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# The Role of Financial Development in Economic Growth of Nepal: ARDL Approach of Cointegration with Structural Break Analysis

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## Abstract

This paper, using the most recent index of financial development as developed in Svirydzhenka (2016), examines the role of financial development in the economic growth of Nepal. This paper employs the Autoregressive distributed lag (ARDL) approach of cointegration with the structural break in time series data for the period of 1980-2017. Nepal is a unique country with a population of about 30 million with high demographic dividend and big markets in the neighbours, the earlier entrant in the liberalization and reform in the region, endowed with lots of natural resources and beauties, and comparatively cheaper labor force in the region but it remains as one of the poor landlocked developing countries sandwiched between two emerging economies, namely China and India. The results show that financial development has a strong long-run positive relationship with economic growth. Therefore, developing the strategies for the proper financial development improving the financial institution quality and widening the financial market to improve capital formation would be a way to accelerate the economic growth in Nepal.

**Keywords:** Financial Development, Economic Growth, ARDL Cointegration with Structural Break

**JEL:** C23, O16, O40, O41

## 1. Introduction

The role of financial development in economic growth is widely discussed in the literature of finance and development economics. It is said that financial development lubricates the economic activities to boost the economic growth in a country. The role of financial development is not found unique in all countries' cases. The literature suggests that the role of financial development in different countries are found of three types. The first, positive impact of financial development in economic growth, second negative role of financial development in economic growth. The literature in the second group suggest that financial development is the result of economic growth, and it does not contribute to economic growth. The third is that the role of financial development is

ambiguous, that is, not aggressive role of financial development resulting neither significantly positive nor negative role in economic growth. These findings are based on different countries' experience. In this background, the role of financial development in economic growth of Nepal, a landlocked developing country, has not been investigated systematically yet. This background motivates this study to identify the role of financial development in economic growth of Nepal.

Nepal is a unique country for country specific case study as it represents the group of landlocked developing countries and lagging behind even having lots of natural beauties and resources with in the country, large markets in the closed neighbor, comparatively cheap labor force with high demographic dividend, sandwiched between two emerging large economies-India and China, and evergreen suitable climate for agriculture. Notably, Nepal is an earlier entrant in the liberalization and reform policy not only in the regional context, but also in the global context as it started reform since the mid-1980s as prescribed by the international financial institutions, donor agencies and development partners.

Conventionally, it is believed that liberalization and reform support for financial development and trade performance to boost the economic growth (Ramesh C Paudel, 2016). Nepal has a new government elected recently, which seem to be stable government of Nepal after very long time in the history, and it has put forward a high target for the economic growth in the years to come. But still Nepal is struggling in many respects of the development. These scenarios seek the urgent attention to whether the role of financial development is contributing positively for economic growth or not in Nepal.

The proxies of financial development were always a matter of confusion and choice among the variables, i.e., De Gregorio and Guidotti (1995) uses the ratio of bank credit to the private sector to gross domestic product (GDP) while Levine (1997) suggests the aggregate measure of overall financial system. In this background, Svirydzenka (2016) constructed a single index of financial development analyzing the overall financial development issues and variables. This index has removed the confusion on choosing the appropriate proxies for financial development. The index is constructed using the data for financial institutions and financial markets which are synthesized from financial depth, financial access, and financial efficiency for their respective areas. Therefore, this study would be the first of its kind in the Nepalese context using the time series data. This index covers the data for the period of 1980-2017, thus we cover the same period in the empirical analysis using the autoregressive distributed lag (ARDL) approach of cointegration with structural break analysis. The advantage of using ARDL approach is that provides the long-run and short-run coefficients despite the different order of cointegration of the variables.

The major aims of this paper are of two folds. First, to document the financial development scenario in the Nepalese context, then to investigate the role of financial development in economic growth of Nepal so that a more credible results can be obtained for the better policy inferences. Major findings from this paper suggest that financial development index (FD) has a strong long-run relationship indicating that a one index point (one percent increase in index) of financial development (FD) causes to increase the GDP on average by about 3.50 percentage. Also, the finding suggests that improving the financial institution and financial market to increase the capital formation may be a good strategy to accelerate the economic growth in the country.

This article is divided into six sections. The following section highlights the financial development in Nepal analyzing the issues and trends with brief historical context about the financial development. In section three, a brief literature review is presented followed by a discussion on research methodology in Section four. The estimated results have been discussed and interpreted in Section five before concluding in Section six.

## **2. Financial Development in Nepal: brief history, issues and trends**

If we look at the history of the financial development in Nepal, we find the country has passed through various milestones in the financial sector development process. Following other countries' trends, Nepal's formal financial sector begins with the commercial bank, that is, Nepal Bank Limited was established as a first bank in 1937. This bank was established by the investment from both government and private sector with the share of 51 % and 49

% respectively. The second milestone was the establishment of the Central Bank of Nepal, namely Nepal Rastra Bank, in 1956 (Acharya, 2003; Maskay & Subedi, 2009). From the same year Nepal started first 5-year development planning system which paved the ways to flourish the financial sector. Until the mid-1980s Nepal had two commercial banks, two development banks, two insurance companies, Security Exchange Center, Employees Provident Fund, and the Credit Guarantee Corporation. These organizations were established during the early 1960s and mid-1980s when Nepal started financial reform and liberalization process. By the time of the restoration of democracy in 1989/90, these institutions were focused in the urban areas of the country.

Since the mid-1980s, particularly since the restoration of the democracy, the financial sector has been expanded due to the implementation of various measures of the financial liberalization, such as, removal of entry barriers in 1984, introduction of prudential norms in 1988, establishment of credit bureau in 1989, strengthening of the government owned commercial banks in 1991 onward, reform in capital market, enactment of development bank Act in 1996, Revision of Nepal Rastra Bank Act 2001/02 and many other efforts (Shrestha, 2005). Nepal's constitution has recognized the cooperative sector as one of the pillars of Nepalese economy. This has helped to flourish the cooperative sectors and institutions all over the country. All these efforts have contributed to flourish financial sectors' activities in the country.

If we look at the issues in the financial development and economic growth, we find many studies in the literature suggest that financial development has a positive contribution economic growth. Gupta (1984) highlights the positive role of financial development in economic growth for the period of industrial revolution, and other many studies have followed the similar findings, such as, Jayaratne and Strahan (1996) and Luintel and Khan (1999). There are some studies that suggest some proxies of financial development have positive contribution in economic growth, and also some proxies may have negative association with economic growth as discussed in Liu and Hsu (2006) and Perera and Paudel (2009).

The established link to contribute in economic growth by financial development is through motivating various factors of production. For example, a well-managed and developed financial sector provides sufficient working capital, financial information, knowledge and innovative ideas to the entrepreneurs so that the output of a nation can be increased to contribute in economic growth (R. C. Paudel & Jayanthakumaran, 2009; Shrestha, 2005).

Another link is said to be the policy context to motivate the factors of production. We find many recommendations of policy reforms in developing countries for the speedy economic growth. The branch of literature suggests that the more open and liberal economic policies promote economic growth. Notably, financial development and financial reforms are interrelated (R. C. Paudel, 2007). Nepal is one of the earlier entrants into the liberalization reform policies in the region, but its economic growth has not met the expectation of the policy makers and stakeholders. This has become the major issue in the economic development of Nepal, and the country is facing a challenge to meet the sustainable development goals (SDGs) by 2030 (Government of Nepal, 2019).

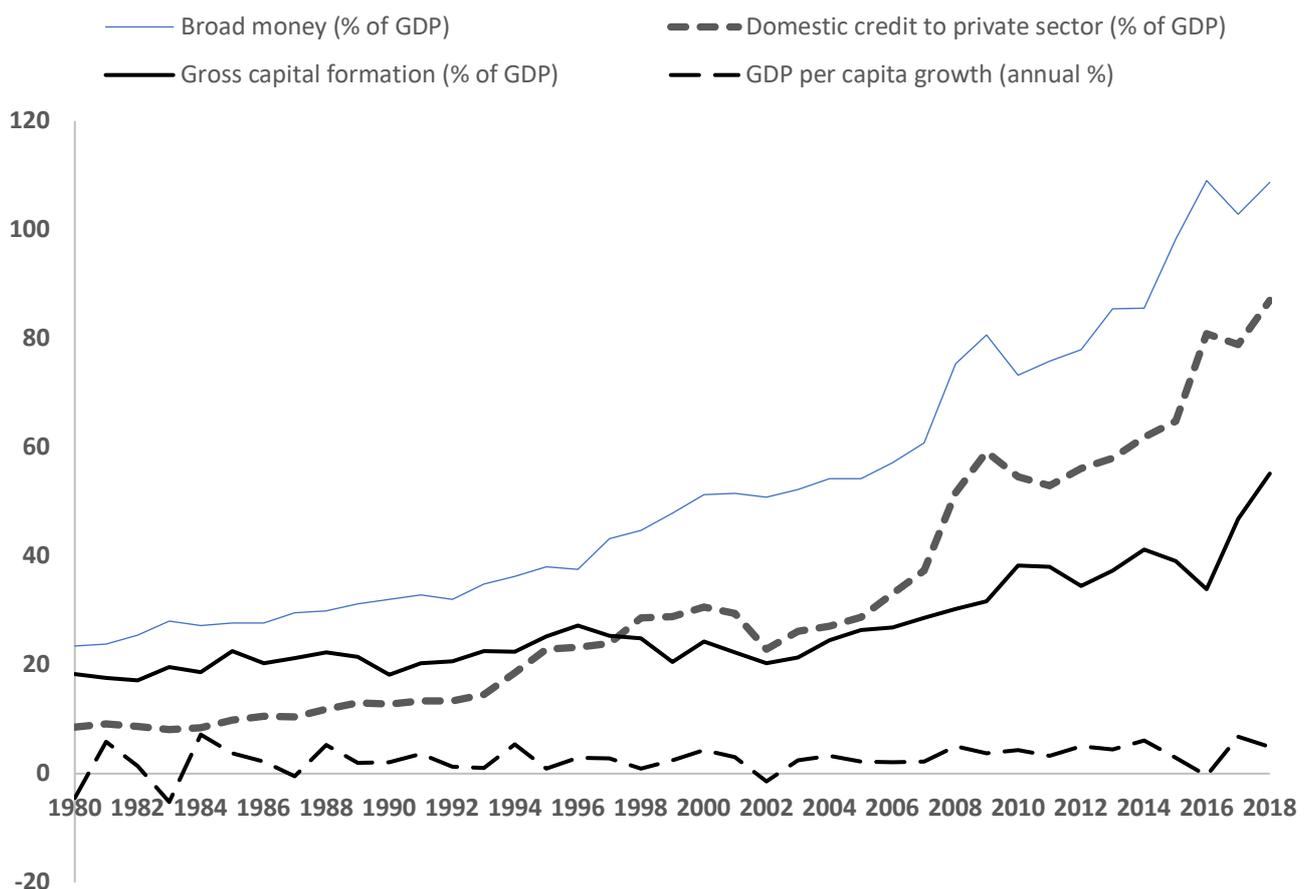
Because of the reform policy adopted by the country, the banking sector has grown quite remarkably. As a result of this, total of 27 commercial banks are active and performing well. This number itself is not small and their profits are reported increasing over the years. Almost all, total of 739 out of 753, local governments have banking facilities available in the locality. Even in those 14 out of banking access have the access of finance and microfinance accesses (Nepal Rastra Bank, 2019).

Figure 1 shows a trend of financial developments indicators and economic growth in Nepal for the duration of 1980-2018. As it can be seen in the figure, the broad money and domestic credit to private sector have followed almost similar trend over the period except for few years after 2002 where outmigration from Nepal picked up. Domestic credit to private sector declined in the early 2000 due to political turmoil in the country that results a shortage of labor forces due to outmigration and unstable political circumstances. It gradually increased when political turmoil was ended by the comprehensive peace agreement between the government of Nepal lead by major political parties and Nepal Communist Party (Maoist) in 2006 (Hachhethu, 2009). The broad money also has been increased significantly from the same period. The domestic credit to private sector has overshoot the

gross capital formation since 1997, when the region was affected by the Asian financial crisis. This shows the weak integration of Nepalese economy with the other economies in the region.

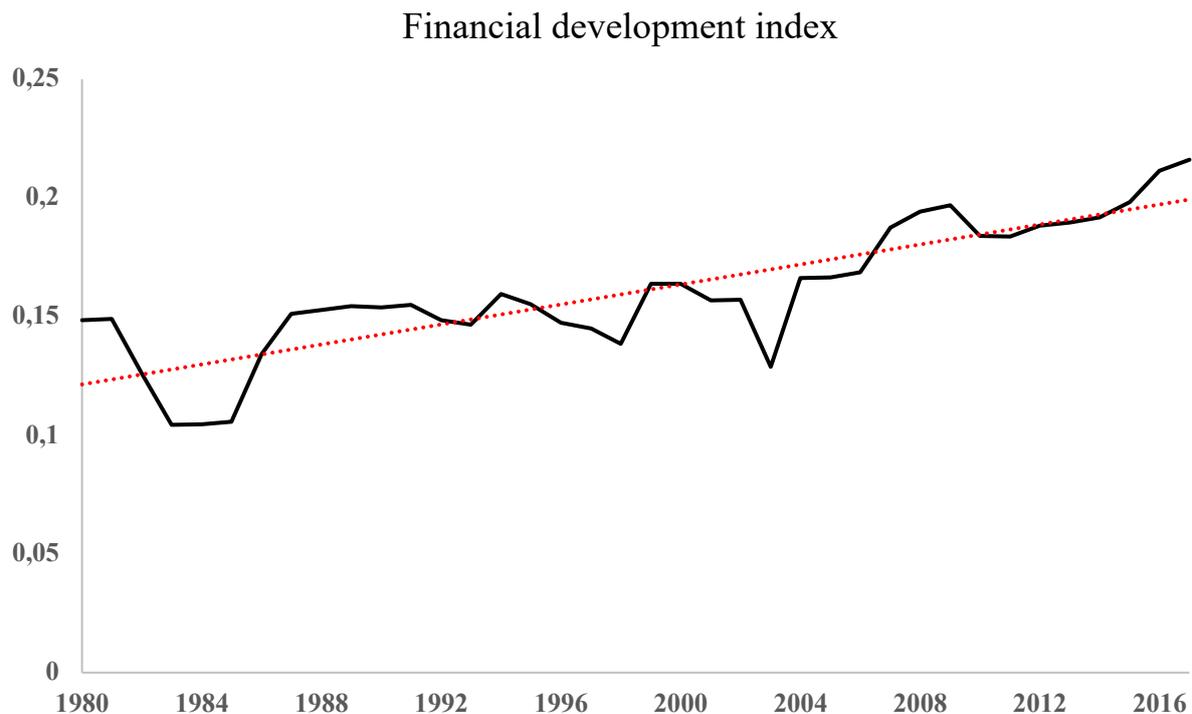
Whatever the situation of broad money, domestic credit to private sector and gross capital formation in the country, the per capita growth remained very low during this entire period. Nepal achieved the highest growth rate, that is, 7 percent in 1985, for the given duration it remained less than 7 percent. It was recorded 6 percent in 1981 and 7 percent in 2017 again while the growth was recorded negative in 1980, 1983, 1987, 2002 and remained zero growth in 2016 just after the two exogeneous shocks, i.e., devastating earthquake and undeclared trade blockade in the Indian border in 2015. The average growth for this entire period is just remained at 3 percent, which is the major concern of the policy makers and other stakeholders in the country.

**Figure 1: Financial development indicators and economic growth, 1980-2018**



Source: author's presentation using the data from World Bank (2020)

As discussed in the introduction, Svirydzhenka (2016) has developed financial development index of Nepal analyzing the overall financial development issues and relevant variables. She uses the principal component analysis for financial institution depth, financial institution access and financial institution efficiency to get financial institution scores. Similar process is repeated to obtain the financial markets scores, then, a single index for financial development is constructed. This index is presented in Figure 2 for the duration of 1980-2017. The figure shows that it has been increasing trend over the period, but the progress is too slow as indicated by the fitted trend line. The index has many fluctuations in many years, such as during the mid-1980s it declined and remained in the lowest point, and again was in the lower point in 2003. The maximum is in 2017 with 0.22 scores.

**Figure 2: Financial development index for Nepal, 1980-2017**

Source: author's presentation using the data from Svirydzhenka (2016)

### 3. Brief literature review

Financial development and its association with economic growth are widely discussed in the literature both qualitatively and quantitatively. Probably the first organized study in the modern field of financial development is Bagehot (1873) that has established the role of financial sector in economic development and has explained the issues related with the financial system of that time, and this was largely a qualitative analysis. Schumpeter (1934) links the entrepreneurial initiatives to economic development. Similarly, Goldsmith (1969), McKinnon (1973), and Shaw (1973) explored the relationship between financial development and economic growth considering the role of financial system, financial intermediaries, and overall financial sector in many ways. Since then, the financial development and its role in economic growth has been widely discussed and covered in the literature of development and financial economics in various form and conclusions.

The large body of the literature is related with how financial development impacts to economic growth. In this regard, Levine (1997) states that a growing body of empirical analyses from firm-level studies, industry-level studies, individual country-studies, and cross country comparisons, employing various method of studies, clearly demonstrate a strong positive relationship between the financial system and long-run economic growth. However, this is not always the case if we look the studies after that period. Arestis and Demetriades (1997) study the relationship between financial development and economic growth using the cross-country regression and time series method to estimate the macro variables of different countries. They suggest that financial development leads the economic growth. They also suggest that time-series analyses show more consistent results than cross-country regression method. Further, Acaravci, Ozturk, and Acaravci (2009) state that the debate in this field of studies are in broad issues: first, whether financial development results a faster economic growth, and the second, how financial development affects economic growth.

Our major concern in this study is whether financial development cause to economic growth. Considering this concern, I notice that most of the empirical literature in this issue can be classified into three broad categories. The

first category is that conclude the leading role of financial development in economic growth or development. The second view suggests the financial development follows economic growth, even in some cases, the relationship between financial development and economic growth is ambiguous. It means if the economic development is there, the financial development follows the growth. In other words, first growth then only financial development. Sometime the financial development may have inconclusive role on economic growth. The third view finds a negative correlation between financial development and economic growth. For example, Gupta (1984) highlights the positive role of financial development in economic growth for the period of industrial revolution. Jayaratne and Strahan (1996) and Luintel and Khan (1999) and many other many studies have followed the similar findings. There are some studies that suggest the negative association with economic growth, depending on the proxies of financial development, as discussed in Liu and Hsu (2006) and Perera and Paudel (2009).

In the empirical analyses, various methods have been used. These studies use cross sectional data, panel data and country specific time series data. These studies have selected the method to suit the context of the studies. For example, Estrada, Park, and Ramayandi (2010) find the positive effect of financial development in economic growth using the data of 125 countries in the format of both cross sectional and panel data analysis techniques. Hassan, Sanchez, and Yu (2011) study using panel data from the low-income and middle-income countries and find the positive and strong relationship between financial development and economic growth. And, the method used in this study is Similarly, Choong and Lam (2011) study about the financial development using the data for 70 developed and developed countries for the period of 1988 to 2002 and found that the role of financial development is prerequisite for the foreign direct investment inflows to the country, which is known as one of the source of economic growth in the modern era. This study uses Generalized Method of Moments (GMM) panel data analysis in the panel data. Recently, Durusu-Ciftci, Ispir, and Yetkiner (2017), using the panel data for 40 countries for the period of 1989-2011, suggest that fostering the financial development in the country helps to accelerate the economic growth.

There are many studies that are focused of country specific cases using timeseries data for different periods. For example, Asteriou and Price (2000), using the timeseries data from the United Kingdom, suggest that there is a causal direction from development of the financial sector to the real per capita gross domestic products employing cointegration and causality tests.

Thangavelu and Jiunn (2004) investigates the dynamic relationship between financial development and economic growth using Vector autoregressive (VAR) model approach and suggest that financial markets have positive role in economic growth while the economic growth has a causality with financial intermediaries in the case of Australia. Liang and Jian-Zhou (2006) studies the relationship between financial development and economic growth covering the period of 1952-2001 for China. The study uses VAR model and suggest the causality runs from economic growth to financial development and contradicts with the conventional findings, i.e., causality from financial development to economic growth.

Soukhakian (2007) studies using Japanese data for the period of 1960-2003 employing Granger causality tests and suggest that financial development proxied by the broad money causes the economic growth in Japan. Majid (2007) employs ARDL approach to cointegration and finds the long-run relationship between economic growth and financial development as proxied by financial depth. Ang and McKibbin (2007), using the time series data of Malaysia for the period 1960 to 2001, find the positive relationship between financial development and economic growth but the causality is from economic growth to financial development, that is, financial widening and financial deepening are the consequences of economic growth. As in the Chinese case discussed in Liang and Jian-Zhou (2006), Chakraborty (2008) finds in the case of India that causality runs from growth to financial development employing granger causality tests.

Perera and Paudel (2009), using the time series data for the period of 1955 to 2005, employs vector autoregression (VAR) approach and error correction model and conclude that financial development does not boost the economic growth in the case of Sri Lanka. Adelakun (2010) explored the relationship between financial development and economic growth in developing country Nigeria. Econometrically, the Ordinary Least Square Estimation Method (OLSEM) was used to analyze the data. The result showed the financial development has a strong positive role in

economic growth. The Granger causality test revealed the financial development accelerates the economic growth, at the same time evidence of causality showed the economic growth promotes financial intermediaries. In conclusion financial development, including financial diversification serves economic growth.

In case of Nigeria, there is strong positive relationship between financial development and economic growth (Adelakun, 2010; Balago, 2014). Lawal, Nwanji, Asaleye, and Ahmed (2016) suggest, in the Nigerian case using ARDL approach of cointegration, that financial development and economic growth has two-ways causality. A recent study in the case of Bangladesh, Kabir and Halder (2018) find that the causality from financial development to economic growth using data from 1977 to 2016. The paper uses the Vector error correction framework and granger causality tests.

There are very few studies about the financial development and economic growth issues of Nepal. Regmi (2012) examines the causal relationship between stock market development and economic growth employing the time series data for the period of 1994-2011 and suggest that stock market development has a significant contributed to the economic growth of Nepal.

Gautam (2014) examines the relationship between financial development and economic growth in Nepal using the time series data for the period of 1975 – 2012 employing Granger causality tests and concludes that there is a strong relationship between financial development and economic growth. Timsina (2014) uses Johansen cointegration approach and error correction model covering the data for 1975-2013 and finds the positive effects of bank credit to the private sector in economic growth. Recently, Ramesh C. Paudel and Acharya (2020) investigates the nexus of financial development and economic growth of Nepal using various five indicators (broad money, domestic credit to private sector, total credit from banking sector, capital formation, and foreign direct investment) of financial development in the context of Nepal covering the period of 1965-2018 and concluded that the four indicators except the foreign direct investment cause to accelerate economic growth. We aim to improve Paudel and Acharya (2020) in two broad senses; first, we use a composite index of financial development as developed in Svirydzhenka (2016) so that we can find out the total impact of financial development in economic growth. Second, we use more advance method of estimation employing the structural break analysis in the time series data in addition to the unit root tests. Thus, the findings would be more credible.

The brief literature survey suggests the literature gap in three two points. First, there is not a unique index to measure the financial development. Therefore, past studies have used various measures to proxy the financial development depending on data and their perception. The study in the Nepalese context of financial development and economic growth seek urgent attention from scholars to make a credible study suing a unique index for financial development. Second, an analysis using a complete procedures of time series analysis has not been made in the Nepalese context in relation to the financial development and economic growth. These facts motivate this paper.

#### **4. Research Methodology**

Financial development is the result of the positive change in many areas of the financial sectors, which include financial institution (supply sides) and financial markets (demand and supply sides). In the literature, we find various proxies of financial development are used due to the lack of sing index to represent the overall financial development situation in the region, country or states. Economic growth is a long-term phenomenon and is the combined efforts of the factors of production, which include, but not limit to, capital, labor force, and technology. In the modern economy, the issue of economic growth is a complex matter as the number diverse factors may be contributing for economic growth in many ways. Therefore, the variables used for modelling the economic growth are not unique.

The original Solow-Swan growth model as discussed in Solow (1956) has been augmented to include the main variables of the interest of the researchers. This paper uses the variables based on growth literature including working aged population, capital formation, financial development index as developed in Svirydzhenka (2016), and a macroeconomic variable-inflation. The robustness check of the results is made employing alternative

specifications of the model. To know the timeseries properties of the data, first the structural break test is performed before going to the econometrics.

#### 4.1 Model, variables and data

This paper employs Solow-Swan growth model that has widely been used in the economic growth literature. In this paper for the modelling purpose, I follow the standard literature related with financial development and economic growth as in King and Levine (1993). Our model mainly differs from King and Levine (1993) in terms of using the proxy for financial development.

Gross domestic product in the natural log form (LGDP), the dependent variable, is employed as the proxy of economic growth. The independent variables are financial development index (FD), working aged population in the natural log form (LWAPOP), gross capital formation in the natural log form (LGCF), and inflation measured by consumer price index measured in percentage (INFCPI) as in the equation (1) form:

$$LGDP_t = \alpha + \beta_1 FD_t + \beta_2 LWAPOP_t + \beta_3 LGCF_t + \beta_4 INFCPI_t + \epsilon_t \dots \dots \dots (1)$$

Where,  $\alpha$  is a constant term,  $\beta_1 \dots \beta_4$  are the coefficients of the variables,  $\epsilon$  is the error term,  $t$  refers to the time period, i.e., year as we are using the annual data for the period of 1980-2017. Based on the literature, we expect  $\beta_2$  and  $\beta_3$  to be positive and want to test the coefficients of  $\beta_1$  as the literature has shown various cases in different countries context. The coefficient for  $\beta_4$  can be both, i.e., either positive or negative. In both cases it has the economic interpretation in the literature if it comes to be significant. Normally, the production (capital) sector prefers the positive rate of inflation, while if the growth is from labor dominant then the negative coefficient of  $\beta_4$  is preferred. The FD would be replaced by financial institution (FI) and financial markets (FM) in the alternative specifications of the model.

The data used in this empirical analysis are collected from the world development indicators as given in World Bank (2020) except for FD, FI and FM which are collected from Svirydzenka (2016), which introduced a new broad-based index of financial development of 183 countries for the year 1980-2017. She synthesized the financial development indicator (FD) from financial institution (FI) and financial markets (FM). Also, the FI and FM are obtained employing the principal component analysis (PCA) from financial market depth, financial market access and financial market efficiency for both (FI and FM).

#### 4.2 Structural break analysis

It is a kind of mandatory to conduct the unit root and structural break tests on time series data. The reason is that if there is a structural break point and is ignored in the time series analysis, it may lead to a wrong and inferior inference for the policy recommendation. There are number of methods for unit root test with and without structural break. Noting this importance of structural break analysis, in this study, the structural break test is conducted employing Gregory and Hansen (1996) test for cointegration.

Here, H0: no-cointegration at the break point  
H1: there is cointegration at the break point

Table 1 shows the results for structural break using Gregory-Hansen method. The results for all specifications of model shows that there is a structural break only with intercept shift detected at 5 percent level of significance, and the structural break year is 1999 based on both augmented dicky fuller (ADF) and  $Z_t$  statistics where the lags are chosen by the Bayesian Information Criterion (BIC). It would be better to have similar results by all statistics but could not ignore even the H0 is rejected in only one model with intercept shift that suggest the cointegration, that is, there exhibits stable properties in the long only with structural break. Hence, further econometric estimations are conducted assuming the structural break in 1999 for all estimations.

Table 1: Structural Break Analysis, Gregory-Hansen Cointegration Test

<i>Models (FD)</i>	<b>ADF</b>		<b>Z<sub>t</sub></b>		<b>Z<sub>a</sub></b>	
	<i>Statistics</i>	<i>Break Year</i>	<i>Statistics</i>	<i>Break Year</i>	<i>Statistics</i>	<i>Break Year</i>
Intercept Shift	-5.60**	1999	-5.68**	1999	-35.27	1999
Intercept Shift with trend	-5.25	1999	-5.35	1999	-33.82	1999
Intercept shift with slope	-5.91	1992	-5.99	1992	-38.33	1992
<b><i>Models (FI)</i></b>						
Intercept Shift	-5.68**	1999	-5.76**	1999	-35.65	1999
Intercept Shift with trend	-5.25	1999	-5.36	1999	-33.84	1999
Intercept shift with slope	-5.78	1992	-5.56	1992	-37.78	1992
<b><i>Models (FM)</i></b>						
Intercept Shift	-5.61**	1999	-5.69**	1999	-35.44	1999
Intercept Shift with trend	-5.26	1999	-5.33	1999	-33.68	1999
Intercept shift with slope	-5.92	1999	-5.98	1992	-38.35	1992

Note: 1) \*\*indicates the variables are significant at 5 % level of significance.

2) The results detect year 1999 has a structural break as indicated by *ADF* and *Z<sub>t</sub>* results at 5% level of significance

### 4.3 Econometrics

Once the structural break analysis is done, the standard procedure is to conduct the cointegration test to find out the coefficients to explain the relationship among the dependent and independent variables. As we have the time series data with structural break and order of integration is different, the variables included in the equation (1) will be analyzed using a co-integration test based on autoregressive distributed lag (ARDL) approach and it gives the long-run and short-run relationship among the dependent and independent variables irrelevance of the order of their integration (R. C. Paudel & Jayanthakumaran, 2009; Pesaran, Shin, & Smith, 2001).

Therefore, the equation (1) will be modified as in equation (2) to incorporate the structural break (SBDUMY) and its interaction with independent variables. The SBDUMY takes the value 0 until the year 1998 and 1 after then. Notable point here is that for the short run, the structural break becomes out of story. Therefore, the dummy variable and interaction with independent variables are not to be included in the ARDL model for error correction model (ECM) version.

$$\begin{aligned}
 LGDP_t = & \alpha + \beta_1 FD_t + \beta_2 LWAPOP_t + \beta_3 LGCF_t + \beta_4 INFCPI_t + \beta_5 SBDUMY_t + \beta_6 SBDUMY_t * FD_t \\
 & + \beta_7 SBDUMY_t * LWAPOP_t + \beta_8 SBDUMY_t * LGCF_t + \beta_9 SBDUMY_t * INFCPI_t \\
 & + \epsilon_t \dots \dots \dots (2)
 \end{aligned}$$

The ARDL version of Equation (2) is presented in equation (3):

$$\begin{aligned}
 \Delta LGDP_t = & \alpha + \beta_1 LGDGP_{t-1} + \beta_2 FD_{t-1} + \beta_3 LWAPOP_{t-1} + \beta_4 LGCF_{t-1} + \beta_5 INFCPI_{t-1} + \beta_6 SBDUMY \\
 & + \beta_7 IND * DUMY_{t-1} + \sum_{i=1}^{38} \gamma_i \Delta LGDP_{t-i} + \sum_{i=1}^{38} \delta_i \Delta FD_{t-i} + \sum_{i=1}^{38} \theta_i \Delta LWAPOP_{t-i} \\
 & + \sum_{i=1}^{38} \varphi_i \Delta LGCF_{t-i} + \sum_{i=1}^{38} \lambda_i \Delta INFCPI_{t-i} + v_t \dots \dots \dots (3)
 \end{aligned}$$

where,  $\beta_5$  refers to the coefficients of each interaction term of dummy variable and independent variable ( $IND * DUMMY$ ). Equation (3) captures the dynamic impact in the form of Auto Regressive Distributed Lag Model. In the model,  $\Delta$  stands for the first order differential variable. In the equation,  $\alpha$  is intercept,  $\beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5$  are the coefficients of first order variables. Similarly,  $\gamma_i, \delta_i, \theta_i, \varphi_i$  and  $\lambda_i$  are the parameters of error correction model, and  $v_t$  is vector of random error.

## 5. Results and discussions

Table 2 presents the long-run relationship results for the growth model of different specifications in column (1), (2) and (3). In the similar fashion, Table 3 presents the results for ECM model. These tables show the long-run and short-run coefficients of ARDL with different lags as shown in their headings for the given model. Schwartz-Bayesian Criteria (SBC) is selected due to relatively small size of the series. In both tables, the first column presents the results for the model with financial development index (FD), the second column present the results with financial institutions (FI) and the third column presents the results with financial market (FM). In all the specifications for the long-run relationship, the F-statics (Bound) results show that the values are higher than that of upper bound of the critical value indicating that the long run relationships exist in all 3 specifications.

The results in Table 2 show that financial development index (FD) has a strong long-run relationship indicating that a one index point (one percent increase in index) of financial development (FD) causes to increase the GDP on average by about 3.56 percent holding other variables in the model constant (Column 1, Table 2) at 1 percent level of significance. Against the normal expectation, it can be summarized that the working aged population-the proxy of the labor force-does not have the statistically significant impact in economic growth in this case, however, it has the expected positive sign.

The gross capital formation has a statistically significant impact on economic growth of Nepal. A one percent increase in the gross capital formation contributes to growth the economic by almost half percentage on average, holding other variables in the model constant— coteries *per* bus. It supports the voice that Nepal is in need of capital to inject in the economy in many ways. Against our normal expectation, the role of FD after the break point, i.e., since 1999 seems negative and statistically significant as seen for Structural break year\*FD in the column (1) in Table 2. The variables such as inflation and other interaction term do not have any statistically significance in the model.

The results in column (2) and (3) of Table 2 also have almost similar explanation as of column (1) of the table. The FI and FM both maintain the significance level at 1 percent. The working aged population (LWAPOP) has statistically significant positive impact as expected in these cases but at 10 percent level of significance.

Table 3 presents the short-run results. In all three specifications, ECM (-1) are statistically significant with expected negative sign indicating the disequilibrium that occurred in the previous period is corrected in the present period following a short-run shock in a quicker pace if the coefficients are closed to one. We did not find that impressive impact of the variables in the short run. The variables such as FD (-2) and FI (-2) have statistically significant negative impact in economic growth unlike in the long run.

The high value of R-square shows that the overall goodness of fit of the model is high. The diagnostic test results show that the model passes the tests for serial correlation, functional form, normality and heteroscedasticity. Further, the stability test results (CUSUM and CUSUMSQ) plotted against the critical bounds of 5 percent level of significance are within the range, indicating that the model is structurally stable (Figures 3, 4 and 5).

Table 2: ARDL (2 2 2 2 2 0 0 0 0) model long run coefficients Results

<i>Dependent variable: GDP growth in log (LGDP)</i>	(1)	(2)	(3)
Financial development index (FD)	3.564*** (1.062)		
Financial institution (FI)		2.069*** (0.563)	
Financial markets (FM)			4.022*** (1.539)
Working aged populations-log (LWAPOP)	0.375 (0.334)	0.522* (0.314)	0.627* (0.368)
Gross capital formation-log (LGCF)	0.422*** (0.115)	0.356*** (0.117)	0.478*** (0.125)
Inflation-consumer price index-%(INFCPI)	-0.005 (0.005)	-0.006 (0.005)	-0.002 (0.005)
Structural break year (Dummy)	-16.268* (9.031)	-17.607** (8.574)	-12.487 (11.179)
Structural break year*FD	-2.380** (1.141)		
Structural break year*FI		-1.728*** (0.668)	
Structural break year*FM			-3.379* (1.731)
Structural break year* LWAPOP	0.890 (0.681)	0.898 (0.639)	0.674 (0.828)
Structural break year*LGCF	0.101 (0.132)	0.163 (0.125)	0.075 (0.146)
Structural break year*INFCPI	0.004 (0.005)	0.008 (0.005)	-0.001 (0.006)
<i>Number of observations</i>	36	36	36
<i>Root MSE</i>	0.03	0.03	0.04
<i>Log likelihood</i>	87.01	90.41	79.94
<i>R-squared</i>	0.90	0.92	0.85
<i>Adjusted R-squared</i>	0.78	0.82	0.68

Note: \*\*\*, \*\* and \* indicate that the statistics are significant at 1%, 5% and 10% level of significance. The figures in the parenthesis are the standard error.

Table 3: ARDL (2 2 2 2 2 0 0 0 0) model, ECM Results

<i>Dependent variable: <math>\Delta GDP</math> growth in log (<math>\Delta LGDP</math>)</i>	(1)	(2)	(3)
LGDP (-1)	-0.053 (-0.152)	0.019 (0.143)	0.054 (0.177)
FD (-1)	-0.722 (-0.641)		
FD (-2)	-1.435** (0.591)		
FI (-1)		-0.139 (0.360)	
FI (-2)		-0.674** (0.292)	
FM (-1)			-0.597 (1.107)
FM (-2)			-0.506 (1.003)
LWAPOP (-1)	-1.386 (3.047)	-1.700 (3.221)	-1.560 (3.970)
LWAPOP (-2)	-1.205 (3.744)	-0.189 (3.378)	-0.511 (4.762)
LGCF (-1)	-0.158 (0.117)	-0.165 (0.117)	-0.252* (0.134)
LGCF (-2)	-0.077 (0.087)	-0.090 (0.812)	-0.124 (0.114)
INFCPI (-1)	0.004 (0.004)	0.003 (0.003)	0.002 (0.004)
INFCPI (-2)	-0.001 (0.003)	-0.002 (0.002)	-0.001 (.003)
ECM (-1)	-0.982*** (0.206)	-0.986*** (0.191)	-0.987*** (0.267)

Note: \*\*\*, \*\* and \* indicate that the statistics are significant at 1%, 5% and 10% level of significance. The figures in the parenthesis are the standard error.

Figure 3

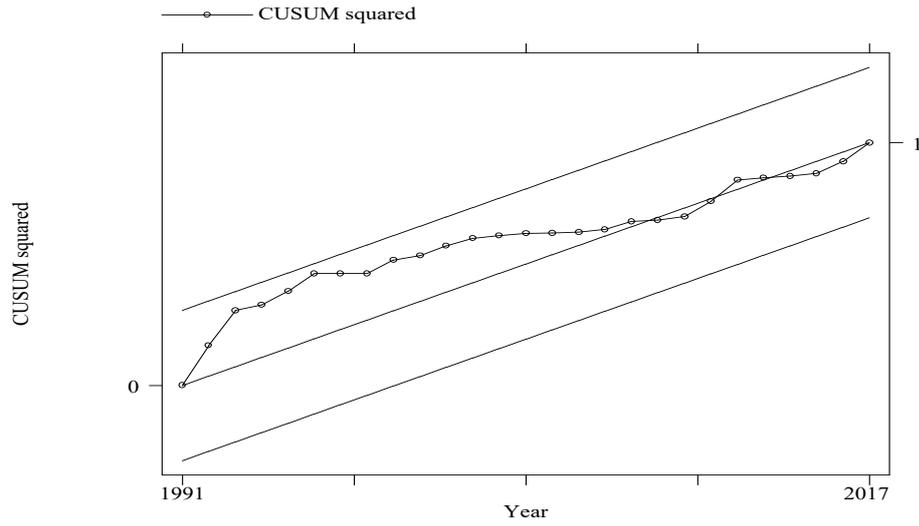


Figure 4

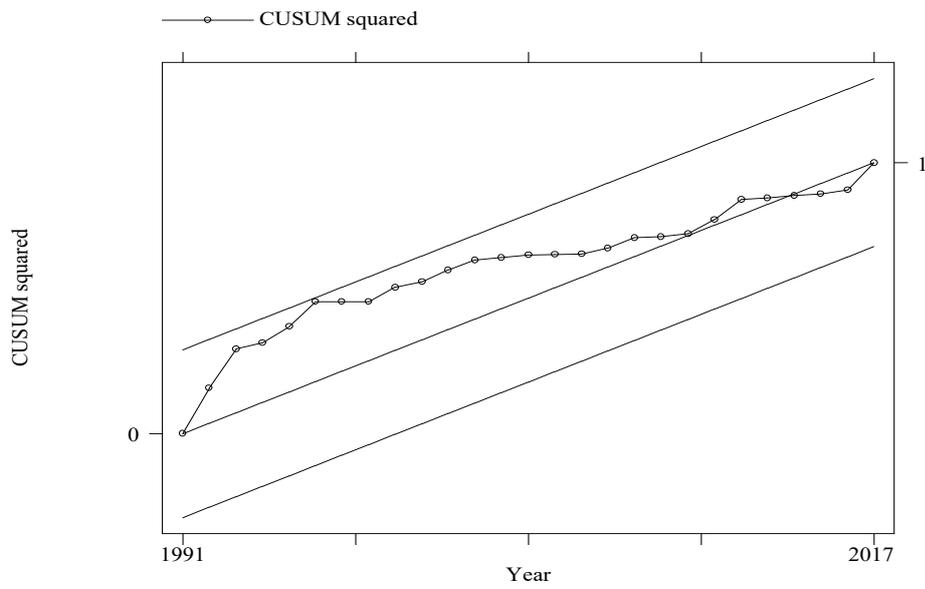
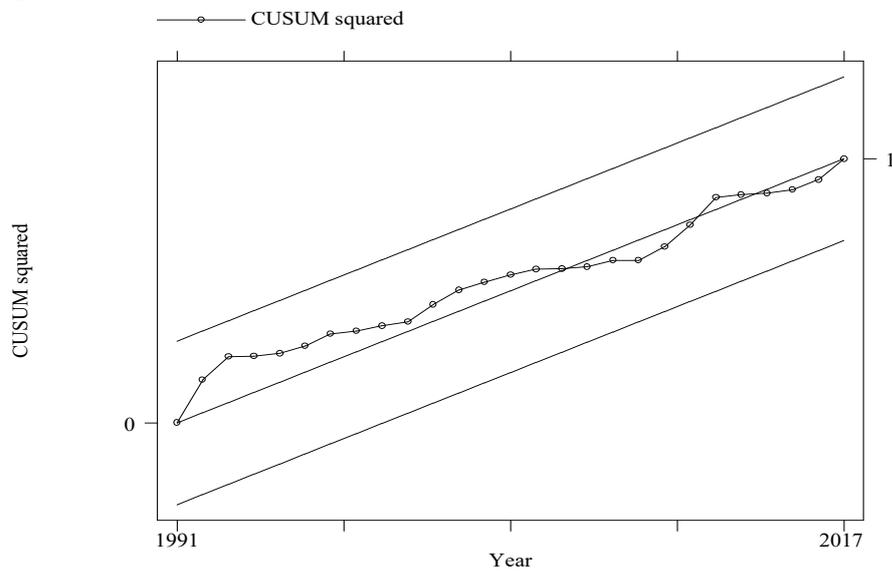


Figure 5



## 6. Conclusions

This study documents the brief history of financial development touching the main issues and trends of the financial development in Nepal, and then proceed to investigate the role of financial development in economic growth of Nepal using the ARDL approach of cointegration with structural break analysis employing a comprehensive financial development indicator for the period of 1980-2017. After conducting the structural break tests, we estimate the model to detect the long-run and short-run relationship among the dependent and independent variables in the model.

As the interactive variables with break year dummy are negatively associated with the financial development, financial institution and financial markets variables, there is the room to improve the overall governing of the financial sector. The activities after the break year, i.e., from the early 2000s, in the financial sectors need to be corrected in such a way to motivate the economic growth. All the banking and financial products needed to be designed to suit the production activities and entrepreneurship environment so that more output, thus employment can be possible in the economy to foster the economic growth.

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