Does Financial Development Cause Economic Growth: A Case Study of Nepal

by

StudentID - 43235093

Uprety, Dilli

MRES 2014

Thesis submitted in partial fulfilment of the requirements for the Masters in Research (MRes)

Department of Economics

Macquarie University

Statement of Candidate

I certify that the work in this thesis entitled "**Does Financial Development Cause Economic Growth: A Case Study of Nepal**" has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

Dilli Raj Uprety

3rd October 2014

Table of Contents

List of Tables

Acknowledgement

I would like to express my very great appreciation to my supervisors Associate Professor Sean Turnell and Dr. Chris Heaton for their admirable guidance throughout my research period. Their creative comments and invaluable suggestions always inspired me to learn more and endeavour to produce quality work.

I am grateful to Associate Professor Tony Bryant for his continuous encouragement to complete this research successfully on time. Also, I would like to thank Phanh Oudomlith, and Sean Bullock for their great assistance in data collection. I am thankful to my friends Bowen Fu, Qin Zhang, Meg Sambyal, Matthias Oldham, Przemyslaw Chapko and Shangnian Jiang for their valuable suggestions and assistance during this study period.

I would like to offer my special thanks to my brother Niranjan Prasai for his financial support throughout my research period. This project would not be possible without his assistance. I also like to express my sincere thanks to Samjhana Khadka and Sunil Prasain for their love, care and support. Finally, I am grateful to my parents for their blessings, inspiration and partial financial assistance to complete my study.

I acknowledge that all errors and omissions in this work are mine.

Summary

A large number of studies have been conducted to investigate the association between financial development and economic growth. However, whilst these studies have found substantial evidence to support the notion that financial development has a positive impact on growth; a remarkable knowledge gap remains- on causal direction, and on the ways in which country specific policies and institutions influence the findings. Into this milieu, we conduct this study to investigate whether financial development is important for real growth in Nepal. We employ a Granger non-causality test developed by Toda and Yamamoto (1995), and analyse the impact of the indicators of financial development (financial depth and private credit) on real growth. Our empirical analysis reveals that financial development causes economic growth significantly. Furthermore, our results show a highly significant impact of trade, gross capital formation and government credit on output growth. Hence, we suggest that economic policy should be aimed at reforming and improving the efficiency of the financial sector, as well as real sector reforms simultaneously to accelerate the economic growth rate of Nepal. Using newly assembled data and hitherto unapplied methodologies, we believe that, this study imparts valuable insight on the role of financial sector development on the economic growth of Nepal.

Keywords: economic growth; financial development; causality

Chapter 1.

1.1 Introduction

For years economists have debated the question of the links between financial development and economic growth. In recent decades the consensus in economics has roughly presumed the unidirectional flow of causality from financial development to economic growth. However, in truth it remains an unsettled issue, subject to many methodological assumptions and presumptions. This thesis represents a modest attempt to shed light on this question in the context of Nepal.

Nepal is a small Himalayan nation with an area of 147, 181 square kilometres, and a population of approximately 28 million. The country is one of the poorest and least developed in the world, with a quarter of the population living below the line of absolute poverty. In terms of per capita income, the county is ranked among the bottom ten least developed in the world. The average economic growth rate after the beginning of the new millennium is approximately 4.5%, with a Gini index of approximately 33 (out of 100), and an average inflation rate of around 9%. The country's human development index is 0.540 and it is ranked 145 out of 187 countries (Central Bureau of Statistics 2010; United Nations Development Programme 2013). Yet, compared to the performance of other sectors, the financial sector in Nepal is relatively advanced.

Nepal's financial sector grew especially rapidly after the introduction of liberalization policies in the early 1980s. Before this liberalization interest rates were regulated, and an array of other restrictive policies such as credit ceilings, directed credit programs to priority sectors, high cash reserves ratios and so on were in practice. Banks and nonbank financial institutions alike were fully owned by the government. Nonetheless, with the liberalization of the Nepalese economy,

all kinds of financial restrictions were gradually eliminated, and the private sector's participation in financial (and real) development was actively sought. However, while the private sectors' participation was invited to both real and financial sector development, the financial sector grew at a faster pace, whereas the real sector lagged behind.

Given all of the above, the study of the interaction between financial sector development and economic growth in Nepal could be enlightening. This study can enrich literature on finance growth interaction by providing empirical evidence on the direction of causality between banking development and economic growth in Nepal, where the financial development has been occurring rapidly in recent decades.

Studies on Nepal's financial sector have been conducted before (e.g., Demetriades & Luintel 1996; Shrestha 2004; Bhetwal 2007; Maskey & Subedi 2009; Kharel & Pokhrel 2012), but this question was not really central to them.

Dimitriades and Lunitel (1996) investigated the policy impact of banking sector in financial development and economic growth of Nepal. Similarly, Shrestha (2004) empirically examined the effect of financial liberalization on financial development and economic growth of Nepal. Bhetwal (2007) evaluated the interrelationship between financial liberalization and financial development in Nepal. Maskay and Subedi (2009) assessed the effectiveness of financial liberalization in geographically balanced financial development of Nepal. Kharel and Pokhrel (2012) examined the impact of financial structure in economic growth of Nepal, and reported the key role of the banking sector in real growth of Nepal. However, this study analysed data from 1993-2010, which is fairly short time period.

When the trend of financial development and real growth in Nepal is observed, the question arises, "Is financial development important for economic growth?"

So far, a large number of studies have been conducted to examine the link between financial development and real growth, most of which are reviewed in Chapter Two of this thesis. Amongst these, a number of studies have established the evidence that financial development influences economic growth positively and significantly[1]. However, most of the studies that examine the association between financial development and output growth are cross-country studies, and they analyse data from emerging and developed economies. Therefore, these studies cannot provide proper information on the finance growth relationship in low income economies.

Moreover, despite the findings from cross-country studies that impart valuable understanding on the nature of the association between financial development and economic growth, they cannot appropriately capture the interaction between financial development and real output growth in each sample country because of differences in legal origins, institutions, and policies from one country to another (Arestis & Demetriades 1997). Due to such reasons, case studies to examine the link between financial development and output growth are essential.

This study attempts to establish the hypothesis that there is a positive relationship between financial development and economic growth in the context of Nepal. We build vector autoregression model and apply a Granger non-causality test developed by Toda and Yamamoto (1995) to examine annual data from 1965 to 2013. According to Toda and Yamamoto (1995), their Granger non-causality test overcomes deficiencies such as nonstandard asymptotic distribution and nuisance parameter dependencies, observed in the case of unrestricted levels VAR method and Johansen's error correction model.

[1] For e.g., see Levine & Zervos 1998; Beck, Levine & Loayza 2000; Tadesse 2002; Carlin & Mayer 2003; Beck & Levine 2004; ; Rioja & Valev 2004; Ndikumana 2005; Lee 2012; Rousseau and Wachtel 2012.

The results obtained from our empirical examination show that both the indicators of financial development (private credit, and financial depth, M3) cause economic growth in Nepal. Furthermore, the empirical evidence reveals that other variables, such as gross capital formation, government credit and trade are as important as financial depth and private credit to stimulate real output growth.

The organization of our study is as follows: Chapter Two presents the theoretical framework and broad literature review, Chapter Three describes the history of financial development in Nepal, focussing especially on the post liberalization era. Chapter Four explains the econometric framework, data and methodology employed in the study, while we devote Chapter Five to the discussion of results obtained from our econometric analysis. Finally, Chapter Six provides some brief conclusions.

A note on data sources

Banking and financial data for Nepal across the sample period selected is scattered and disjointed. Accordingly, and as a by-product of the research conducted here, one of the contributions of this thesis is the bringing together of historical data on Nepal's financial sector.

Chapter 2.

Review of the Literature on Financial Development and Economic Growth

2.1. Theoretical Framework

The two mutually contradictory propositions with respect to the relationship between financial development and economic growth are (i) the finance leading growth hypothesis, and (ii) the growth leading finance hypothesis. Schumpeter (1912), Hicks (1969), Goldsmith (1969), McKinnon (1973), and Shaw (1973) were the forerunners of the finance leading growth theory. On the other hand, Robinson (1952) was the precursor of the growth leading finance principle. In the below we review these two hypotheses, and the debate upon which it is hoped this thesis might make a modest contribution towards in the context of Nepal. Considered first is the finance leading growth hypothesis, after which we consider its intellectual opponent.

Schumpeter (1911) argued that a well functioning financial system promotes technological innovation and economic growth by identifying and channelling capital to the entrepreneurs with potential to manufacture innovative products and applying new production techniques. Similarly, Hicks (1969) maintained that financial systems played a significant role in igniting the industrial revolution in England by mobilizing savings and channelling capital to large projects with capacity to generate large profits and productive efficiencies. Goldsmith (1969) affirmed that the financial superstructure of a country stimulates output growth by facilitating the transfer of capital to the best possible users.

In two highly influential and near simultaneous works, McKinnon (1973) and Shaw (1973) contended that financial development is necessary to promote economic growth; however, they

put forward their argument based on the fundamentals of financial liberalization[2]. They highlighted that financial liberalization stimulates economic growth by increasing the rate of capital accumulation, and by generating efficiencies in the mobilization and allocation of capital to more competitive and productive enterprises. They argued that the liberalization of the financial system allows autonomy to financial institutions in the determination of interest rates, thus, financial institutions can offer higher interest rates and attract more deposits to the banks, bringing into equilibrium the demand and supply sides of the capital allocation and mobilization equation.

However while acknowledging the importance of the financial sector for growth, Stiglitz (1994) opposed the financial liberalization view and advocated in favour of more restrictive prudential regulatory measures, maintaining that well designed financial intervention policies can improve the financial system as well as real output. Moreover, Singh and Weisse (1998) argue that the liberalization of once completely regulated financial systems can make the financial system vulnerable to failure, and can ultimately invite crisis in the economy.

Bencivenga and Smith (1991) developed a financial development model integrating financial intermediaries in endogenous growth models developed by Romer (1986) and Lucas Jr. (1988). According to Bencivenga and Smith (1991), financial institutions transform savings that people generate into productive capital by channelling these to productive economic activities, thus playing the role of a growth inducing medium. Further, they emphasize that the development of financial intermediaries decrease socially unwanted capital insolvency, and hence provide an impetus to economic growth through this avenue too. Bencivenga, Smith and Starr (1996) highlight the growth inducing role of finance by illustrating that financial institutions reduce the

[2] By which they meant the removal of the 'caps and floors' on interest rates, and other restrictions on banks they were such a feature of financial sector regulation, post-World War Two.

transaction costs of capital allocation, thus accelerating economic growth by channelling investment to highly productive projects.

Minsky (1991) underpins the leading role of finance; however, he cautions that as the financial sector observes vigorous growth, financial institutions often adopt risky behaviour, which, as a consequence, may lead to financial crisis and stagnation. According to Minsky and later writers, the risky behaviour of financial institutions increases leverage and encourages speculative activities in the economy. In turn, the speculative activities lead debtors and firms to default on loans, and eventually, the economy may plunge into recession (Kar, Nazlıoğlu & Ağır 2011).

In the late 1990s there emerged four different theories of financial structure, which are: (i) bank-based theory; (ii) market-based theory; (iii) financial services based theory; and (iv) law and finance based theory. These theories offer varying explanations to assess the link between financial development and economic growth.

To illustrate, the bank based approach highlights the idea that banking institutions are necessary to spur economic growth in the early stage of economic development because capital markets are small and inefficient, and hence cannot accelerate economic growth. In such a setting, banking institutions are necessary to exploit economies of scale and scope in information gathering and processing as well (Tadesse 2002, Chakraborty & Ray 2006, Lee 2012).

On the other hand, the market based theory stresses that big, liquid and well functioning stock markets (and other financial markets) can accelerate economic growth by improving corporate governance; facilitating diversification and the management of risk; allowing exit channels to entrepreneurial investors; supplying long term capital for large and indivisible projects with potentially high productivity; and providing information about the quality of investments (Levine 1991, Rousseau & Wachtel 2000).

While the bank based and market based theories highlight competitiveness between banks and financial markets in promoting growth, the financial services theory underscores that financial institutions (and markets) speed up economic growth by supplying different kinds of financial services effectively. According to this view, financial institutions execute various functions such as the accumulation and mobilization of savings, the allocation of resources; the monitoring and control of corporate activities; the management and diversification of risk; and the facilitation of the trading of goods, services and contracts; which, in effect, stimulate economic growth (Levine 1997).

Porta et al. (1998) merged the financial services view with legal structure and developed the law and finance theory. This theory can help to discover how legal structure combined with financial development influences economic growth. According to the law and finance view, a backdrop of strong legal institutions can ensure the rights of creditors, and enforce contracts between creditors and debtors. In this setting, the efficient financial institutions (and markets) can provide momentum to growth by supplying good financial services and maintaining proper accounting principles.

Ranged against all the theories above, are those of the 'growth leading finance' approach Robinson (1952), Lucas Jr. (1988) and Chandavarkar (1992) all cast doubt on the importance of financial development for economic growth. Robinson (1952) emphasized that the expansion of the 'real sector' of the economy promotes entrepreneurial activities, which in turn raise the demand for financial capital. In response, financial institutions emerge simply to fulfil the demand for this capital. Similarly, Lucas (1988) cautions that economists 'badly over-stress' the importance of financial development for economic growth. Chandavarkar (1992) questions the idea that underscores 'financial development leads real growth', and notes that none of the

pioneers of development economics has mentioned financial development as an important precondition for growth.

The conceptual differences among economists reveal that they neither have a unanimous view on the relationship between financial development and real growth, nor on the direction of causality. The majority of cross-country studies have shown bi-directional causality *as well as* one way causality from financial development to economic growth. Furthermore, the investigations of the interaction between financial development and economic growth in low income economies have mostly found an ambiguous causal relationship between finance and growth. This lack of clarity in the empirical evidence has amplified the debate on the role of financial development on real growth.

Considered below in more detail is the empirical literature asserting that financial sector development in developing countries might be significant for growth, notwithstanding the dichotomised debate noted above.

2.2 Empirical literature review: cross country studies

The formal empirical study of the importance of financial development in economic growth was re-energized in the early 1990s after the ground-breaking research by King and Levine (1993). This study suggested that financial development influences long run economic growth, capital accumulation and productivity growth, positively and significantly. Thereafter, numerous empirical studies (e.g., Levine & Zervos 1998; Beck, Levine & Loayza 2000; Tadesse 2002; Beck & Levine 2004; Christopoulos & Tsionas 2004; Rioja & Valev 2004; Ndikumana 2005; Deidda & Fattouh 2008; Luintel et al 2008; Yang & Yi 2008; Anwar & Nguyen 2011; Hassan, Sanchez and Yu 2011; Bordo and Rousseasu 2012) established what they perceived to be the *fact* that financial development is an essential precondition for economic growth.

Using cross-section regression techniques to analyse the data from 1976-1993 across 47 countries, Levine and Zerovos (1998) inferred that financial deepening influences real growth strongly and positively through the channels of capital accumulation and productivity enhancement. In addition, their study asserted the larger impact of financial markets than banks in economic growth.

Likewise, Rajan & Zingales (1998) used panels of industrial data from 1980-1990 across 41 economies to examine the impact of financial development on output growth. They inferred that financial improvement is positively linked with real output growth. Also, their study discovered that, in nations with large and efficient financial markets, financial development can exert incomparably higher effects in industrial expansion by reducing the cost of borrowing funds from external sources.

However, Luintel & Khan (1999) claimed that cross-section regression methods are not an appropriate technique to analyse causal relationships; thus, they employed a multivariate vector auto-regression (VAR) model to assess the causality between finance and growth in sample of ten countries. They inferred bidirectional causality between financial improvement and real growth in more than half of the countries included in their study, while economic growth caused financial development in two countries.

Soon after, Rousseau and Wachtel (2000) employed a novel econometric technique known as a generalized method of moments (GMM) estimator, developed especially to analyse dynamic panels, and examined the cross-country data from 1980-1995 to assess interrelationships between financial development and economic growth. The empirical results revealed a highly significant and leading role of financial markets in economic growth. Moreover, this study suggested that large and efficient financial markets, along with an active banking sector, can induce high real output growth.

The subsequent study by Beck, Levine and Loyaza (2000) employed both cross-section methods and dynamic panel estimation techniques and analysed the link between financial development and real growth based on 71 countries over the period 1960-1995. The findings from both the techniques illustrated a positive impact of financial advancement on economic growth across the range of countries included. Furthermore, the study revealed that the level of financial development across the countries may vary due to cross-country differences in legal and accounting systems.

Arestis, Demetriades and Luintel (2001) carried out another study that explored the interaction between financial institutions and economic growth, using data from 1970s to 1998 in five developed nations, controlling for variables of banking development. This empirical analysis discovered significantly positive impacts of both financial markets and financial intermediaries on real output growth; however, the evidence showed greater impact of banking institutions on economic growth.

On the other hand, Shan, Morris and Sun (2001) investigated causality between financial development and economic growth in nine OECD countries and China using data through 1960 to 1998. This study concluded bi-directional causality between financial development in five nations, one way causality from economic growth to financial development in three nations (including China), and no causal relationship between finance and growth in two nations. These outcomes contradicted the findings from previous studies by Beck, Levine and Loyaza (2000), and Rousseau and Wachtel (2000).

Beck, Demirguc-Kunt and Levine (2002) examined the importance of legal origin for financial development and economic growth, and inferred that the degree of efficiency of a financial system in stimulating economic growth varies from one country to another due to differences in legal origin, and the effectiveness of legal establishments in guaranteeing creditors and

borrowers rights. This finding reinforced the evidence obtained by Beck, Levine and Loyaza (2000), and is consistent with the law and finance view (noted above) developed by Porta et al. (1998).

Likewise, Tadesse (2002) analysed the link between the financial system and economic performance in 36 countries using industry level data from 1980-1995, and suggested that bank-based systems are suitable in countries with an underdeveloped financial infrastructure (including legal), and that market-based financial systems are appropriate in financially mature nations. Further, the evidence showed that bank-based systems can perform better in economies with smaller firms and with weaker legal institutions, whereas market-based systems can perform well in economies with larger firms and stronger legal entities. These findings strengthen both the bank based and market based views.

Improving upon the methodological shortcomings in previous studies, and using new panel data from 1976-1998, Beck and Levine (2004) evaluated the role of banks and stock markets in economic growth by using a dynamic panel estimator. The evidence from this investigation signified that *both* banks and financial markets play a highly significant role in economic growth. Similarly, Christopoulos & Tsionas (2004) employed panel unit root tests and panel cointegration tests to analyse data from 1970-2000 in ten developing countries, and reported a highly significant impact of financial development on real output growth in all the sample economies.

Apart from a direct focus on the importance of financial development on economic growth, Roija and Valev (2004) examined the *transmission mechanisms* through with financial development can impact economic growth. The outcome of their study suggested that financial improvement influences growth through the channel of capital accumulation in developing economies, and through technological innovation and productivity improvement in developed economies.

As noted, one of the major impediments to growth in developing economies is the shortage of sufficient capital. As concluded by Roija and Valev (2004), financial institutions can help to overcome a lack of funds by accumulating scattered capital and mobilizing it to potentially profitable projects in developing economies. In the case of economically mature economies, however, factor productivity is the major constraint that may decelerate the growth rate. Financial development can help to overcome this problem by encouraging improved technology or by providing finance for skill enhancement of the labour force, which, in effect, can increase productivity and growth.

Ndikumana (2005), based on the analysis of 99 developing and developed countries from 1965-1997, reported that neither banks nor financial markets play a more important role in stimulating domestic investment. Rather, the investment can be encouraged by lowering the cost of transactions, and implementing creditors and investors rights effectively. Thus, efficiencies in financial development can be achieved by reducing transaction costs and strengthening legal origins.

Shan (2005) discovered a weak relationship between financial development and economic growth in ten OECD countries and China using variance decomposition and impulse response analysis (also known as innovation accounting) to analyse the variables in a VAR framework. This inference is different from the conclusion of Shan, Morris and Sun (2001) (discussed above) in nine OECD countries and China. Shan (2005) noted that since innovation accounting is different from standard Ganger causality approach used to evaluate finance growth nexus, the results obtained from this study may have been different from previous investigations. Further, this study insists that financial development can be a secondary factor, rather than a leading factor, for stimulating real output growth.

According to Chakraborty and Ray (2006), banking systems can accelerate the process of modernizing an economy by supplying finance at lower cost compared to the cost of financing through financial markets. In addition, banking institutions provide capital to small firms, which is necessary to enlarge their capacity and enhance productivity after screening them properly and monitoring their activities closely. Hence, banking systems can play important role in modernizing developing economies dominated by smaller production units.

Bordo and Rousseau (2006) analysed the historical data of seventeen developed economies across the Atlantic from 1880-1997 and suggested that, along with legal origin, political factors such as proportional representation voting systems, timely elections, universal female suffrage, few revolutions and military takeovers, may all be strongly connected to superior financial systems and higher rates of economic growth.

Naceur and Ghazouani (2007) examined data from 1979-2003 across eleven Middle East and North Africa (MENA) countries, and concluded a negligible impact of financial development on economic growth in the MENA region. This insignificant link between financial improvement and output growth in the MENA region can be attributed, they argued, to the higher government control of the financial sector and less active involvement of private sector in productive economic activities (Neli and Rastad 2007). This evidence supports the statements of Lucas (1988) and Chandavarkar (1992), who expressed doubt on the role of financial development on real growth. Based on the outcomes of the studies from the MENA region, we can comprehend that the encouragement of private sector activity, along with lesser government intervention, are important to realize efficiency in the performance of a financial sector and to accelerate real output growth.

Deidda and Fattouh (2008) implied that banks have a smaller impact in real output growth the larger is the financial market, therefore banks and financial markets are substitutes to some

extent. Therefore, the transformation from a bank based system to one in which both banks and financial markets coexist may harm real growth. Actually, the development of financial markets may reduce banks' incentives to screen borrowers due to competition between the two financial sectors; hence, banks may supply credit to borrowers with lower credit ratings which, in turn, reduces the contribution of the banking sector in real output growth. Of course, in addition such activity increases the risk of loan default and financial crises.

Very recent studies that investigated the finance growth link have also shown mixed results. For instance, Luintel et al. (2008) showed that financial development is a strong predictor of economic growth. Next, Fung (2009) confirmed higher interdependence between financial development and economic growth in premature stages of development, rather than in mature stages of development. Thus, the low income economies with enhanced financial development can grow rapidly to coincide with a higher growth rate, while the ones with poor financial superstructure may suffer from poverty trap.

Another investigation by Wu, Hou and Cheng (2010) reveal that, in the long run, banks, financial markets, and output growth have positive relationship in the EU region. However, banks financial deepening may have a negative impact on real growth in the long run while financial markets may have a negative impact in the short run. The negative effect of financial deepening may arise in the long run due to moral hazard hence, this problem can be reversed by implementing bank screening effectively. This evidence to some extent reinforces Minsky's financial instability hypothesis.

On the other hand, Bangake and Eggoh (2011) found long run bi-directional causality between financial development and output growth in low, middle and high income countries. However, their investigation suggested no causal relationship between financial development and real growth in low and middle income countries in the short run. Furthermore, their study

demonstrated (not surprisingly) that government expenditure and trade play an important role in real output growth. Therefore, both real and financial sectors need equal emphasis to realize strong economic growth, since financial development alone is not sufficient to cause steady growth in developing countries.

Similarly, Hassan, Sanchez and Yu (2011) concluded a positive relationship between financial progress and real growth in the long run for both low and middle income regions. Their investigation showed bi-directional causality between finance and growth for most of the regions in the short term, except for the Asia-Pacific and the Sub-Saharan Africa regions, both of which are low income regions. In the Asia-Pacific and Sub-Saharan regions, the empirical results showed that causality flows from real growth to financial development. These results strengthen the growth leading hypothesis put forward by Robinson (1953).

Analysing data from 1980-2007, Kar, Nazlıoğlu & Ağır (2011) reported an undetermined direction of causality between financial development and output growth in a panel of fifteen MENA countries. This study suggested that the pattern of finance growth interaction varies from one country to another, depending on their level of financial development and policy. The study discovered that unbalanced policies that pay greater attention on financial sector improvement and put little emphasis on the development of other sectors can prove ineffective for growth. In addition, political systems; legal origins; and universal female suffrage may also have influenced finance growth interrelationship in the MENA region.

Bordo and Rousseau (2012) carried out historical analysis of the importance of financial development and trade in 17 cross-Atlantic nations from 1880-1999. Their investigation showed that financial development influenced economic growth significantly and directly throughout the sample period, while the significant impact of trade in economic growth was observed especially after World War II. Bordo and Rousseau (2012) suggested that the greater impact of trade may

have resulted from the introduction of treaties such as the General Agreement on Tariffs and Trade (GATT), and the declaration of the European common market that dissolved trade and tariffs barriers among those nations after the Second World War.

Lee (2012) investigated the role of market based versus bank based systems in the long run development of France, Germany, Japan, Korea, UK and the USA. This empirical analysis revealed that finance causes growth in all of the nations. However financial markets play a greater role in Japan, UK and the USA, while the banking system is more important in France, Germany and Korea for stimulating real growth. Also, the study implied a complementary role of banks and financial markets on the economic development of all the economies except USA.

2.3 Empirical Literature Review: Individual Country Case Studies

As is apparent from the above, the evidence obtained from the majority of *cross-country* empirical studies mostly support the finance leading growth hypothesis. However, the evidence obtained from individual country case studies are remarkably different from the results obtained from the cross-country studies.

For instance, Thangavelu and Ang Beng Jiunn (2004), analysing the data from 1960-1999 using a VAR model, suggested that economic growth causes financial intermediary development, while financial markets development cause real output growth in Australia. These findings suggest that both finance leading growth and finance following growth hypotheses, are true in case of Australia. On the other hand, Chang & Caudill (2005), using data from 1962-1998, carried out a Granger no-causality test on the interrelationship between financial enhancement and the increase in real output in Taiwan. This test produced results in favour of the finance leading growth hypothesis.

Another study by Bolbol, Fatheldin and Orman (2005) reported a weak impact of banking institutions on development, but a strong impact of financial markets on development and real output growth in Egypt. In contrast, the study by Hondroiyannis, Lolos and Papapetrou (2005) revealed a small positive impact of financial development on the real growth of Greece. In the same manner, Liang and Teng (2006) analysed the interaction between financial development and economic growth utilizing data from 1952-2001, and concluded that causality flows from economic growth to financial development in China.

In another case study of China, Hao (2006) inferred a significant impact of financial development on economic growth, especially after the economic reforms of 1978. Further, the study suggested that financial development influences economic growth in China through two transmission mechanisms: (i) state budget appropriation; and (ii) mobilization of household savings. Since state budget appropriation in China is a substitute of loan distribution, Hao (2006) pointed out the need to reform China's financial sector profoundly in order to improve the performance of financial institutions through loan distribution to the private sector.

In contrast, analysing the data from 1977-2001, Shan and Jianhong (2006) concluded that financial development and real output growth have a bi-directional causal relationship in China. Although, both Hao (2006) and Shan and Jianhong (2006) investigated the data of the post reform era in China, they derived different conclusions. In this author's opinion, this difference may have arisen due to the utilization of different methodology by the two studies.

Meanwhile, Nieuwerburgh, Buelens & Cuyvers (2006) examined the historical relationship between financial development and economic growth in Belgium using data from 1832-2002. The investigation revealed a strong and positive impact of financial development in the long run real growth of Belgium. Interestingly, before 1873 when Belgium's economy was in its initial stage of development and the financial system was regulated; banking institutions played

important role in real growth as well as promotion of financial markets. However, in the post 1873 period, the legal impediments on financial markets were lifted, after that the strongest influence of capital financing through financial market was observed in Belgium.

Ang (2008) investigated the transmission channels through with financial development contributes to real output growth in Malaysia, and confirmed that financial development influences growth through the quantitative channel of capital accumulation *and* the qualitative channel of productivity growth. Interestingly, this outcome differs from Roija and Valev's (2004) result (discussed above) since they suggested that financial development influences growth through the quantitative channel in developing nations, and the qualitative channel in developed countries. However, the evidence obtained from both the studies buttress the findings of Levine and Zervos (1998).

Another case study of Egypt by Abu- Bader and Abu-Qarn (2008) suggested bi-directional causality between financial development and economic growth. This evidence differs from the results obtained by Bolbol, Fatheldin and Orman (2005). Similarly, Odhiambo (2008), using data from 1991-2005, examined whether saving can cause financial development in Kenya, which, in effect, can then accelerate real output growth. However, the empirical evidence showed that economic growth causes saving, which, in turn, increases financial depth in Kenya. Therefore, their study reinforces the reverse causality hypothesis in the case of Kenya.

A study by Shahbaz, Ahmed and Ali (2008) analysed data from 1971 to 2006, and suggested a close association between financial markets development and economic growth in Pakistan. The study insisted that, by reducing the cost of borrowing, financial markets development in Pakistan encouraged competitive and prospective business enterprises to invest in profitable projects.

Likewise, Yang & Yi (2008) analysed the impact of financial development in the economic growth of Korea, employing data from 1971-2002. The study concluded that financial development causes real output growth in Korea, but the reverse is not true. In like manner, and based on endogenous growth theory, Anwar and Nguyen (2011) examined the association between financial development and output growth in 61 provinces of Vietnam using data panels from 1997-2006. The study reported a significant impact of bank credit to provincial output growth in Vietnam. Hence, in both Vietnam and Korea, financial development plays an important role in increasing the level of real output.

Significantly for this study, Kharel and Pokhrel (2012) examined the importance of financial structure for the economic growth of Nepal using data from 1994- 2010. The research suggested that financial intermediaries play a highly important role in real output growth compared to the role of financial markets in the economic growth of Nepal. Since the size of stock market in Nepal is very small and is inefficient compared to the size and efficiency of the banking sector, the latter is judged to have a large effect on real out growth.

In the same way, Marques, Fuinhas and Marques (2013) carried out investigations on the nature of association between financial development and economic growth in Portugal from 1993-2010, a period that marked the change in the Portuguese economic regime as a result of joining the European Monetary Union, and replacing the existing national currency with the Euro. Their study reported bi-directional causality between financial market development and real output growth, whereas the study showed that economic growth benefited banks (.i.e., reverse causation) in Portugal.

This review of the literature on the interaction between financial development and economic growth reveals that the causality between financial improvement and economic growth varies from one economy to another, since the relationship depends on country specific policies, and

broader institutional contexts as well as the performance of financial institutions in individual countries. Hence, in a case study of finance growth interrelationship it is imperative to confirm the causal direction. Although Kharel and Pokhrel (2012) unravelled useful information on the importance of the financial system in the economic growth of Nepal, the evidence is not adequate to comprehend the direction of causality between financial development and economic growth. Thus, the investigation of causality between financial development and economic growth in Nepal is essential. The current study is designed to fill this observed gap.

Chapter 3.

History of financial development in Nepal

The modern history of Nepal's financial sector properly begins shortly before the Second World War. Serious progression, however, did not take place until the 1950s. Since then, the sector has proceeded along a rocky path of growth that has followed closely the country's political economy trajectory more broadly. Below is a brief outline of this progress, divided into four discrete phases of financial sector development. The first phase covers the period from the mid 1930s to the early 1950s; phase two traces the story following the founding of Nepal's central bank in 1956; phase three takes the narrative from the 1980s until 2002; finally, phase four takes the story to the present day[3].

3.1 The first phase

In 1937, the formal development of the financial sector in Nepal commenced with the establishment of Nepal Bank Limited[4] (NBL). NBL was a commercial bank established as a joint venture of the government of Nepal and a consortium of the domestic private sector investors, with government ownership of 51% of the issued shares and 49% of the NBL's shares owned by general public (Tiwari 2009). The private sector partners were all Nepalese citizens.

At that time, the NBL was established to accumulate the capital 'scattered' among people, and to promote trade and industry as a first step to the path of modern development in Nepal. However,

[3] This study does not focus in detail upon political developments in Nepal. For more on these, and their interactions with the financial sector prior to 2007, see Bhetuwal (2007).

[4] Neapl Bank Limited (NBL) was established under the Nepal Bank Act 1936.

the NRB could not achieve this goal as expected due to the remoteness and vast areas of the nation away from the major cities, the lack of confidence and experience the population had with formal banking, high rates of illiteracy, the high cost of financial transactions, and the prevalence of subsistence farming and barter trade among the majority of the people in Nepal.

Furthermore, the NBL alone could not make a significant impact in the mobilization and allocation of resources through banking activities because the NBL was the only commercial bank in operation until the mid of 1950s in Nepal (Tiwari 2009). The development of financial institutions was constrained during this first phase as a consequence of a range of institutional absences, including the lack of a central monetary authority that could enact policies to promote a stable economy, and to encourage financial inclusion.

3.2 The second phase

In 1956, the second phase of financial development started with the establishment of Nepal Rastra Bank (NRB), which was the (first) central monetary authority (central bank) of Nepal[5]. The major objective behind the establishment of the NRB was to accelerate the development of financial institutions. However, progress was slow with only three banks, all under government ownership and all policy banks, being established over the next decade and a half. In 1959, the Nepal Industrial Development Corporation[6] was instituted to promote the development of the industrial sector. This was followed, in 1966, by Rastrya Banijya Bank[7] which was established with a broader mandate to expand banking service to nearly every corner of Nepal. Finally, in

[5] Nepal Rastra Bank (NRB) was established under the NRB Act 1955.

[6] Nepal Industrial Development Bank was founded under the Nepal Industrial Cooperation Act, 1959, with an objective to direct capital into the industrial sector and to aid the industrial development of the private sector.

[7] Rastrya Banijya bank was established under the Rastrya Banijya Bank Act, 1965, which aimed to expand banking services throughout Nepal and improve the socio-economic situation of the people.

1968, the Agricultural Development Bank[8] was established with an objective to encourage agricultural development (Maskay & Subedi 2009).

To implement monetary policy effectively, and to accelerate financial sector development, a necessary precondition was to make the Nepalese currency (Nepalese Rupees) the exclusive legal tender. The task of making Nepalese Rupees the exclusive legal tender was finally achieved only in 1966, although Nepal started issuing its own currency immediately after the establishment of the NRB as the central monetary authority. Before that, the Indian Rupee was in wide circulation in Nepal, and the country accordingly did not have an independent exchange rate or monetary policy.

However, after 1966 the NRB took full charge of controlling the exchange rate, determining interest rates (especially the allowable range of lending and deposit rates applying to all financial institutions), and various prudential measures such as capital reserve ratios. Prior to 1966, the central bank did not interfere in the determination of interest rates; nevertheless, the interest rate in Nepal was heavily influenced by interest rates in India (Demetriades & Luintel 1996).

In 1968, the NRB declared the 'Banking Development Plan' which provisioned incentives such as the subsidization of operational capital for new branches of commercial banks, and promoted the active involvement of the central bank in the expansion of bank branches. As a result, the number of bank branches rose from 80 in 1970 to 241 in 1980[9]. In 1974, the NRB introduced new banking regulations such as a liquidity ratio which obliged banks to hold a certain proportion of cash and marketable securities against outstanding debt. Similarly, a directed credit

[8] The Agricultural Development Bank was established under the Agricultural Development Bank Act, 1967, with the aim to develop the agriculture sector by providing loans to farmers at discounted interest rates.

[9] The number of bank branches in Nepal rose from 241 in 1980 to 441 in 1990. According to the current figure (of mid- April 2014), the total number of commercial bank branches in Nepal is 1507.

program was introduced in the same year, which required the commercial banks to lend a certain proportion of their total deposits to preferential sectors[10].

We do not have financial sector development data for Nepal before 1960. Therefore, in Table 1, we have attempted to illustrate the financial development of Nepal using deposit and credit aggregates for the commercial banks for various years after 1960. Aggregate domestic and private credit increased approximately 59 and 18 times respectively from 1965 to 1980. Similarly, lending to the public sector soared fourfold from 1975 to 1980. The near vertical rise in government credit was largely due to the rapid construction of public infrastructure during this period. Before 1975, credit supplied to government was negative, which implied a surplus balance in government accounts. Reinforcing the notion of an abstemious central government before 1975, the data shows that the claims on the private sector were more than 1.5 times the claims on the government sector at the end of this second phase of the financial development in Nepal.

Interestingly, the rate of rise in fixed and saving deposits was more than five times the rate of increase in current deposits across this period. This perhaps suggests the increasing confidence of people in financial institutions of Nepal, allowing them to 'lock' saving away for longer time intervals.

[10] For more information on financial policies and financial development in Nepal before 1990, see Demetriades & Luintel (1996).

Table 1: Commercial Banks Credit and Deposit

(In million Rupees)

Year	Domestic Credit	Net Claims on Government	Claims on Private Sector	Current Deposits	Savings Deposits	Fixed Deposits
1965	73.1	-51.7	110.5	86.4	10.9	32.5
1970	96.8	-201.2	258.9	188.0	52.9	143.9
1975	1,637.8	285.7	783.4	438.6	172.7	517.4
1979	3,540.8	1,129.3	1,331.6	880.0	454.5	1,477.7
1980	4,305.8	1,258.3	1,916.5	853.5	571.2	1,814.9

Source: Nepal Rastra Bank (www.nrb.org.np)

3.3 The third phase

The third phase of Nepal's financial sector development (as categorized here) started with the promulgation of a liberalization policy in the mid 1980s. Nepal experienced a prolonged balance of payments crisis in the early 1980s which induced the government to liberalize the economy (Maskay & Subedi 2009). After embracing this liberalization policy, private banks, fully financed by the capital of Nepalese citizens, were allowed to operate for the first time. Additionally, the government of Nepal permitted foreign banks to operate inside the country under joint venture arrangements of Nepalese and foreign investors, which generated a wave of banking sector expansion and development (Shrestha 2004).

The financial sector was further liberalized again during the third phase under the 'Structural Adjustment Program' of the International Monetary Fund (IMF) in 1987. The major shifts in monetary policies as a consequence of this program saw; the move from direct to indirect methods of monetary control; a switch from regulated to deregulated interest rate determination;

an espousal of open market operations as a principal policy instrument; the liberalization of the exchange rate; full convertibility of the Nepalese currency in current account transactions; the introduction of the import licensing system; and the establishment of an auction market for government securities (Demetriades & Luintel 1996).

Furthermore, on the banking front, the NRB eliminated all kinds of interest rate restrictions except the prescription of a minimum deposit rate in 1986. By 1989, commercial banks in Nepal were given full autonomy to determine all other interest rates except those applying to 'priority sector' credit.

Table 2 below illustrates measures indicative of financial sector development between 1980 and 2002 in Nepal. The third phase of financial development experienced greater intensity of commercial bank deposits and lending to both government and the private sector compared to the second phase discussed above. Between 1985 and 1990, the proportion of bank claims on the government sector exceeded claims on the private sector, in great contrast to the tradition of an abstemious government noted earlier. However, this scenario reversed after the year 1990. The data shows that banks credit to government surpassed private credit from 1985 through to 1990, which may be due to increased government expenditure to curb people's uprising against the then present autocratic system.

More specifically, the people's uprising against the then ruling authoritarian government induced the authorities in Nepal to increase the expenditure on the security sector. Simultaneously, Nepal's giant neighbour, India imposed sanctions on the supply of essential goods such as salt and fuel as part of a series of economic sanctions designed to lend support to the people's movement to restore democracy (which had been brought to an end by King Mahendra in 1960). Due to these sanctions, the government of Nepal rationed and made compensation payments for

petroleum products, salt and other essential goods. As a result, government expenditure increased until the restoration of democracy in 1990.

Following the restoration of democracy in Nepal, the government put greater emphasis on financial sector liberalisation, which led to a dramatic increase in the number of financial institutions. This was accompanied by an equally remarkable increase in the volume of banking transactions. Table 2 shows the improvement in banking activities during this third phase of financial development.

Fixed and saving deposits soared swiftly and created a huge gap over current deposits after the reinstatement of democracy in 1990. Interestingly, savings deposits increased tremendously after 1990, which suggests the supply of banking services to a greater proportion of people. Similarly, private credit surged more than three times the credit to the government whereas (as noted) the ratio of private credit to government credit was less than one from 1985-1990. The increase in the ratio of private credit suggests the encouragement of private sector development by the monetary authorities.

In general, the volume of domestic credit increased approximately forty-five times by the end of the third phase compared to the volume of domestic credit during the second phase. The speedy increase in bank deposits and private credit after the adoption of the liberalization policy indicated perhaps that financial institutions can play a momentous role in resources mobilization and allocation in the event of a suitable environment for the financial sector to grow.

Table 2: Commercial Banks Credit and Deposit

(In million Rupees)

Year	Domestic Credit	Net Claims on Government	Claims on Private Sector	Current Deposits	Savings Deposits	Fixed Deposits
1985	12,550.9	6,492.1	4,036.6	1,667.9	1,776.2	4,693.7
1990	29,661.6	13,940.2	11,687.6	4,293.7	5,218.2	11,761.5
1995	72,184.7	25,191.2	41,943.1	12,014.4	22,765.9	24,811.8
2000	158,001.1	38,242.6	109,447.6	20,307.6	65,703.6	66,516.2
2001	187,885.4	49,191.1	126,757.9	24,629.2	80,987.8	73,488.8

Source: www.nrb.org.np

A much greater range of depository institutions such as development banks, finance companies, micro-credit development banks, saving and credit cooperatives, and non-government organizations (NGOs) were allowed to operate in Nepal from 1992 (Maskay & Subedi 2009). After permitting the establishment of these banking services, the number of financial institutions surged rapidly throughout the nation and a greater proportion of people in rural parts of Nepal started receiving financial services.

Meanwhile, in 1994, the capital market was established to facilitate investment in the corporate sector. The seminal studies by Levine and Zerovs (1998), and Rousseau and Wachtel (2000) suggest that a large and liquid financial market can promote economic growth by attracting more corporate business and investors to join financial markets. Stock market size is measured by a ratio of secondary market capitalization to GDP. Likewise, the ratio of market turnover to market capitalization explains the stock market liquidity. Below is a brief descriptive analysis of stock markets development in Nepal, by examining stock market capitalization and liquidity.

Table 3 demonstrates the development of Nepal's stock market from 1995 to 2001. The figures in the table show that market capitalization rose from approximately 6% of GDP in 1995 to approximately 11% in 2000. Across the same period stock market liquidity (turnover ratio) reduced from around 7% of market capitalization in 1995, to 3% in 2001. In addition, throughout the period from 1995 to 2002, stock market liquidity contracted (except in the year 1999). However the performance of the stock market was satisfactory in the first year of its establishment, but its efficiency diminished continually throughout the third phase. This may have occurred due to the flaring Maoist armed conflict in Nepal after 1995, which was prompted by an aim to establish a communist system by overthrowing Democracy.

Table 3: Stock Market Capitalization and Turnover

Year	Stock market capitalization (in million Rupees)	Stock market capitalization/ GDP(%)	Stock market turnover (in million Rupees)	Stock market turnover/Market Capitalization (%)
1995	12,963	5.75	1,054.3	8.13
1997	12,898	4.01	416.2	2.53
1999	23,508	6.22	73.8	0.31
2000	43,123.3	10.50	283.7	0.65
2001	46,349.4	10.2	128.0	0.28

Sources: www.nrb.org.np

3.4 The fourth phase

The fourth phase of Nepal's financial development, which commenced with the promulgation of the 'Nepal Rastra Bank Act' (NRBA) 2002, continues to the present day. Despite a series of financial sector reforms during the 1980s and 1990s (noted), they were not sufficient to ensure the healthy development of the financial system in Nepal. This fact was revealed by "a financial

sector assessment program" (FSAP) jointly conducted by the International Monetary Fund and the World Bank in 1999, which reported that the financial system in Nepal was very weak, vulnerable and risky since the Nepalese financial system fulfilled only few core principles and norms of banking supervision set by the Basel Accords of 1988 (Maskay & Subedi 2009).

Thus in 2002, NRBA was reformulated with an aim to reform the financial sector and to improve its performance. Central to this was the granting of greater autonomy to the NRB in making and implementing decisions related to foreign exchange policy, as well as improving its supervision and control of financial institutions throughout the nation.

In this fourth phase of Nepal's financial sector development, various kinds of depository institutions such as commercial banks, development banks, finance companies, and microcredit development banks were authorised to execute different functions, as a consequence of which, however, the NRB experienced difficulties in the supervision and control of the activities of all the financial institutions under a single category. Hence, the NRB formulated the 'Bank and Financial Institution Act' (BFIA) in 2006, which is also known as "Umbrella Act".

BFIA envelops a set of diversified acts including the NRBA, categorizing financial institutions operating across the nation in various groups based on their nature and responsibilities. Thus, under the BFIA, commercial banks are categorized together in group A; development banks are in group B; finance companies are in group C; and micro-credit and development banks are in group D. Saving and credit cooperatives and NGOs are not categorized into any group, but function under explicit guidelines of the NRB (Maskay & Subedi 2009).

Table 4 shows the scenario of financial sector development in Nepal which is in progress now (2014). The data demonstrate that commercial banks' domestic credit grew more than 3.5 times, and private credit rose more than four times in this fourth phase of Nepal's financial development compared to the third phase. Furthermore, savings and fixed deposits have been

rocketing, while current deposits are growing steadily. Aggregate fixed and saving deposits have increased approximately 350% and 330% respectively between 2002 and 2011, whereas the current deposits, although small in volume, expanded 235%. Meanwhile, the credit to government has been constrained at less than 20% of total domestic credit.

Table 4: Commercial Banks Credit and Deposit

(In million Rupees)

Year	Domestic Credit	Net Claims on Government	Claims on Private Sector	Current Deposits	Savings Deposits	Fixed Deposits
2002	207,323.0	59,576.6	133,315.3	23,749.2	83,817.7	74,373.7
2003	228,443.8	62,825.0	150,956.9	28,299.4	97,236.4	75,348.4
2004	251,089.9	62,313.7	172,517.4	33,038.7	114,106.3	83,268.2
2005	285,157.5	68,811.6	197,016.9	34,120.0	130,013.6	84,137.4
2006	327,634.4	75,921.2	243,570.4	35,716.2	151,710.7	100,068.2
2007	365,225.1	83,010.6	273,447.4	42,692.2	174,633.9	114,032.5
2008	442,282.3	92,092.0	339,834.2	54,124.4	211,406.4	152,364.3
2009	560,670.7	109,862.9	438,354.4	69,489.5	259,872.4	216,854.7
2010	654,666.4	136,812.8	500,650.6	79,149.2	237,492.6	298,925.0
2011	910,224.9	163,439.4	727,322.4	78,203.6	230,693.1	252,137.3

Source: www.nrb.org.np

After the 2002 financial liberalization in Nepal the number of financial institutions increased rapidly. However, the distribution of financial institutions is not balanced across the nation. A large proportion of banks and bank branches are concentrated in the central (including the capital, Kathmandu), eastern and western development regions, while only a few are operating in

the mid-western and far western regions (despite the fact that these two regions cover nearly half of the land area of Nepal).

3.5 Improvements in Financial Markets

Improvements in Nepal's financial markets also occurred during the fourth phase of financial development discussed here. We analyse data in Table 5 to evaluate this performance. The table shows that stock market capitalization increased from 8% of GDP in 2002 to 44% of GDP in 2008. After 2008, market capitalization started shrinking until 2012. In 2013, however, growth in market capitalization to GDP increased again, rising in terms of GDP to 30% from 23% in 2012. However, the market capitalization ratio to GDP remains far below the ratio in 2008. On the other hand, stock market liquidity (market turnover to market capitalization ratio) is less than 5% on average.

Table 5: Stock Market Capitalization and Turnover

Year	Stock market capitalization (in million Rupees)	Stock market capitalization/ GDP (%)	Stock market turnover (in million Rupees)	Stock market turnover/ Market Capitalization (%)
2002	34,704.0	8.6	1,540.6	4.4
2004	41,425.0	8.4	2,144.3	5.2
2006	96,763.8	15.0	3,451	3.6
2008	366,247.6	44.7	22,873.4	6.2
2010	376,871.4	31.6	11,787	3.1
2011	323,484.3	23.6	6,665.3	2.1
2012	368,262.1	23.6	10,279.0	2.8
2013	514,492.1	30.2	22,048.9	4.3

Source: www.nrb.org.np

The trend of stock market capitalization and liquidity elucidate that stock market capitalization is climbing while market liquidity is low and flat. Since market liquidity is directly determined by the volume of transactions in capital markets, the small and stagnant liquidity ratio implies that the stock market in Nepal is inefficient.

The data in the tables above shows that private credit issued by banking institutions is increasing dramatically, whereas stock market liquidity has been stagnant even as market capitalization has been going up gradually. The private credit was approximately 20% of GDP in 1995, which rose to nearly 26.5% of GDP in 2002 and to 50% of GDP in 2011. In contrast, in 1995, the stock market turnover ratio was 8.13% of market capitalization, dropping to 4.4% in 2002. In 2013 the ratio was 4.3%. Shrestha (2004) remarked that the trading in capital market is low due to the listing of only a few corporate organizations and limited trading of government securities. This statement is reinforced by the reality that more than 90% of the companies listed on Nepal's stock market belong to the category of bank and nonbank financial institutions[11].

[11] In the current study, we investigate the impact of the development of financial intermediaries in the economic growth of Nepal. We do not incorporate financial markets in our study, because of the lack of sufficient financial market development data.

Chapter 4.

Research Methodology

4.1 Introduction

The debate on econometric methodology used to assess the causal relationship between financial development and economic growth is not yet fully resolved. The seminal studies that have examined the finance growth relationship used cross-section regression methods to analyse panels of data from across a range of countries (e.g., see King and Levine 1993, Levine and Zervos 1998, Ranjan and Zingales 1998). However, later studies that apply time series technique and panel methods discovered that cross-section regression methods may suffer from potential biases such as simultaneity bias, omitted variables bias and individual country specific effects. Hence, the results obtained from cross-section regression methods have been widely questioned (e.g., see Demetriades and Hussein 1996, Luintel and Khan 1999, Arestis, Demetriades and Luintel 2001; Rousseau and Wachtel 2000, and Beck and Levine 2004).

The studies by Rousseau and Wachtel (2000) and Beck, Levine and Loayza (2000) used a dynamic panel method highlighting the fact that dynamic panel technique removes the potential biases such as simultaneity bias, omitted variables bias and individual country specific effects (already noted) as may present in cross-country analysis. Succeeding studies by Beck and Levine (2004), Kar, Nazlıoğlu and Ağır (2011), and Bordo and Rousseau (2012) also used dynamic panel techniques to assess the causal relationship between financial development and real growth across a range of countries. These new techniques are useful in creating better cross-country analysis. Of course, given that, in this study, we are focussing on one country only, the dynamic panel estimator is not an appropriate method for our case study.

More useful for this study are vector autoregression (VAR) models such as that employed by Luintel and Khan (1999), who analysed the cross-section data from ten countries initially to investigate causal relationship between financial development and real growth. Following that study, Arestis, Demetriades and Luintel (2001), Shan, Morris and Sun (2001), Shan (2005), Lee (2012) also examined the finance-growth interrelationship in a panel of countries by using VAR models. Similarly, Chang and Caudill (2005), Hondroyiannis, Lolos and Papapetrou (2005), Shan and Jianhong (2006), Ang and McKibbin (2007) and Abu-Bader and Abu-Qarn (2008) carried out the case studies of Taiwan, Greece, China, Malaysia and Egypt respectively using a VAR technique.

Arestis, Demetriades and Luintel (2001), Shan (2005), and Abu-Bader and Abu-Qarn (2008) maintain that a VAR analysis permits the examination of the impact of the financial development on real output growth of each country included in panel individually, so that the VAR model can remove problems that may arise from individual country specific effects. Nonetheless, different studies employed different analytical frameworks within a VAR model to perform empirical analysis. For example, Luintel and Khan (1999), Chang and Caudill (2005), Hondroyiannis, Lolos and Papapetrou (2005), Ang and McKibbin (2007), and Abu-Bader and Abu-Qarn (2008) employed error correction model (ECM) developed by Johansen (1988) to investigate the causal relationship between financial development and economic growth.

Likewise, Shan, Morris and Sun (2001) employed a Granger causality test developed by Toda and Yamamoto (1995) to investigate causality between financial development and economic growth in the panel of ten countries. By contrast, Shan (2005), and Shan and Jianhong (2006) examined the direction of causality between finance and growth using variance decomposition and impulse response function analysis.

However, while most of the time series studies have applied Johansen's ECM, the study by Philips and Toda (1993) reported finite sample bias in ECM, which can lead to a misleading inference by rejecting null hypothesis when the null is true. Since our interest is to examine the causal effect of financial development on economic growth, we employ the Granger causality test developed by Toda and Yamamoto (1995) in our study because they insist that their method overcomes deficiencies in the ECM model reported by Philips and Toda (1993). In addition, this test is based on a simple theory and is easy to apply. In the following section, we discuss the methodology of our empirical study.

4.2 Methodology Used in this Thesis

Granger Non-Causality Test

In this study, we use the Granger non-causality test developed by Toda and Yamamoto (1995), and as extended by Dolado and Lutkepohl (1996). Later, Rambaldi and Doran (1996) illustrated the application of a Toda and Yamamoto (1995) test in a simple bivariate VAR model with integrated and cointegrated systems. This illustration made employment of the test easier. Similarly, Zapata and Rambaldi (1997) conducted a Monte Carlo simulation of the small-sample size and power of two causality tests, including Toda and Yamamoto.

The Monte Carlo simulation elucidated that the MWALD statistic computed from estimated "augmented" VAR (MWALD) is equal in size and power to the likelihood ratio (LR) and WALD tests when the sample size is 50 or greater. And, in fact, the Granger non-causality test developed by Toda and Yamamoto (1995) uses MWALD test to check Granger non-causality, and the test is based on the multivariate least squares estimation of VAR.

The test of Granger non-causality in a VAR model requires testing if some of the parameters are jointly zero. In the past, WALD test was used to confirm whether the parameters of the variables

of interest are zero or not in the case of unrestricted levels VAR technique. But, Toda & Phillips (1993) demonstrated that WALD test may not be suitable for testing Granger non-causality when the variables in a VAR model are integrated of I(1). Further, they suggested that the asymptotic distribution of a WALD test suffers from various limitations such as nuisance parameter and nonstandard distribution in the case of unrestricted levels VAR, even if the order of integration and cointegration are known. Also, they elucidated that ECM developed by Johansen (1988) is suitable for testing the rank of cointegration empirically, however, the Granger non-causality test used in ECM may suffer from nuisance parameter dependencies asymptotically.

As a likely solution of the deficiencies in existing testing procedures, the applied works in econometric analysis always condition the Granger causality testing system on the estimation of unit roots, and cointegration rank, and then cointegrating vectors. If the selected variables are identified as I(1) and non-cointegrated, then the first order differentiated VAR may be chosen as a preferred model. Alternatively, the preferred model can be ECM if the cointegrating relationship is found between the chosen variables. However, the applied works may also result in severe distortion of the inference procedure because both the testing procedures adopted by applied works are known to suffer from low power due to their dependence on nuisance parameters in the case of finite samples. Besides, the cointegration structure of a model under examination cannot be known as well (Dolado & Lütkepohl 1996).

Dolado and Lütkepohl (1996) illustrated that the nonstandard asymptotic properties of the WALD test on the parameters of the cointegrated VAR systems are due to singularity of the asymptotic distribution of least squares estimators. This singularity can be eliminated by fitting a VAR system, whose order exceeds the true lag order. Actually, the Granger non-causality test developed by Toda and Yamamoto (1995) permits to fit lags greater than the true lag order of a VAR model. Hence the Granger causality test suggested by them can remove the nonstandard

asymptotic χ^2 distribution of WALD statistic, and can eliminate possible pretest biases experienced in the tests developed earlier.

The Toda and Yamamoto (1995) Granger non-causality test is simple in theory as well, and can be carried out directly using multivariate least squares estimators of the parameters of a VAR system stated in levels of variables. Further, this test does not presuppose that cointegration structure of a process under examination is identified- however, the testing procedure allows possible cointegration among the variables. Thus, the test is not sensitive to the cointegration properties of the variables (Dolado & Lütkepohl 1996).

To carry out the Granger causality test developed by Toda and Yamamoto (1995), first, we have to select the optimal lag length using a normal lag selection procedure such as Akaike information criterion (AIC) or Schwartz criterion (SC). After fixing the optimal number of lags, we have to estimate $k + d_{max}$ order VAR model, where k stands for the true number of lags and d_{max} represents the maximum order of integration of the variables that we infer applying the usual stationarity tests. Finally, we test the linear restrictions on first k coefficient matrices using the MWALD statistic, which is assumed to have standard asymptotic distribution as likelihood ratio statistic does.

According to Toda and Yamamoto (1995), the standard asymptotic χ^2 distribution holds for the WALD test as long as the optimal number of lags selected for the model exceeds the order of integration of the variables included in VAR system. In the same manner, we discount the coefficient matrices of d_{max} lagged vectors since they are presupposed to be zero by this test.

4.3 Data

We use annual data from Nepal's financial sector from 1965-2011 to estimate a VAR model. We employ six variables: economic growth rate (GDPG), government credit (GC), gross capital

formation (GCF), financial depth (FD), private credit (PC) and trade (TRD) to carry out empirical analysis.

In the current study, we use GDPG, expressed as the percentage of increase in gross domestic product (GDP) over the GDP of previous period, as an indicator of output growth rate in Nepal. We include GDPG in our study because GDPG is the indicator that reflects output growth of economy, and in case of our study GDPG is the indicator of economic performance. We examine the impact of FD and PC on GDPG to uncover whether financial development is important for real output growth in Nepal.

Following King and Levine (1993) and Levine and Zervos (1998), we use the ratio of M3 to GDP, to measure degree of financial depth (FD) because liquid liabilities measure the overall magnitude of financial intermediaries; hence this measure can reflect the financial depth of the financial sector in the economy. But, in this case study, we deduct the currency held by public (as a proportion of GDP) from the liquid liabilities of the banking sector, since a large proportion of the currency remains outside banking sector in Nepal.

However there is another issue we need to consider with respect to the M3/GDP ratio - this indicator does not separate the liabilities of the central bank from that of commercial banks and other financial intermediaries. Likewise, this indicator does not identify whether the financial intermediaries channel the accumulated capital to the private or public sector. Thus, following Levine and Zervos (1998), we use private credit (PC), expressed by the ratio of private credit to GDP, to examine the impact of banks development on economic growth through the mobilization of capital to the private sector. As this indicator purely reflects the credit supplied by banking institutions to the private sector, private credit can measure the degree of the impact of financial development on private sector improvement, and its effect on real output growth.

Similarly, we incorporate government credit (GC) measured by the ratio of government credit to GDP, as another variable in our study to evaluate whether the credit to government by the financial intermediaries can spur economic growth in Nepal. As opposed to the role of PC, the government credit aids to evaluate the importance of the credit by financial intermediaries to the public sector in output growth.

Furthermore, we examine the impact of gross capital formation (GCF), measured by the ratio between gross capital formation and GDP, on real output growth. Similarly, we investigate the importance of trade (TRD), which is measured by the ratio of the sum of export and import trade to GDP, on economic growth. We introduce GCF and TRD variables in our empirical analysis because they are potential indicators which can exert significant influence on economic growth of Nepal beside financial development. In our study, GCF shows the impact of gross domestic investment in output growth while TRD is the potential source of growth outside the financial sector.

Additionally, we investigate whether PC can augment GCF to find whether private credit can increase the level of gross domestic investment in Nepal. Apparently, this examination provides information on whether private credit is directed to investment activities that promote capital accumulation directly or to other activities such as purchasing land or the consumption of goods.

We obtained the data required for our empirical analysis from the world-bank website http://data.worldbank.org and the central bank of Nepal website http://www.nrb.org.np. The main source of our data is the World Bank databank. However, the data for some years were missing for liquid liabilities, private credit and government expenditure. In those cases, we drew raw data from the central bank of Nepal for the years of missing data, and computed a ratio with GDP. This ratio was then supplied in place of the missing data. In addition, since the data for money held by the public in Nepal was not available at the World Bank website, we drew raw

data for money held by the public from the central bank website then calculated its ratio with GDP and, finally, deducted the ratio from the ratio of M3 to GDP.

4.4 Model Specification of the MWALD Test for Granger Non-causality

In this case study, we develop bivariate VAR (k) model to examine the Granger non-causality between set of variables included in our study. Our VAR specification is,

$$V_t = A_0 + \sum_{i=1}^{k} A_i V_{t-i} + \varepsilon_t \qquad (1)$$

We can represent the equations of VAR system (1) more completely using matrix notation.

$$\begin{bmatrix} V_{1t} \\ V_{2t} \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(11)} + a_1^{(12)} \\ a_1^{(21)} + a_1^{(22)} \end{bmatrix} \begin{bmatrix} V_{1t-1} \\ V_{2t-1} \end{bmatrix} + \dots + \begin{bmatrix} a_k^{(11)} + a_k^{(12)} \\ a_k^{(21)} + a_k^{(22)} \end{bmatrix} \begin{bmatrix} V_{1t-k} \\ V_{2t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (2)$$

Where, $V_t = [V_{1t}, V_{2t}]'$ is a vector of variables in our bivariate VAR (k) model. Similarly, $A_0 = [a_{10}, a_{20}]'$ is a vector of constants, $A_i = [a_1^{(11)} + a_1^{(12)}, a_1^{(21)} + a_1^{(22)}, \dots, a_k^{(11)} + a_k^{(12)}, a_k^{(21)} + a_k^{(22)}]'$ stands for coefficient matrix, $V_{t-i} = [V_{1t-1}, V_{2t-1}, \dots, V_{1t-k}, V_{2t-k}]'$ represents lags from 1 to k of a vector of variables, and $\varepsilon_0 = [\varepsilon_{1t}, \varepsilon_{2t}]'$ is the vector of white noise processes for the system of equations in VAR (k). The white noise processes are independent and identically distributed with zero mean and Σ variance, .i.e., $E(\varepsilon_t) = 0$ and $E(\varepsilon_t \varepsilon'_t) = \Sigma$, which is a non-singular matrix.

Next, to check that V_{2t} does not Granger cause V_{1t}, we impose zero restrictions on the parameters of V_{2t} in the first equation of our VAR (k) model represented by matrix (2) , i.e., $a_1^{(12)}, \dots, a_k^{(12)} = 0$. Next, we presume that V_{1t} and V_{2t} are I(1), .i.e., $d_{max} = 1$, so a normal t-test is not suitable for our test. Therefore, as suggested by Dolado and Lutkepohl (1996), we check whether $a_1^{(12)}, \dots, a_k^{(12)} = 0$, by building a MWALD test which is supported by least squares estimates in the "augmented" VAR model,

$$\begin{bmatrix} V_{1t} \\ V_{2t} \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(11)} + a_1^{(12)} \\ a_1^{(21)} + a_1^{(22)} \end{bmatrix} \begin{bmatrix} V_{1t-1} \\ V_{2t-1} \end{bmatrix} + \ \dots + \begin{bmatrix} a_k^{(11)} + a_k^{(12)} \\ a_k^{(21)} + a_k^{(22)} \end{bmatrix} \begin{bmatrix} V_{1t-k} \\ V_{2t-k} \end{bmatrix}$$

$$+ \begin{bmatrix} a_{k+1}^{(11)} + a_{k+1}^{(12)} \\ a_{k+1}^{(21)} + a_{k+1}^{(22)} \end{bmatrix} \begin{bmatrix} V_{1t-k-1} \\ V_{2t-k-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (3)$$

In our augmented VAR model (3), we have added one more lag to VAR (k) and made the number of lags equal to $(k + d_{max})$. When conducting Granger non-causality test in augmented VAR model, the coefficient matrix of $k + 1$ lag is ignored since these parameters are assumed to be zero by Toda and Yamamoto (1995) test.

In this study, we perform tests of Granger non-causality between FD and GDPG; PC and GDPG; GCF and GDPG; TRD and GDPG; GC and GDPG; and, between PC and GCF respectively. For this, we construct augmented VAR $(k + d_{max})$ model for each pair of variables.

4.4.1 Granger non-causality between FD and GDPG

The augmented VAR model for testing Granger non-causality between FD and GDPG is,

$$\begin{bmatrix} GDPG_t \\ FD_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(1GDPG)} + a_1^{(1FD)} \\ a_1^{(2GDPG)} + a_1^{(2FD)} \end{bmatrix} \begin{bmatrix} GDPG_{t-1} \\ FD_{t-1} \end{bmatrix} + \ \dots + \begin{bmatrix} a_k^{(1GDPG)} + a_k^{(1FD)} \\ a_k^{(2GDPG)} + a_k^{(2FD)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k} \\ FD_{t-k} \end{bmatrix}$$

$$+ \begin{bmatrix} a_{k+1}^{(1GDPG)} + a_{k+1}^{(1FD)} \\ a_{k+1}^{(2GDPG)} + a_{k+1}^{(2FD)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k-1} \\ FD_{t-k-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (4)$$

For testing Granger non-causality from FD to GDPG, we impose zero restrictions on the parameters of FD from lag $1\ to\ k$ in the first equation of model (4), therefore, our null hypothesis becomes, $H_0 : \alpha_1^{(1FD)}, \ \dots, \alpha_k^{(1FD)} = 0$, where, $\alpha_1^{(1FD)}, \ \dots, \alpha_k^{(1FD)}$ are the coefficients of financial development from FD_{t-1} to FD_{t-k}. Next, we test reverse causality from GDPG to FD imposing zero limit on the coefficients of GDPG from lag $1\ to\ k$ in the second equation. In

this case, the null is, $H_0 : \alpha_1^{(2GDPG)}, \dots, \alpha_k^{(2GDPG)} = 0$, where, $\alpha_1^{(2GDPG)}, \dots, \alpha_k^{(2GDPG)}$ are the coefficients of GDP growth from $GDPG_{t-1}$ to $GDPG_{t-k}$.

4.4.2 Granger non-causality between PC and GDPG

The augmented VAR model for testing Granger non-causality between PC and GDPG is,

$$\begin{bmatrix} GDPG_t \\ PC_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(1GDPG)} + a_1^{(1PC)} \\ a_1^{(2GDPG)} + a_1^{(2PC)} \end{bmatrix} \begin{bmatrix} GDPG_{t-1} \\ PC_{t-1} \end{bmatrix} + \dots + \begin{bmatrix} a_k^{(1GDPG)} + a_k^{(1PC)} \\ a_k^{(2GDPG)} + a_k^{(2PC)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k} \\ PC_{t-k} \end{bmatrix}$$
$$+ \begin{bmatrix} a_{k+1}^{(1GDPG)} + a_{k+1}^{(1PC)} \\ a_{k+1}^{(2GDPG)} + a_{k+1}^{(2PC)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k-1} \\ PC_{t-k-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (5)$$

To carry out the test of Granger non-causality from PC to GDPG, we impose zero restrictions on the coefficients of PC from lag $1\ to\ k$ in the first equation of model (5). After that, we test the null hypothesis that claims, $H_0 : \alpha_1^{(1PC)}, \dots, \alpha_k^{(1PC)} = 0$, where, $\alpha_1^{(1PC)}, \dots, \alpha_k^{(1PC)}$ are the coefficients of private credit from PC_{t-1} to PC_{t-k}. Then we test reverse causality from GDPG to PC assuming that the coefficients of GDPG from lag $1\ to\ k$ are zero in the second equation. In this case, the null insists that, $H_0 : \alpha_1^{(2GDPG)}, \dots, \alpha_k^{(2GDPG)} = 0$, where, $\alpha_1^{(2GDPG)}, \dots, \alpha_k^{(2GDPG)}$ are the coefficients of GDP growth from $GDPG_{t-1}$ to $GDPG_{t-k}$.

4.4.3 Granger non-causality between GCF and GDPG

The augmented VAR model for testing Granger non-causality between GCF and GDPG is,

$$\begin{bmatrix} GDPG_t \\ GCF_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(1GDPG)} + a_1^{(1GCF)} \\ a_1^{(2GDPG)} + a_1^{(2GCF)} \end{bmatrix} \begin{bmatrix} GDPG_{t-1} \\ GCF_{t-1} \end{bmatrix} + \dots + \begin{bmatrix} a_k^{(1GDPG)} + a_k^{(1GCF)} \\ a_k^{(2GDPG)} + a_k^{(2GCF)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k} \\ GCF_{t-k} \end{bmatrix}$$
$$+ \begin{bmatrix} a_{k+1}^{(1GDPG)} + a_{k+1}^{(1GCF)} \\ a_{k+1}^{(2GDPG)} + a_{k+1}^{(2GCF)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k-1} \\ GCF_{t-k-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (6)$$

In this case, we impose zero restrictions on the coefficients of GCF from lag $1\ to\ k$ in the first equation of model (6) then, we test Granger non-causality from GCF to GDPG with the null

$H_0: \alpha_1^{(1GCF)}, \ldots, \alpha_k^{(1GCF)} = 0$, where, $\alpha_1^{(1GCF)}, \ldots, \alpha_k^{(1GCF)}$ are the coefficients of gross capital formation from GCF_{t-1} to GCF_{t-k}. Also, we conduct reverse causality test from GDPG to GCF restricting coefficients of GDPG from lag $1\ to\ k$ to zero in the second equation, thus the null claims, $H_0: \alpha_1^{(2GDPG)}, \ldots, \alpha_k^{(2GDPG)} = 0$, where, $\alpha_1^{(2GDPG)}, \ldots, \alpha_k^{(2GDPG)}$ are the coefficients of GDP growth from $GDPG_{t-1}$ to $GDPG_{t-k}$.

4.4.4 Granger non-causality between TRD and GDPG

The augmented VAR model for testing Granger non-causality between TRD and GDPG is,

$$\begin{bmatrix} GDPG_t \\ TRD_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(1GDPG)} + a_1^{(1TRD)} \\ a_1^{(2GDPG)} + a_1^{(2TRD)} \end{bmatrix} \begin{bmatrix} GDPG_{t-1} \\ TRD_{t-1} \end{bmatrix} + \ldots + \begin{bmatrix} a_k^{(1GDPG)} + a_k^{(1TRD)} \\ a_k^{(2GDPG)} + a_k^{(2TRD)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k} \\ TRD_{t-k} \end{bmatrix}$$
$$+ \begin{bmatrix} a_{k+1}^{(1GDPG)} + a_{k+1}^{(1TRD)} \\ a_{k+1}^{(2GDPG)} + a_{k+1}^{(2TRD)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k-1} \\ TRD_{t-k-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (7)$$

To test Granger non-causality from TRD to GDPG, we impose zero restrictions on the coefficients of TRD from lag $1\ to\ k$ in the first equation of model (7) then, our null hypothesis is, $H_0: \alpha_1^{(1TRD)}, \ldots, \alpha_k^{(1TRD)} = 0$, where, $\alpha_1^{(1TRD)}, \ldots, \alpha_k^{(1TRD)}$ are the coefficients of trade from TRD_{t-1} to TRD_{t-k}. After that, we check reverse causality from GDPG to TRD imposing zero restrictions on the coefficients of GDPG from lag $1\ to\ k$ in the second equation. In this case, the null is, $H_0: \alpha_1^{(2GDPG)}, \ldots, \alpha_k^{(2GDPG)} = 0$, where, $\alpha_1^{(2GDPG)}, \ldots, \alpha_k^{(2GDPG)}$ are the coefficients of GDP growth from $GDPG_{t-1}$ to $GDPG_{t-k}$.

4.4.5 Granger non-causality between GC and GDPG

The augmented VAR model for testing Granger non-causality between GC and GDPG is,

$$\begin{bmatrix} GDPG_t \\ GC_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(1GDPG)} + a_1^{(1GC)} \\ a_1^{(2GDPG)} + a_1^{(2GC)} \end{bmatrix} \begin{bmatrix} GDPG_{t-1} \\ GC_{t-1} \end{bmatrix} + \dots + \begin{bmatrix} a_k^{(1GDPG)} + a_k^{(1GC)} \\ a_k^{(2GDPG)} + a_k^{(GC)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k} \\ GC_{t-k} \end{bmatrix}$$

$$+ \begin{bmatrix} a_{k+1}^{(1GDPG)} + a_{k+1}^{(1GC)} \\ a_{k+1}^{(2GDPG)} + a_{k+1}^{(2GC)} \end{bmatrix} \begin{bmatrix} GDPG_{t-k-1} \\ GC_{t-k-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (8)$$

We conduct Granger non-causality test from GC to GDPG imposing zero restrictions on the coefficients of GC from lag $1\ to\ k$ in the first equation of model (8). Therefore, the null hypothesis states, $H_0 : \alpha_1^{(1GC)}, \dots, \alpha_k^{(1GC)} = 0$, where, $\alpha_1^{(1GC)}, \dots, \alpha_k^{(1GC)}$ are the coefficients of government credit from GC_{t-1} to GC_{t-k}. Again, we examine reverse causality from GDPG to GC. For this, we assume the parameters of GDPG from lag $1\ to\ k$ are zero in the second equation, and test the null, $H_0 : \alpha_1^{(2GDPG)}, \dots, \alpha_k^{(2GDPG)} = 0$, where, $\alpha_1^{(2GDPG)}, \dots, \alpha_k^{(2GDPG)}$ are the coefficients of GDP growth from $GDPG_{t-1}$ to $GDPG_{t-k}$.

4.4.6 Granger non-causality between PC and GCF

The augmented VAR model for testing Granger non-causality between PC and GCF is,

$$\begin{bmatrix} GCF_t \\ PC_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_1^{(1GCF)} + a_1^{(1PC)} \\ a_1^{(2GCF)} + a_1^{(2PC)} \end{bmatrix} \begin{bmatrix} GCF_{t-1} \\ PC_{t-1} \end{bmatrix} + \dots + \begin{bmatrix} a_k^{(1GCF)} + a_k^{(1PC)} \\ a_k^{(2GCF)} + a_k^{(2PC)} \end{bmatrix} \begin{bmatrix} GCF_{t-k} \\ PC_{t-k} \end{bmatrix}$$

$$+ \begin{bmatrix} a_{k+1}^{(1GCF)} + a_{k+1}^{(1PC)} \\ a_{k+1}^{(2GCF)} + a_{k+1}^{(2PC)} \end{bmatrix} \begin{bmatrix} GCF_{t-k-1} \\ PC_{t-k-1} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \qquad (9)$$

To carry out Granger non-causality test from PC to GCF we impose zero restrictions on the coefficients of PC from lag $1\ to\ k$ in the first equation of model (9) then, we test the null which claims, $H_0 : \alpha_1^{(1PC)}, \dots, \alpha_k^{(1PC)} = 0$, where, $\alpha_1^{(1PC)}, \dots, \alpha_k^{(1PC)}$ are the coefficients of private credit from PC_{t-1} to PC_{t-k}. Also, we perform reverse causality test from GCF to PC setting zero limit on the coefficients of GCF from lag $1\ to\ k$. Then we test our null hypothesis $H_0 : \alpha_1^{(2GCF)}, \dots, \alpha_k^{(2GCF)} = 0$, against the alternative hypothesis $H_1 : \alpha_1^{(2GCF)}, \dots, \alpha_k^{(2GCF)} \neq 0$, where, $\alpha_1^{(2GCF)}, \dots, \alpha_k^{(2GCF)}$ are the coefficients of gross capital formation from GCF_{t-1} to GCF_{t-k}.

If our empirical analyses do not reject the zero restrictions on the coefficients of the variables, we do not reject the null hypotheses of Granger non-causality. But, if our empirical analyses do reject the zero limits on the coefficients, we reject the null of Granger non-causality and validate alternative hypotheses. Consequently, based on the evidences obtained from our empirical study, we will infer whether financial development causes economic growth in Nepal.

Chapter 5.

Empirical analysis and results

5.1 Lag selection, unit root and autocorrelation tests

We begin our empirical analysis by determining the optimal lag length for our VAR model. To determine the optimal lag order, we depend on Akaike information criterion (AIC) and Schwartz's criterion (SC). AIC suggests lags 5 while SC suggests lag 1 (see Appendix for the test results).

As suggested by SC, we choose lag 1 as an optimal lag order for our VAR model. We select the optimal lag order 1 since we are analysing annual data. Lag 1 can appropriately capture the impact of changes in financial and monetary policy on economic growth in the instance of using annual data. Next, we establish the order of integration of the variables GDPG, GCF, FD, PC, TRD and GC employing augmented Dickey-Fuller (ADF) test. For ADF test, we choose maximum lag order 5 based on Akaike information criterion (AIC). We select lag 5 to carry out ADF test since the selection of too small lag length can provide biased result.

The ADF unit root test results are shown in Table 6. The results illustrate that ADF tests do not reject the null that insist the variables are I(1) with 1% significance level for all the variables. Furthermore, we check stationarity of the selected variables using Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test. Table 7 illustrates the results of KPSS test. As shown in Table 7, the KPSS tests do not reject the null hypotheses that claim the variables are stationarity with 5% level of significance for financial depth (FD), and government credit (GC), and for rest of the variables, the test does not reject the null with 1% level of significance. Hence, the results obtained from both ADF and KPSS tests confirm stationarity of the selected variables.

Table 6: Augmented Dickey-Fuller Test

Variable	*Deterministic Terms*	*Lags*	*Test-value*	*Critical Values*		
				1%	5%	10%
$GDPG$	constant, trend	5	-1.626	-4.15	-3.50	-3.18
$\Delta GDPG$	Constant	4	-12.15**	-2.62	-1.95	-1.61
GFC	constant, trend	5	-3.063	-4.15	-3.50	-3.18
ΔGFC	Constant	4	-4.614**	-2.62	-1.95	-1.61
FD	constant, trend	5	-1.585	-4.15	-3.50	-3.18
ΔFD	Constant	4	-4.311**	-2.62	-1.95	-1.61
PC	constant, trend	5	1.509	-4.15	-3.50	-3.18
ΔPC	Constant	4	-3.433**	-2.62	-1.95	-1.61
TRD	constant, trend	5	-2.21	-4.15	-3.50	-3.18
ΔTRD	Constant	4	-4.043**	-2.62	-1.95	-1.61
GC	constant, trend	5	-2.727	-4.15	-3.50	-3.18
ΔGC	Constant	4	-3.655**	-2.62	-1.95	-1.61

**Specifies significance at the 5% level and **at the 1% level.*

Since the lag selection procedure suggested that the optimal lag length is 'one' for our VAR model, and the ADF unit root test showed that all the variables used in this study are I(1), as per the

recommendation of Toda and Yamamoto (1995), we fit lags 2 in our augmented VAR model to carry out Granger causality test.

Table 7: KPSS Test

Variable	*Lags*	*Test-value*	*Critical Values*		
			10%	5%	1%
Gross Domestic Product Growth (GDPG)	Short	0.199**	0.119	0.146	0.216
Financial Depth (FD)	Short	0.125*	0.119	0.146	0.216
Gross Capital Formation (GCF)	Long	0.155**	0.119	0.146	0.216
Private Credit (PC)	Long	0.161**	0.119	0.146	0.216
Trade (TRD)	Short	0.174**	0.119	0.146	0.216
Government Credit (GC)	Short	0.124*	0.119	0.146	0.216

**Specifies significance of KPSS test statistic at the 5% level and **at the 1% level.*

In addition, we use Breusch-Godfrey LM test to investigate the residual autocorrelation in our bivariate VAR models. Table 8 illustrates the results that explain residual autocorrelation in bivariate models used in our study.

Table 8: Test for residual autocorrelation (Breusch-Godfrey LM test)

Null Hypothesis(H0)	*Lag =1(p-values)*
No autocorrelation between Residuals of FD and GDPG	*0.695 > 0.05 (No autocorrelation)*
No autocorrelation between Residuals of PC and GDPG	*0.121 > 0.05 (No autocorrelation)*
No autocorrelation between Residuals of PC and GCF	*0.225 > 0.05 (No autocorrelation)*
No autocorrelation between Residuals of GCF and GDPG	*0.756 > 0.05 (No autocorrelation)*
No autocorrelation between Residuals of TRD and GDPG	*0.418 > 0.05 (No autocorrelation)*
No autocorrelation between Residuals of GC and GDPG	*0.304 > 0.05 (No autocorrelation)*

In Table 8, we can see that the *p*-values for LM test of residual autocorrelation for all bivariate models are greater than 0.05, thus, we do not reject the null of no residual autocorrelation in our bivariate VAR models. The evidence of no residual autocorrelation satisfies the assumption that the error terms are independent in least squares estimation. Hence, we can confirm that the VAR framework in our study does not suffer from biasness that may arise due to residual autocorrelation.

5.2 Causality between Financial Development and Economic Growth

The *p*-values in Table 9 demonstrate causal association between the indicators of financial development (FD, PC), and economic growth (GDPG). Also, the *p*-values for Granger non-causality between PC and gross capital formation (GCF) are shown in Table 9.

Our empirical analysis discovered positive evidence on the causal effect of financial depth (FD) and private credit (PC) on economic growth of Nepal. With 95% certainty, the *p*-value in Table 9 rejects the null hypothesis that claims FD does not Granger cause GDPG. But, the Granger test of the reverse causality from GDPG to FD does not reject the null that insists no causal relationship between the two variables.

Similarly, the *p*-value in Table 9 rejects the null of Granger non-causality from PC to GDPG with 95% confidence. In contrast, we do not reject the null of Granger non-causality from PC to GCF as *p*-value is greater than 0.05 for this test. Likewise, considering the flow of causality from GDPG to PC, the *p*-value in table 1 is insignificant (as *p*-value > 0.05) so we do not reject the null that insists GDPG does not Granger cause PC. In the like manner, the *p*-value for reverse causality from GCF to PC is insignificant as well.

Table 9: Granger non-Causality *p-values*

Null Hypothesis(H0)	p^a*=2*	*p=3*
FD does not Granger cause GDPG	0.031*	0.5
PC does not Granger cause GDPG	0.031*	0.13
PC does not Granger cause GCF	0.152	0.127
Reverse Causality Test		
GDPG does not Granger cause FD	0.521	0.432
GDPG does not Granger cause PC	0.704	0.864
GCF does not Granger cause PC	0.474	0.383

p^a *= number of lags in the VAR; and *Specifies significance at the 5% level and **at the 1% level.*

In table 9, we have demonstrated the *p*-values for the test of Granger non-causality in augmented VAR(3) model as well. We reported the *p*-values from augmented VAR(3) framework to demonstrate that augmented VAR(2) model is valid for our case study. We do so by comparing the *p*-values from augmented VAR(2) with the ones from augmented VAR(3). The *p*-values obtained from augmented VAR(3) do not reject the null of Granger non-causality in case of all the bivariate models in Table 9, while the *p*-values acquired from augmented VAR(2) show that FD and PC are important for real output growth in Nepal. Since augmented VAR(2) produces significant result, we conclude that augmented VAR(2) model is good fit for our study.

Table 10 explains the direction of causality between FD, PC, GDPG and GCF. From Table 10, we can confirm that causality flows from FD to GDPG but, the reverse causality does not happen. Similarly, the evidences in Table 10 prove that causality flows in one direction from PC to GDPG

in Nepal. Based on these outcomes, we can infer that both financial depth and private credit can cause economic growth in Nepal significantly. Hence the timely review of financial policy can help to formulate appropriate guiding principal to improve the financial structure and performance that can cause higher economic growth in Nepal.

Table 10: Direction of Granger causality (significance at 5% level)

Granger Causality	*Direction of Causality*	*Two-way or one-way*
Between FD and GDPG	$FD \rightarrow GDPG$	*One-way*
Between PC and GDPG	$PC \rightarrow GDPG$	*One-way*
Between PC and GCF	*No causality*	*No causality*

On the other hand, the empirical results suggest that private credit does not promote gross capital formation and vice versa. This evidence is surprising given the above. However, for a deeper understanding of the dynamics between the two variables, we suggest a broader analysis of the interaction between the variables. However, as a preliminary explanation based on the personal experiences and observations of the author of this study, the explanation could well be the extent to which 'unproductive' economic activities absorb private credit flows. Specifically, much private credit in Nepal is absorbed in real-estate speculation, and upon imported consumer goods. To the extent that this is the case, increasing private sector credit could be making people 'better off' in certain ways, but may not drive capital formation.

5.3 Causality between other variables and Economic Growth

In this section, we interpret the results obtained from Granger no-causality tests between GCF and GDPG; trade (TRD) and GDPG; and government credit (GC) and GDPG. Table 11 shows the *p*-values. In Table 11, we can see that, the *p*-value rejects the null hypothesis that asserts GCF does

not Granger cause GDPG with 99% confidence. Similarly, the *p*-values refuse the null hypotheses of Granger non-causality from TRD to GDPG, and from GC to GDPG with 1% level of significance.

Table 11: Granger non-Causality *p-values*

Null Hypotheis (H0)	p^a =2	*p* =3
GCF does not Granger cause GDPG	0.002**	0.001**
TRD does not Granger cause GDPG	0.002**	0.026*
GC does not Granger cause GDPG	0.008**	0.024*
Reverse Causality Test		
GDPG does not Granger cause GCF	0.390	0.270
GDPG does not Granger cause TRD	0.358	0.055
GDPG does not Granger cause GC	0.970	0.932

*p^a = number of lags in the VAR; and *Specifies significance at the 5% level and **at the 1% level.*

On the other hand, the *p*-values for reverse causality from GDPG to GCF, GDPG to TRD, and GDPG to GC are insignificant (as *p*-values > 0.05). So, we do not reject the null hypotheses that assert Granger non-causality from GDPG to GCF, TRD and GC respectively. We have demonstrated the *p*-values obtained from augmented VAR(3) in Table 11 as well. Here, however, both the models illustrate similar results, the *p-values* show that augmented VAR(2) is good fit for our study.

Table 12 illustrates causal direction. Looking at this table, we can confirm that causality flows in single direction from gross capital formation (GCF), trade (TRD) and government credit (GC) to

GDPG. Apparently, the empirical evidence elucidates that gross capital formation, trade and government credit cause economic growth in Nepal (highly significantly). Hence we infer that a balanced economic policy that can foster gross capital formation, trade, government credit and financial development side by side is necessary to attain high economic growth in Nepal.

Table 12: Direction of Granger causalities (significance at 5% level)

Granger Causality	*Direction of Causality*	*Two-way or one-way*
Between GCF and GDPG	$GCF \rightarrow GDPG$	*One-way*
Between TRD and GDPG	$TRD \rightarrow GDPG$	*One-way*
Between GC and GDPG	$GC \rightarrow GDPG$	One-way

We performed the various robustness tests in the course of our econometric analysis. We tested the sensitivity of Granger non-causality tests to lag order other than the optimal lag chosen in our study to ensure that the maximum lag order chosen for our study is valid, since VAR systems are often sensitive to various lag orders. Moreover, we used White's Heteroscedasticity consistent covariance matrix estimator to ensure that the results obtained from our Granger non-causality tests are robust to any discrepancies that may arise due to heteroscedasticity present in residual distribution of each variable. Thus, we infer that the results of our study are robust and reliable.

Our empirical analysis discovered that financial development is significantly important for economic growth in Nepal. However, this investigation did not employ impulse response analysis and variance decomposition analysis, which can measure a magnitude of the impact of a shock in financial sector on economic growth of Nepal.

Chapter 6.

Conclusions, Policy Implications and Further Research

This study investigated the possible causal relationship between financial development and economic growth in Nepal using a Granger causality test as developed by Toda and Yamamoto (1995). Based on the results obtained from our empirical analysis, we conclude that financial development plays an important role in the economic growth of Nepal. This finding is consistent with the finance leading growth framework promoted by Schumpeter (1911), Goldsmith (1969), McKinnon (1973), Shaw (1973), and King and Levine (1993). Similarly, we conclude that gross capital formation, trade and government credit also play highly significant roles in the economic growth of Nepal. These findings imply that both real and financial sectors development is essential for the healthy economic growth of Nepal.

This study's findings are also consistent with the claims made by Hassan, Sanchez, and Yu (2011), and Bordo and Rousseau (2012). Hassan, Sanchez, and Yu (2011), who suggest that the variables from the real sector, such as government expenditure and trade, can play important role along with financial development to steer developing nations to the path of stable economic growth.

Lately, many studies have claimed that legal origin, political factors, regulatory and supervisory framework, human capital, and macroeconomic variables such as, inflation and budget deficits, influence financial system. As a consequence of all of this, and of the findings here, there is clearly no 'silver bullet' for economic growth and development. Nepal's financial sector will, if appropriately regulated and encouraged, be part of a mix of policies and institutions that together can take a country forward to better times ahead.

The time and space allowed for a thesis such as this leaves much room for further research. Data limitations for Nepal preclude much in the way of greater statistical 'mining', but productive effort could be employed especially in two areas; firstly, a study such as this could be 'nuanced' for institutional (laws, 'rules of game') quality; secondly, the analysis of the contribution of banks to economic growth could be extended to include financial markets, as well as non-bank financial institutions. Also, we have observed a big knowledge gap on whether banks and financial markets compete or complement each other in the process of economic growth in Nepal. Further studies on such issues can provide useful insight on dynamic interaction between banks and financial markets to promote growth.

APPENDIX

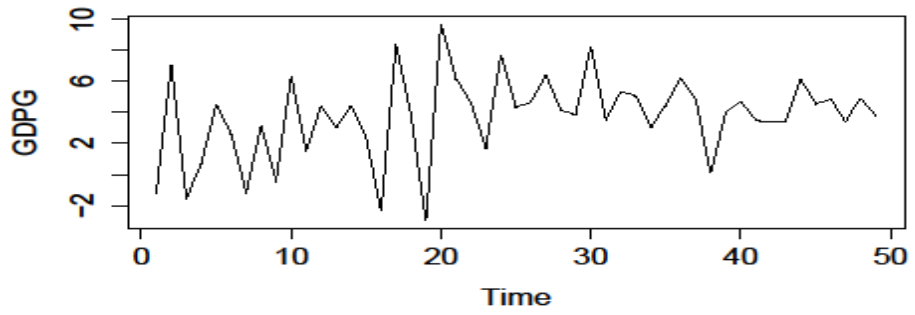
A. Data Table

Year	GDPG	GCF	FD	PC	TRD	GC
1965	-1.20319	6.444127	3.604429	1.97	21.68868	0
1966	7.040643	4.834274	4.175019	2.27	14.4015	0
1967	-1.5715	4.988309	5.083605	2.12	13.82697	0.09
1968	0.675483	5.687997	5.290187	2.71	14.34546	0
1969	4.463422	4.846587	6.245288	2.43	17.23231	0
1970	2.575992	5.964872	7.865758	2.95	13.20712	0
1971	-1.19538	7.753412	7.534565	3.59	14.53345	0
1972	3.1178	7.32954	6.945984	3.86	13.57894	0
1973	-0.47654	9.178453	8.491874	4.6	16.98265	0.42
1974	6.33359	8.76015	11.21178	5.48	15.99782	1.09
1975	1.456471	14.4952	12.02844	4.73	22.26782	1.72
1976	4.398536	15.13165	12.13787	4.12	24.95113	2.76
1977	3.016973	16.02431	14.49799	5	26.10532	4.33
1978	4.405741	18.27995	14.53152	5.43	26.04399	4.89
1979	2.368878	15.81814	15.63183	5.99	27.75152	5.08
1980	-2.31939	18.28616	18.13967	8.21	30.2728	4.997
1981	8.341974	17.60721	17.00724	9.15	32.51914	4.762
1982	3.779375	17.14857	16.91021	8.51	30.39886	5.391
1983	-2.97741	19.6327	17.4284	7.99	31.54621	7.394

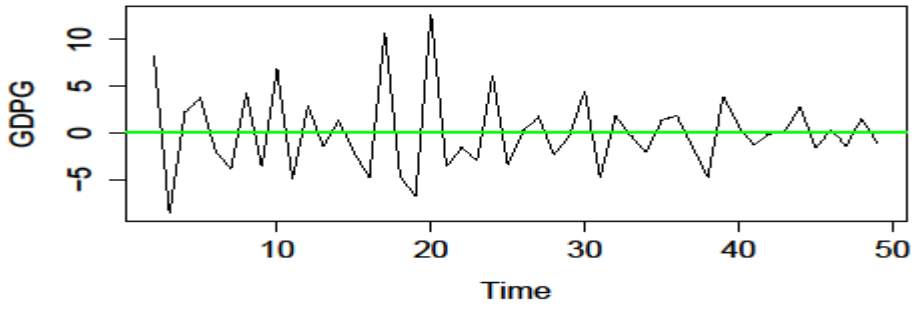
1984	9.68113	18.6621	18.06557	8.06	30.10155	6.586
1985	6.144905	22.55613	18.8142	8.66	31.52879	7.231
1986	4.565651	20.26416	19.46862	9.27	31.96504	6.572
1987	1.695618	21.18878	20.00462	9.6	32.71989	7.647
1988	7.696809	22.29215	21.35953	10.33	33.82904	7.463
1989	4.329648	21.50691	21.77772	11.6	33.35093	6.374
1990	4.635036	18.12582	23.16841	11.3	32.18875	6.189
1991	6.36815	20.25347	23.76973	11.4	34.67506	7.932
1992	4.106407	20.70466	25.6708	11.64	41.69541	7.239
1993	3.84985	22.5709	26.07225	12.07	47.18958	7.403
1994	8.216003	22.40355	28.09236	14.86	50.43207	5.219
1995	3.468452	25.1995	32.73031	19.14	59.49052	3.75
1996	5.328284	27.20509	33.60495	22.31	58.45777	3.745
1997	5.048613	25.34072	36.2381	23.05	64.03553	3.593
1998	3.016389	24.83937	36.75445	25.54	56.7096	3.307
1999	4.412573	20.48352	38.00117	26.55	52.56698	4.318
2000	6.2	24.31487	39.19261	28.84	55.71059	4.58
2001	4.799763	22.3941	39.7115	28.71	55.83717	6.846
2002	0.120267	20.24621	40.92201	29.02	46.23072	8.558
2003	3.945038	21.40938	41.53117	30.67	44.24788	10.021
2004	4.682603	24.53115	46.41758	32.14	46.14729	10.303
2005	3.479181	26.45116	52.82846	33.43	44.06295	9.315
2006	3.364615	26.85186	59.24184	37.24	44.76197	10.068

2007	3.41156	28.68525	60.14403	46.69	44.57936	9.266
2008	6.104639	30.31565	60.02507	53.74	46.03621	9.527
2009	4.533079	31.67438	67.90142	50.66	47.07945	7.145
2010	4.816415	38.34716	71.46577	50.22	45.98491	9.399
2011	3.421828	37.98723	60.02507	53.21	41.58491	10.292
2012	4.852476	34.49707	67.90142	53.02	43.65821	10.664
2013	3.781821	36.90353	71.46577	57.49	48.21336	9.912

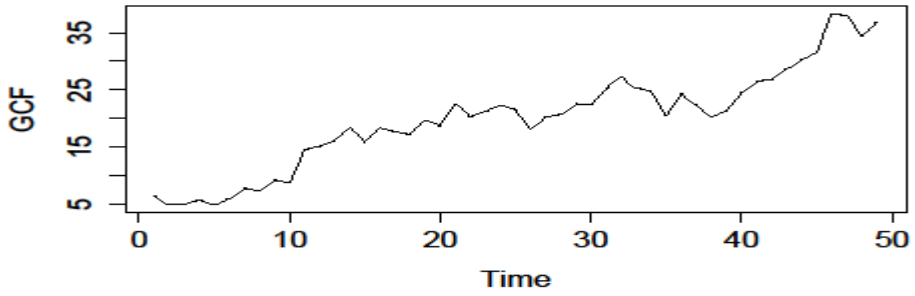
B. Graphs of each variable at level and their first difference:



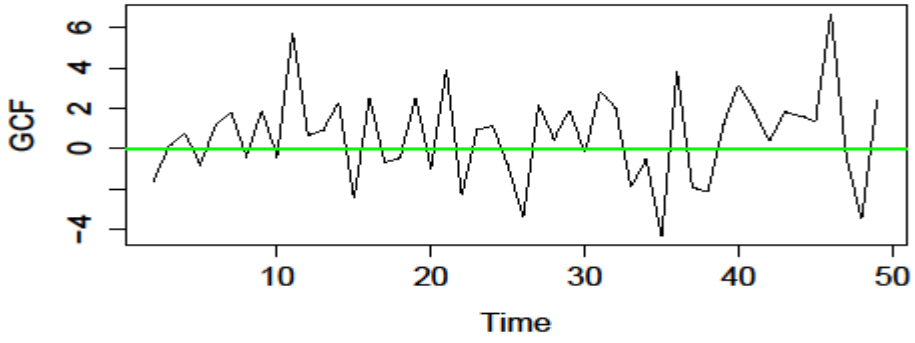
Graph of GDP growth at level



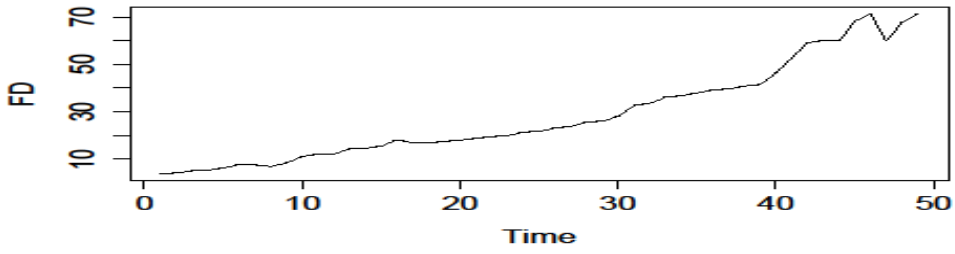
First difference of GDP growth



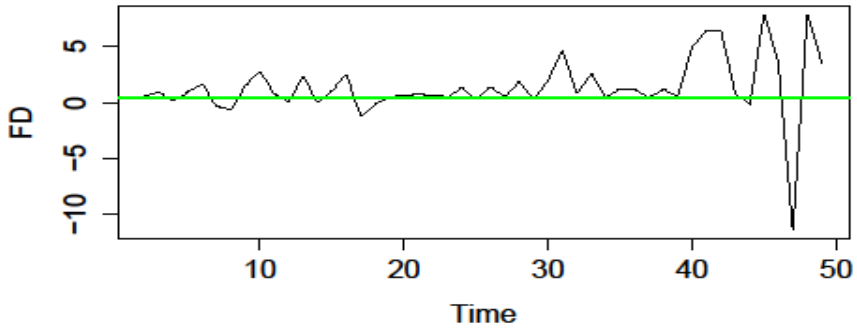
Graph of gross capital formation at level



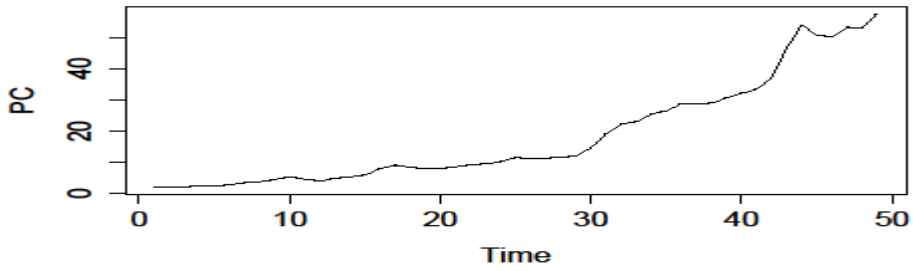
First difference of Gross Capital Formation



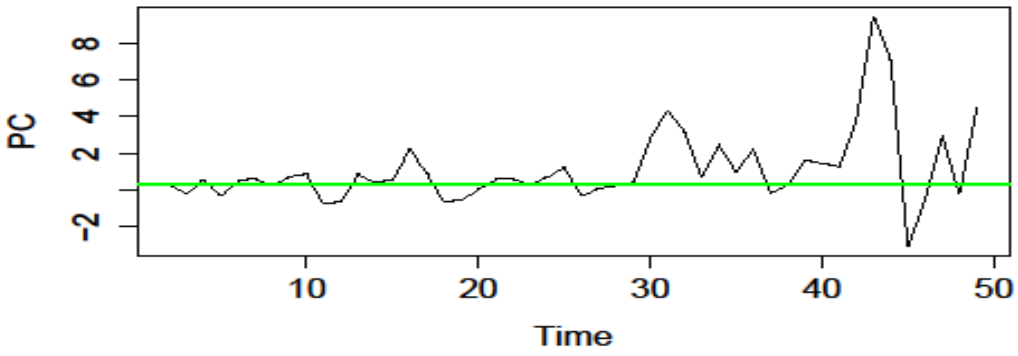
Graph of Financial Development at Level



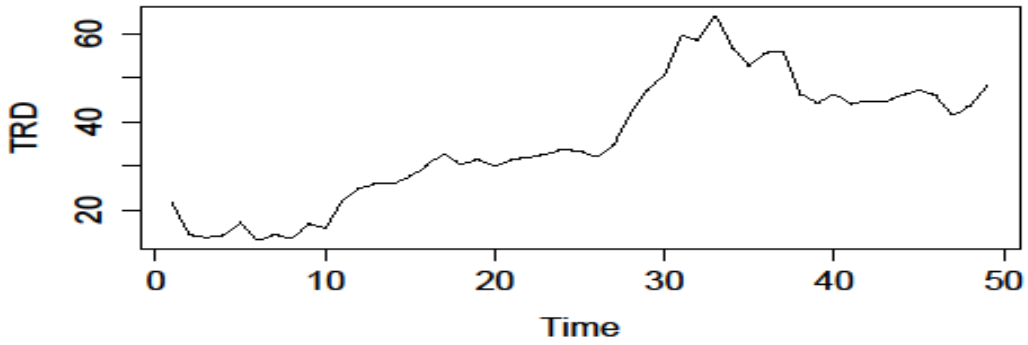
First difference of Financial Development



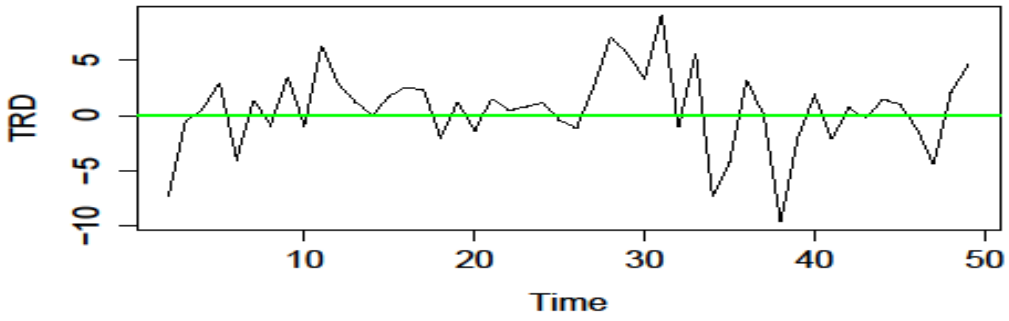
Graph of private credit at level



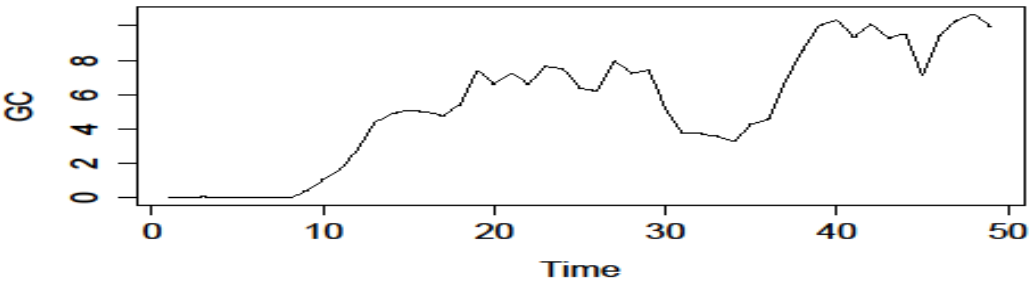
First difference of private credit



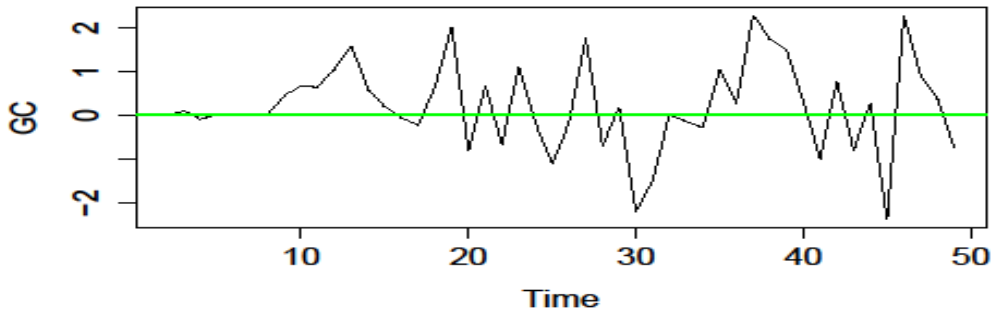
Plot of trade at level



First difference of trade



Plot of government credit at level



First difference of government credit

C. Max lag selection test

```
$selection
AIC(n)  HQ(n)  SC(n) FPE(n)
     7      7      7      6

$criteria
                  1             2             3             4             5
AIC(n) -4.877666e+01 -4.897360e+01 -4.951613e+01 -4.943398e+01 -5.273491e+01
HQ(n)  -4.781784e+01 -4.726905e+01 -4.706583e+01 -4.623794e+01 -4.879313e+01
SC(n)  -4.614361e+01 -4.429262e+01 -4.278723e+01 -4.065715e+01 -4.191015e+01
FPE(n)  6.896781e-22  7.308836e-22  8.729103e-22  5.640064e-21  4.373438e-20
                  6    7    8
AIC(n) -1.991749e+02 -Inf -Inf
HQ(n)  -1.944874e+02 -Inf -Inf
SC(n)  -1.863022e+02 -Inf -Inf
FPE(n) -1.381973e-83    0    0
```

References

Abu-Bader, S & Abu-Qarn, AS 2008, 'Financial development and economic growth: The Egyptian experience', *Journal of Policy Modeling*, vol. 30, no. 5, pp. 887–898.

Ang, JB 2008, 'What are the mechanisms linking financial development and economic growth in Malaysia?', *Economic Modelling*, vol. 25, no. 1, pp. 38–53.

Anwar, S & Nguyen, L 2011, 'Financial development and economic growth in Vietnam', *Journal of Economics & Finance*, vol. 35, no. 3, pp. 348–360.

Arestis, P, Demetriades, PO & Luintel, KB 2001, 'Financial Development and Economic Growth: The Role of Stock Markets', *Journal of Money, Credit & Banking*, vol. 33, no. 1, pp. 16–41.

Bangake, C & Eggoh, JC 2011, 'Further evidence on finance-growth causality: A panel data analysis', *Economic Systems*, vol. 35, no. 2, pp. 176–188.

Beck, T, Demirguc-Kunt, A & Levine, R 2002, *Law and Finance: why Does Legal Origin Matter?*, National Bureau of Economic Research, accessed March 3, 2014, from <http://www.nber.org/papers/w9379>.

Beck, T & Levine, R 2004, 'Stock markets, banks, and growth: Panel evidence', *Journal of Banking & Finance*, vol. 28, no. 3, pp. 423–442.

Beck, T, Levine, R & Loayza, N 2000, 'Finance and the Sources of Growth', *Journal of Financial Economics*, vol. 58, no. 1, pp. 261–300.

Bencivenga, VR & Smith, BD 1991, 'Financial Intermediation and Endogenous Growth', *The Review of Economic Studies*, vol. 58, no. 2, pp. 195–209.

Bencivenga, VR, Smith, BD & Starr, RM 1996, 'Equity markets, transactions costs, and capital accumulation : an illustration', *The World Bank Economic Review*, vol. 10, no. 2 (May 1996), pp. 241–265.

Bhetuwal, K 2007, 'Financial Liberalization and Financial Development in Nepal', *NRB Economic Review*, vol. 19, pp. 23–41.

Bolbol, AA, Fatheldin, A & Omran, MM 2005, 'Financial development, structure, and economic growth: the case of Egypt, 1974–2002', *Research in International Business and Finance*, vol. 19, no. 1, pp. 171–194.

Central Bureau of Statistics 2010, *Statistical Pocket Book Nepal*, Government of Nepal. http://cbs.gov.np/?page_id=1079

Chakraborty, S & Ray, T 2006, 'Bank-based versus market-based financial systems: A growth-theoretic analysis', *Journal of Monetary Economics*, vol. 53, no. 2, pp. 329–350.

Chandavarkar, A 1992, 'Of finance and development: Neglected and unsettled questions', *World Development*, vol. 20, no. 1, pp. 133–142.

Chang, T & Caudill, SB 2005, 'Financial development and economic growth: the case of Taiwan', *Applied Economics*, vol. 37, no. 12, pp. 1329–1335.

Christopoulos, DK & Tsionas, EG 2004, 'Financial development and economic growth: evidence from panel unit root and cointegration tests', *Journal of Development Economics*, vol. 73, no. 1, pp. 55–74.

Deidda, L & Fattouh, B 2008, 'Banks, financial markets and growth', *Journal of Financial Intermediation*, vol. 17, no. 1, pp. 6–36.

Demetriades, PO & Hussein, KA 1996, 'Does financial development cause economic growth? Time-series evidence from 16 countries', *Journal of Development Economics*, vol. 51, no. 2, pp. 387–411.

Demetriades, PO & Luintel, KB 1996, 'Banking Sector Policies and Financial Development in Nepal', *Oxford Bulletin of Economics and Statistics*, vol. 58, no. 2, pp. 355–372.

Dolado, JJ & Lütkepohl, H 1996, 'Making wald tests work for cointegrated VAR systems', *Econometric Reviews*, vol. 15, no. 4, pp. 369–386.

Fung, MK 2009, 'Financial development and economic growth: Convergence or divergence?', *Journal of International Money and Finance*, vol. 28, no. 1, pp. 56–67.

Goldsmith, R 1969, *Financial Structure and Development*, Yale University Press, New Haven, CT.

Hao, C 2006, 'Development of financial intermediation and economic growth: The Chinese experience', *China Economic Review*, vol. 17, no. 4, pp. 347–362.

Hassan, MK, Sanchez, B & Yu, J-S 2011, 'Financial development and economic growth: New evidence from panel data', *The Quarterly Review of Economics and Finance*, vol. 51, no. 1, pp. 88–104.

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

Hondroyiannis, G, Lolos, S & Papapetrou, E 2005, 'Financial markets and economic growth in Greece, 1986–1999', *Journal of International Financial Markets, Institutions and Money*, vol. 15, no. 2, pp. 173–188.

Johansen, S 1988, 'Statistical analysis of cointegration vectors', *Journal of Economic Dynamics and Control*, vol. 12, no. 2–3, pp. 231–254.

Kar, M, Nazlıoğlu, Ş & Ağır, H 2011, 'Financial development and economic growth nexus in the MENA countries: Bootstrap panel granger causality analysis', *Economic Modelling*, vol. 28, no. 1–2, pp. 685–693.

Kharel, R & Pokhrel, D 2012, 'Does Nepal's Financial Structure Matter for Economic Growth?', *NRB Economic Review*, vol. 24, no. 2, pp. 31–46.

King, RG & Levine, R 1993, 'Finance and Growth: Schumpeter Might be Right', *The Quarterly Journal of Economics*, vol. 108, no. 3, pp. 717–737.

Lee, B-S 2012, 'Bank-based and market-based financial systems: Time-series evidence', *Pacific-Basin Finance Journal*, vol. 20, no. 2, pp. 173–197.

Levine, R 1991, 'Stock Markets, Growth, and Tax Policy', *Journal of Finance*, vol. 46, no. 4, pp. 1445–1465.

Levine, R 1997, 'Financial Development and Economic Growth: Views and Agenda', *Journal of Economic Literature*, vol. 35, no. 2, pp. 688–726.

Liang, Q & Teng, J-Z 2006, 'Financial development and economic growth: Evidence from China', *China Economic Review*, vol. 17, no. 4, pp. 395–411.

Lucas Jr., RE 1988, 'On the mechanics of economic development', *Journal of Monetary Economics*, vol. 22, no. 1, pp. 3–42.

Luintel, KB & Khan, M 1999, 'A quantitative reassessment of the finance–growth nexus: evidence from a multivariate VAR', *Journal of Development Economics*, vol. 60, no. 2, pp. 381–405.

Luintel, KB, Khan, M, Arestis, P & Theodoridis, K 2008, 'Financial structure and economic growth', *Journal of Development Economics*, vol. 86, no. 1, pp. 181–200.

Maskay, NM & Subedi, SR 2009, 'Development of the Nepalese Financial System: Need for the Formulation of a Master Plan', *NRB Economic Review*, vol. 21, pp. 31–51.

Marques, LM, Fuinhas, JA & Marques, AC 2013, 'Does the stock market cause economic growth? Portuguese evidence of economic regime change', *Economic Modelling*, vol. 32, pp. 316–324.

McKinnon, RI 1973, *Money and Capital in Economic Development*, Brookings Inst., Washington.

Minsky, H 1991, *The financial instability hypothesis: a clarification,* In Feldstein, M. (Ed.), *The Risk of Economic Crisis*, University of Chicago Press, Chicago and London.

Ndikumana, L 2005, 'Financial development, financial structure, and domestic investment: International evidence', *Journal of International Money and Finance*, vol. 24, no. 4, pp. 651–673.

Nepal Rastra Bank 2014 April, *Quraterly Economic Bulletin*, NRB, http://red.nrb.org.np/publications/economic_bulletin/Quarterly_Economic_Bulletin--2014-04_(Mid_April)-New.pdf.

Nieuwerburgh, SV, Buelens, F & Cuyvers, L 2006, 'Stock market development and economic growth in Belgium', *Explorations in Economic History*, vol. 43, no. 1, pp. 13–38.

Odhiambo, NM 2008, 'Financial depth, savings and economic growth in Kenya: A dynamic causal linkage', *Economic Modelling*, vol. 25, no. 4, pp. 704–713.

Porta, RL, Lopez-de-Silanes, F, Shleifer, A & Vishny, RW 1998, 'Law and Finance', *Journal of Political Economy*, vol. 106, no. 6, pp. 1113–1155.

Rajan, RG & Zingales, L 1998, 'Financial dependence and growth', *The American Economic Review*, vol. 88, no. 3, pp. 559–586.

Rambaldi, A & Doran, H 1996, 'Testing for Granger nan-causality in cointegrated systems made easy, Working Papers in Econometrics and Applied Statistics, no. 88, Department of Econometrics, University of New England.

Rioja, F & Valev, N 2004, 'Finance and the Sources of Growth at Various Stages of Economic Development', *Economic Inquiry*, vol. 42, no. 1, pp. 127–140.

Robinson, J 1952, 'The Generalization of the General Theory', in *The Rate of Interest, and Other Essays*, Macmillan, London, pp. 67–142.

Romer, PM 1986, 'Increasing Returns and Long-Run Growth', *Journal of Political Economy*, vol. 94, no. 5, pp. 1002–1037.

Rousseau, PL & Wachtel, P 2000, 'Equity markets and growth: cross-country evidence on timing and outcomes, 1980–1995', *Journal of Banking & Finance*, vol. 24, no. 12, pp. 1933–1957.

Schumpeter, JA 1912, *Theorie der Wirt-schaftlichen Entwicklung [The theory of economic development], Dunker & Hum-blot;* translated by Redvers Opie 1934, Harvard University Press, Cambridge, MA.

Shahbaz, M, Ahmed, N & Ali, L 2008, 'Stock Market Development and Economic Growth: Ardl Causality in Pakistan', *EuroJournals Publishing*, vol. 14, pp. 182–195.

Shan, J 2005, 'Does financial development lead economic growth? A vector auto-regression appraisal', *Applied Economics*, vol. 37, no. 12, pp. 1353–1367.

Shan, J & Jianhong, Q 2006, 'Does Financial Development Lead Economic Growth? The Case of China', *Annals of Economics and Finance*, vol. 7, no. 1, p. 197.

Shan, JZ, Morris, AG & Sun, F 2001, 'Financial Development and Economic Growth: An Egg-and-Chicken Problem', *Review of International Economics*, vol. 9, no. 3, pp. 443–54.

Shaw, ES 1973, *Financial Deepening in Economic Development*, Oxford University Press, New York.

Shrestha, GK 2004, 'Financial Sector Reforms in Nepal', *NRB Economic Review*, vol. 16, pp. 75–90.

Singh, A & Weisse, BA 1998, 'Emerging stock markets, portfolio capital flows and long-term economie growth: Micro and macroeconomic perspectives', *World Development*, vol. 26, no. 4, pp. 607–622.

Stiglitz, JE 1994, 'The role of state in financial markets and seven types of market failures',

www-wds.worldbank.org/servlet/.../IW3P/IB/1994/.../multi_page.pdf.

Tadesse, S 2002, 'Financial Architecture and Economic Performance: International Evidence', *Journal of Financial Intermediation*, vol. 11, no. 4, pp. 429–454.

Thangavelu, SM & Ang Beng Jiunn 2004, 'Financial development and economic growth in Australia: An empirical analysis', *Empirical Economics*, vol. 29, no. 2, pp. 247–260.

Tiwari, S 2009, 'Saroj Tiwari's Collections: Evolution of Banking Sector in Nepal', *Saroj Tiwari's Collections*, accessed August 2, 2014, from <http://sarojtiwari.blogspot.com.au/2009/09/evolution-of-banking-sector-in-nepal.html>

Toda, HY & Phillips, PCB 1993, 'Vector Autoregressions and Causality', *Econometrica*, vol. 61, no. 6, pp. 1367–1393.

Toda, HY & Yamamoto, T 1995, 'Statistical inference in vector autoregressions with possibly integrated processes', *Journal of Econometrics*, vol. 66, no. 1–2, pp. 225–250.

United Nations Human Development Programme 2013, Human Development Report, UNDP. http://hdr.undp.org/en/content/table-1-human-development-index-and-its-components.

Wu, J, Hou, H & Cheng, S 2010, 'The dynamic impacts of financial institutions on economic growth: Evidence from the European Union', *Journal of Macroeconomics*, vol. 32, pp. 879-891.

Yang, YY & Yi, MH 2008, 'Does financial development cause economic growth? Implication for policy in Korea', *Journal of Policy Modeling*, vol. 30, no. 5, pp. 827–840.

Zapata, HO & Rambaldi, AN 1997, 'Monte Carlo Evidence on Cointegration and Causation', *Oxford Bulletin of Economics & Statistics*, vol. 59, no. 2, pp. 285–293.