Financial Development and Economic Growth in Nepal: Empirical Evidence from a Liberalized Developing Economy

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<Contents>

Abstract

This study analyzes the relationship between financial development and economic growth in Nepal using annual time series data from 1985 to 2016. The *autoregressive distributed lag (ARDL) bound test approach* estimated the cointegration form and long-run relationship. The results indicate that Nepal's financial development and economic growth are cointegrated with bi-directional causality in the long-run, which suggests that they positively and significantly impact each other. The causal effects from financial development to economic growth are more potent than from economic growth to financial development. However, the speed of adjustment towards long-run equilibrium, directing from economic growth to financial development, is robust. There is a one-directional reverse causality from economic growth to financial development in the short-run. Based on these results, the study recommends that policymakers prioritize developing a well-functioning and effective financial sector to enhance economic growth, particularly in developing countries such as Nepal.

Key words: Financial development, Economic growth, ARDL, Bi-directional causality, Nepal.

1. Introduction

The acquisition and interaction of production factors and technological transformations explain the countries' economic growth and productivity variances. Besides this, financial intermediation is also evolving as a critical channel of economic growth and productivity in the globalized world where labor and capital are moving rapidly across the countries (Demetriades and Law 2006). The financial sector plays a crucial role in economic development by efficiently allocating resources to productive sectors. It helps monitor investment, facilitates trade, manages risk, mobilizes savings, facilitates markets, increases the velocity of resources, and increases economic inclusiveness in society (King and Levine 1993a). Thus, a stable and well-developed financial sector robustly determines variances in many countries' economic development (Levine 1997). Many researchers have accepted that a sound and vibrant financial sector stimulates economic growth (Christopoulos and Tsionas 2004; Levine 1997; Levine, Loayza, and Beck 2000). However, it does not mean expanding the financial sector always gives higher economic benefits (Demetriades and Hussein 1996; Zingales 2003). Every nation exhibits distinct economic characteristics in its fiscal policies, financial regulations and systems, and institutional quality. Indeed, an optimal and well-functioning financial sector always accelerates its economic activities (Durusu-Ciftci, Ispir, and Yetkiner 2017).

Numerous cross-country studies have provided valuable insights into the interplay between effective financial systems and economic growth. Nonetheless, due to variations in legal origins, institutions, and economic policies across countries, these studies need to be revised to capture the specific fundamental nature of the causal dynamics underlying the finance-growth relationship at the country level (Arestis and Demetriades 1997; Arestis, Demetriades, and Luintel 2001). Therefore, it is imperative to conduct country-specific case studies to investigate the finance-growth relationship, particularly in developing nations where the comprehensive range of financial reform and liberalization is a crucial policy concern.

Nepal has recently uplifted to a lower-middle-income country with a gross

national income (GNI) per capita of 1090 US dollars as of 2019. However, Nepal has developed a diversified financial system by enacting financial reform and liberalization policies since the mid-1980s with significant policy reform and structural reforms (Ozaki 2014). The government has proactively facilitated the entry of private sector entities and foreign joint ventures into the domestic financial system. This has led to a more diversified financial sector in size, ownership, operations, and investments and strengthened central bank independence, enhancing its supervisory and regulatory capabilities to a certain extent (Bhetuwal 2007; Ozaki 2014; Shrestha and Chowdhury 2006). Notwithstanding these achievements, Nepal continues to face significant challenges in creating a well-functioning financial sector with robust corporate governance, enhanced financial inclusion, and greater resilience to external shocks. The domestic civil war from 1996 to 2006 and the prolonged political transition have impeded the development and diversification of the Nepalese financial sector. Therefore, policymakers need to investigate the causal mechanisms underlying the relationship between financial development and economic growth in Nepal, particularly given the implementation of the federal administration system after the promulgation of new constitutions in 2015.

Some studies have investigated the relationship between Nepal's financial development and economic growth (See for example: Bhetuwal 2007; Kharel and Pokhrel 2012; Gautam 2014; Timsina 2014). However, most existing studies on the finance-growth relationship either employ conventional econometric methods or are guided by the 'finance leading growth' hypothesis, failing to account for the short and long-run two-way causal dynamics. Against this backdrop, this study endeavors to augment the literature on the finance-growth nexus by offering novel empirical evidence and assessing the Nepalese context. To this end, the study posits two distinct hypotheses, with the primary hypothesis positing that financial development is a function of economic growth and the alternate hypothesis suggesting that economic growth is contingent on financial development. The bound test approach of cointegration under the autoregressive distributed lag (ARDL) model examines the cointegration form and long-run dynamics. The error correction model (ECM) under ARDL estimates short-run dynamics. Finally, one period lagged error correction term (ECT) confirmed

the speed of adjustment toward long-run equilibrium.

The organization of this paper is as follows. Section 2 explains a summary of financial reform and development in Nepal. Section 3 describes the literature review, section 4 presents data and proxy measures, and section 5 explains the econometric approaches and empirical models. Section 6 presents empirical analysis and discussions, section 7 highlights the conclusion and recommendation, and section 8 presents brief options for future research. Results obtained from these analyses help set clear financial sector development policies, especially for developing countries like Nepal.

2.   Financial Reform and Development in Nepal

2.1 Financial Reform in Nepal

After facing an economic crisis in the early 1980s, Nepal introduced economic liberalization (Maskay and Subedi 2009). The government and the International Monetary Fund (IMF) made a Stand-By Agreement (SBA) in 1985, which introduced the first phase of financial reform under the Economic Stabilization Program (ESP) (Ozaki 2014). The program was intended to devaluate Nepalese currency, restrict public expenditure and bank credits, liberalize industrial licensing, promote exports, and control imports. The Structural Adjustment Program (SAP) of the World Bank in 1987 was implemented for further liberalization. Only two state-owned banks dominated the banking industry by holding 70% of the financial sector's total assets before implementing SAP (Ozaki 2014). Policies such as indirect monetary control, interest rate deregulation, the open market economy, liberal exchange rate, import licensing system, and auction system of government securities fundamentally changed the financial system (Demetriades and Luintel 1996). The World Bank helped restructure and strengthen state-owned banks, amend the income tax act, commercial bank act, central bank act, and national industrial development corporation act, and establish a credit information bureau.

In 1999, the IMF and the World Bank jointly conducted the Financial Sector Assessment Program (FSAP). They stated that the Nepalese financial system was still fragile, vulnerable, and risky concerning fundamental norms and principles of the Basel Accords 1988 (Maskay and Subedi 2009). Therefore,

the second stage of financial reform was initiated after 2002. The IMF helped implement the Poverty Reduction and Growth Facility (PRGF) program in 2003 and supported a tenth five-year plan for Nepal. Their programs include improving accounting and auditing standards, developing institutional and legislative frameworks and privatization, and restructuring state-owned financial institutions. The World Bank helped implement the Financial Sector Restructuring Project (FSRP) in 2004 to restructure the financial sector by reengineering the central bank, reforming and privatizing state-owned banks, and building capacity. Asian Development Bank (ADB) helped to implement the Rural Finance Sector Development Cluster Program (FSDCP) in 2006. The objectives of the policy initiatives were to strengthen the supervision and regulation framework of the rural financial sector, restructure and reform financial institutions, establish a national banking training institute, bolster a debt recovery tribunal, and create microfinance credit information services. Consequently, Nepal has been able to augment the supervisory and regulatory capabilities of the central bank while preserving its independence. In addition, the financial sector has achieved diversification in size, ownership, operations, and investments within a relatively brief timeframe.

2.2 Financial Development in Nepal

Nepal's modern financial system was introduced by establishing its first commercial bank in 1937, aimed at accumulating capital and promoting trade and industry. This marked the onset of formal institutional development in Nepal's financial sector. The central bank was established in 1956 under the Nepal Rastra Bank (NRB) Act-1955 and became the first central monetary authority to monitor financial institutions and issue Nepalese currency. Three other state-owned financial institutions were established in 1959, 1966, and 1968 to promote the industrial, commercial, and agricultural sectors separately. The first policy initiation was enacted with the 'Banking Development Plan' in 1968. The central bank of Nepal introduced regulations and directed credit programs in 1974. Due to these substantial institutional and policy arrangements, the number of commercial bank branches in Nepal rose from 80 in 1970 to 241 in 1980. However, despite these initial developments, domestic credit to the

private sector, a crucial gauge of financial development, stood at only 8.57% of GDP in 1980.

The entrance of the private sector and foreign joint ventures after 1985 generated a wave of banking sector expansion and development in Nepal (Shrestha 2004). Nepal Stock Exchange (NEPSE) was established in 1993 to facilitate investment in the corporate sector. A significant range of depository institutions, from commercial banks to microfinance institutions, were allowed to operate in Nepal from 1992 (Maskay and Subedi 2009). As a result, the Nepalese financial sector diversified in size, ownership, operations, and investment. Therefore, commercial bank branches increased from 241 in 1980 to 430 in 2001. However, the domestic credit to the private sector increased from 8.57% in 1980 to only 21.42% of GDP in 2001. The domestic civil war from 1996 to 2006 became the primary cause of the stagnation of Nepal's financial sectors.

In 2002, the Nepal Rastra Bank (NRB) act was amended to reform. It governed the financial sector, which granted complete autonomy to the central bank for the supervision and regulation of the financial sector. Following this, the Bank and Financial Institution Act (BAFIA) was promulgated in 2006, which became the overarching act of banks and financial institutions (BFIs) in Nepal. Under the BAFIA, BFIs are classified into four levels, each with specific authority over financial activities. As a result, the establishment of BFIs increased rapidly from 98 in 2000 to 272 in 2011. The central bank encountered challenges regulating BFIs due to their urban-focused operations and intense competition. In response, the central bank implemented a policy of financial consolidation through mergers and acquisitions in 2013 and restricted the issuance of new BFI licenses.

Consequently, the number of BFIs is expected to decrease significantly to 162 by 2020. Despite this, the Nepal government has implemented policies to ensure that financial services are accessible in all local municipalities, leading to aggressive branch expansion of BFIs in semi-urban and rural areas. This has substantially increased commercial bank branches from 430 in 2001 to 4219 in 2020 (MoF 2020). Various acts related to the financial sector, such as the Asset/Money Laundering Prevention Act 2008, Banking Offence and Punishment

Act 2008, Payment and Settlement Act 2017, and Foreign Exchange Regulation Act 2019, are also been gradually issued. As a result, the domestic credit to the private sector increased from 21.42 % in 2001 to 88.07 % of GDP in 2019. The stock market capitalization also increased from 8% in 2002 to 47.6% of GDP in 2019.

Despite these developments, the key indicators of financial access and stability are still low in Nepal. For example, the ownership of a bank account at a formal financial institution of an adult is 45.38% as of 2017. The Lerner index, a critical indicator of bank competition, decreased from 0.359 in 1996 to 0.273 in 2014. On the other hand, the Nepalese financial sector is only dominated by bank-based financial institutions. Almost 57.6% of the Nepalese financial system's total assets belong to commercial banks only as of mid-January 2020. Besides this, the distribution of financial institutions must be balanced nationwide. Province No. 3 consists of 26% of the total branches of the BFIs, whereas Karnali province, a far-western region of Nepal, consists of only 3.9% (MoF 2020). The financial sector's contribution to developing small and medium-sized enterprises (SMEs) and credit expansions in highly potential sectors like tourism, green energy, and agro-processing industries still need to be higher in Nepal. Therefore, the central bank is enforcing commercial banks to expand their credit portfolio to the agricultural, energy, and SME sectors by maintaining a minimum threshold of 15%, 10%, and 15% of their total credit (NRB 2020). Nepal's central bank has set a clear vision of achieving sustainable and inclusive economic growth by *"maintaining macroeconomic and financial stability through proactive and effective monetary and financial policies"* in their term in the third strategic plan for 2017-2021. For this, the financial sector must efficiently mobilize available resources in the economy's most productive and feasible sectors by increasing financial access and boosting the economy's financial stability.

3. Review of Literature

Historically, the influential studies of Schumpeter (1911) and Hicks (1969) raised the financial sector's implication to encourage innovations through proper

resource allocation in economic development. In contrast, Robinson (1952) and Goldsmith (1969) explained that economic development processes promote entrepreneurial activities and stimulate the financial sector. The viewpoints of these early economists have sparked varying opinions among researchers in the literature on the relationship between finance and economic growth. As a result, three hypotheses have emerged, each with its points of contention. Of these, the 'finance leading growth' and 'growth leading finance' hypotheses are the most contradictory. The third hypothesis posits a mutual relationship between the two factors, with very few studies showing non-causality between them. However, Patrick (1966) focused on both hypotheses and stated that the financial sector leads to economic growth in the preliminary phases of economic development and reverses in post-stage economic development. McKinnon (1973) and Gurley and Shaw (1967) raised the implication of government regulations for the repression and liberalization of the financial sector. They stated that financial liberalization enhances savings, encourages domestic investment, and boosts economic growth. In revisiting these policy arguments, Lucas (1988, p. 6) stated that *"the financial sector's role in economic growth is over-stressed"* in previous studies. Chandavarkar (1992, p. 134) raised a neglected question about the needs and obstacles of the financial sector in developing countries, saying that *"none of the pioneers of development economics ⋯ even lists finance as a factor in development"*. King and Levine's (1993a) substantial effort confirms that the financial system promotes entrepreneurship by mobilizing savings in innovative and productive activities by diversifying risk and enhancing economic growth. Later on, King and Levine (1993b) supported Schumpeter's (1911) viewpoint empirically, arguing that financial sector development significantly determines the strength of accumulating capital, productivity, and efficiency of economic activities. The seminal works of Ross Levine and his co-authors, with empirical evidence and broad literature, stated that cross-country variances in economic growth concerning size, depth, policies, and financial sector access (Levine 1997, 2005; Levine and Zervos 1998).

However, some evidence shows that the finance-growth relationship varies concerning the economic development stages of the countries (Blackburn and

Hung 1998; Christopoulos and Tsionas 2004; Demetriades and Hussein 1996; Hassan, Sanchez, and Yu 2011; Levine, Loayza, and Beck 2000; Minea and Villieu 2010). For example, Christopoulos and Tsionas (2004) claim that financial intermediation constitutes higher returns on economic activities in the middle stage of economic development. In their study, Hassan *et al*. (2011) suggested that economic growth can benefit the financial sector in the early stages of economic development, particularly in vulnerable countries. As per capita income rises, there is an increase in economic activities, creating a higher demand for financial development. Despite varying opinions, many researchers hold that there are positive linkages between financial intermediation and economic activities, as they tend to grow together, causing each other to grow (Calderón and Liu 2003; Gregorio and Guidotti 1995; Jung 1986; Kar *et al.* 2011). It is important to note that the impact of financial sector expansion on economic growth may vary across countries, depending on factors such as regulatory and supervisory frameworks, financial policies, and access to financial services. Thus, while some studies suggest that the finance-growth relationship is positive, the benefits of expanding the financial sector may not be uniform across all countries. Certain studies have shown that firms that rely on external financing and optimize their capital structure through financial intermediation can boost productivity and growth, particularly in countries with more developed financial systems (Arestis, Demetriades, and Luintel 2001; Rajan and Zingales 1998). The capital market-based financial structure matters for sizeable economic growth for advanced countries rather than middle and lower-income countries (Luintel *et al*., 2016). The capital and credit markets have an encouraging influence on real sector growth, but the credit market's contribution makes a more significant influence (Durusu-Ciftci, Ispir, and Yetkiner 2016). However, an over-expansion of the financial sector or beyond the optimum level might introduce volatility and diminish economic growth (Arcand, Berkes, and Panizza 2012, 2015; Beck, Degryse, and Kneer 2014; Law and Singh 2014; Samargandi, Fidrmuc, and Ghosh 2015).

Therefore, there is no consensus about the finance-growth relationship's causality directions (Martin Čihák *et al*., 2013). However, all countries may not benefit equally from the expansion of the financial sector. Instead, the benefits

depend on regulatory and supervisory strengths and the effectiveness of the financial policies regarding services, stability, structure, and access (Barajas, Chami, and Yousefi 2016). Hence, the success of the financial sector development of an economy highly relies on the financial system's efficiency and effectiveness and the regulatory authorities' supervision and monitoring strength.

While talking about Nepal, Demetriades *et al.* (1996) studied the role of banking sector policies, their coexistence in Nepal, and their impact on financial deepening. However, their analysis did not consider the 'growth-leading finance' hypothesis and primarily focused on testing the 'finance-leading growth' hypothesis. Shrestha (2004) studied Nepal's financial sector reform program and emphasized its proper implementation. Shrestha and Chowdhury (2006) constructed a financial liberalization index for Nepal but still need to examine its impact on financial development. Bhetuwal (2007) has studied the causal relationship between the financial liberalization index and various proxies of financial development. Kharel and Pokhrel (2012) focus on the causal relationship between Nepal's financial structure and economic growth and reveal that the credit market promoted economic growth rather than the capital market in Nepal. Timsina (2014) examined Nepal's economic growth effects through the 'finance leading growth' hypothesis. However, he failed to evaluate the reverse effects. A study by Gautam (2014) stated that reverse causality runs from economic growth to financial development in the long-run in Nepal, suggesting that further reform and expansion are needed for the efficiency and effectiveness of Nepal's financial sector. A recent study by Bist and Bista (2018) has addressed the two-way dimensions of the finance-growth relationship addressing significant structural breaks in Nepal's financial development and economic growth. However, their study depends on only one indicator of financial development.

There remains a gap in exploring the bidirectional relationship between finance and growth in Nepal by utilizing different financial development measures and examining their impact on both the real and external sectors. Therefore, this study aims to contribute to the existing literature by providing fresh empirical evidence through dynamic estimation techniques.

4. Data and Proxy Measures

4.1 Data

The primary aim of this study is to investigate the long-term relationship and causal dynamics between financial development and economic growth in Nepal to provide policy recommendations. The study utilizes yearly data spanning 32 years from 1985 to 2016, obtained from the World Development Indicators (WDI). The study period covers a phase of financial liberalization, policy reform, and structural reform in the Nepalese economy. Since Nepal is still in the process of financial liberalization and needs a resilient financial system to withstand internal and external shocks, the findings of this study could contribute to the development of financial sector policies in developing countries such as Nepal.

Table 1 presents the selected variables' list, indications, and short definitions. The graphical representation of the trend of these variables at their level values is presented in Appendix A.

<Table 1> List of Selected Variables and Their Short Definition

Variables	Indication	Short Definition
Economic Growth	LnGDPPC	GDP per capita (constant 2010 US$)
Financial Development (1)	LnDCP	Domestic credit to the private sector (ratio to GDP)
Financial Development (2)	LnDCB	Domestic credit to the private sector by banks (ratio to GDP)
Financial Development (3)	LnBM	Broad money (ratio to GDP)
Financial Development (4)	LnNDC	Net domestic credit (ratio to GDP)
Control Variable: 1	LnGDS	Gross domestic savings (ratio to GDP)
Control Variable: 2	LnTRD	Merchandise trade (ratio to GDP)
Control Variable: 3	LnGOV	General government final consumption expenditure (ratio to GDP)
Control Variable: 4	LnINF	Inflation, GDP deflator (annual rate)

Note: Ln refers to the natural logarithm.

4.2 Proxy Measures

4.2.1 Economic Growth

Among measures, this study prefers to measure economic growth by calculating annual changes in real GDP per capita (GDPPC). As Mankiw (1995) explained, the study follows the neoclassical growth model to measure economic growth.

Thus, this study defines economic growth for one year as follows:

$$\Delta LnGDPPC_t = LnGDPPC_t - LnGDPPC_{t-1} \qquad (1)$$

In which, LnGDPPC is the natural logarithms of GDP per capita constant 2010 US dollar, and t represents the time-series observations.

4.2.2 Financial Development

Financial development is a multidimensional phenomenon concerning the depth, access, efficiency, and stability of an economy's financial institutions and financial markets (Almarzoqi, Ben Naceur, and Kotak 2015; Beck *et al.* 2008; Čihák et al. 2008). However, the financial depth measures, such as narrow money and broad money supply of monetary aggregates (Arestis and Demetriades 1997; Kar, Nazlioğlu, and Ağir 2011; King and Levine 1993b, 1993a; Levine, Loayza, and Beck 2000), total bank credit and deposit from financial institutions (Christopoulos and Tsionas 2004; Luintel and Khan 1999), and stock market capitalization and stock traded from financial markets (Arestis, Demetriades, and Luintel 2001; Levine and Zervos 1998), and their GDP ratios are commonly used. However, financial depth measures from financial institutions rather than monetary aggregates significantly explain long-term economic growth (Sharma 2016). Nepal has a bank-based financial system rather than a market-based one. Therefore, this study uses bank-based financial measures and monetary aggregates following King and Levine (1993a, 1993b) and Levine, Loayza, and Beck (2000) to measure financial development. They are domestic credit to the private sector (DCP), domestic credit to the private sector by banks (DCB), broad money (M2) as net liquid assets (BM), and net domestic credit (NDC). All of them are ratios to GDP. A high level of domestic credit to the private sector indicates higher credit access for the private sector, indicating the strength of capital formation of an economy. Levine (2005, p. 890) has stated that *"financial systems that allocate more credit to private firms are more engaged in researching firms, exerting corporate control, providing risk management services, mobilizing savings, and facilitating transactions."*

Banks' high level of domestic credit to the private sector indicates the private sector's higher dependence on the banking sector than the non-banking sector

(Hassan, Sanchez, and Yu 2011). It indicates a higher level of financial development because of the five special functions of banks suggested by Levine (1997). The higher level of the broad money (M2) measured as net liquid assets implies higher financial intensity and mobility and explains the strengths of channeling liquid funds from the surplus sector to deficit sectors in an economy (Hassan, Sanchez, and Yu 2011; Khan and Senhadji 2003). A higher net domestic credit (NDC) indicates general credit mobilization's strengths to the government, non-financial public sector, and the economy's private sector.

The study has followed the neoclassical growth model to measure financial development, as Mankiw (1995) explained. Thus, financial development for one year is defined as:

$$\Delta LnFD_t = LnFD_t - LnFD_{t-1} \qquad (2)$$

In which LnFD is the natural logarithms of four proxies of financial development, i.e., DCP, DCB, BM, NDC, used separately, and t represents the number of time-series observations.

4.2.3 Other Control Variables

This study has incorporated four additional variables that signify the extent of an economy's real and external sectors to control the association between financial development and economic growth. One crucial factor for sustained economic growth is the availability of domestic savings that can be utilized for investment activities through financial intermediation (Pagano 1993). Financial intermediation is critical in directing domestic savings toward investment activities, which is essential for steady economic growth. In line with this, the gross domestic savings (GDS) ratio to GDP is expected to affect both financial development and economic growth positively. As such, this study uses the GDS ratio to GDP as one of the control variables in the estimations.

In addition, the magnitude of the real sector in an economy can be determined by its dependence on international trade. Nepal heavily relies on international trade, and financial institutions mainly use inward remittances to finance imports due to the low level of domestic production. Therefore, to control the estimations, this study uses the merchandise trade, the sum of the exports and imports ratio

to GDP, as a measure of trade openness (TRD).

Besides this, Nepal's frequently changing governments exercise budgetary spending through fiscal policies to influence the economy. The size of the fiscal budget and policies may affect an economy's financial and economic activities. Therefore, the general government's final consumption expenditure ratio to GDP as the size of government (GOV) is also used. Finally, inflation reflects the price distortion's effects on an economy and may affect economic and financial activities. Hence, the annual rate of GDP deflator as inflation (INF) is also used to control the estimations. This study employs natural logarithm transformation to ensure consistency in the results as the data are in varying scales.

5. Model Specification and Econometric Approaches

5.1 Model Specification

Depending upon the existing empirical studies on the finance-growth relationship (Beck, Levine, and Loayza 2000; Christopoulos and Tsionas 2004; Luintel and Khan 1999), the estimated equations for economic growth can be expressed as:

$$LnGDPPC = \alpha + \beta_1 LnFD_t + \beta_2 LnGDS_t + \beta_2 LnTRD_t + \beta_2 LnGOV_t + \beta_2 LnINF_t + \varepsilon_t \quad (3)$$

where GDPPC is economic growth represented by real GDP per capita (Constant 2010 USD), and FD is financial development represented by four mutually exclusive variables explained in section 4.2.2. GDS is the gross domestic savings, TRD is the trade openness, GOV is the government's size, and all are ratios to GDP. INF is the inflation rate.

However, there is no clear consensus about the causality directions of the finance-growth relationship (Martin Čihák *et al*., 2013); this study follows the method of Christopoulos and Tsionas (2004) to examine the reverse causality directions; the estimation equations for financial development can be expressed as:

$$LnFD = \alpha + \beta_1 LnGDPPC_t + \beta_2 LnGDS_t + \beta_2 LnTRD_t + \beta_2 LnGOV_t + \beta_2 LnINF_t + \varepsilon_t \quad (4)$$

This study assumes that the critical economic growth and financial development variables expressed in equations (3) and (4) are expected to have a long-run cointegrating relationship in a highly liberalized developing economy such as Nepal. A theoretical understanding of these equations is set to understanding the egg-and-chicken problem of the finance-growth relationship (Shan, Morris, and Sun 2001). The study uses a dynamic regression model. The bound test approach under the Autoregressive Distributed Lag (ARDL) model developed by (Pesaran and Shin 1998; Pesaran, Shin, and Smith 2001) is used to confirm the cointegrating form and long-run level relationship, whereas the error correction model (ECM) is being used for short-run causality and confirmation of speed of adjustment towards long-run equilibrium.

5.2. *Bound Test Under ARDL Model*

The ARDL model is a standard time series model that examines the relationship between a dependent variable and independent regressors contemporaneously and historically using current and lagged regressors' values. The ARDL model is a specific framework of ordinary least square (OLS) regression equation applicable for stationary, non-stationary, and mixed nature of time series variables. It performs an F-test for the existence of long-run form and cointegration. It provides a short-run dynamic form of error correction with a long-run equilibrium through simple linear transformation (Shrestha and Bhatta 2018).

Thus, the principal estimation model of equation (3) for economic growth under ARDL (p, q, r, s, t, u) is expressed by:

$$\Delta LnGDPPC_t = \alpha$$
$$+ \sum_{i=1}^{p} \lambda_{1i}\Delta LnGDPPC_{t-i} + \sum_{J=0}^{q} \lambda_{2j}\Delta LnFD_{t-j} + \sum_{k=0}^{r} \lambda_{3k}\Delta LnGDS_{t-k} + \sum_{l=0}^{s} \lambda_{4l}\Delta LnTRD_{t-l}$$
$$+ \sum_{m=0}^{t} \lambda_{5m}\Delta LnGOV_{t-m} + \sum_{n=0}^{u} \lambda_{6n}\Delta LnINF_{t-n} + \delta_1\Delta LnGDPPC_{t-1} + \delta_2\Delta LnFD_{t-1}$$
$$+ \delta_3\Delta LnGDS_{t-1} + \delta_4\Delta LnTRD_{t-1} + \delta_5\Delta LnGOV_{t-1} + \delta_6\Delta LnINF_{t-1} \quad (5)$$

On the contrary, the reverse estimation model of equation (4) for financial development under ARDL (p, q, r, s, t, u) is expressed by:

$$\Delta LnFD_t = \alpha + \sum_{i=1}^{p} \beta_{1i}\Delta LnFD_{t-i} + \sum_{J=0}^{q} \beta_{2j}\Delta LnGDPPC_{t-j} + \sum_{k=0}^{r} \beta_{3k}\Delta LnGDS_{t-k} + \sum_{l=0}^{s} \beta_{4l}\Delta LnTRD_{t-l}$$

$$+ \sum_{m=0}^{t} \beta_{5m}\Delta LnGOV_{t-m} + \sum_{n=0}^{u} \beta_{6n}\Delta LnINF_{t-n} + \gamma_1\Delta LnGDPPC_{t-1} + \gamma_2\Delta LnFD_{t-1}$$

$$+ \gamma_3\Delta LnGDS_{t-1} + \gamma_4\Delta LnTRD_{t-1} + \gamma_5\Delta LnGOV_{t-1} + \gamma_6\Delta LnINF_{t-1}$$

$$+ \varepsilon_t \tag{6}$$

In which Δ represents the first differenced value. LnGDPPC indicates real GDP per capita, and LnFD indicates the four proxies of financial development. They are LnDCP, LnDCB, LnBM and LnNDC. The other control variables are LnGDS, LnTRD, LnGOV and LnINF. The coefficients $\lambda_1 - \lambda_6$ and $\beta_1 - \beta_6$ provide the coefficients for short-term $\delta_1 - \delta_6$, and $\gamma_1 - \gamma_6$ provides the long-run coefficients. And p, q, r, s, t, u represents the optimum number of lags selected automatically based on Akaike's (1974) Information Criteria (AIC). The existence of cointegration or long-run relationship is confirmed under the bound test approach. If the F-statistic is higher than the upper bound critical value, it ascertains the joint significance of coefficients of the regressors for the long-run cointegration.

5.3 Error Correction Model (ECM) Under the ARDL Model

If cointegration exists between two variables, at least one directional or bi-directional causality might exist (Engle and Granger 1987). Therefore, this study confirms the short-run causality between financial development and economic growth proxies using the error correction model (ECM). The ECM is restricted to only two critical financial development variables, used separately and as the proxy of economic growth. It provides partial information for adjustment and allows us to estimate short-run relationships. However, the estimation of short-run coefficients on the error correction model (ECM) heavily depends on the optimum lags selected for the estimations.

Thus, The ARDL estimation equations of (5) and (6) took the following ECM equations for the short-run relationship:

$$\Delta LnGDPPC_t = \alpha$$
$$+ \sum_{i=1}^{p} \lambda_{1i}\Delta LnGDPPC_{t-i} + \sum_{J=0}^{q} \lambda_{2j}\Delta LnFD_{t-j} + \sum_{k=0}^{r} \lambda_{3k}\Delta LnGDS_{t-k} + \sum_{l=0}^{s} \lambda_{4l}\Delta LnTRD_{t-l}$$
$$+ \sum_{m=0}^{t} \lambda_{5m}\Delta LnGOV_{t-m} + \sum_{n=0}^{u} \lambda_{6n}\Delta LnINF_{t-n} + \delta_1 ECT1_{t-1}$$
$$+ \varepsilon_t \qquad (7)$$

$$\Delta LnFD_t = \alpha + \sum_{i=1}^{p} \beta_{1i}\Delta LnFD_{t-i} + \sum_{J=0}^{q} \beta_{2j}\Delta LnGDPPC_{t-j} + \sum_{k=0}^{r} \beta_{3k}\Delta LnGDS_{t-k} + \sum_{l=0}^{s} \beta_{4l}\Delta LnTRD_{t-l}$$
$$+ \sum_{m=0}^{t} \beta_{5m}\Delta LnGOV_{t-m} + \sum_{n=0}^{u} \beta_{6n}\Delta LnINF_{t-n} + \gamma_1 ECT2_{t-1}$$
$$+ \varepsilon_t \qquad (8)$$

In which, Δ represents the first differenced value. The coefficients $\lambda_1 - \lambda_6$ and $\beta_1 - \beta_6$ provide the coefficients for the short-term. And p, q, r, s, t, u represents the number of lags selected automatically based on Akaike's (1974) Information Criteria (AIC). $ECT1_{t-1}$ and $ECT2_{t-1}$ represent the one-period lagged value of error correction terms. Equation (7) gives the idea about the short-run causality of financial development and other control variables to economic growth, and equation (8) gives the idea about the short-run causality of economic growth and other control variables to financial development. Finally, the coefficient of one period lagged value of ECT confirms the long-run causality and specifies the speed of adjustment towards equilibrium.

6. Empirical Analysis and Discussions

6.1. Descriptive Statistics

Table 2 presents a summary of statistics. As data are balanced, all indicators have 32 years of observations from 1985 to 2016. The maximum real GDP per capita is 732.00 US dollars, and the minimum is 317.77 US dollars. There exist significant changes in the proxies of financial development over the period. The maximum domestic credit to the private sector is 81%, and broad money is 109% of the GDP. The level of savings also varies across time from 4% to 16% of GDP. Trade openness varies from 21% to 45% of GDP. The government's final consumption expenditure has remained between 8% to 12%

of GDP. The maximum inflation is 18%, and the lowest is 3 % over the period. It indicates that Nepal has gone through many volatile movements but not with severe inflationary or deflationary conditions. So, the result obtained from the estimated model using these variables gives a clear picture of Nepal's finance-growth relationship.

<Table 2> Summary of Statistics

	GDPPC	DCP	DCB	BM	NDC	GDS	TRD	GOV	INF
Mean	478.27	0.32	0.32	0.54	0.45	0.11	0.35	0.09	0.09
Median	458.91	0.28	0.27	0.51	0.39	0.11	0.37	0.09	0.08
Maximum	732.00	0.81	0.81	1.09	0.86	0.16	0.45	0.12	0.18
Minimum	317.77	0.10	0.09	0.28	0.27	0.04	0.21	0.08	0.03
Std. Dev.	124.20	0.20	0.20	0.22	0.18	0.02	0.07	0.01	0.04
Observations	32	32	32	32	32	32	32	32	32

Notes: GDPPC: real GDP per capita; DCP: domestic credit to the private sector; DCB: domestic credit to the private sector by banks; BM: broad money; NDC: net domestic credit; GDS: gross domestic savings; TRD: merchandise trade; and GOV: general government final consumption expenditure. All are ratios to GDP. INF: Inflation rate (GDP deflator).
Source: Author's calculation.

6.2. Correlation Matrix

Table 3 presents the correlation matrix. Each proxy of financial development is positively correlated with the other and significantly correlates with real GDP per capita. Thus, they are used one by one separately. Other control variables, i.e., size of government and trade openness, are also positively correlated with real GDP per capita. However, gross domestic savings and inflation negatively correlate with real GDP per capita. The correlation between the proxy of trade openness with financial development and economic growth proxies may show a multicollinearity issue. Hence, the Lagrange Multiplier (LM) test is performed after the estimations to detect multicollinearity issues.

<Table 3> Correlation Matrix

Correlation	LnGDPPC	LnDCP	LnDCB	LnBM	LnNDC	LnGDS	LnTRD	LnGOV	LnINF
LnGDPPC	1.00								
LnDCP	0.97	1.00							
LnDCB	0.97	1.00	1.00						
LnBM	0.99	0.98	0.98	1.00					
LnNDC	0.97	0.98	0.98	0.98	1.00				
LnGDS	-0.31	-0.24	-0.24	-0.33	-0.29	1.00			
LnTRD	0.69	0.75	0.75	0.69	0.62	0.01	1.00		
LnGOV	0.63	0.64	0.64	0.65	0.73	-0.30	0.15	1.00	
LnINF	-0.34	-0.34	-0.34	-0.34	-0.24	0.12	-0.47	-0.02	1.00

Notes: LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money; LnNDC: net domestic credit; LnGDS: gross domestic savings; LnTRD: merchandise trade; LnGOV: general government final consumption expenditure. All are ratios to GDP. LnINF: One plus inflation rate (GDP deflator). Variables are transformed into a natural logarithm intended as 'Ln.'
Source: Author's calculation.

6.3. Test of Stationarity

This study uses multivariate time series data under the ARDL estimations. ARDL model does not require selected variables to be in the same order of integration. They could be either stationary or non-stationary at their level values. However, all the variables must have the same order of integration at the maximum of their first differenced values (Pesaran, Shin, and Smith 2001). This study confirms the stationarity and non-stationarity features of the series with the help of the most widely used unit root test methods. They are the Augmented Dickey-Fuller (ADF) test, Phillips and Perron (PP) test, and the Kwiatkowski, Phillips, and Schmidt-Shin (KPSS) test. Table 4 presents the summary of unit root test results with two different model specifications. The first model specification considers intercept only, and the second considers both trends and intercepts. Results show that the selected variables have mixed properties (stationary and non-stationary) in their level values. However, they all are stationary at their first differenced values in intercept specification. These results indicate that variables have the same order of integration at their first differenced value, i.e., I (1). Hence, the results provide sufficient backup to use the ARDL bound test method for the above-designed model specification.

<Table 4> Summary of Unit Root Test

Sample period: 1985 to 2016	Lag selection Criteria: Akaike Information Criterion (AIC), Automatic				
		Intercept Only		Trend and Intercept	
Variables	Test Methods	Level Value	1st Difference Value	Level Value	1st Difference Value
LnGDPPC	ADF-Fisher χ^2	1.224	-5.204***	-3.477***	-5.527***
	PP-Fisher χ^2	1.340	-5.184***	-1.263	-5.521***
	KPSS LM-Stat	0.745	0.311**	0.161	0.062***
LnDCP	ADF-Fisher χ^2	-0.182	-3.583***	-3.444	-3.476
	PP-Fisher χ^2	-0.244	-4.232***	-2.179	-4.153***
	KPSS LM-Stat	0.732	0.054***	0.056***	0.050***
LnDCB	ADF-Fisher χ^2	-0.269	-3.503***	-3.351	-3.395
	PP-Fisher χ^2	-0.322	-4.308***	-2.199	-4.219***
	KPSS LM-Stat	0.732	0.052***	0.057***	0.050***
LnBM	ADF-Fisher χ^2	0.806	-5.353***	-2.695	-5.433***
	PP-Fisher χ^2	3.566**	-5.948***	-1.922	-7.422***
	KPSS LM-Stat	0.751	0.384***	0.135***	0.325
LnNDC	ADF-Fisher χ^2	0.654	-4.739***	-2.280	-3.931***
	PP-Fisher χ^2	0.746	-4.700***	-2.322	-4.851***
	KPSS LM-Stat	0.718	0.204***	0.151	0.049***
LnGDS	ADF-Fisher χ^2	-1.615	-3.797***	-1.774	-3.766***
	PP-Fisher χ^2	-1.615	-3.905***	-1.774	-3.962***
	KPSS LM-Stat	0.253***	0.201***	0.104***	0.113***
LnTRD	ADF-Fisher χ^2	-1.851	-7.440***	-2.407	-7.509***
	PP-Fisher χ^2	-1.676	-7.551***	-2.251	-7.922***
	KPSS LM-Stat	0.498	0.116***	0.154	0.093***
LnGOV	ADF-Fisher χ^2	-0.443	-8.374***	-2.746	-8.663***
	PP-Fisher χ^2	-1.237	-8.641***	-2.676	-16.901***
	KPSS LM-Stat	0.444***	0.402***	0.186	0.500
lining	ADF-Fisher χ^2	-3.188***	-7.729***	-3.436	-3.222
	PP-Fisher χ^2	-3.134***	-16.846***	-3.406	-16.932***
	KPSS LM-Stat	0.307**	0.323***	0.139***	0.313

Notes: ***, ** and * indicates significance at 1%, 5%, and 10%, respectively. LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money; LnNDC: net domestic credit; LnGDS: gross domestic savings; LnTRD: merchandise trade; LnGOV: general government final consumption expenditure. All are ratios to GDP. LnINF: One plus inflation rate (GDP deflator). All are transformed into a natural logarithm.
Source: Author's calculation.

6.4. Cointegration Results

Table 5 summarises the results of the ARDL bound test approach for cointegration. The results indicate that the calculated F-statistic is higher than the upper bound value when the proxy of economic growth, i.e., real GDP per capita, is the dependent variable in four models of principle estimation equations. It indicates that financial development and other regressors have a long-run relationship with the economic growth of Nepal. On the other hand, the calculated F-statistic is higher than the upper bound value when four proxies of financial development are used as the dependent variable separately in the four models of the reverse estimation equations. It indicates that economic growth and other regressors have a long-run relationship with each proxy of Nepal's financial development. Therefore, the bound test approach of cointegration under the ARDL model confirms that Nepal's financial development and economic growth have a two-way cointegration vector in the long-run. The level relationship further confirms their significance and direction of causality in the long-run.

<center><Table 5> ARDL Bound Testing for the Existence of a Level Relationship</center>

Models	Detail		ARDL (Selected Models)	F-Statistics	Bound Value						Outcomes
					10%		5%		1%		
					Lower	Upper	Lower	Upper	Lower	Upper	
Model 1 LnDCP➔LnGDPPC	Dependent Variable	Real GDP Per Capita (LnGDPPC)	(1,0,1,2,0,0)	18.417***	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnDCP LnGDS LnTRD LnGOV LnINF									
Reverse 1 LnGDPPC➔LnDCP	Dependent Variable	Domestic Credit to Private Sector (LnDCP)	(1,1,1,2,0,0)	5.563***	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnGDPPC LnGDS LnTRD LnGOV LnINF									
Model 2 LnDCB➔LnGDPPC	Dependent Variable	Real GDP Per Capita (LnGDPPC)	(1,0,1,2,0,0)	18.635***	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnDCB LnGDS LnTRD LnGOV LnINF									
Reverse 2 LnGDPPC➔LnDCB	Dependent Variable	Domestic Credit from Banks (LnDCB)	(1,1,1,2,0,2)	4.015**	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnGDPPC LnGDS LnTRD LnGOV LnINF									
Model 3 LnBM➔LnGDPPC	Dependent Variable	Real GDP Per Capita (LnGDPPC)	(2,0,0,2,1,2)	4.729***	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnBM LnGDS LnTRD LnGOV LnINF									
Reverse 3 LnGDPPC➔LnBM	Dependent Variable	Broad Money: M2 (LnBM)	(1,0,0,0,0,0)	5.609***	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnGDPPC LnGDS LnTRD LnGOV LnINF									
Model 4 LnNDC➔LnGDPPC	Dependent Variable	Real GDP Per Capita (LnGDPPC)	(1,0,1,2,0,0)	13.358***	2.08	3.00	2.39	3.38	3.06	4.15	Cointegrated
	Regressor:	LnNDC LnGDS LnTRD LnGOV LnINF									
Reverse 4 LnGDPPC➔LnNDC	Dependent Variable	Net Domestic Credit (LnNDC)	(1,1,1,1,0,2)	2.772	2.08	3.00	2.39	3.38	3.06	4.15	Inconclusive
	Regressor:	LnGDPPC LnGDS LnTRD LnGOV LnINF									

Notes: ***, ** and * indicate significance at 1%, 5%, and 10%, respectively. LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money; LnNDC: net domestic credit; LnGDS: gross domestic savings; LnTRD: merchandise trade; LnGOV: general government final consumption expenditure. All are ratios to GDP. LnINF: One plus inflation rate (GDP deflator). All are transformed into a natural logarithm.
Source: Author's calculation.

6.5. Estimation Results

6.5.1. Principle Estimation Model: Economic growth is the function of financial development

After confirming the cointegrating relationship between proxies of financial development and economic growth, the long-run relationship is estimated. The real GDP per capita is the dependent variable in principle estimation models, and four proxies of financial development are the dependent variables in the reverse estimation models. The long-run results of the principal estimation model for economic growth are reported in Table 6, and the results of the reverse estimation model for financial development are reported in Table 7, respectively.

Table 6 reports the long-run estimation results of equation (3), where the first differenced value of real GDP per capita (ΔLnGDPPC) is the dependent variable for economic growth. The results indicate that all the proxies of financial development are positive and significant in causing real GDP per capita except broad money. It indicates that the higher the level of financial development, the higher the economic growth in the long-run. For example, a one-unit increase in domestic credit to private sector ratio to GDP causes a 0.993-unit increase in real GDP per capita in the long-run. Therefore, economic growth is financial development elastic in Nepal. Results also indicate that gross domestic saving is insignificant to causing real GDP per capita. Trade openness is negative and significant in causing real GDP per capita in models 1 and 2. One possible reason behind this could be the import-based economic feature of Nepal. However, trade openness is insignificant to causing real GDP per capita in models 3 and 4. The size of the government is negative and significant to cause real GDP per capita in the long-run in models 1 and 2. Inflation has a primarily negative but insignificant impact on Nepal's real GDP per capita.

<Table 6> Long-Run Coefficients for Economic Growth

Dependent Variable:	△LnGDPPC	△LnGDPPC	△LnGDPPC	△LnGDPPC
Lag selection method:	Akaike info criterion(AIC) Sample (included): 1985 to 2016			
Maximum lags:	2 (Automatic selection)			
Models	Model 1	Model 2	Model 3	Model 4
Sample (adjusted):	1987 to 2016	1987 to 2016	1987 to 2016	1987 to 2016
Selected Models:	(1, 0, 1, 2, 0, 0)	(1, 0, 1, 2, 0, 0)	(2, 0, 0, 2, 1, 2)	(1, 0, 1, 2, 0, 0)
Variables	Coefficient	Coefficient	Coefficient	Coefficient
LnDCP	0.993***			
	(0.247)			
LnDCB		0.984***		
		(0.243)		
LnBM			1.275	
			(1.123)	
LnNDC				1.251***
				(0.431)
LnGDS	0.417	0.413	0.568	0.420
	(0.255)	(0.252)	(0.931)	(0.357)
LnTRD	-1.398**	-1.400**	-0.633	-0.639
	0.570	(0.566)	(1.192)	(0.534)
LnGOV	-1.346**	-1.357**	0.967	-1.047
	(0.620)	(0.618)	(1.974)	(0.744)
LnINF	-0.091	-0.090	0.061	-0.091
	(0.065)	(0.064)	(0.249)	(0.087)
Constant	3.590**	3.557**	10.744	4.975***
	(1.383)	(1.381)	(7.319)	(1.491)
LM Test F- Stat. (Prob.)	2.487(0.111)	2.576(0.104)	1.484(0.258)	2.539(0.107)
Ramsey Test F-Stat. (Prob.)	0.061(0.808)	0.088(0.770)	0.697(0.416)	0.116(0.737)
Included observations (after adjustments)	30	30	30	30

Notes: ***, ** and * indicate significance at 1%, 5%, and 10%, respectively. Standard errors
   are in parentheses. LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private
   sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money;
   LnNDC: net domestic credit; LnGDS: gross domestic savings; LnTRD: merchandise trade;
   LnGOV: general government final consumption expenditure. All are ratios to GDP.
   LnINF: One plus inflation rate (GDP deflator). All are transformed into a natural
   logarithm.
Source: Author's calculation.

The short-run estimation results of equation (7) are reported in Table 7. The
first differenced value of real GDP per capita (△LnGDPPC) is the dependent
variable, and four different proxies of financial development and other control
variables are independent regressors. The estimation results indicate that none
of the proxies of financial development causes real GDP per capita in Nepal's
short-run. It means that financial development is not short-run elastic to the
economic growth of Nepal. The results also indicate that a year-lagged value
of trade openness has a positive and significant impact on real GDP per capita.
It means trade openness has short-run positive effects on economic growth in
Nepal. However, government size and inflation only significantly affect

economic growth in the short-run, except for model 3.

<Table 7> Short-Run Coefficients for Economic Growth

Dependent Variable:	ΔLnGDPPC	ΔLnGDPPC	ΔLnGDPPC	ΔLnGDPPC
Models	Model 1	Model 2	Model 3	Model 4
Sample:	1985 to 2016	1985 to 2016	1985 to 2016	1985 to 2016
Selected Models:	(1, 0, 1, 2, 0, 0)	(1, 0, 1, 2, 0, 0)	(2, 0, 0, 2, 1, 2)	(1, 0, 1, 2, 0, 0)
Variables	Coefficient	Coefficient	Coefficient	Coefficient
ΔLnGDPPC(-1)			-0.389**	
			(0.178)	
ΔLnGDS	0.014	0.014		0.012
	(0.010)	(0.010)		(0.012)
ΔLnTRD	-0.010	-0.009	-0.013	0.024
	(0.019)	(0.019)	(0.024)	(0.021)
ΔLnTRD(-1)	0.130***	0.129***	0.084***	0.100***
	(0.022)	(0.022)	(0.023)	(0.026)
ΔLnGOV			-0.038	
			(0.036)	
ΔLnINF			0.001	
			((0.006)	
ΔLnINF(-1)			-0.011*	
			(0.006)	
ECT(-1)*	-0.112***	-0.112***	-0.052***	-0.097***
	(0.009)	(0.009)	(0.008)	(0.009)
R-squared	0.631	0.635	0.575	0.516
Adjusted R-squared	0.589	0.593	0.464	0.460
SE of regression	0.011	0.011	0.013	0.013
Sum squared resid	0.003	0.003	0.004	0.004
Log-likelihood	93.864	94.017	91.718	89.791
Durbin-Watson stat	2.502	2.512	2.261	2.309
Akaike info criterion	-5.991	-6.001	-5.648	-5.719
Included observations:	30	30	30	30

Notes: ***, ** and * indicate significance at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money; LnNDC: net domestic credit; LnGDS: gross domestic savings; LnTRD: merchandise trade; LnGOV: general government final consumption expenditure. All are ratios to GDP. LnINF: One plus inflation rate (GDP deflator). All are transformed into a natural logarithm.
Source: Author's calculation.

6.5.2. Reverse Estimation Model: Financial development is the function of economic growth

Table 8 reports the long-run estimation results of equation (4), where the first differenced value of four proxies of financial development (ΔLnDCP, ΔLnDCB, and ΔLnBM) are the dependent variables. The results indicate that real GDP per capita is positive and significant to impact financial development

in Nepal. It indicates that the higher the level of economic growth, the higher would-be financial development in the long-run. For example, a one-unit increase in real GDP per capita causes a 0.868-unit increase in the domestic credit to the private sector ratio to GDP in the long-run. Therefore, financial development is also economic growth elastic in Nepal. Results indicate that gross domestic saving is negative and significant in causing financial development in models 1 and 2. It indicates that savings must be mobilized through Nepal's financial system for credit expansion. Trade openness is significant in causing proxies of financial development in models 1 and 2 but insignificant in model 3. The government's size is significant and positive to cause proxies of financial development in models 1 and 2. Inflation is insignificant to cause all proxies of financial development. It indicates that Nepal has not faced hyperinflation, by its financial activities are not adversely affected in Nepal.

<Table 8> Long-Run Coefficients for Financial Development

Dependent Variable:	$\triangle$LnDCP	$\triangle$LnDCB	$\triangle$LnBM
Lag selection method:	Akaike info criterion(AIC)	Sample (included): 1985 to 2016	
Maximum lags:	2 (Automatic selection)		
Models	Model 1	Model 2	Model 3
Sample (adjusted):	1987 to 2016	1987 to 2016	1986 to 2016
Selected Model:	(1, 1, 1, 2, 0, 0)	(1, 1, 1, 2, 0, 2)	(1, 0, 0, 0, 0, 0)
Variables	**Coefficient**	**Coefficient**	**Coefficient**
LnGDPPC	0.868**	0.807*	1.281***
	(0.355)	(0.414)	(0.224)
LnGDS	-0.461*	-0.514*	-0.095
	(0.223)	(0.261)	(0.107)
LnTRD	1.543***	1.720***	0.226
	(0.319)	(0.413)	(0.201)
LnGOV	1.916***	2.025***	0.784
	(0.538)	(0.627)	(0.497)
LnINF	0.053	0.125	-0.073
	(0.068)	(0.098)	(0.072)
Constant	-1.351	-0.46	-6.783**
	(3.223)	(3.858)	(2.464)
LM Test F- Stat. (Prob.)	0.360(0.703)	0.353(0.708)	0.329(0.723)
Ramsey Test F-Stat. (Prob.)	0.102(0.754)	0.041(0.843)	1.830(0.189)
Included observations (after adjustments)	30	30	31

Notes: ***, ** and * indicate significance at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money; LnGDS: gross domestic savings; LnTRD: merchandise trade; LnGOV: general government final consumption expenditure. All are ratios to GDP. LnINF: One plus inflation rate (GDP deflator). All are transformed into a natural logarithm.
Source: Author's calculation.

The short-run estimation results of equation (8) are reported in Table 9, where the first differenced value of four different proxies of financial development (ΔLnDCP, ΔLnDCB, and ΔLnBM) are used as the dependent variable separately. The real GDP per capita and other control variables are independent regressors. The estimation results indicate that real GDP per capita is significant and positive to cause all financial development proxies, except broad money in the short-run. If the economy grows, there could be a quick demand for credit in Nepal's short-run. However, gross domestic savings have adverse effects on financial development in the short-run as its first differenced value has adverse and significant effects on two proxies of financial development in models 1 and 2. The merchandise trade significantly and positively affects financial development in the short-run. However, one period of the lagged value of merchandise trade has adverse effects on economic growth in models 1 and 2. Inflation also negatively and significantly impacts financial development in model 1. It means that financial development reacts negatively to inflation in the short-run. However, the size of the government only affects financial development in the short-run.

<Table 9> Error Correction Coefficients for Financial Development

Dependent Variable:	Δ**LnDCP**	Δ**LnDCB**	Δ**LnBM**
Models	Model 1	Model 2	Model 3
Selected Model:	(1, 1, 1, 2, 0, 0)	(1, 1, 1, 2, 0, 2)	(1, 0, 0, 0, 0, 0)
Variables	**Coefficient**	**Coefficient**	**Coefficient**
ΔLnGDPPC	3.339***	2.890***	
	(0.451)	(0.452)	
ΔLnGDS	-0.105*	-0.104*	
	(0.056	(0.058)	
ΔLTRD	0.233**	0.227**	
	(0.104)	(0.106)	
ΔLnTRD(-1)	-0.419**	-0.353*	
	(0.165)	(0.178)	
ΔLnINF		0.026	
		(0.029)	
ΔLnINF(-1)		-0.061**	
		(0.028)	
ECT (-1)*	-0.606***	-0.551***	-0.380***
	(0.085)	(0.089)	(0.054)

R-squared	0.717	0.753	0.385
Adjusted R-squared	0.672	0.689	0.385
SE of regression	0.063	0.063	0.045
Sum squared resid	0.099	0.090	0.060
Log-likelihood	43.166	44.533	52.856
Durbin-Watson stat	2.245	1.951	2.128
Akaike info criterion	-2.544	-2.502	-3.346
Included observations:	30	30	30

Notes: ***, ** and * indicate significance at 1%, 5%, and 10%, respectively. Standard errors are in parentheses. LnGDPPC: real GDP per capita; LnDCP: domestic credit to the private sector; LnDCB: domestic credit to the private sector by banks; LnBM: broad money; LnGDS: gross domestic savings; LnTRD: merchandise trade; LnGOV: general government final consumption expenditure. All are ratios to GDP. LnINF: One plus inflation rate (GDP deflator). All are transformed into a natural logarithm.
Source: Author's calculation.

7. Conclusion and Policy Recommendations

This study utilizes a time series dataset spanning 32 years from 1985 to 2016 to investigate the dynamic relationship between financial development and economic growth in Nepal. The ARDL bound test approach has been used to estimate the long-run relationship and the cointegration form. The short-run relationship and the speed of adjustment towards long-run equilibrium are estimated using the ECM, and one period-lagged error correction term (ECT) value is used to confirm the speed of adjustment. GDP per capita (constant 2010 US dollar) measures economic growth, while four different bank-based financial indicators are used to measure financial development. Additionally, four additional variables are used to control the estimations. The study's estimation results are robust regarding the data, econometric approach, model specification, proxies of financial development, economic growth, and other variables. Like the Lagrange Multiplier test, the post-estimations test and the Ramsey test have been done to detect the estimations' multicollinearity and stability. The cumulative sum (CUSUM) and its squares are presented in Appendix B and show the absence of model specification problems.

Based on the estimation results, this study confirms that Nepal's financial development and economic growth are cointegrated with bi-directional causality in the long-run. It means they are moving together in the long-run. These findings are consistent with the arguments of the coexistence of financial development

and economic growth enhancing each other, as concluded by Calderón and Liu (2003); Gregorio and Guidotti (1995); Jung (1986); and Kar *et al.* (2011). All measures of financial development are significant and positive to enhance economic growth in the long-run. Thus, the study concludes that the Nepalese financial sector is well-functioning, especially with the backbone of financial reform and liberalization enacted after the 1980s.

Additionally, the positive and significant coefficients of real GDP per capita to cause proxies of financial development in the reverse direction also indicate that economic growth is equally important to enhance Nepal's financial development. It also justifies that economic growth triggers financial development in the preliminary phase of economic development, as Hassan *et al.* (2011) concluded. The long-run coefficient of the domestic credit to the private sector and domestic credit to the private sector by banks ratio to GDP to cause real GDP per capita are very close. It justifies that the Nepalese financial sector is dominated by the banking sector rather than the non-banking financial sector. So, there is ample space to develop non-banking financial sectors in Nepal. The one-directional reverse causality from real GDP per capita to proxies of financial development in the short-run indicates that there could be quick demand for financial intermediation if economic growth rises.

Trade openness is primarily negative and significant to cause real GDP per capita of Nepal. The reason could be Nepal's import-based economic features, triggered mainly by the higher import of consumable goods with the backup of remittance inflows. Therefore, Nepal's export promotion and import substitution economic policies must guide the trade integration policies. However, trade openness is positive and significant, causing the proxies of financial development in Nepal, and it indicates that trade liberalization might boost the financial sector in developing countries.

The gross domestic savings ratio to GDP, which is most volatile throughout the study period, is insignificant to cause real GDP per capita in Nepal. It indicates that Nepal's economic growth is independent of the level of domestic savings of Nepal. It is crucial to channel domestic savings into investment activities to achieve sustainable economic growth. However, volatile savings are not conducive to investment. Thus, the government needs to formulate

long-term policies that support mobilizing domestic savings for steady growth. A conducive investment environment is essential for mobilizing savings in an economy. The negative and significant coefficients of gross domestic savings towards two proxies of financial development indicate that Nepal's financial market does not benefit from gross domestic savings. Therefore, the government must set policies to stabilize savings that can be converted into capital formation through financial intermediaries.

The size of the government is primarily negative and significant in causing economic growth in Nepal. A reduction in general expenditure in the government budget tends to raise economic growth. This argument may suggest that the government should have a sensitive budget allocation on general administrative expenditures versus capital expenditures such as infrastructure, education, and health. However, the size of the government is significant and positive for fostering financial development in Nepal. It means fiscal expansion gives opportunities to expand credit activities in Nepal. However, the expansion of fiscal speeding through general expenditure might introduce volatility in an economy.

In Nepal, inflation is an insignificant factor in economic growth and financial development, indicating that hyperinflation has not been a concern during the study period. Nevertheless, high levels of inflation can hinder financial and economic activities in an economy. Therefore, the government needs to maintain control over inflation to promote a stable financial system.

Finally, despite these findings, some limitations in this study can be extended in future research, such as an extension of the study period and consideration of the access, efficiency, and stability measures of both financial institutions and the market depending upon the degree of financial liberalization of Nepal. Further studies can also consider the effect of political, economic, and fiscal structural breaks to analyze more insights into the finance-growth relationship of Nepal.

References

Akaike, Hirotugu. 1974. "A New Look at the Statistical Model Identification." *IEEE Transactions on Automatic Control*, 19(6): 716‒23.

Almarzoqi, Raja, Sami Ben Naceur, and Akshay Kotak. 2015. "What Matters for Financial Development and Stability?" *IMF Working Papers*, 15(173): 1‒43.

Arcand, Jean Louis, Enrico Berkes, and Ugo Panizza. 2015. "Too Much Finance?" *Journal of Economic Growth*, 20(2): 105‒48.

Arestis, Philip, and Panicos Demetriades. 1997. "Financial Development and Economic Growth: Assessing the Evidence." *The economic journal*, 107(442): 783‒99.

Arestis, Philip, Panicos O. Demetriades, and Kul B. Luintel. 2001. "Financial Development and Economic Growth: The Role of Stock Markets." *Journal of Money, Credit, and Banking,* 33(1): 16‒41.

Barajas, Adolfo, Ralph Chami, and Reza Yousefi. 2016. "The Finance and Growth Nexus Re-Examined: Do All Countries Benefit Equally?" *Journal of Banking and Financial Economics,* 1(5): 5-38

Beck, Thorsten, Hans Degryse, and Christiane Kneer. 2014. "Is More Finance Better? Disentangling Intermediation and Size Effects of Financial Systems." *Journal of Financial Stability,* 10: 50‒64.

Beck, Thorsten, Erik Feyen, Alain Ize, and Florencia Moizeszowicz. 2008. "Benchmarking Financial Development." *World Bank Policy Research Working Paper* 4638: 1‒45.

Beck, Thorsten, Ross Levine, and Norman Loayza. 2000. "Finance and the Sources of Growth." *Journal of Financial Economics,* 58(1‒2): 261‒300.

Bhetuwal, Khem Raj. 2007. "Financial Liberalization and Financial Development in Nepal." *NRB Economic Review,* 19: 23‒41.

Bist, Jagadish Prasad, and Nar Bahadur Bista. 2018. "Finance-Growth Nexus in Nepal: An Application of the ARDL Approach in the Presence of Structural Breaks." *Vikalpa: The Journal for Decision Makers,* 43(4): 236‒49.

Blackburn, Keith, and Victor T. Y. Hung. 1998. "A Theory of Growth, Financial Development, and Trade." *Economica,* 65(257): 107‒24.

Calderón, César, and Lin Liu. 2003. "The Direction of Causality between Financial Development and Economic Growth." *Journal of Development Economics,* 72(1): 321‒34.

Chandavarkar, Anand. 1992. "Of Finance and Development: Neglected and Unsettled Questions." *World Development,* 20(1): 133‒42.

Christopoulos, Dimitris K, and Efthymios G Tsionas. 2004. "Financial Development and Economic Growth: Evidence from Panel Unit Root and Cointegration Tests." *Journal of Development Economics,* 73(1): 55‒74.

Čihák, M., Demirgüç-Kunt. A., E. Feyen, and R. Levine. 2008. "Benchmarking Financial Systems around the World." *Policy research working paper* 4638.

Čihák, Martin, Asli Demirgüč-Kunt, Erik Feyen, and Ross Levine. 2013. "Financial Development in 205 Economies, 1960 to 2010." *Journal of Financial Perspectives,* 1(2): 17-36

Demetriades, Panicos, and Siong Hook Law. 2006. "Finance, Institutions and Economic Development." *International Journal of Finance and Economics,* 11(3): 245‒60.

Demetriades, Panicos O., and Khaled A. Hussein. 1996. "Does Financial Development Cause Economic Growth? Time-Series Evidence from 16 Countries." *Journal of Development Economics,* 51(2): 387‒411.

Demetriades, Panicos O, and Kul B. Luintel. 1996. "Banking Sector Policies and Financial Development in Nepal." *Oxford Bulletin of Economics and Statistics,* 58(2): 355‒72.

Durusu-Ciftci, Dilek, M. Serdar Ispir, and Hakan Yetkiner. 2017. "Financial Development and Economic Growth: Some Theory and More Evidence." *Journal of Policy Modeling,* 39(2): 290‒306.

Engle, Robert F, and C W J Granger. 1987. "Co-Integration and Error Correction : Representation, Estimation, and Testing P." *Econometrica,* 55(2): 251‒76.

Gautam, Bishnu Prasad. 2014. "Financial Development and Economic Growth in Nepal." *NRB Working Paper* 25: 1‒17.

Goldsmith, Raymond W. 1969. Yale University Press *Financial Structure and Development*. New Haven.

Gregorio, Jose D E, and Pablo E Guidotti. 1995. "Financial Development and Economic Growth." *World Development,* 23(3): 433‒48.

Gurley, John G., and E. S. Shaw. 1967. "Financial Structure and Economic Development." *Economic Development and Cultural Change,* 15(3): 257‒68.

Hassan, M Kabir, Benito Sanchez, and Jung-suk Yu. 2011. "Financial Development and Economic Growth: New Evidence from Panel Data." *Quarterly Review of Economics and Finance,* 51(1): 88‒104.

Hicks, J. 1969. *A Theory of Economic History*. Oxford: Clarendon Press.

Jung, Woo S. 1986. "Financial Development and Economic Growth: International Evidence." *Economic Development and Cultural Change,* 34(2): 333‒46.

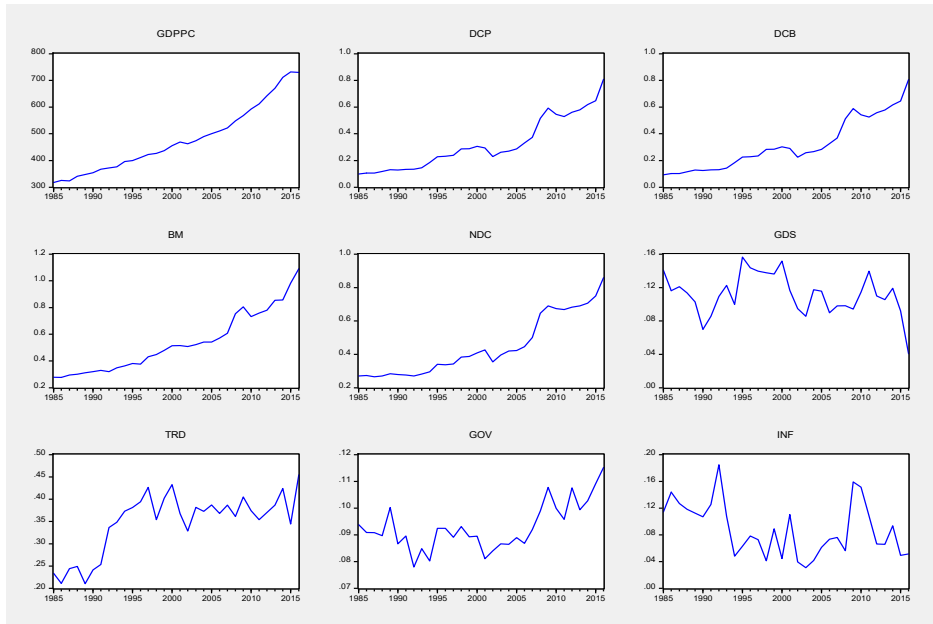Kar, Muhsin, Şaban Nazlioğlu, and Hüseyin Ağir. 2011. "Financial Development and

Economic Growth Nexus in the MENA Countries: Bootstrap Panel Granger Causality Analysis." *Economic Modelling,* 28(1−2): 685−93.

Khan, Mohsin S., and Abdelhak S. Senhadji. 2003. "Financial Development and Economic Growth: A Review and New Evidence." *Journal of African Economies,* 12(ii): 89−110.

Kharel, Ram Sharan, and Dilli Ram Pokhrel. 2012. "Does Nepal's Financial Structure Matter for Economic Growth?" *NRB Economic Review,* 24(April): 31−46.

King, Robert G., and Ross Levine. 1993a. "Finance, Entrepreneurship, and Growth: Theory and Evidence." *Journal of Monetary Economics,* 32: 513−42.

―――. 1993b. "Finance and Growth: Schumpeter Might Be Right." *The Quarterly Journal of Economics,* 108(3): 717−37.

Law, Siong Hook, and Nirvikar Singh. 2014. "Does Too Much Finance Harm Economic Growth?" *Journal of Banking and Finance,* 41(1): 36−44.

Levine, Ross. 1997. "Financial Development and Economic Growth: Views and Agenda." *Journal of economic literature,* 35(2): 688−726.

―――. 2005. "Finance and Growth: Theory and Evidence." *Handbook of Economic Growth,* 1(Part A): 865−934.

Levine, Ross, Norman Loayza, and Thorsten Beck. 2000. "Financial Intermediation and Growth: Causality and Causes." *Journal of Monetary Economics,* 46(1): 31−77.

Levine, Ross, and Sara Zervos. 1998. "Stock Markets, Banks, and Economic Growth." *American Economic Review,* 88(3): 537−58.

Lucas, Robert E. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics,* 22: 3−42.

Luintel, Kul B., and Mosahid Khan. 1999. "A Quantitative Reassessment of the Finance-Growth Nexus: Evidence from a Multivariate VAR." *Journal of Development Economics,* 60(2): 381−405.

Luintel, Kul B., Mosahid Khan, Roberto Leon-Gonzalez, and Guangjie Li. 2016. "Financial Development, Structure and Growth: New Data, Method and Results." *Journal of International Financial Markets, Institutions and Money,* 43: 95−112.

Mankiw, N. 1995. The Growth of Nations. Brooking Pap Econ Activities. 1: 275−405.

Maskay, Nephil Matangi, and Satyendra Raj Subedi. 2009. "Development of the Nepalese Financial System : Need for the Formulation of a Master Plan." *Economic Review,* 21: 31−51.

McKinnon, R. I. 1973. *Money and Capital in Economic Development.* Washington, DC: The Brookings Institution.

Minea, Alexandru, and Patrick Villieu. 2010. "Financial Development, Institutional Quality and Maximizing-Growth Trade-off in Government Finance." *Economic Modelling,* 27(1): 324−35.

MoF. 2020. Economic Survey 2019/20. Kathmandu: Ministry of Finance, Nepal.

NRB 2020. Monetary Policy 2019/20. Kathmandu: Nepal Rastra Bank, Nepal.

Ozaki, Mayumi. 2014. "Finance Sector Reform in Nepal-What Works, What Doesn't." *ADB South Asia Working Paper Series* 28: 1−32.

Pagano, Marco. 1993. "Financial Markets and Growth An Overview." *European Economic Review,* 37: 613−22.

Patrick, Hugh T. 1966. "Financial Development and Economic Growth in Underdeveloped Countries." *Economic Development and Cultural Change,* 14(2): 174−89.

Pesaran, M. Hashem, and Yongcheol Shin. 1998. "An Autoregressive Distributed Lag Modeling Approach to Co-Integration Analysis." *Econometric Society Monographs,* 31: 371−413.

Pesaran, M. Hashem, Yongcheol Smith Shin, and Richard J. Smith. 2001. "Bounds Testing Approaches to the Analysis of Level Relationships." *Journal of Applied Econometrics,* 16: 289−326.

Rajan, Raghuram G., and Luigi Zingales. 1998. "Financial Dependence and Growth." *American Economic Review*, 88(3): 559-86.

Robinson, J. 1952. The Generalisation of the General Theory, in The Rate of Interest, and Other Essays. London: Macmillan.

Samargandi, Nahla, Jan Fidrmuc, and Sugata Ghosh. 2015. "Is the Relationship Between Financial Development and Economic Growth Monotonic? Evidence from a Sample of Middle-Income Countries." *World Development*, 68(1): 66−81.

Schumpeter, Joseph. 1911. *The Theory of Economic Development*. Cambridge, Harvard University Press.

Shan, Jordan Z, Alan G Morris, and Fiona Sun. 2001. "Financial Development and Economic Growth : An Egg-and-Chicken Problem ?", 9(3): 443−54.

Sharma, Keshob. 2016. "Financial Development, Human Capital, and Economic Growth: A Cross Country Analysis." http://thekeep.eiu.edu/theses/2430.

Shaw, E. S. 1973. *Financial Deepening in Economic Development*. Oxford: Oxford University Press.

Shrestha, Ganesh Kumar. 2004. "Financial Sector Reforms in Nepal." *NRB Economic Review*, 16: 75−90.

Shrestha, Min B., and Khorshed Chowdhury. 2006. "Financial Liberalization Index for

Nepal." *International Journal of Applied Econometrics and Quantitative Studies*, 3(1): 41−54.

Shrestha, Min Bahadur, and Guna Raj Bhatta. 2018. "Selecting Appropriate Methodological Framework for Time Series Data Analysis." *The Journal of Finance and Data Science*, 1(19).

Timsina, Neelam. 2014. "Bank Credit and Economic Growth in Nepal: An Empirical Analysis." *NRB Working Paper Series*, 22: 1−24.

Zingales, Luigi. 2003. "The Weak Links." *Federal Reserve Bank of St. Louis Review*, 85(4): 47−52.
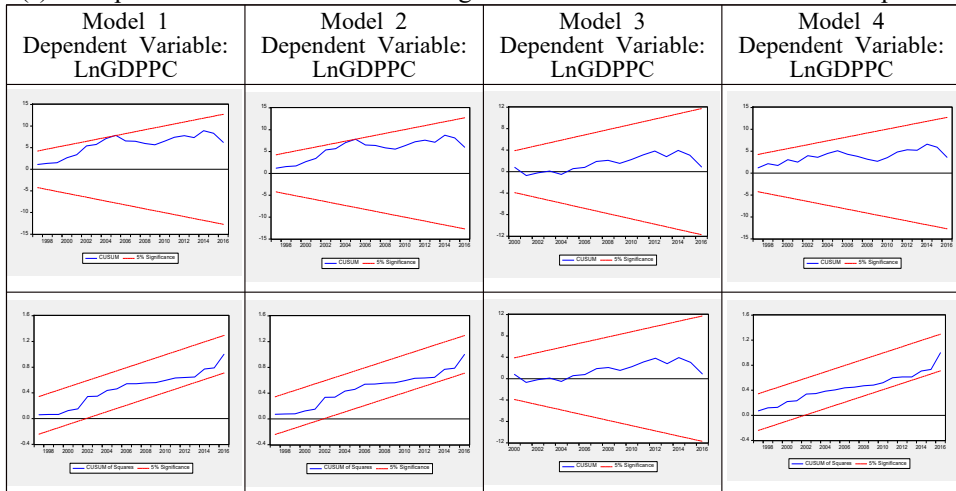
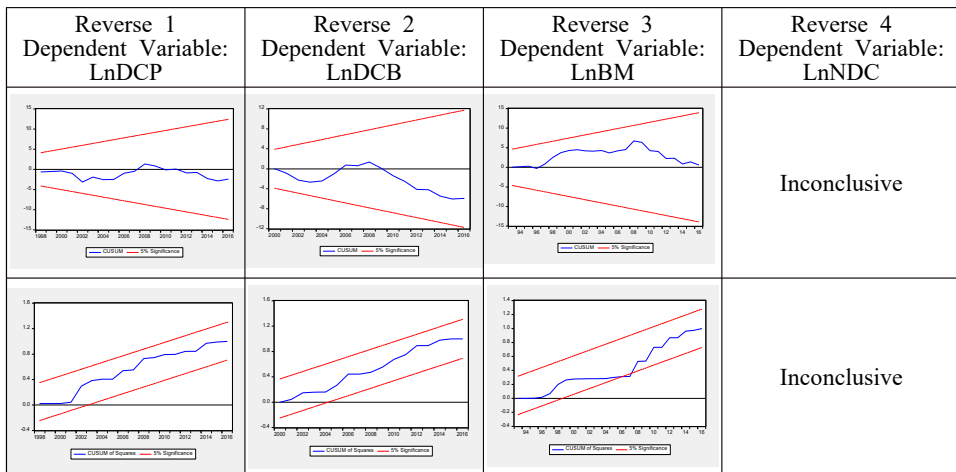## Appendix A: Graphical Representations of Selected Variables in Their Level Values

Source: Author's adaptation from Eviews 10 using World Development Indicators (WDI) data.

Appendix B: Plots of CUSUM and CUSUM Squares Tests

(1) Principle Estimation Model: Economic growth is the function of financial development.

Model 1 Dependent Variable: LnGDPPC	Model 2 Dependent Variable: LnGDPPC	Model 3 Dependent Variable: LnGDPPC	Model 4 Dependent Variable: LnGDPPC

(2) Reverse Estimation Model: Financial development is the function of economic growth.

Reverse 1 Dependent Variable: LnDCP	Reverse 2 Dependent Variable: LnDCB	Reverse 3 Dependent Variable: LnBM	Reverse 4 Dependent Variable: LnNDC
			Inconclusive
			Inconclusive

Source: Author's adaptation from Eviews 10.

<한글초록>

네팔의 금융발전과 경제성장: 자유화된 개발도상국의 실증적 연구

Pradeep Panthi
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　본 논문은 1985년부터 2016년까지의 연간 시계열 데이터를 사용하여 '네팔의 금융발전과 경제성장 간의 관계'를 분석하였다. 이를 위해 'ARDL(autoregressive distributed lag) 바운드 테스트(bound test) 접근법'을 사용하여 공적분의 형태와 장기적 관계를 추정했다. 그 결과 네팔의 금융발전과 경제성장은 장기적으로 '양방향 인과관계'를 갖는 공적분 관계에 있으며, 이는 서로에게 긍정적이고 유의미한 영향을 미친다는 것을 시사한다. '금융발전에서 경제성장으로 이어지는 인과관계'는 '경제성장에서 금융발전으로 이어지는 인과관계'보다 더 강하다. 그러나 경제성장에서 금융발전으로 이어지는 장기 균형으로의 조정 속도는 견고하게 나타났다. 단기적으로는 경제성장에서 금융발전으로 이어지는 단방향의 역 인과관계가 존재하였다. 이러한 결과를 바탕으로 본 연구는 정책 입안자들이 특히 네팔과 같은 개발도상국에서 경제성장을 촉진하기 위해 잘 작동하고 효율적인 '금융부문을 우선적'으로 발전시킬 필요가 있음을 시사한다.