

# Financial Sector and Stock Market in Nepal: Complement or Substitute?

Keshab Khatri Chettri<sup>1</sup>

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## Abstract

*This paper empirically examines the complement or substitute relationship between Nepalese financial sector and stock market using annual data from 1988 till 2019. The time series data underwent unit root tests without structural breaks employing Dickey Fuller-GLS and Philips-Perron tests followed by tests of unit root with structural break using Zivot and Andrew (1992) model. The ARDL approach to co-integration in the presence of one structural break was employed to analyze the long-run relationship. The results reveal that there exists bidirectional causal relationship between financial sector development and stock market development in the short-run. However in the long-run it is the stock market development that significantly causes financial sector development. The significant positive relationship between financial intermediary indicator (credit-to-private sector) and stock market development indicator (market capitalization ratio) reveal that financial sector development and stock market development are complementary to each other both in the short-run and in the long-run. Saving rate is observed to have important role in determining stock market development whereas investment and inflation are found influencing to determine financial sector development.*

**Key words:** ARDL, Complement, Financial Sector, Stock Market, Complement, Substitute, ARDL, Nepal

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## I. Introduction

Over the past several decades, the development of the financial sector has received considerable attention since the pioneer contribution of Goldsmith (1969), Shaw (1973), McKinnon (1973) and has gained distinct importance in fostering economic development. The contributing relationship of financial sector development toward economic growth has been empirically observed by different eminent studies (Calderon and Liu, 2003; Demurgic-Kunt and Levine, 2001; King and Levine, 1993b). Since early research of Schumpeter (1911) and McKinnon (1973), debate still exists about the role of stock market development on economic growth process. Recent empirical studies in different economies have shown that the development of stock market contributes to the economic growth both in short-run and long-run (Ang and McKibbin, 2007; Beck and Levine, 2004).

Against the above backdrop it can be well assumed that financial sector and stock market play important role in contributing towards economic growth. However, the relationship between financial sector development and stock market development is still debatable. Garcia and Liu (1999) put forward that both the stock market and banking sector play the role of intermediating savings towards investment projects so they can either have complement or substitute relationship. The authors discussed that from the point of view of 'demand for funds', in a perfect market where information is symmetric, the market value the securities issued by the firms is independent of firm's source of finance and thus, firms would be

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<sup>1</sup> Keshab Khatri Chettri has completed M.Phil from Tribhuvan University. He is PhD Scholar at Tribhuvan University. He can be reached at keshab1khatr@gmail.com

indifferent to finance their capital either from banks or from stock markets. Whereas from the view point of 'supply of fund' the arbitrage between stock market returns and interest rates may show negative relationship between the two sectors in the short-run. Medium and long-term investors however, may want to spread their savings between banks and stock market.

As discussed in Dhungana (2019), the history of Nepalese banking sector is not very old as the first commercial bank, Nepal Bank Limited was just established in the year 1937 and the country's central bank, Nepal Rastra Bank in 1956. It is only after the liberalization of the economy since mid 1980s the financial sector started making progress in size, number and outreach. On the other hand as discussed in Shrestha and Pokhrel (2019), Nepalese stock market also do not boast a long history. Floor for secondary trading was opened only in 1981 and that too for government bonds. Corporate shares though very limited started trading in 1984 after the enactment of Securities Exchange Act 1983. So, both financial sector and security market can be considered to actually take off after mid 1980s with the embracement of liberal policies and financial structural changes. Nepalese studies have also found that financial sector influence the economic growth (Paudel and Acharya, 2020; Dhungana, 2019; Bist and Bista, 2018; Gautam, 2015; Rimal, 2014; Timsina, 2014) and likewise there are evidences that stock market development have significant contribution to the economic growth (Bist, 2017; Regmi, 2012; G.C. and Neupane, 2006).

Although there are plethora of studies examining the relationship between stock market development and economic growth as well as financial sector development and economic growth, very scant empirical resources are available on complement-substitute relationship between financial sector development and stock market development. The purpose of this paper is to identify if stock market and financial market are contributing to each other or are substitutes in a developing economy like that of Nepal. The study examines the effect of financial intermediary development on stock market capitalization and the effect of stock market capitalization on financial intermediary development in the presence of saving rate, investment rate and macroeconomic stability as control variables.

The rest of the paper is structured as follows. Section 2 briefly reviews the stock market and financial sector of Nepal and Section 3 reviews the literature. Section 4 introduces data, variables and methodology, Section 5 presents the empirical results followed by conclusions that emerge from the study in Section 6.

### **Overview of Nepalese Financial Sector and Stock Market**

After the establishment of the first bank, Nepal Bank Limited in 1937, formal financial activities got into play and general public got access to banking transactions. The financial system gained momentum after the establishment of Nepal Rastra Bank (NRB) as a central bank of Nepal in 1956 under Nepal Rastra Bank Act 1955. With the first development bank, Nepal Industrial Bank in 1957 and second commercial bank, Rastriya Banijya Bank in 1966, the Nepalese financial sector made a tremendous progress in terms of banks and service clients with the adoption of liberal policy after mid 1980s.

After the adoption of liberalization policy in 1980, new financial institutions entered the market and the trend kept growing till 2015. However through the monetary policy of 2015, NRB announced to raise the minimum paid up capital of commercial banks to four times high to Rs. 8 billion and twenty-four times increment to Rs. 2.5 billion for the development banks. As such the Merger Bylaw 2011 that came as encouragement for consolidation became an indirect compulsion for many institutions to foster merger and acquisition. This led to a huge drop in the numbers of development banks and financial companies bringing down the total to 194 in 2020 from 248 in 2015 as shown in Table 1. Since liberalization, commercial banks have

extended their services widely reaching the number of branches to 4436 in 2020 from mere 241 in 1980. In addition, the total assets of commercial banks is almost 1000 times higher since the past forty years.

The history of the Nepalese stock market can be traced back to 1936 when Biratnagar Jute Mill Ltd's shares and in 1937 Nepal Bank Ltd's shares were floated to the public (Regmi, 2012). However the direction towards security market development initiated only in 1976 with the establishment of Securities Exchange Center (SEC) which too was not very active at its initial years.

It was after the enactment of Securities Exchange Act, 1983 the SEC undertook to create few securities exchange norms and SEC became the only legal stock exchange house which organized itself to get involved as a merchant banker there on. SEC started listing and trading corporate securities from 1984 but it was very limited. Table 2 shows different indicators of Nepalese stock market after mid 1980s.

The Eighth Fifth Year Plan (1992-1997) of the government however paved the way for more organized securities market in Nepal by formulating the first comprehensive plan and as a result, development of the securities market was strengthened by the establishment of the Securities Board of Nepal (SEBON) on June 7, 1993 under the new Securities Exchange Act of 1993 with the basic objectives of formulating policies and regulations, prescribing terms and conditions for stock exchange operations, as well as inspecting and registering securities. The first amendment in the Act also led to conversion of SEC into Nepal Stock Exchange Ltd. (NEPSE) in 1993 and thus an organized and full-fledged stock market began with the formation of NEPSE which opened its trading floor on 13<sup>th</sup> January, 1994.

## II. Theoretical Framework

For decades now, there has been a debate on the relative roles of bank-based and market-based financial structures in boosting economic growth and development (Levine, 2003). Bank-based system advocates contend that a bank-based financial system is better than a market-based system because it is capable of stimulating longer-term real-sector investment. In particular, in a variety of ways, banks can increase domestic investment (Ndikumana, 2005). By pooling financial savings, banks increase the amount of funds i.e. investable funds, available for investment. It is also argued that by reducing liquidity risks and inducing higher investment quality and quantity, banks increase investment. Investment in the market-based system is perceived to be too vulnerable to stock market prices and may not be sustainable in the long term, unlike investment in the bank-based system (Hoshi et al., 1990). Bank-based system is less influenced by turbulent financial markets, this structure will promote productive investments and the intimate relationship between banks and firms will allow firms to continue investing even during recessions without driving them into bankruptcy (Hoshi et al., 1990). It is also argued that in a bank-based system, industrial policies of the government can be carried out more effectively because it provides governments with more measures than the market-based system to interfere in the financial sector i.e., interest rate management and credit control (Pollin, 1995).

The financial system based on banks, however, has its own challenges. It is argued that a bank-based structure is prone to problems such as an inefficient distribution of resources, an intimate relationship between banks and companies and above all, a higher debt ratio. In the bank-based scheme, the moral hazard dilemma is much worse. Finance sometimes only damages the economy with the implied government bailout, making the system more prone to financial crisis (Greenspan, 1999). The crisis in the East-Asian countries in the late 1990s is a case in point. Before the 1990s, some economists argued that in comparison to

many market-based economies, the good performance of economies such as Japan was due to the inefficiency of the market-based system, especially in terms of long-term economic growth. However, with the emergence of the Asian crisis in the 1990s, this thinking was adversely challenged. As Greenspan (1999) puts it the East Asia crisis would not have been that extreme if the capital market had grown well in East Asia, as the capital market could have buffered the credit contraction in the banking sector.

The current discussion focuses on complementarity and substitutability between the two frameworks. The point here is that, because investment savings are intermediate between banks and capital markets, they can be used either as substitutes or as complements (Naceur et al., 2007). However, some recent studies have shown that banks and stock markets are not competitive systems, but complementary (Ndikumana, 2005). What is relevant, in other words, is not whether a financial system is bank-based or stock-market-based, but how developed and effective the financial system is. Furthermore, some studies have shown that the position of the stock market in economic growth depends on the development stage of a nation. Banks play a predominant role in stimulating economic growth in the early stages of development. However, as a country reaches higher levels of income, stock markets tend to play an increasing role (Demirguc-Kunt and Levine, 1999). This suggests that comparatively larger and more liquid capital markets are expected in more developed countries, whereas less developed countries are expected to be largely bank-based. However, very few studies have attempted to empirically analyze the relationship between the financial system focused on banks and the growth of the stock market. Some of the studies that have attempted to examine this linkage include those of Garcia (1986), Boyd and Smith (1996), Demirguc-Kunt and Levine (1996), Garcia and Liu (1999), Naceur et al. (2007) and Yartey (2008), amongst others. Boyd and Smith (1996), for example, suggest that banks and stock markets may behave as complements rather than substitutes. The empirical work done by Demirguc-Kunt and Levine (1996) also shows that the degree of stock market development is positively related to that of bank development. Similar results were obtained by Naceur et al. (2007) in the case of MENA countries. The authors, while examining the main determinants of stock market development, find that financial intermediaries and stock markets are complements rather than substitutes in the growth process. While examining the macroeconomic determinants of stock market development, Garcia and Liu (1999) also find that financial sector development has a positive impact on stock market development in a sample of Latin American and Asian countries. Contrary to the above studies, Garcia (1986) argues that central banks may generate a negative correlation between bank growth and stock market development. However, according to Yartey (2008), the relationship between the two systems is non-monotonic. The growth of the banking sector acts as a supplement to the development of the stock market in funding investments at the early stages of its development. However, as the two systems develop, they begin to compete with each other as vehicles for financing investment.

### Variables Definition and Hypothesis

The variables in the study include market capitalization ratio and credit to private sector along with control variables such as saving rate, investment rate and inflation described as follows:

*Stock market development.* Stock market capitalization is taken as the proxy for stock market development as it is a good proxy for general development and less arbitrary than other indicators (Garcia and Liu, 1999). Moreover, Demirguc-Kunt and Levine (1996b) have also shown that different individual measures and indexes of stock market development are highly correlated. The variable is defined as the total market value of all listed shares in NEPSE as a percentage of nominal GDP.

*Saving rate.* The saving rate is calculated as the ratio of gross domestic saving to nominal GDP (Beck et al., 2000; Levine et al., 2000). Like financial intermediaries, stock markets also convey saving to investment projects. Larger the saving rate, the higher the flow of capital to security markets (Naceur et al., 2007; Garcia and Liu, 1999).

*Investment rate.* The investment rate is calculated as the ratio of gross fixed capital formation to nominal GDP. Invest rate is considered in the study because it depends on saving rate. (Naceur et al., 2007; Garcia and Liu, 1999).

*Credit-to-private sector.* We use the domestic credit-to-private sector divided by nominal GDP to account for financial intermediary development (Naceur et al., 2007; Garcia and Liu, 1999; Demirguc-Kunt and Levine, 1996a; Garcia, 1986).

*Macroeconomic instability.* To measure the incidence of macroeconomic instability on stock market development and financial intermediary development, we use inflation change (Naceur et al., 2007; Beck et al, 2000; Garcia and Liu, 1999). The variable is measured as percentage change in consumer price index with base year 2014/15. Higher the volatility of the economy (inflation change) lesser is the participation of companies and investors due to increased market volatility. At the same time, inflation affects the interest rate which has a direct impact on the deposit collection and credit flow of financial intermediaries.

*Hypotheses:* The intention of the research paper requires us to test the following relationships.

Complement H1: There is significant positive relationship between financial intermediary development and stock market development.

Substitute H2: There is significant negative relationship between financial intermediary development and stock market development.

### III. Research Methodology

#### Data

Annual time series data for the period of 1988 till 2019 (32 years) is used covering post era of liberalization along with rapid financial institutions growth. The data sources for stock market development include different issues of annual reports of Nepal Stock Exchange (NEPSE) and Securities Exchange Board of Nepal (SEBON); inflation from Quarterly Economic Bulletin published by the central monetary authority Nepal Rastra Bank and other variables extracted from World Development Indicators, data bank portal of World Bank.

#### Econometric Model

The study uses following two equations to examine the relationships between the variables and for statistical estimation and modeling.

$$\ln MCR_t = \delta_0 + \delta_{cps} \ln CPS_t + \delta_{sav} \ln SAV_t + \delta_{inv} \ln INV_t + \delta_{inf} \ln INF_t + \mu_t \quad (1)$$

$$\ln CPS_t = \delta_0 + \delta_{mcr} \ln MCR_t + \delta_{sav} \ln SAV_t + \delta_{inv} \ln INV_t + \delta_{inf} \ln INF_t + \mu_t \quad (2)$$

where  $\ln MCR_t$  is log of market capitalization ratio at time  $t$ ;  $\ln CPS_t$  is log of credit-to-private

sector by the financial intermediaries as a percentage of nominal GDP at time  $t$ ;  $\ln SAV_t$  is the log of gross savings to GDP ratio at time  $t$ ;  $\ln INV_t$  is log of gross fixed capital formation to GDP ratio and  $\ln INF_t$  is log of percentage change in consumer price index at time  $t$ . Only if the variables are cointegrated, valid inferences could be drawn from the above long-run equations (Engle and Granger, 1987) for which the study employs autoregressive distributed lag (ARDL) bounds testing approach to cointegration suggested by Pesaran et al. (2001) to investigate the long-run relationship between financial intermediary development and stock market development. ARDL approach is chosen over other cointegration estimation methods, because it can be used regardless of whether the chosen variables are integrated at level or first difference [I(0) or I(1)] but not I(2) because in this case it would normally invalidate the results (Adu et al., 2013). Secondly, the ARDL technique unlike other cointegration methods are not sensitive to the size of sample as it can provide more consistent coefficients in a small sample size as well (Panopoulou and Pittis, 2004).

In analyzing long-run relationship between the stock market development as represented by market capitalization ratio and financial sector development represented by credit-to-private sector, the study uses bounds testing procedures for cointegration test within the ARDL framework represented by equations (3) and (4).

$$\Delta \ln MCR_t = \alpha_0 + \lambda_1 \ln MCR_{t-1} + \lambda_2 \ln CPS_{t-1} + \lambda_3 \ln SAV_{t-1} + \lambda_4 \ln INV_{t-1} + \lambda_5 \ln INF_{t-1} + \sum_{i=1}^{p_1} \gamma_{1i} \Delta \ln MCR_{t-i} + \sum_{j=0}^{p_2} \gamma_{2j} \Delta \ln CPS_{t-j} + \sum_{k=0}^{p_3} \gamma_{3k} \Delta \ln SAV_{t-k} + \sum_{i=0}^{p_4} \gamma_{4i} \Delta \ln INV_{t-i} + \sum_{l=0}^{p_5} \gamma_{5l} \Delta \ln INF_{t-l} + \gamma_6 DUM_{MCR,t} + \varepsilon_t \quad (3)$$

$$\Delta \ln CPS_t = \alpha_0 + \delta_1 \ln CPS_{t-1} + \delta_2 \ln MCR_{t-1} + \delta_3 \ln SAV_{t-1} + \delta_4 \ln INV_{t-1} + \delta_5 \ln INF_{t-1} + \sum_{i=1}^{p_1} \theta_{1i} \Delta \ln CPS_{t-i} + \sum_{j=0}^{p_2} \theta_{2j} \Delta \ln MCR_{t-j} + \sum_{k=0}^{p_3} \theta_{3k} \Delta \ln SAV_{t-k} + \sum_{l=0}^{p_4} \theta_{4l} \Delta \ln INV_{t-l} + \sum_{l=0}^{p_5} \theta_{5l} \Delta \ln INF_{t-l} + \theta_6 DUM_{CPS,t} + \varepsilon_t \quad (4)$$

where  $\alpha_0$  is a drift component,  $\Delta$  is the first difference operator and  $\varepsilon_t$  is the white noise residuals. The coefficients  $\lambda_i$  and  $\delta_i$  represent the long run coefficients whereas  $\theta_i$  represent short term dynamics of the models. The values (p1, p2, p3, p4, p5) are the selected number of optimum lags for cointegrating equations based on Schwarz Bayesian Criteria (SBC). DUM is the dummy variable of respected dependent variables used to capture single structural breaks where  $DUM_t=0$ , if  $t < B_t$  or the break year and 1 otherwise.

The existence of cointegration is tested by performing bounds test, comparing F-statistic against two sets of critical values at I(0) and I(1) provided by Pesaran and Shin (1999) and Pesaran et al. (2001) for large samples and for small sample size ranging from 30 to 80, critical values given by Narayan (2005). The null hypotheses of no cointegration  $H_0$ : and  $H_0$ : are tested against the alternative hypothesis of presence of cointegration. The variables are cointegrated if we reject the null hypothesis. It is essential to note that the critical values based on large sample size deviates significantly from that of small sample size (Narayan, 2004a,b; Narayan, 2005). Thus critical values constructed by Narayan (2005) are used in this study to compare the calculated F-statistic and confirm the existence of long-run relationship if any. If the F-statistic falls below the lower bound values, we do not reject the null hypothesis of no co-integration. In contrast, if the F-statistic is greater than the upper bound values we reject the null hypothesis. However, the test is inconclusive if the F-statistic falls between the lower and the upper bound critical values.

The next step involves formulation and estimation of long-run model if the cointegrating relationship is confirmed, using the OLS procedure in equations (5) and (6), which take the following forms:

Finally, it involves the formulation and estimation of short-run dynamics and causality tests based on the error correction term using the following reduced forms:

$$\Delta \ln MCR_t = \alpha_0 + \lambda_1 \ln MCR_{t-1} + \lambda_2 \ln CPS_{t-1} + \lambda_3 \ln SAV_{t-1} + \lambda_4 \ln INV_{t-1} + \lambda_5 \ln INF_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta \ln CPS_t = \alpha_0 + \delta_1 \ln CPS_{t-1} + \delta_2 \ln MCR_{t-1} + \delta_3 \ln SAV_{t-1} + \delta_4 \ln INV_{t-1} + \delta_5 \ln INF_{t-1} + \varepsilon_t \quad (6)$$

Finally, it involves the formulation and estimation of short-run dynamics and causality tests based on the error correction term using the following reduced forms:

$$\Delta \ln MCR_t = \alpha_0 + \sum_{i=1}^{p_1} \gamma_{1i} \Delta \ln MCR_{t-i} + \sum_{j=0}^{p_2} \gamma_{2j} \Delta \ln CPS_{t-j} + \sum_{k=0}^{p_3} \gamma_{3k} \Delta \ln SAV_{t-k} + \sum_{l=0}^{p_4} \gamma_{4l} \Delta \ln INV_{t-l} + \sum_{i=0}^{p_5} \gamma_{5i} \Delta \ln INF_{t-i} + \mu_1 ECT_{t-1} + \varepsilon_t \quad (7)$$

$$\Delta \ln CPS_t = \alpha_0 + \sum_{i=1}^{p_1} \theta_{1i} \Delta \ln CPS_{t-i} + \sum_{j=0}^{p_2} \theta_{2j} \Delta \ln MCR_{t-j} + \sum_{k=0}^{p_3} \theta_{3k} \Delta \ln SAV_{t-k} + \sum_{l=0}^{p_4} \theta_{4l} \Delta \ln INV_{t-l} + \sum_{i=0}^{p_5} \theta_{5i} \Delta \ln INF_{t-i} + \mu_2 ECT_{t-1} + \varepsilon_t \quad (8)$$

where,  $ECT_{t-1}$  is the lagged value of error correction term and the coefficient of ECT indicates both long run causality and the speed of adjustment. The coefficient of the error correction term is expected to be negative which implies that when variables drift apart from the equilibrium in the short-run, they can quickly correct back to their equilibrium levels in the long-run.

### IV. Results and Conclusion

#### Descriptive Results

Table 3 reports descriptive statistics and correlations of the examined variables. The average market capitalization ratio is 21.63% with wide standard deviations similar to the credit-to-private sector whose average ratio is 39.19%. The investment is double of saving whereas average inflation for the study period is around 8%. The deviations in savings ratio, investment ratio and inflation are however lesser than market capitalization and credit-to-private sector ratios.

Table 1

Financial Institutions in Nepal after Liberalization

Table 1: Financial institutions in Nepal after liberalization

Types of financial institutions	Mid July								
	1980	1985	1990	1995	2000	2005	2010	2015	2020
CBs	2	3	5	10	13	17	27	30	27
DBs	2	2	2	3	7	26	79	76	20
FCs				30	47	60	79	78	22
MFDBs				4	7	11	18	38	85
Insurance	4	4	5	9	12	19	25	26	40
	<b>8</b>	<b>9</b>	<b>12</b>	<b>56</b>	<b>86</b>	<b>133</b>	<b>228</b>	<b>248</b>	<b>194</b>
CB Branch	241	381	441	444	439	375	990	1672	4436
CB Assets	4543.9	10678.5	26687.9	83795.5	210895	341023	771139	1753726.4	4446865.2

Source: Banking and financial statistics and Quarterly Economic Bulletin of various issues, NRB

CBs: Commercial Banks; DBs: Development Banks; FCs: Finance Companies; MFDBs: Micro-finance Development Banks (in numbers)

CB Branch: Commercial Banks' branches in units

CB Assets: Commercial Banks' total assets in million, Nepali rupees.

Table 2

Nepalese Stock Market

Table 2: Nepalese stock market

F. Y. (mid July)	No. of Listed Companies	Market capitalization (in million Rs.)	Value of shares traded (in million Rs.)	NEPSE Index
1987-88	27	1089	7.7	n.a.
1990-91	46	2516	27.3	n.a.
1994-95	79	12963	1054.3	195.48
1998-99	107	23508	1500	216.92
2002-03	108	35240.4	576	204.86
2006-07	135	186301	8360	683.95
2010-11	209	323484	6665.3	362.85
2014-15	232	989404	65331.6	961.2
2018-19	215	1567499.4	110075	1259.02

Source: Annual publications of Nepal Rastra Bank, NEPSE and Securities Board of Nepal

Table 3

Descriptive Results and Correlations

Table 3: Descriptives and correlations

Descriptives	MCR	CPS	SAV	INV	INF
Mean	21.626	39.187	11.537	22.228	7.909
Minimum	1.388	11.790	4.067	16.120	2.400
Maximum	83.888	88.080	18.973	34.548	21.100
Std. Deviation	22.431	23.495	2.958	4.352	3.575
Skewness	1.179	0.728	0.150	1.702	1.395
Kurtosis	0.567	-0.645	0.889	2.436	4.823
Observations	32	32	32	32	32

*Correlations*

lnMCR	1				
lnCPS	0.971***	1			
lnSAV	-0.033	0.084	1		
lnINV	0.700***	0.771***	0.299	1	
lnINF	-0.236	-0.210	-0.241	-0.189	1

**Notes:** MCR, Market capitalization ratio; CPS, Credit to private sector; SAV, Gross domestic saving; INV, Gross fixed capital formation; INF, Change in consumer price index. All variables except INF are percentages of nominal GDP and INF is percentage change for descriptive analysis. The variables are log transformed in correlation analysis.

\*\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 4

Unit Roots Test Without Structural Breaks

**Table 4: Unit roots test without structural breaks**

Series	Constant (C),	Stationarity at Level	Stationarity at first difference	Decision
<i>DF-GLS test statistics</i>				
lnMCR	C	-0.526	-4.534***	I(1)
lnCPS	C	0.177	-4.741***	I(1)
lnSAV	C	-3.528***	-6.572***	I(0)
lnINV	C	0.316	-2.231**	I(1)
lnINF	C	-2.551**	-6.720***	I(0)
<i>Philips-Perron test statistic</i>				
lnMCR	C	-1.351	-5.558***	I(1)
lnCPS	C	-0.593	-4.682***	I(1)
lnSAV	C	-3.237**	-8.242***	I(0)
lnINV	C	0.451	-5.109***	I(1)
lnINF	C	-2.630	-7.168***	I(1)

Note: \*\*\* & \*\* indicate statistical significance at 1% and 5% levels.

Table 5

Zivot and Andrew Unit Root Test for One Break

**Table 5: Zivot and Andrew unit root test for one break**

Variables	lag length	Break	t	Inference
lnMCR	1	2016	-4.593*	Stationary
lnCPS	5	2001	-6.169***	Stationary
lnSAV	4	2005	-3.821	Nonstationary
lnINV	0	1996	-2.031	Nonstationary
lnINF	7	1999	-5.252***	Stationary

Note: \*\*\* & \* indicate statistical significance at 1% and 10% levels.

Table 6

Lung-run and Short- run Relationships

### Inferential Results

Correlation results show that credit-to-private sector (0.971) and investment ratio (0.700) are both highly positively and significantly correlated with market capitalization ratio. The positive correlation of 0.971 between CPS and MCR gives an impression that financial intermediary sector and stock market function as complement to each other. The significant positive correlations of investment with CPS and MCR show that investment is better predictor of financial sector development and stock market development (Garcia and Liu, 1999). Inflation is observed to relate negatively with all the variables though this relationship is not significant, implying that increase in inflation may have adverse impact on all financial sector, stock market and macroeconomic activities.

### Unit Root Tests Without and With Breaks

ARDL model requires that all the series to be analyzed be either integrated of order zero, I(0) i.e., at level or at order one, I(1) i.e., at first difference. In order to ascertain that the variables under study are not integrated of order two, I(2) or higher, the study employed both

Dickey-Fuller-GLS test statistic and Phillips-Perron test statistic as developed by Elliot et al. (1996) and Phillips and Perron (1988) respectively. The results in Table 4 show that all the variables are integrated at the first difference for both the tests except for savings rate which is integrated at level in both the tests and inflation which is integrated at level in DF-GLS.

The underlying time series are likely to contain structural breaks due to the shocks caused by different events at national and international level. The influential national political events such as start of Maoist movement in 1996, declaration of state of emergency and the Royal massacre in 2001, King lifted state of emergency after intensive protest for democracy in 2005, five months economic blockade in September 2015 must have been reflected as the structural breaks.

**Table 6: Long-run and short-run relationships**

Panel A: Long run relationships, ARDL and bounds test result				Panel B: Short-run and error correction form		
Levels Equations	lnMCR (1,1,0,0,0)	lnCPS (1,0,1,0,0)		Selected model	lnMCR (1,1,0,0,0)	lnCPS (1,0,1,0,0)
lnMCR		0.444***		ΔlnMCR		0.209***
lnCPS	2.053***			ΔlnCPS	2.535***	
lnSAV	-0.681**	0.258		ΔlnSAV	-0.464**	0.036
lnINV	-0.065	0.641**		ΔlnINV	-0.044	0.302**
lnINF	-0.301	0.139**		ΔlnINF	-0.205	0.066
				DUMMY	-0.298**	-0.001
F-statistic	4.101	10.147***		C	-1.566***	-0.181***
		5%	1.0%	ECT(-1)	-0.681***	-0.471***
Finite sample: n=30	I(0)	3.354	4.768	$\chi^2$ SC (1)	0.335(0.563)	0.674(0.412)
k=4	I(1)	4.774	6.670	<b>JB</b> NOR	1.016(0.602)	1.002(0.606)
				$\chi^2$ HET (1)	6.837(0.446)	3.834(0.798)
				$R^2_{aj}$	0.639	0.667
				F-Statistic	18.752***	21.027***

Note: Critical values for the bounds test: case III: unrestricted intercept and no trend, Narayan (2005, p. 1988); I(0), lower bound; I(1), upper bound  
 \*\*\* and \*\* indicate statistical significance at 1 and 5% respectively; SC, Serial correlation; NOR, Normality; HET, Heteroscedasticity

Financial sector reform programs such as World Bank Structural Adjustment program during 1986 till 1989, World Bank financial assessment study in 1999, Nepal’s entry into World Trade Organization in 2004 also had impact in the Nepalese economy. According to Perron (1989), structural breaks caused by such events, if present in the series are found to affect the statistical power of the stationarity tests by accepting null hypothesis of unit roots when there is clear evidence of no unit roots. As such, we also perform Zivot and Andrew (1992) unit root test to examine single break in the underlying series. Table 5 shows the outcome of Zivot and Andrew unit roots test with one break in the series. The impact of the break year on the dependent variable is examined by regressing a dummy variable of the dependent variable’s break year.

*Test of Cointegration using ARDL and Bounds Testing Approach*

Panel A in Table 6 presents long-run relationships between stock market development and financial sector development in the presence of control variables such as saving rate, investment rate and inflation rate. The long-run coefficients of the variables are derived by employing the ARDL bound testing procedure. Both MCR and CPS are treated as dependent variables as such two models are estimated. The equations in levels are presented vertically with coefficients followed by bound test statistic. The unrestricted models are estimated for each variable and the lag estimation for model selection is done using Schwartz Criterion (SC).

Panel A of the table reveals that there is statistical evidence for long-run dynamic relationship between stock market development (lnMCR) and financial intermediary development (lnCPS) when latter is the dependent variable given by significant F-statistic (10.147). In the long-run, it is observed that investment ratio and inflation have positive and significant impact on financial sector development. The model with MCR as dependent variable shows no cointegration relationship with financial sector development.

#### *Short-run Relationship and Causality Test Based on Error Correction Model*

Panel B of Table 6 shows the short-run dynamics along with causality test and speed of convergence through error correction model. Lagged error-correction term (ECT) and significance of the independent variables are used to estimate the causality test. The table reveals that credit-to-private sector and saving ratio have significant influence on market capitalization ratio in the short-run whereas stock market and investment have significant impact on financial sector in the short-run. The lagged value of error-correction terms are all negative, less than one and highly significant. As per the coefficients of ECT reported in Panel B, the evidences indicate that differenced lnMCR and differenced lnINV Granger cause lnCPS in the long-run. Based on the result of the error-correction term, there is statistical evidence for convergence of stock market development on financial sector development. The ECT coefficient is -0.471 (approx. -0.47) indicating that when stock market development indicator drift apart from the equilibrium level by 1 per cent in the short-run, it corrects by 47percent towards the equilibrium level in the long-run (in one year). This, indicates almost 50 percent convergence towards the long-run equilibrium from stock market to financial sector.

#### **Conclusion and policy recommendations**

The objective of this paper was to examine the relationship between financial sector development and stock market development and identify their substitution or complementary roles in Nepal. For this purpose 32 years data for the period of 1988 till 2019 has been used to empirically analyse financial sector and stock market relationship. The time series data underwent unit root tests without structural breaks employing Dickey Fuller-GLS and Philips-Perron tests followed by tests of unit root with structural break using Zivot and Andrew (1992) model. The ARDL approach to cointegration in the presence of one structural break was employed to analyze the long-run relationship.

The regression table shows that there exist bidirectional causal relationship between financial sector development and stock market development in the short-run. However in the long-run it is the stock market development that significantly causes financial sector development. The significant positive relationship between the two sectors reveal that financial sector development and stock market development are complementary to each other both in the short-run and in the long-run and the complementary result is consistent with the findings of Naceur et al. (2007), Ndikumana (2005), Garcia and Liu (1999), Boyd and Smith (1996), Demirguc-Kunt and Levine (1996a). Saving rate is important determinant of stock market development whereas investment and inflation are seen to be important determinants of financial sector development.

This paper also has some policy implications to both financial sector and stock market regulators. In order to promote financial sector development in Nepal, it is important to increase capital investments so that it generates more financial activities. On the other hand the regulators must discourage savings and encourage the savers' fund in the security market for the overall market development.

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