphi_2 \neq \varphi_3 \neq \varphi_4 \neq \varphi_5 \neq \varphi_6 \neq \varphi_7 \neq 0$. The given sets of critical values are compared with F-statistic for the sake of a long-run relationship.

ARDL short-run dynamics and error correction mechanism (ECM)

According to Pesaran et al. (2001), the ARDL bound test equation (4),when justifying the co-integration, suggests re-parameterization of the equation into short-run dynamics and error correction mechanisms (ECM) to validate long-run associations among variables. Specifically, the lag long-term variables in the form of unrestricted ECM of the equation are replaced by lag error correction terms, (e_{t-1}) allowing to estimate restricted vector auto-regressive models. The identification of long-run connections between variables in equation 4 enables us to reformulate it into equation 5 as:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{P} \beta_{1i}\Delta Y_{t-i} + \sum_{i=0}^{q} \beta_{2i}\Delta X_{t-i} + \lambda e_{t-1} + e_t \quad \ldots\ldots (5)$$

Whereas λ in equation (5) is a parameter that stands for speed for an adjustment that particularly measures the extent to which any disequilibrium in the previous period is being adjusted in Y_t in the current period. Theoretically, the coefficient of error correction term is expected to lie between -1 and 0 that is, $-1< \lambda <0$, indicating a convergence towards equilibrium whereas a positive coefficient shows a divergence. The general error correction representation of the equation 5 is re-written in equation 6to estimatethe error correction model imperative to derive the feedback effect necessary to return towards equilibrium from any deviation so that it establishes a meaningful long-run connection of the variables under the consideration in this study.

$$\Delta LNMCAP_t = C_0 + \sum_{i=1}^{P} \beta_{1i}\Delta LN\_MCAP_{t-i} + \sum_{i=0}^{q} \beta_{2i}\Delta LN\_GDP_{t-i} + \sum_{i=0}^{r} \beta_{3i}\Delta GDS_{t-i} + \sum_{i=0}^{s} \beta_{4i}\Delta INT_{t-i}$$
$$+ \sum_{i=0}^{u} \beta_{5i}\Delta LN\_TA_{t-i} + \sum_{i=0}^{v} \beta_{6i}\Delta ROE_{t-i} + \sum_{i=0}^{w} \beta_{7i}\Delta LISTCOM_{t-i} + \eta_1 d_{1t} + \eta_2 d_{2t} +$$
$$\lambda ECT_{t-1} + \varepsilon_t \quad \ldots\ldots (6)$$

The λ in equation 6 represents the coefficient of lag error correction term, ECT_{t-1} which measures the speed of adjustment of the previous period's disequilibrium in the current period in stock market development (LN_MCAP_t). The stock market capitalization (LN_MCAP_t) in equation 6 follows the similar practices as mentioned earlier which replaces by the market capitalization (LN_MCAP_t), by considering the same independent variables in the model.

Residual and stability diagnostic test

Normality tests, serial correlation, heteroscedasticity tests have been employed as residual diagnostic tests and also performed the parameter stability diagnostic tests.

Results

Correlation matrix

The correlation of stock market capitalization (D(LN_MCAP)) with the gross domestic product (D(LN_GDP)), gross domestic savings (D(LN_GDS)), and return on equity (ROE) is positive and negative with an interest rate (INT), reported in Table 2. However, the correlation of stock market capitalization is negative with the size of the market. The linear relationship among the variables is important from the standpoint of econometric theory, which suggests that high inter-correlation between predictor variables violates the assumption of a non-multicollinearity regression model. With respect to the pairwise relationship among the explanatory variables, the magnitude of correlation coefficient has observed maximum with 0.39 between the natural logarithm of total assets (D(LN_TA)) and interest rate (D(INT)) and suggest the coefficient of determinants (R2) for these two variables reported below 0.9. Thus, the results of the cross-correlation coefficient of independent variables with their respective coefficients lying below the set of standards imply no major cause of concern regarding the multicollinearity in the model employed in this study.

Table 2
Correlation matrix

Variables	D(LN_MCAP)	D(LN_GDP)	D(LN_GDS)	D(INT)	D(LNTA)	D(ROE)	LISTCOM
D(LN_MCAP)	1.000						
D(LN_GDP)	0.191	1.000					
D(LN_GDS)	0.037	0.332	1.000				
D(INT)	-0.637	0.018	0.008	1.000			
D(LN_TA)	0.388	0.349	0.050	-0.388	1.000		
D(ROE)	0.258	0.066	0.062	0.049	0.324	1.000	
LISTCOM	-0.145	0.140	0.084	0.254	-0.113	0.352	1.000

ARDL bound test for co-integration

Table 3 reports the results of co-integration for the time series for the sample period from mid-July 1989 to mid-July 2019.

Table 3
ARDL bound test results for co-integration test

Null Hypothesis, H_0: There is no level relationship							
		Critical Value					
D. Variable	**F-Statistics**	**1 percent**		**5 percent**		**10 percent**	
		Lower Bound I(0)	**Upper Bound I(1)**	**Lower Bound I(0)**	**Upper Bound I(1)**	**Lower Bound I(0)**	**Upper Bound I(1)**
LN_MCAP	5.802* (k=6)	4.068	5.250	2.962	3.910	2.496	3.346

'' significant at 1 percent level of significance*

Table reports the two sets of critical values with unrestricted intercept and no trend at 1 percent, 5 percent, and 10 percent level of significance respectively in which lower critical bound assumes that all the variables in the ARDL model are I(0), and the upper critical bound assumes I(1). As the study uses the sample size of 31 years of observation, the critical values reported in the table consist of small sample sizes provided by Narayan (2004). The computed F-statistics value with a number of variables (k) equal six (i.e., F=5.802, k=6), when compared with the critical values provided by Narayan (2004) for small samples, is greater than the upper bound value I(1) at 1 percent level. This rejects the null hypothesis of there is no level relationship. This indicates that there exists co-integration between stock market capitalization, macro-economic factors, and company-specific variables.The existence of co-integration suggests further re-parameterization of the equation into error correction mechanism (ECM) for valid long-run relationship and short-run dynamics among variables.

ARDL long-run model for stock market capitalization

Table 4 presents the ARDL long-run coefficient estimate for stock market capitalization on macro-economic variables and company-specific variables. The macro-economic variables are real gross domestic product (LN_GDP), real gross domestic savings (LN_GDS), and interest rate (INT); company-specific variables are the real total assets (LN_TA) and return on equity (ROE); and the size of stock market represented by growth of listed companies at NEPSE. The dummy for political change (d1) and a dummy for policy changes (d2) remained as fixed regressors and are not part of the long-run relationship in this study.

Table 4
ARDL long-run coefficient estimation

Dependent Variable: Stock Market Capitalization				
Regressor	**Coefficients**	**Std Error**	**t-Statistics**	**P-value**
LN_GDP	13.864**	4.735	2.928	0.012
LN_GDS	0.495	0.796	0.622	0.545
INT	-0.900**	0.357	-2.522	0.026
LN_TA	-4.721***	2.377	-1.986	0.069
ROE	0.064**	0.022	2.879	0.013
LISTCOM	-0.011	0.021	-0.509	0.619

*'**' significant at 5 percent level of significance*
*'***' significant at 10 percent level of significance*

As can be seen from the results reported in Table 4, the coefficients of the natural logarithm of real GDP, interest rate, and return on equity are all significant at a 5 percent level and the outcome is obtained as suggested by economic theories. The coefficient of real GDP with 13.864 indicates that for one percentage point increase in real GDP leads to an increase in real stock market capitalization by 13.864 percentage points, in the long run, holding other variables unchanged. The long-run coefficient of return on equity (i.e., 0.064) implies that a one unit increase in return on equity causes an increase in stock market capitalization by 0.064 units. Likewise, the increase in interest rate has negatively affected the stock market capitalization and implies that for 1 percentage point increase in the interest rate causes a 0.9 percentage point decrease in market capitalization in the long run, without changing other variables.

The coefficient of assets size is negative and significant at the 10 percent level; however, the result is against the prior expectation. Finally, the real GDS has also experienced the positive sign and size of market exhibiting the negative relationship with stock market capitalization but their relationships are not significant.

ARDL short-run dynamics and error correction mechanism (ECM) for stock market capitalization, ARDL (1, 0, 1, 2, 1, 2, 0)

Table 5 reports the results of ARDL short-run dynamics and error correction model coefficient estimates for the stock market capitalization (LN_MCAP) with the corresponding model: ARDL (1, 0, 1, 2, 1, 2, 0). The long-run equilibrium relationship among the variables only holds when the deviations in the short-run in any of the variables in the model are corrected over a period.

Table 5
ARDL short-run dynamics and error correction coefficient estimates

Dependent Variable: Stock Market Capitalization				
Regressor	**Coefficients**	**Std Error**	**t-Statistics**	**P-value**
C	-42.693*	5.558	-7.681	0.000
D(LN_GDS)	-0.134	0.094	-1.428	0.177
D(INT)	-0.252*	0.028	-8.811	0.000
D(INT(-1))	0.093*	0.027	3.387	0.005
D(LN_TA)	-0.822**	0.381	-2.158	0.050
D(ROE)	0.017*	0.002	7.065	0.000
D(ROE(-1))	-0.006**	0.003	-2.593	0.022
d1	-0.299*	0.086	-3.467	0.004
d2	0.202**	0.089	2.270	0.041
ECT(-1)	-0.374*	0.049	-7.705	0.000
R^2	0.906			
Adj R^2	0.861			
F-Statistics	20.293*			
Serial Correlation LM Test ($x^2_{\text{Serial Correlation}}$)	0.319			
Heteroscedasticity ($x^2_{\text{Heterioscedasticity}}$)	0.299			
Normality Test ($x^2_{\text{Normality}}$) 0.697				
N (after adjustment)	29			

'' and '**' indicates the results are significant at 1 percent and 5 percent level.*

The R^2 suggests that the 90.6 percent of the variation in stock market capitalization is explained by the regressors considered in this model. The F-statistics (i.e., 20.293) is significant at a 1 percent level and shows the overall fitness of the model. As the residual diagnostic test results reported in the table suggest no evidence of problems in residual in with the model. The LM serial correlation test indicates the evidence of no serial correlation since the estimated probability value of chi-square (i.e., $x^2_{\text{Serial correlation}}$=0.319) is higher than the 5 percent level of significance. The Jarque-Bera normality test ($x^2_{\text{Normality}}$ = 0.697) implies that the residuals are normally distributed. The Breusch-Pegan test for heteroscedasticity (i.e., $x^2_{\text{Heterioscedasticity}}$ = 0.299) shows that the disturbance term in the model is homoscedastic.

With respect to the short-run causal effect for stock market capitalization, the gross domestic savings, interest rate, total assets in contemporaneous form, and return on equity in lag form is negative whereas the relationship is positive with one year lag of interest rate and return on equity. This indicates short-run causal effects running from these variables to the stock market capitalization. However, the relation of gross domestic savings with stock market capitalization is not significant as well as inconsistent with the results obtained in the earlier section of this study. The Wald test has been performed with the purpose to test the joint significance of the causal effect of short-run parameters on dependent variables in the model. With respect to the joint short-run causal impact of interest rate on stock market capitalization (LN_MCAP), the probability value of chi-square ($x^2$2 =16.664) is reported with 0.124 and it is insignificant at 1 percent level. This implies that the null hypothesis of two short-run coefficients of interest rate is simultaneously equal to zero (i.e., H0: C(3) = C(4) = 0) is rejected.

This suggests that the interest rates in contemporaneous form (INT) and one-year lag form (INT (-1), which are individually significant at 1 percent level, have no evidence of joint impact on stock market capitalization.

Likewise, the chi-square value (x^2) reported with 5.354 for the joint test of significance of the coefficients of ROE reveals the p-value of 0.068. This rejects the null hypothesis (i.e., H0: C (6) = C (7) = 0) in favor of an alternative hypothesis at a 10 percent level, suggesting that the ROE marginally has a joint causal effect on dependent variables. The coefficient of dummy for political instability (d1) is negative and that for policy change (d2) is positive and both the coefficients are significant at 1 percent level.

The coefficient of one period lag of error correction term (ECTt-1) for the model reported negative with 0.374 and significant at 1 percent level as expected earlier. The absolute value of the coefficient of error correction term (i.e., 0.374) implies that about 37 percent of the disequilibrium in the stock market capitalization is adjusted toward equilibrium annually. For instance, if the stock market capitalization (LN_MCAP) lowers its long-run relationship with the other variables in the model, then the stock market capitalization adjusts upwards at a rate of 37.4 percent per year.

Figure 1
Cumulative sum of squares of recursive residuals

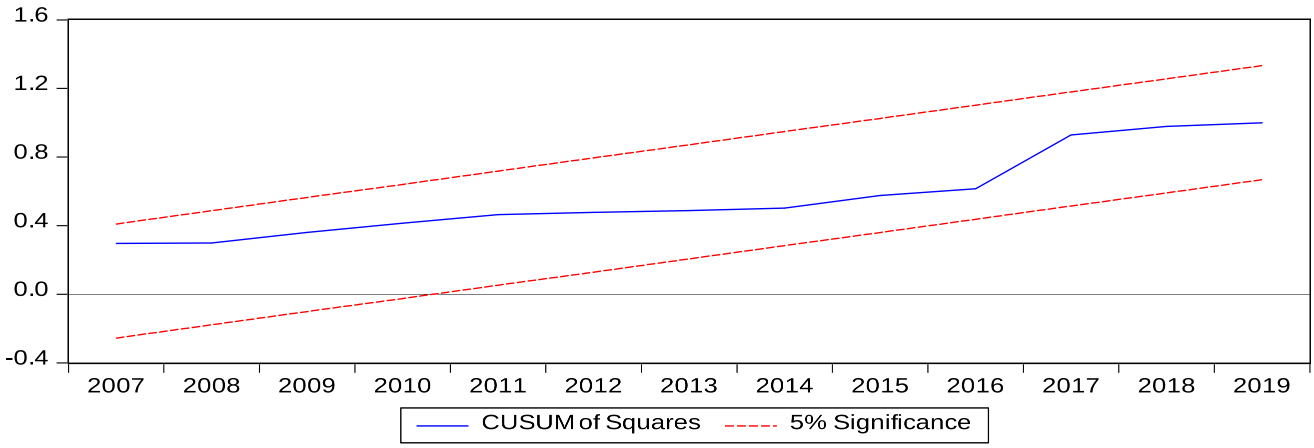

Figure 1 presents the CUSUMSQ test to examine the stability of the long-run coefficients and CUSUM squares (represented by blue line) stay within the two critical bounds indicated by red dotted lines showing the stability of long-run coefficients of the model.

Discussion

The ARDL bound test result revealed a long-term relationship between the dependent variable: stock market capitalization and other independent variables under consideration, and this relationship has been confirmed by the results of Error Correction Model (ECM) since the coefficient of one period lag of error correction term is negative and significant. The significant negative nexus between the interest rate with the stock market capitalization confirms the interest rate as one of the major macro-economic forces influencing the stock market capitalization in Nepal. It is apparent when investors view the bank interest rates as a viable alternative investment to stock choices. The rise in interest rate is also theoretically argued to raise the required rate of return on the investments and ultimately result in a decline in stock values. Mok (1993) claimed that lower interest rates would stimulate investment and economic activity, causing stock prices to rise. The empirical evidences provided by Lynge and Zumwalt (1980), Bashir and Hasan (1997), Alam and Uddin (2009), Pushpakumara and Anthony (2009), Ali (2014), and Ho (2017), among others, have revealed consistent findings of negative correlations between stock price movements and interest rate changes.

Similarly, a long-run positive association of stock market capitalization with real gross domestic product resulted has a strong theoretical support. The economic theory postulates two noticeable justifications for the linkage between the stock market and GDP. The first explanation contends that the changes in information about the future course of real GDP cause a change in the current stock prices. Secondly, at the point when it costs more for firms for the credit, and they obtain less amount for investment and GDP growth slows down causing stock prices to decline. Moreover, the stock market is also considered as important economic pillars for the overall economic development of a country, the role of the stock market has been realized in facilitating the trading of securities amongst the buyers and sellers of securities at exchanges for their money invested in the companies. The company makes the best use of its available resources to increase profits, which drives up stock prices. Haider and Tariq (2018) argue that the country's circumstances and situations must bring positive economic changes, and these changes in economic factors affect stock prices. This result agrees with a number of earlier research, including those by Nazir et al. (2010), AI-Abedallat and AI-Shabib (2012), among others.

The positive significant nexus between the stock market capitalization with return on equity (ROE) exhibited in the study suggests for a higher earning firms support to create market value of the companies and profit situation of the company is important in stock market capitalization of the country. Most people think that businesses with higher returns on equity pay out more dividends and make better use of their capital, which raises the value of their stock. Moreover, the higher profit enterprises attract investor attention and trust which increases the company's value and, as a result, positively affects stock prices. Ball and Brown (1968) and Agionmirgiannakis et al. (2006) have presented empirical evidences of a positive effect of return on equity on company stock prices.

The causality running from the political instability to stock market development indicators in Nepal supports the logical hypothesis of a negative relationship between the undesirable political conditions and stock market development of the country. It confirms the important role of political stability in the development of stock markets of the country because the political stability decreases the uncertainty and investors are more likely to diversify their investments. This result is consistent with findings provided by Erb, Harvey, and Viskanta (1998) and Lehkonen and Heimonen (2015) in an international area, and Dongol (2008), Shrestha and Kharel (2019) in the context of Nepal. This research outcome is predictable in the sense that the political instability causes stock price volatility due to the uncertainty associated with the possible range of future cash flows and the rising cost of capital (Ioannidis & Kontonikas, 2006). They argue political stability as the foremost essence to gear up economic growth and develop the stock market of the country, and the efforts ought to concentrate on a good political scenario to play a crucial role in mobilizing financial resources.

The results of the effect of changes in government's policies on the stock market development of the country have revealed positive and significant. The outcome is expected as the policy issuances reshape the financial system accountable to capital allocation, income distribution, and a sustainable economy and promote the equity market thereby. The positive nexus between the policy changes and stock market development has jointly been supported in both the theoretical and practical grounds. For instance; Bernanke and Kuttner (2004), La Porto et al. (2006), and Shrestha and Subedi (2014) have documented that the developed legal and regulative infrastructure essential to confirm the correct functioning of the financial setup and promote for growth and development of the securities market of the country. These results suggest for an important policy consideration for the improved policies to make the stock market more representative from divergent sectors and to consider it as a truly required component of the country's capital market.

Conclusion and implications

The relation of stock market capitalization with other independent variables: macro-economic factors, company specific variables, size of stock market, and institutional forces have been examined with the ARDL model. There exists a long-run relationship of stock market capitalization with these independent variables, and the relationship has further confirmed by the short-run dynamics and Error Correction Mechanism. The econometric models confirmed that the gross domestic product and bank interest rate are the major macro-economic forces influencing the stock market capitalization of Nepal.

The positive link between stock market capitalization and GDP indicates that the stock market capitalization tends to rise together with the country's GDP. This has significant repercussions for investors, businesses, and policies. This only suggests that companies can raise market capitalization during economic growth, and stock market investors may profit from it. Therefore, the focus of policy should be to promote stable financial markets, investor confidence, and sustained economic growth.The negative association between the bank deposit rates and stock market capitalization is also supported by conventional finance-economic theory. This indicates that not only do investors view bank deposit rate as alternative options to invest in stock market, but higher interest rates also tend to lead to decline in stock prices. The understanding the interplay between the interest rates and stock market capitalization is crucial as it has the far-reaching consequences on investment decisions and corporate financing. Thus, the market participants and policymakers should continue to pay attention to maintain stable interest rates for the overall health of economy and capital market of the country.

The strong positive association between return on equity and stock market capitalization emphasizes the importance of return on equity to the growth of the national stock market. Profitable companies gain investor interest and confidence, which has a beneficial impact on stock prices. The favorable relationship between return on equity and stock market growth suggest to put in place the appropriate policies to ensure effective and efficient businesses and capital market of the country. Political stability, in other side, is associated negatively with stock market capitalization, which suggests that it reduces uncertainty and encourages investors to diversify their holdings. As a result, policy considerations are essential to maintaining political stability in the nation in order to support the stock market and foster investor confidence. Finally, the stock market capitalization has increased as a result of the policy reforms related to the stock market. This merely recommends that an existing policy be maintained with an enhanced regulatory framework in order to maintain the expansion and development of Nepal's stock market.

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