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NRB ECONOMIC REVIEW

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The Impact of Food Inflation on Poverty in Nepal

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Abstract

This paper examines the impact of food price hike on poverty in Nepal employing cross-sectional sample household consumption data of Nepal Living Standard Survey III. The findings of the study suggest that a 10 percent rise in food prices is likely to increase overall poverty in Nepal by 4 percentage points. It implies that one percent rise in food inflation will push 100 thousand additional people into overall poverty and 180 thousand additional people into food poverty. The paper also analyses the impact at the regional level and suggests some policy options to contain the food inflation and to mitigate the impact of food price hike on the poor section of the population.

Key words: Consumption, food prices, poverty
JEL Classification: A11, A13, E31

1. BACKGROUND

The global food prices have remained highly volatile during the last five years. Food prices in the global market recorded a dramatic increase in 2007 and then sharply declined in 2008 amidst the global financial crisis. Again the food prices started to increase in 2010 and reached a record level in 2011. During both these episodes, South Asia experienced relatively higher inflation rate driven by the food prices. In Nepal also, food prices have been the major contributor of the higher rate of overall inflation in the last few years. The major causes of the food price hike in Nepal are decline in agricultural production due to unfavorable weather conditions and various types of supply bottlenecks. On the demand side, growing population and increased remittance inflow raised the demand for cereal grains, which in turn exerted the pressure on prices. Moreover, export bans imposed by India and use of cereals as feed products also influenced the food prices in Nepal.

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According to the Nepal Living Standard Survey III, 2010/11 (CBS, 2011a), poor people spend 72 percent of their total consumption expenditure on food. This implies that higher food prices have a direct impact on households' purchasing power as it increases food deprivation and malnutrition. Besides, increased expenditures on food due to increased prices may lead to reduced expenditures on health and education, and also squeezes investment in agricultural inputs such as fertilizers, fuels, and power, which are required to increase the food production. Hence, rapid food price hikes have become matter of serious concern as these may have unwanted impact on poverty and hunger and may dilute the progress made toward achieving the Millennium Development Goals (MDGs). In this context, this paper tries to analyze the impact of food price hike on poverty in Nepal. The paper also discusses some policy options to contain the food inflation and suggests some measures for mitigating the impact of higher food prices on poor section of the population.

The rest of the paper proceeds as follows. Section 2 reviews the findings of previous studies on impact of food price hike in the global context. In section 3, the inflation trend in Nepal is discussed. Section 4 presents overview of the poverty status in Nepal and section 5 discusses the methodology and findings of the paper. Finally, section 6 concludes the paper.

2. LITERATURE REVIEW

As poor and vulnerable households spend major share of their total expenditures on basic foodstuffs, higher food prices erode their purchasing power. This will increase the hardship of those who are already below the poverty line and also push additional population below poverty line. Studies show that higher food prices can also increase level of inequality. In particular, studies of Bangladesh, Viet Nam and Latin America show that inequality rates in these countries rose as a result of the 2007-08 food price shocks (World Bank, 2008; Save the Children, 2009). These findings support ADB (2008) estimates that a 20 percent nominal food price increase leads to a one percent increase in the Gini coefficient.

Changes in food prices can affect poverty and inequality through consumption and income channels. As food prices increase, the monetary cost of achieving a fixed consumption basket increases leading to reduced consumer welfare. However, for the segment of the population whose income depends on agricultural markets, the rise in food prices results in an increase in their monetary income. For each household, the net welfare effect of an increase in food prices will depend on the combination of a loss in purchasing power (consumption effect) and a gain in monetary income (income effect). Since poor people spend a large majority of their income on food and many farmers derive much of their income from producing food, the changes in food prices will have large effects on the welfare of both farmers and poorer consumers (De Hoyos and Medvedev, 2009).

FAO (2011) argues that the average income of net food buyers is higher than that of net food sellers in most of the developing countries, and thus high food prices would transfer income from higher-income people to those with lower income. However, studies that use a more detailed disaggregation show that significant number of poor people in the developing countries is a net food buyer. Ivanic and Martin (2008) find that higher food prices increased poverty in seven of nine countries studied, with Peru and Viet Nam being the only exceptions. Viet Nam is a significant rice exporter with relatively equitable land distribution. As a result it has many households that produce a surplus of rice, but that are still relatively poor. In Peru, the beneficial impact was very small. In all other countries in the sample (Bolivia, Cambodia, Madagascar, Malawi, Nicaragua, Pakistan and Zambia), higher prices increased poverty, even after taking account of increased labour demand (Ivanic and Martin, 2008). A study by Zezza *et al.* (2008) also found that the poor are hurt by higher prices in all countries studied (Albania, Bangladesh, Ghana, Guatemala, Malawi, Nepal, Nicaragua, Pakistan, Panama, Tajikistan and Viet Nam), with the exception of rural dwellers in Viet Nam. This study did not examine labor market effects, but did incorporate supply and demand responses, and found that high prices still hurt the poor.

Ivanic and Martin (2008) estimate the poverty impact of global price changes of seven key staples (beef, dairy, maize, poultry, rice, sugar and wheat) between 2005 and 2007. Their results show that the effects of rising commodity prices on poverty differ considerably between countries and commodities, but that poverty increases are considerably more frequent and larger than poverty reductions. Urban households are typically hit harder than rural households, though many in rural areas are also net consumers of food and therefore adversely affected by price rises. The average impact of a 10 percent increase in seven key food items raises the poverty headcount ratio by 0.4 percentage point. Similarly, Wodon and Zaman (2008) find that in West and Central Africa, an increase in the price of cereals by 50 percent could increase the share of the population in poverty by 4.4 percentage points if only the impact on consumers is taken into account. Even when factoring in potential gains for producers, the headcount index of poverty would still increase by 2.5 percentage points.

An examination of the food price elasticity of poverty by ADB (2011) in 25 countries of Asia and Pacific shows that the effects of food price increases on poverty differ across countries and within countries. India, the rural areas in particular, and Bangladesh would be the most affected; while Sri Lanka would be the least affected by increase in food prices. It also explains that the poor in South Asia are more vulnerable to food price increases than other regions in developing Asia.

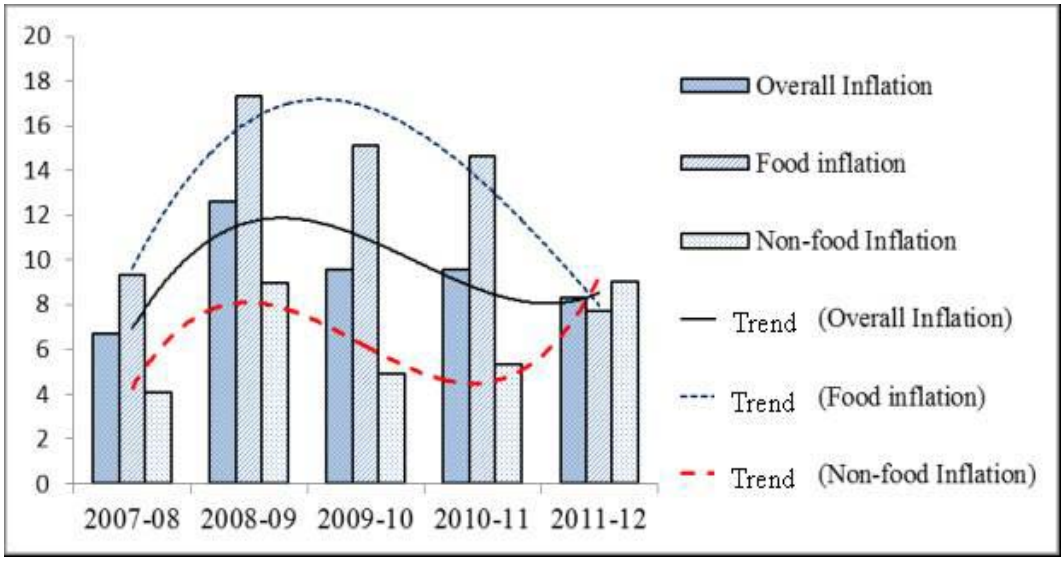
ESCAP (2011) simulations show that even a halt in the rise of food prices in 2011 would still have an impact on poverty, as the poor would still have to contend with a substantially higher level of food prices than in 2010. The results show that spike in food prices in 2010 and 2011 could postpone the achievement of the Millennium Development Goals (MDGs) on poverty reduction by up to half a decade in many countries of the

region, including least developed countries such as Bangladesh and Nepal. According to ADB (2012), an additional 112 million population in Asia could have escaped poverty annually in the late 2000s, had food prices not escalated.

3. INFLATION TREND IN NEPAL

Rising inflation has appeared as one of the core macroeconomic challenges in Nepal in recent times. During the last five years, fiscal year 2007-08 experienced moderate single digit inflation (6.7 percent) but it hovered around 13 percent in 2008-09 and remained in the higher single digit in the rest of the period. Sudden rise in global fuel prices in 2008 led to a drastic increase in petroleum prices in the domestic market, which in turn increased the cost of production of domestic products, resulting in rising prices of consumer goods and services. The combined effect of the rise in food, commodity, and fuel prices led to spiraling prices starting from 2008. Since then, the inflation remained on the higher side until the third quarter of 2011. However, inflation dropped to a four-year low rate of 8.3 percent in 2011-12 due mainly to moderating food prices (Figure 1).

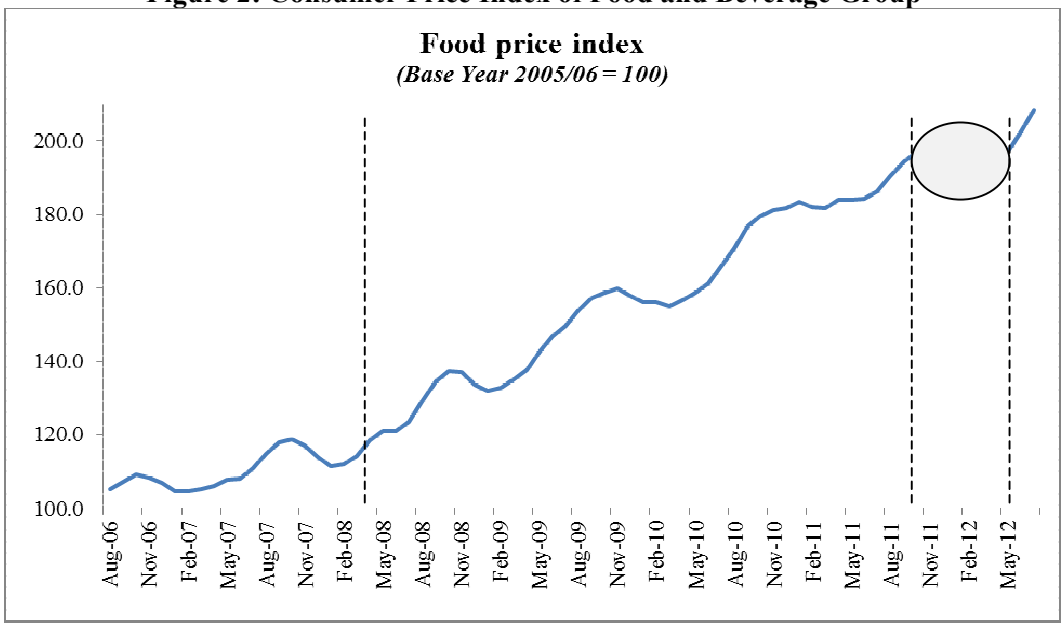
Figure 1: Inflation Trend



Data source: Nepal Rastra Bank, 2012

In most of the cases, food inflation has been the main contributor to overall inflation. Food prices witnessed a double-digit growth rates from April 2008 until September 2011. During these four years, the food price index rose from 118.5 to 194.3, recording an increase of 64 percent. From October 2011 to April 2012, food inflation rate remained moderate at 6 percent on average due to the food surplus in the country and moderation of food prices in India. However, food inflation started to rise after May 2012 mainly because of the supply obstructions resulting from the political activities and reached 11.9 percent in July 2012 (Figure 2).

Figure 2: Consumer Price Index of Food and Beverage Group



Data Source: Nepal Rastra Bank, 2012.

4. POVERTY STATUS IN NEPAL

According to the Cost of Basic Needs (CBN) approach, the poverty line is defined as the expenditure value (in local currency) required by an individual to fulfill his/her basic needs in terms of both food and non-food items. The food basket of the poverty line is constructed by estimating how much the poor spend to reach a minimum caloric requirement of 2,220 Kcal per day. Based on this approach, the overall poverty line has been set to be annual NRs 19,261, which is composed of the food poverty line of NRs 11,929 and the non-food poverty line of NRs 7,332 (CBS, 2011b).

The poverty incidence (head count rate) of overall poverty and food poverty in Nepal are 25 percent and 23 percent respectively. Among the ecological belts, the incidence is highest in Mountain followed by Hills and least in Terai in both the cases. However, the distribution of poor people is least in Mountain and higher in Hills and Terai (Table 1).

Table 1: Poverty and Its Distribution in Ecological Belts

Ecological Belt	Overall Poverty*		Food Poverty#	
	Head Count Rate	Distribution of Poor	Head Count Rate	Distribution of Poor
Mountain	42.3	11.8	43.1	12.9
Hills	24.3	42.8	22.0	48.0
Terai	23.4	45.4	21.1	39.1
Nepal	*25.2*	100.0	23.1	100.0

* *Central Bureau of Statistics (2011b)*

\# *The headcount rate of food poverty has been calculated by comparing the annual per capita food consumption (y_{fi}) of each household to the food poverty line z_f, where i = 1, 2... M; M is the total number of households in the sample. An indicator variable is used for each household, taking the value 1 when annual per capita food consumption falls below the food poverty line or 0 if annual per capita food consumption is greater: $I(y_f, z_f) = 1$ if $y_{fi} \leq z_f$ and $I(y_f, z_f) = 0$ if $y_{fi} > z_f$. The headcount rate is simply the sample average of the variable $I(y_f, z_f)$ weighted by the number of people in each household.*

Among the development regions, Far Western region has the highest headcount rate of overall poverty followed by Mid Western and Western regions. Poverty is least in Eastern region. But, the distribution of poor is highest in Central (31 percent) and least in Far Western region (16 percent). The incidence of food poverty has similar pattern as that of overall poverty. The food poverty situation is severe in Mid and Far Western regions. In case of food poverty, the distribution of poor people is highest in Central region (30 percent) followed by Mid Western (20 percent) and Far Western region (18 percent) respectively (Table 2).

Table 2: Poverty and Its Distribution in Development Regions

Development Region	Overall Poverty*		Food Poverty#	
	Head Count Rate	Distribution of Poor	Head Count Rate	Distribution of Poor
Eastern	21.4	19.8	17.8	16.9
Central	21.7	30.8	18.6	30.3
Western	22.2	16.9	18.3	15.3
Mid-Western	31.7	16.4	32.8	19.7
Far-Western	45.6	16.0	43.3	17.8
Nepal	*25.2*	100.0	23.1	100.0

** Central Bureau of Statistics (2011b)*

 # Calculated as in Table 1

The overall poverty rate is much lower in urban areas than in rural areas. Moreover, urban Hill is the least poor region with a poverty incidence of 8.7 percent only. On the contrary, rural Hills of Mid and Far Western region have the highest poverty incidence, 36.8 percent. Within urban areas, poverty ranges from

8.7 percent in urban Hills to 22 percent in urban Terai. Similarly, within rural Hills, poverty ranges from 15.9 percent in Eastern region to 36.8 percent in Mid and Far Western region. Within rural Terai, poverty ranges from 21 percent in Eastern region to 31.1 percent in Mid and Far Western region. The incidence of food poverty is highest in rural parts of Mid and Far Western regions (40.8 percent in rural Hills and 29.2 percent in rural Terai) followed by rural Hills of Central region (27.8 percent) and Western region (25.4 percent) (Table 3).

Table 3: Poverty and Its Distribution in Urban/Rural areas

	Overall Poverty*		Food Poverty#	
Urban/Rural	Head Count Rate	Distribution of Poor	Head Count Rate	Distribution of Poor
Urban	15.5	11.7	13.1	18.5
Rural	27.4	88.3	27.1	81.5
Urban – Kathmandu	11.5	2.6	12.2	6.6
Urban – Hill	8.7	1.5	9.4	2.9
Urban –Terai	22.0	7.5	16.7	8.2
Rural Hills – Eastern	15.9	4.0	17.3	4.8
Rural Hills –Central	29.4	10.8	27.8	9.4
Rural Hills – Western	28.0	10.5	25.4	7.9
Rural Hills – Mid & Far Western	36.8	13.3	40.8	16.4
Rural Terai – Eastern	21.0	9.6	22.4	8.0
Rural Terai – Central	23.1	13.9	19.9	8.1
Rural Terai – Western	22.3	5.9	19.9	6.0
Rural Terai - Mid & Far Western	31.1	8.5	29.2	8.8
Nepal	*25.2*	100.0	23.1	100.0

** Central Bureau of Statistics (2011b)*
 # Calculated as in Table 1

5. EMPIRICAL ANALYSIS

5.1 Data Source

This paper uses cross-sectional sample household consumption data of the Nepal Living Standard Survey III (CBS, 2011a). The main information taken from the survey is the per capita food and non-food expenditure and per capita farm income of the household members. The per capita expenditure has been used to compare the poverty line; while the per capita farm income has been used to compare the household's food position as net buyer or net seller.

5.2 Methodology

Let y_i be the per capita consumption of household *'i'* where i = 1, 2... M; M is the total number of households in the sample and z is the poverty line, i.e. the monetary value of affording a fixed basket of goods in terms of both food and non-food, required by an individual to fulfill his/her basic needs. The headcount rate (H) of poverty is then calculated by taking ratio of headcount (G) of poor to the total population of the sample (N), i.e. H = G/N.

The headcount (G) is calculated by comparing the income y_i of each household to the poverty line z. The individuals whose per capita consumption (y_i) falls below the poverty line (z) are defined as poor i.e. $I(y, z) = 1$ (poor) if $y_i \leq z$.

$$G = \sum_{i=1}^{M} I(y,z)n_i \tag{1}$$

Where n_i is the number of people in each household.

Thus,
$$H = \frac{\sum_{i=1}^{M} I(y,z)n_i}{N} \tag{2}$$

Now when food prices increase, the monetary value of affording the same basket of goods required by an individual to fulfill his/her basic needs also increases. It means the post-price increase poverty line (say z_1) would become higher than the previous one (z). Therefore, those people who are just above the poverty line and whose income would not increase with the increase in the food prices has greater chance to fall below newly set poverty line (z_1). Thus, the number of poor would rise with the food prices increase. This would give a new headcount rate of poverty (H_1). The difference between the proportions of post-price increase poor (H_1) and old poor (H) is termed as the impact of food price hike.

While estimating the impact of food price increase on poverty in line with the concept discussed above, it is assumed that the expenditure on the food basket would increase proportionately with the rise in food prices with no change in non-food expenditure. Once the new per capita food consumption is determined by increasing the per capita food expenditure proportionately with the inflation rate, it is compared with the set poverty lines to find what proportion of sample population falls under overall and food poverty lines separately (post-price increase poor). The difference between the proportions of post-price increase poor and old poor is termed as the impact of food price hike.

5.3 Findings

The findings of this paper are based on the analysis of consumption of aggregate food basket. The impact of food price increase on poverty has been examined under five different scenarios with food inflation rates ranging from 10 percent to 30 percent, with

an interval of 5 percent points. The findings suggest that overall poverty in Nepal is likely to increase by 4 percentage points while food poverty is likely to increase by 6.3 percentage points when there is a rise in food prices of 10 percent. Similarly, 30 percent rise in food prices will raise the overall poverty by 11.5 percentage points and the food poverty by 20.0 percentage points. A simple regression between the degree of food price hike and its degree of impact on poverty shows that one percentage point increase in food inflation causes 0.38 percent rise in overall poverty (equivalent to 100 thousand poor) which is statistically significant at one percent level. Similarly, one percent increase in food inflation causes 0.68 percent rise in food poverty (equivalent to 180 thousand poor) in Nepal and the result is also statistically significant at one percent level.

$$\text{Overall Poverty} = \underset{(0.90)\ (28.05)^*}{0.26 + 0.38\ \text{Food Inflation}} \quad (3)$$

$$\text{Food Poverty} = \underset{(-6.15)^*\ (178.05)^*}{-0.50 + 0.68\ \text{Food Inflation}} \quad (4)$$

*(Figures in parentheses are t-statistics and * indicates level of significance at 1 percent)*

In this analysis, the impact of food price increase has been looked at in a short-term framework without adjusting for the possibility of higher incomes in certain segments of the population due to higher food prices. The analysis also excludes the substitution effects on the assumption that demand for most goods purchased by consumers below or near the poverty line is inelastic in the short-term.

5.3.1 Poverty Impact in Ecological Belts

Table 4 presents the increase in the overall poverty and food poverty in Nepal by ecological belts. The poverty impact of food price shocks is higher in Mountain and Terai regions. Up to the food price shocks of 20 percent, the overall poverty impact is highest in Mountain region, but impact becomes highest in Terai with the food price shocks of above 20 percent. In terms of food poverty impact, Terai has the highest impact among all scenarios. Thus, Terai region seems to be more vulnerable to food price shocks compared to other ecological belts.

Table 4: Increase in Poverty Head Count in Ecological Belts

Price Shocks →	10%		15%		20%		25%		30%	
Poverty Type →	Overall	Food	Overall	Food	Overall	Food	Overall	Food	Overall	Food
Mountain	5.7	6.4	7.2	10.2	9.0	13.6	10.4	17.2	11.2	18.6
Hills	3.7	5.3	5.4	8.6	7.2	11.8	9.1	14.2	10.6	17.7
Terai	4.1	7.6	6.2	11.2	8.9	14.5	10.9	19.1	12.7	23.0
Nepal	4.0	6.3	5.9	9.8	8.1	13.1	10.0	16.5	11.5	20.0

5.3.2 Poverty Impact in Development Regions

Among the five development regions, the impact is severe in Mid and Far Western regions. The overall poverty impact is highest in Mid Western region while the food poverty impact is highest in Far Western region. In Mid Western region, the impact on overall poverty ranges from 6.2 percent to 16.3 percent while food poverty in Far Western region ranges from 9.8 percent to 25.2 percent. The impact in terms of both overall poverty and food poverty is least in central region (Table 5).

Table 5: Increase in Poverty Head Count in Development Regions

Price Shocks →	10%		15%		20%		25%		30%	
Poverty Type →	Overall	Food	Overall	Food	Overall	Food	Overall	Food	Overall	Food
Eastern	3.4	7.1	5.2	10.9	7.5	14.7	9.7	18.5	11.9	22.6
Central	3.5	5.0	4.7	8.0	6.3	10.8	7.6	13.9	8.7	16.5
Western	3.1	6.1	5.4	9.5	8.1	12.6	10.1	16.7	12.0	20.4
Mid Western	6.2	6.8	8.9	11.1	12.0	14.8	14.9	17.3	16.3	21.4
Far Western	6.0	9.8	8.3	13.4	10.8	16.9	12.4	21.1	14.2	25.2
Nepal	4.0	6.3	5.9	9.8	8.1	13.1	10.0	16.5	11.5	20.0

5.3.3 Poverty Impact in Urban and Rural Areas

In terms of the impact of food prices, urban Hill is the least affected part while rural Hills of Mid and Far Western region is the most affected parts. The food poverty impact differs according to the rates of food price shocks. Up to the food price shocks of 20 percent, rural Terai of Mid and Far Western regions has highest impact. However, rural Terai of the Western region observes the highest impact from the price shocks of more than 20 percent (Table 6).

Table 6: Increase in Poverty Head Count in Urban and Rural Areas

Price Shocks →	10%		15%		20%		25%		30%	
Poverty Type →	Overall	Food	Overall	Food	Overall	Food	Overall	Food	Overall	Food
Urban	2.7	4.2	3.5	7.0	4.7	9.7	6.0	12.1	7.1	15.6
Rural	4.6	7.3	7.0	11.1	9.7	14.7	11.9	18.6	13.6	22.1
Urban – Kathmandu	2.3	4.0	2.8	6.8	4.2	9.3	5.1	11.3	6.2	14.0
Urban – Hill	1.6	1.9	2.3	3.5	2.9	5.2	3.9	6.9	4.6	9.7
Urban –Terai	3.9	6.3	5.1	10.1	6.7	13.4	8.6	16.9	9.8	21.7
Rural Hills – Eastern	3.1	6.5	5.0	10.4	7.5	14.9	12.0	17.2	14.7	21.6
Rural Hills –Central	3.3	4.4	4.9	7.6	6.3	11.0	8.0	13.8	8.8	16.7
Rural Hills – Western	3.9	6.6	6.6	10.4	8.7	14.9	10.4	17.1	12.9	21.2
Rural Hills – Mid & Far West.	7.5	8.5	11.0	13.0	14.1	16.5	16.5	19.8	18.1	24.2
Rural Terai – Eastern	3.7	7.5	6.2	11.1	9.3	14.4	10.6	19.3	13.0	23.6
Rural Terai – Central	5.1	7.3	6.9	10.9	9.2	14.0	10.7	18.1	12.4	21.5
Rural Terai – Western	2.6	8.5	5.9	11.6	10.4	14.6	13.4	22.5	15.5	26.0
Rural Terai - Mid & Far West.	4.7	9.3	7.2	13.3	10.4	17.3	13.0	20.4	14.7	23.2
Nepal	4.0	6.3	5.9	9.8	8.1	13.1	10.0	16.5	11.5	20.0

5.4 Suggestions for Policy Response

The findings of this paper suggest that the overall poverty in Nepal is likely to increase between 4 percent and 12 percent, while the food poverty is likely to range between 6 percent and 20 percent due to the food price rise by 10 percent to 30 percent. It implies that one percent rise in food inflation will push 100 thousand new consumers into overall poverty. Similarly, 6.7 million people, who are already below the poverty line, would face further hardship in their lives. The impact is even intensified in some regions. As higher food prices have serious consequences on poverty in Nepal, the policy makers need to focus on containing the food inflation and maintain a sizable food buffer in order to prevent new consumers from falling into the poverty and also to control further deterioration of living standards of existing poor population. In this regard, following policy options should be considered.

a. Reducing taxes on key staples to lower the domestic prices: In general, countries impose taxes on food imports to encourage domestic production and also to increase domestic revenue. However, in the time of sharply increasing food prices, reduction in taxes can help in lowering the food prices so that some relief can be provided to the consumers, *albeit* at a fiscal cost.

b. Stimulating food grain production: While higher food prices are a burden to net purchasers of food, they also present an opportunity to stimulate food grain production.

To boost agriculture production, irrigation facilities, access to agricultural credit, supply of agricultural inputs and availability of extension services should be increased. In this regard, the government will have to invest heavily in improvement of irrigation facilities, in-country production of necessary chemical fertilizers, and strengthen agricultural research and extension services.

c. Maintaining food buffers at regional level: Establishment and management of national food buffer located in one place may be costly. Therefore, regional food buffers should be established. In this regard, the existing set-up of Nepal Food Corporation will not be sufficient to handle such food buffers. Therefore, either a new agency should be established or a massive structural reform of Nepal Food Corporation should be carried out to enhance its capacity for the effective management of the regional food buffers. This will help in maintaining food reserves at regional level and also support the national food security program. This type of food buffers can make market intervention possible to moderate the price volatility whenever there is a higher surge in food prices.

d. Targeted cash transfers and food grain subsidies: The targeted cash transfers to vulnerable groups can help in maintaining their purchasing power without affecting the incentive to produce more food, and without reducing the incomes of poor food sellers. However, to implement this option effectively, the administrative capacity should be enhanced first. Another option may be to provide food grain subsidies to the targeted poor in order to enable them to cope with household food insecurity in the time of food price hikes.

e. Promoting second-generation agricultural co-operatives: Agricultural cooperatives are involved in supply of inputs to their members and sell of produced items in the market. Besides, they can also purchase food grains to sell to their members during the period of shortage. However, the current level of activities of traditional agricultural cooperatives is not sufficient to make contribution to food security. Therefore, concept of *second-generation agricultural cooperatives* should be promoted for the commercialization of agriculture and proper marketing of produces. This concept will help in making the agricultural co-operatives more competitive and guided by high quality management (Chambo, 2009).

6. CONCLUDING REMARKS

Change in food prices generally affects all the households. As people differ in terms of their needs, consumption patterns and food position (as net buyer or net seller), the effects of food price changes will also be different from one household to another. Depending on households' position as net seller or net buyer of staple food, increase in prices of staple food would raise the income of households that are net sellers and add to the hardship of the households that are net buyers. Hardship of the poor people increases because they have to spend a larger share of their income on essential foods and less is left to spend on other items. Since the population below poverty line spend 72 percent of their total expenditure on food in Nepal, the impact of food price rise is severe on the poor section of the population.

The findings of this study suggest that overall poverty is likely to increase between 4 and 12 percentage points, and the food poverty between 6 and 20 percentage points as a result of the food price rise ranging from 10 percent to 30 percent. It means that a food price hike of 10 percent will push 1 million new consumers into overall poverty while 6.7 million existing poor populations would experience even harder lives. Therefore, policy makers need to focus on containing food price hikes and maintain a sizable food buffer. In this context, short and long term policy responses are required to prevent the reoccurrence of the food crisis and food price hikes in the future. These responses include lowering domestic food prices by reducing taxes on imports of key staples, boosting domestic food production, establishing regional food buffers, providing cash transfers and subsidies and promoting second generation concept among agricultural cooperatives.

REFERENCES

ADB, 2008. *Food Prices and Inflation in Developing Asia: Is Poverty Reduction Coming to an End?* Asian Development Bank, Manila.

ADB. 2011. *Global Food Price Inflation and Developing Asia.* Asian Development Bank, Manila.

ADB. 2012. *Food Security and Poverty in Asia and the Pacific: Key Challenges and Policy Issues.* Asian Development Bank, Manila.

Chambo, Suleman A. 2009. "Agricultural Co-operatives: Role in Food Security and Rural Development." *Paper* presented to Expert Group Meeting on Co-operatives, 28-30 April, New York.

CBS. 2011a. *Nepal Living Standard Survey III, 2010/11*. Central Bureau of Statistics, Government of Nepal, Kathmandu.

CBS. 2011b. *Poverty in Nepal 2010/11*. Central Bureau of Statistics, Government of Nepal, Kathmandu

De Hoyos, Rafael. E. and Denis Medvedev. 2009. "Poverty Effects of Higher Food Prices: A Global Prospective." *Policy Research Working Paper* No. 4887. The World Bank, Washington DC.

ESCAP. 2011. "Rising Food Prices and Inflation in the Asia-Pacific Region: Causes, Impact and Policy Response." *MPDD Policy Briefs* No. 7, United Nations Economic and Social Commission for Asia and the Pacific, Bangkok.

FAO. 2011. *The State of Food Insecurity in the World*. Food and Agriculture Organization of the United Nations, Rome.

Ivanic, Maros. and Will Martin. 2008. "Implications of Higher Global Food Prices for Poverty in Low-Income Countries." *Policy Research Working Paper* No. 4594, April. The World Bank. Washington DC.

NRB. 2012. *Quarterly Economic Bulletin* April 2012. Nepal Rastra Bank, Kathmandu.

Ortiz, Isabel, Jingqing Chai and Mathew Cummins. 2011. "Escalating Food Prices: The Threat to Poor Households and Policies to Safeguard a Recovery for All." *Social and Economic Working Paper*, February. UNICEF, New York.

Save the Children, 2009. *How the Global Food Crisis is Hurting Children: The Impact of the Food Price Hike on a Rural Community in Northern Bangladesh*. Save the Children UK, London.

Wodon, Quentin and Hassan Zaman. 2008. "Rising Food Prices in Sub-Saharan Africa: Poverty Impact and Policy Responses." *Policy Research Working Paper* No. 4738, October. The World Bank, Washington DC.

World Bank, 2008. *Rising Food and Fuel Prices: Addressing the Risks to Future Generations.* World Bank, Washington DC

Zezza, Alberto, Benjamin Davis, Carlo Azzarri, Katia Covarrubias, Luca Tasciotti and Gustavo Anriquez. 2008. "The impact of rising food prices on the poor." *ESA Working Paper 08-07.* Food and Agriculture Organization of the United Nations, Rome.

Linkages between Sectoral Output Growth and Financial Development in Nepal

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Abstract

A feature of the recent period of output growth in Nepal is that growth has been uneven across sectors. While the services sector has been expanding, the agricultural and manufacturing sectors have growing much more slowly. In this paper we attempt to explain this fact by investigating the linkages between financial development and sectoral output growth in a vector-autoregression (VAR) analysis. We find that the services sector reacts strongly to increases in domestic credit, while agriculture and manufacturing are largely unaffected. We interpret this finding in the context of a two sector-growth model, by Schneider and Tornell (2004), where credit constraints and the access to international capital markets play a central role. We also discuss the importance of our findings for the goal of poverty alleviation.

Key words: Financial development, growth, agriculture, poverty
JEL Classification: O11, O16, O53, F41

1. INTRODUCTION

The recent period of output growth in Nepal, has been quite uneven across sectors.[1] While the services sector was able to expand, the manufacturing and agricultural sectors were growing more slowly in the 2000s. At the same time, the financial system has been gradually deregulated and domestic credit has been expanding. In this paper we analyse the empirical link between domestic credit growth and output growth at a sectoral level and discuss the implications of our finding in the context of a two-sector growth model and of the debate on poverty alleviation.

In terms of services and manufacturing, the findings for Nepal, are quite reminiscent of other countries, as well as theoretical predictions on the sectoral output response. A two sector-growth model, originally developed by Schneider and Tornell (2004), where credit constraints and the real exchange rate play a role helps to interpret the results of the

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1 A pattern that is also common for other countries in South Asia (see Eichengreen and Gupta (2009)).

empirical analysis.[2] In this model, the tradable goods producing sectors finance themselves mainly in international capital markets and are independent of domestic credit conditions. The non-tradable goods producing sectors however, often including services, obtain finance from the domestic banking system and are more closely linked to domestic credit changes. Tornell and Westermann (2002) document that this pattern exists in a wide cross section of developing economies.

The pattern in the agricultural sector, on the other hand, is quite uncommon, when compared to other developing economies, and in particular when compared to Europe in the process of industrialization, more than a hundred years ago. Diekmann and Westermann (2011) have shown that the agricultural sector, has reacted most strongly to domestic credit, among all sectors, in 19th century Germany. In fact, the banking system took its origins in small credit co-operatives, which financed the "agricultural revolution", than preceded the rapid process or industrialization during the second half of the 19th century. A comparable sequential process is not observable in Nepal's economy today.

The pattern of development in the agricultural sector is clearly a reason for concern in the development of Nepal's economy. The agricultural sector is not only the largest sector in the economy, but also a sector with below average wages. Data from the national labour force statistics illustrate that more than 70% of the population and up to 80% in rural areas are employed in the agricultural sector. At the same time, the data on income by occupation reveals that market agriculture, and particularly subsistence agriculture, are characterized by below average wage.

The remainder of the paper is organized as follows. Sections 2 discusses the methodology used in the empirical part of the paper. Section 3 contains a graphical analysis of the data and reports the standard descriptive statistics. It also contains the preliminary analysis, testing for stationarity and cointegration. Section 4 reports the main findings of the impulse-response analysis. Section 5 discusses the findings in the context of the debate on poverty alleviation and section 6 concludes.

2. METHODOLOGY

In our study, we use a long sample of annual sectoral output growth rates, starting in 1973, leading up to 2010, as well as several shorter samples. We investigate the empirical link between credit and output at the sectoral level. We start with implementing standard unit root tests (Augmented Dickey-Fuller tests) in order to asses the stationarity properties of the data. Secondly we investigate long run co-movements by implementing the Johansen Cointegration test. As both tests will indicate, that variable are (i) non-stationary in level, (ii) stationary in first differences and (iii) not cointegrated, we implanted the main part of the exercise by estimating an unrestricted Vector-autoregression (VAR) in first differences.
From the estimated coefficients of the VAR, we compute the impulse response functions displayed in figure 5 of section 4. A key issue – like in other VAR studies – is the

[2] See also Tornell, Westermann and Martinez (2003) for a simpler representation.

identification of shocks, as there might be some contemporaneous correlation among the variables that is not explicitly modeled in our time-series setup. In order to address this issue, we use generalized impulse response functions in order to trace the impact of an unexpected shock in domestic credit on output at the sectoral level.

The use of generalized impulse response functions, help mitigate the endogeneity problem associated with the contemporaneous correlation between credit and output. It is independent of the ordering of variables in the VAR, unlike for instance in the Choleski decomposition. The shock we trace, is a system shock that include the contemporaneous reaction of other variables.

All VAR estimated are bi-variate pairs of sectoral output and lending. The lag-length was determined by the SIC criterion. As common in annual data, most VARs are either AR(1) or AR(2) processes. We have experimented with different lag length, for instance chosen by the AIC criterion. We did not find, however that this variation had substantial impact on our findings. We chose the more parsimonious specification of the SIC, because looking at the residuals of the regressions, we did not find a remaining autocorrelation that was not controlled for by the explanatory variables in the model.

3. DATA AND PRELIMINARY ANALYSIS

In this section, we start the analysis with a graphical representation as well as descriptive statistics of the time series under investigation. First, we consider a sectoral breakdown of aggregate lending. Figure 1 decomposes the total stock of domestic credit into various sectors, including the main sub-sectors, agriculture, manufacturing and services that will be included in the empirical analysis in the following sections (we show a more disaggregated breakdown here that is feasible in a cross section. In the later part of the analysis, we will focus in broader aggregates of sectors, for which we have time series data both, in nominal and in real terms).

Figure 1 show that the largest share of domestic credit is provided to firms in the services sectors. In sum, the sectors transport, communication and public services, wholesale and retail trade, financial sector and other services, account for 37% of total domestic lending (10% if this figure is accounted for by the financial sector itself). The second largest sector is the manufacturing industry, with a share of 22%, followed by the construction sector with a share of 11%. Other sectors have much smaller shares. The agricultural sector, the second largest sectors in the economy with respect to output, and the largest with respect to employment, holds only 3% of total domestic credit.[3]

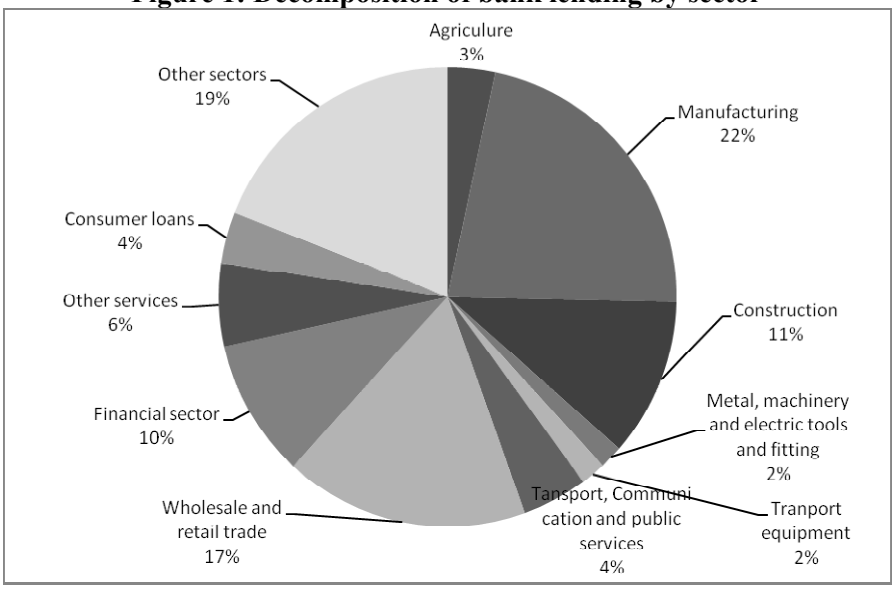
Interesting is also the share of consumer loans in total loan, which is only 4%. In the literature on financial development[4] and growth, this is an indicator of particular

[3] An econometric analysis of the determinants of lending to various types of households and regions is given in Adhikari (2009). The role of institutions for providing micro-finance and analyzed in Shrestha (2009).

[4] By financial development we refer to domestic lending relative to GDP.

importance. If the share of consumer loans in total loans is high, the hypothesis that domestic credit is followed by real output growth is often challenged. However when the largest part of the lending is given to firm, who invest, this investment expands production possibilities and ultimately leads to long run growth. With a share of consumer loan of only about 4%, it seems that the preconditions that financial development can have a positive impact on growth are met.

Figure 1: Decomposition of bank lending by sector



Source: Nepal Rastra Bank, Economic Report 2008/9, Table 7.5

Figure 2a and 2b show the development of long run growth in the main sectors of the economy. The values are expressed in constant prices. Unless indicated otherwise, all data are drawn from the World Bank Developing Indicators (WDI) of the World Bank. Figure 2a shows the levels of output, while figure 2b shows the share of each the three main sectors in total output in the economy. We see that in the beginning of the sample period, the agricultural sector was clearly the most important sector, with a share of more than 50% of total value added in the economy. Although it has grown steadily over the past 38 years, its long run real rate of growth of 2.65%, as reported in Table 1, is clearly below that of the other two sectors. The manufacturing sector has a larger growth rate, with 5.3% of real growth on average; however, its share in total output is rather small, increasing to about 7% of GDP towards the end of the sample. The services sector, on the other hand is both, large in term of share in GDP, and in terms of annual real growth rates. Over the past 38 years, the service sector has grown 4.63% on average and has become the largest sector in total GDP since the early 1990ies. In 2010, it accounted for 43% of total output in the economy.

Figure 2a: Sectoral output – levels in constant prices

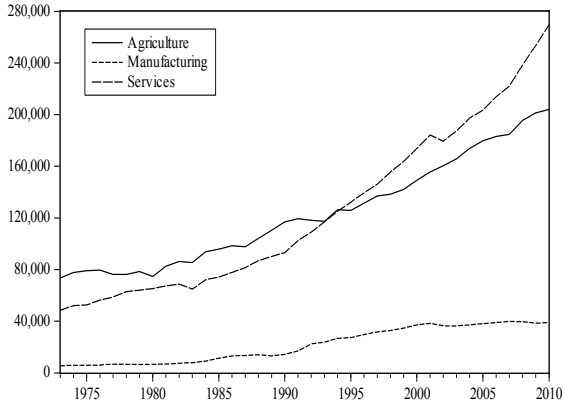
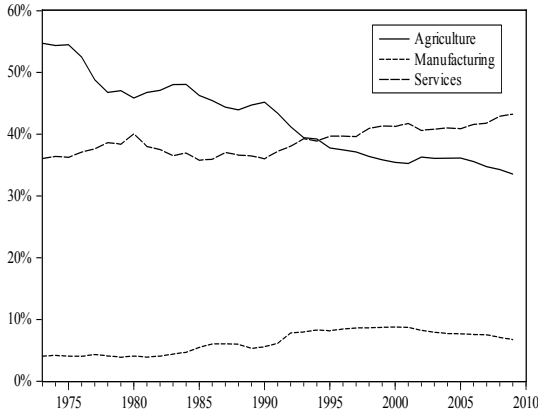


Figure 2b: Share in value added



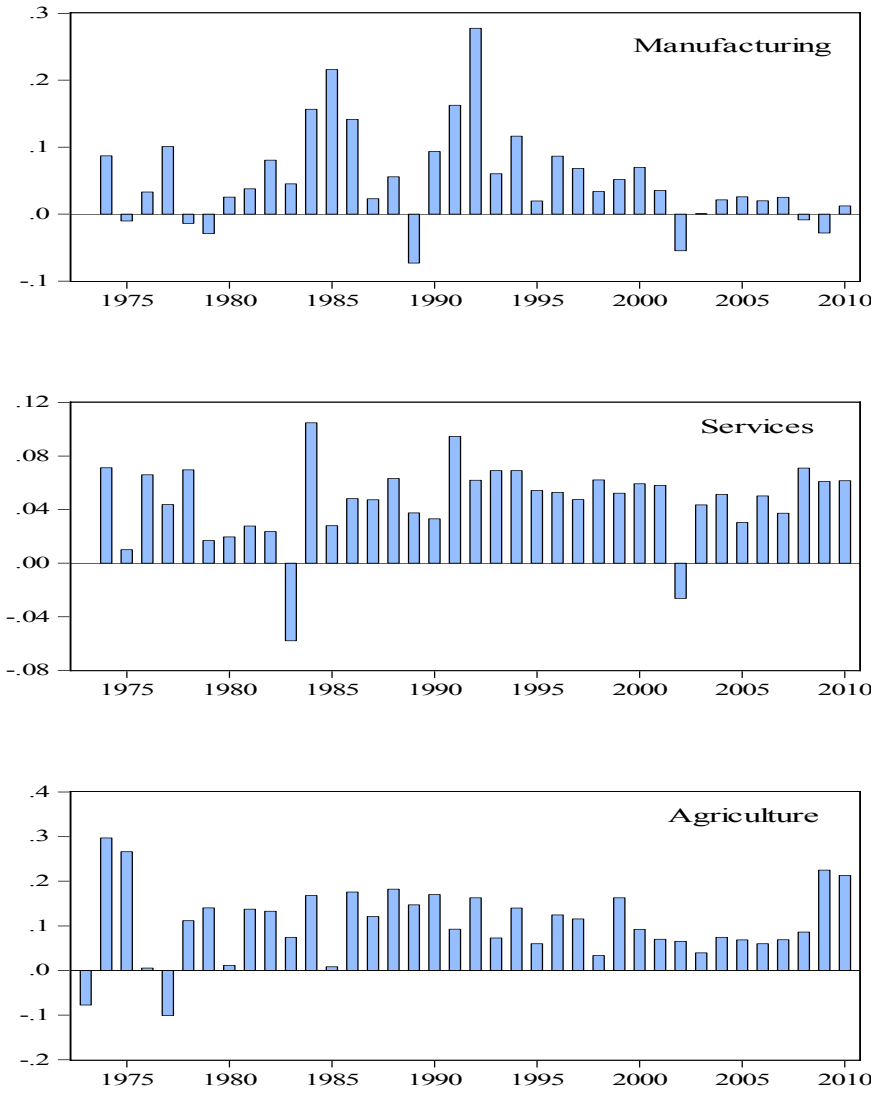
Source: World Development Indicators (WDI)

Figure 3 displays the annual percentage growth rates as that enter the subsequent empirical analysis in the vector-autoregressions (VARs). The figure shows that on top of the differences in long run average growth rates, the growth rates also differ with respect to the variance and the occurrence of occasional outliers. While the agricultural sector and services sector have relatively stable growth rates since 1980s, with a standard deviation of 2.9% and 3.2%, respectively, the manufacturing sector is considerably more volatile. In particular during the mid-80ies and early 1990s, there were rapid expansions in manufacturing. In the later 70s and earlier 2000s, there were multiple-year recessions. The occasional downturn as well as the boom-periods was also larger in absolute terms, as shown in Table 1 below.

Table 1: Descriptive statistics

	Agriculture	Services	Manufacturing	Domestic credit
Mean	0.0265	0.0463	0.0530	0.0726
Maximum	0.0997	0.1048	0.2776	0.3331
Minimum	-0.0490	-0.0578	-0.0732	-0.2517
Std. Dev.	0.0323	0.0295	0.0715	0.1296

Figure 3: Growth rates of value added in manufacturing, services and agriculture



Source: World Development Indicators (WDI)

The last time series in our subsequent analysis is the domestic credit to the private sector, provided by the banking system. This series is plotted in Figures 4a and 4b, as a ratio of gross domestic product, as well as in logged first differences. From Figure 4a, it is clear that Nepal experiences a substantial increase of financial development over the time period under investigation. Until the early 1990s, there was a smooth and steady increase. During the 1990s the credit-to-GDP increased substantially, doubling in magnitude, from 15% in 1993 to 30% in the year 2000. After a short decline in the early 2000s, another rapid expansion occurred in the second half of the first decade of the 2000s. In 2009 the credit-to-GDP ratio reached a peak value of 59%.

Figure 4a: ratio of domestic credit to GDP

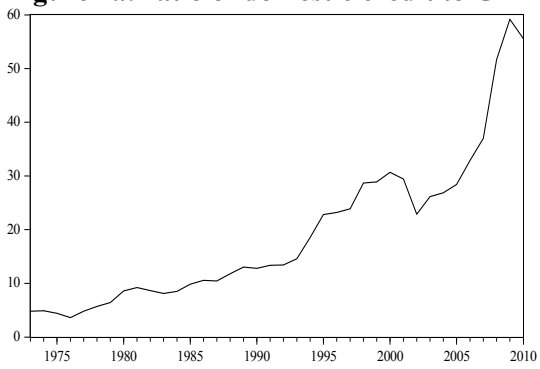
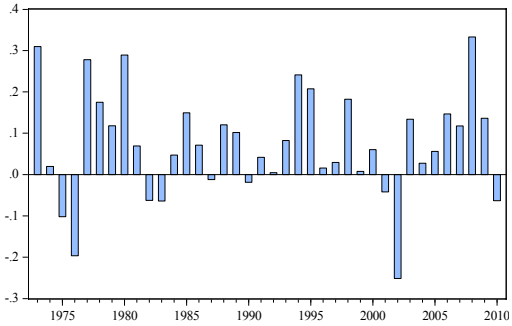


Figure 4b: Growth rates of real credit to the private sector



Source: World Development Indicators (WDI)

Although the nearly 60% credit-to-GDP ratio is nearly 10 times its value of the beginning of the sample, this number is not unusually high when compared to other countries experiences after financial liberalization. In particular the increase in domestic credit-to-GDP that occurred after the liberalization in the early 1990s – documented by Shrestha and Chowdhury (2007) – is quite reminiscent to the increase documented in a broad cross section of developing economies in Tornell and Westermann (2005).[5]

When looking at the growth rates of real credit growth (deflated by the consumer price index), we see that domestic credit is quite volatile throughout the sample period. Major contractions occurred in 1975/6 and 2002. Measurable downturns where also experienced in the early 1980ies, 1990 and, more recently, in 2010. Overall, the standard deviation of almost 13% is substantially higher than the fluctuation in real output in any of the main sectors. Also the absolute value of the negative growth rates is much larger, with negative values of up to 25%. The process of financial development in Nepal, although quite large when compared to the beginning of the sample, has been a risky one, with repeated severe setbacks. In this sense, again, the experience in Nepal is reminiscent of many developing economies, in which the process of financial liberalization is associated both, with an increase in the average GDP growth rate, but also an increase in the incidence of financial crisis (see Tornell and Westermann (2008))

As a preliminary analysis of the data, we conduct test for stationarity and cointegration. Table 2 reports the results of the augmented Dickey-Fuller test. In all regressions the lag length was chosen by the AIC criterion. We find that in all sectoral time series as well as the domestic credit series, we cannot reject the null hypothesis of a unit root in the logged levels, while we can reject it at the 1% level in all logged first differences that approximately correspond to the percentage growth rates. In the following analysis, we therefore treat the data as stationary in 1st differences.

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5 As shown in figure A4 of the appendix, the agricultural sector also had a below average share in the latest credit expansion that started in 2007. In fact it is the only sector that fell in levels, in nominal terms.

Table 2: Unit root tests

	Agriculture		Manufacturing		Services		Domestic credit	
	ADF test-statistic	P-value	ADF test-statistic	P-value	ADF test-statistic	P-value	ADF test-statistic	P-value
Levels	0.672	0.990	-1.319	0.611	0.652	0.989	-0.604	0.858
1st differences	-7.004	0.000	-3.773	0.007	-6.779	0.000	-5.564	0.000

Note: Lag length was chosen by the AIC criterion. MacKinnon-critical values are applied.

In a second step, we also test for the cointegration properties of the data. Table 3 reports the results of the Johansen Cointegration test. It shows that all variables in the analysis following individual stochastic trends: we cannot reject the null hypothesis of no cointegration. This result is strengthened, when applying the stricter finite sample critical values that were reported by Cheung and Lai (1995).

Table 3: Test for Cointegration

Number of Cointegration Vectors	Eigenvalue	Trace statistic	5% Critical value	Maximum eigenvalue statistic	5% Critical value
None	0.421533	41.48248	47.85613	19.70544	27.58434
At most 1	0.335006	21.77704	29.79707	14.68719	21.13162
At most 2	0.176654	7.089847	15.49471	6.997633	14.2646
At most 3	0.002558	0.092214	3.841466	0.092214	3.841466

Note: Lag length was chosen by the AIC criterion.

4. EMPIRICAL ANALYSIS: THE SECTORAL RESPONSE TO AN UNEXPECTED SHOCK IN CREDIT

In this section, we investigate the responses of growth rates in agriculture, services and manufacturing to an unexpected change in domestic credit. As the above unit root tests revealed a unit root in the levels of the sectoral output and credit series, we start by estimating the vector-autoregression (VAR) in first differences. From the VAR coefficients, we compute the generalized impulse response functions that are reported in figure 5 below.

We estimate bi-variate VAR's and compute the corresponding impulse response functions for the three sectors under consideration. Figure 5 shows the reaction of output growth in agriculture, manufacturing and services to an unexpected shock in the growth rates of domestic credit. We start by analyzing the full sample from 1973 to 2010. We find, overall, that that the responses are only weakly significant, at the 10% level, or statistically insignificant. In the agricultural sector there is an initial negative reaction, followed by equal sized positive reaction in the second year. Thereafter, as well as in the aggregate, the reaction is insignificant. In the manufacturing, the reaction is highly insignificant throughout the 10 year time-window under investigation. The only sector that displays a positive reaction in the services sector. Here the reaction is positive for the

first two years and (weakly) significant at the 10% level in the 1st year after the shock in domestic credit[6].

As the sample period includes years before the liberalization and deregulation of Nepal's financial system, we next shorten the time interval in several steps. This, by itself, would have the statistical effect hat standard errors would widen, as the sample becomes shorter. However, as relatively more years are part of the period with more open and developed capital markets, the findings could also become sharper. In the sample period from 1980-2010, we see that the initial positive reaction of the services sector becomes statistically significant at the 5% level, while the other two sectors remain nearly unchanged. When shortening the sample even further, the agricultural sector turns insignificant over the entire 10-year response-window, while the services sector becomes even more clearly significant. This pattern remains also for the window from 1990-2010.[7]

While the insignificance of the agricultural sector in the later periods is an inconclusive finding, due to the reduced power of the test in smaller samples, it can be argued that the positive reaction of services to domestic credit growth is a rather recent phenomenon in the Nepalese economy.

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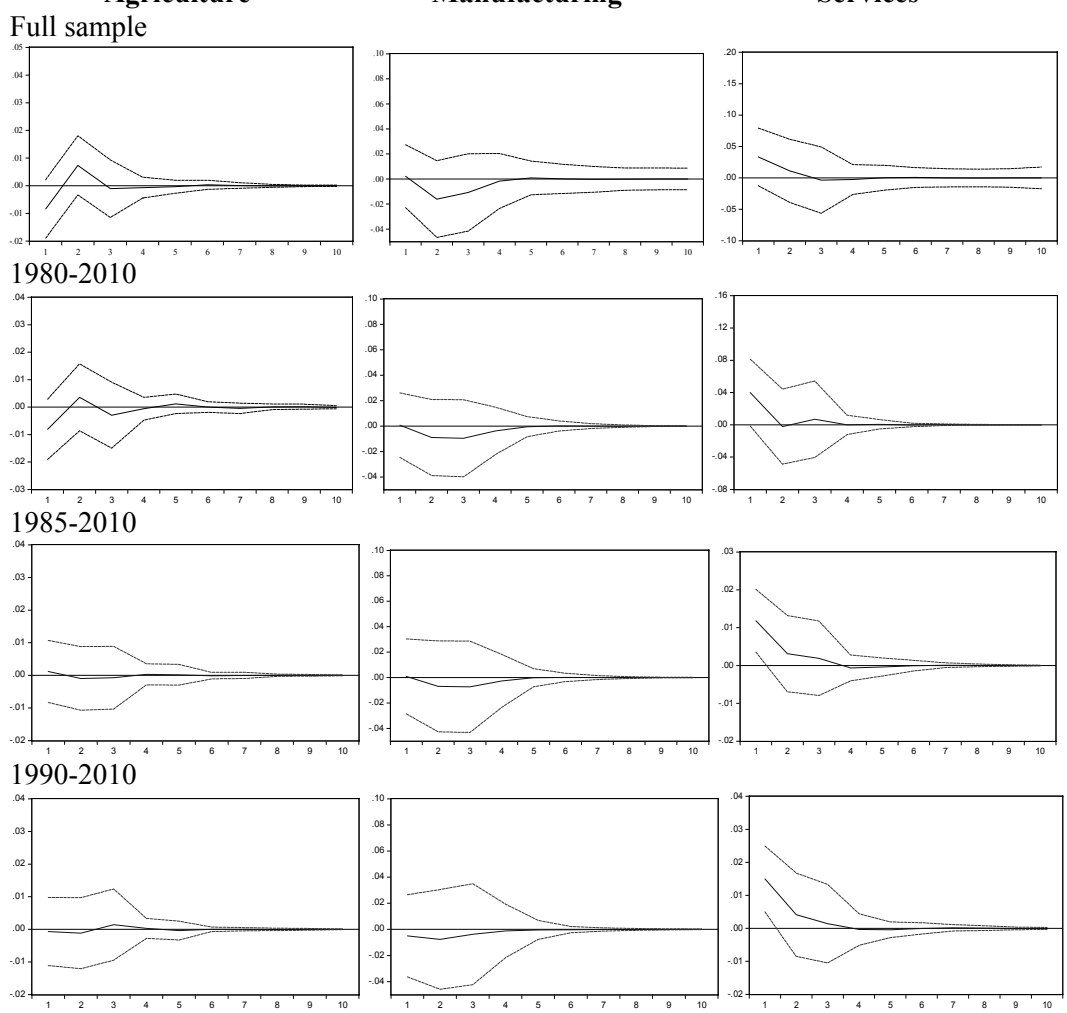
6 This result is consistent with earlier finding by Gautam (2008), that analyses the impact of the tourism industry on GDP and the role of tourism financing.

7 The process of Nepals financial sector reforms roughly corresponds to these time windows. Shrestha (2004) documents the various steps of financial sectors development in Nepal. In his analysis, the first period of financial sector reform started in 1984 and the second phase started in 1991. Phase 3 that started in 1999, is difficult to capture in a VAR model, as the sample period is too short.

Figure 5: Reactions of sectoral output to an unexpected change in domestic credit



For the agricultural sector and the services sector, the results of the VAR analysis are quite plausible. The services sector, that was documented above to have the largest share in domestic credit was found to have the strongest response to changes in domestic credit, and the agricultural sector, the sector with the smallest share in domestic credit also displays the weakest reaction in the VAR.

The manufacturing sector, however does not react significantly, although with 22%, it receives a substantial share of total domestic lending. The explanation for the insensitivity of output in the manufacturing sector, to changes in bank lending may be found in the alternative sources of finance that is available to this sector. Manufacturing firms are typically larger than other firms, and can more easily participate in international trade, and thereby have access to international sources of finance.

Two graphs in the appendix of this paper suggest, that this is indeed the case. Figure A1 shows that the manufacturing sector receives by far the largest share of total foreign direct investment[8], among all sectors (39%). It is also like to benefit from the development of direct financing on the domestic capital market. Figure A2 shows that the market capitalization of the stock market has increased from less than 10% in 2003 to values of 30-40% in recent years.

5. DISCUSSION: THE LINK BETWEEN FINANCIAL DEVELOPMENT, ECONOMIC GROWTH AND POVERTY

In the previous section, we have seen that the empirical link between output growth and domestic credit growth is quite different across the main sectors in Nepal. This is interesting in the context of the theoretical model of Tornell and Schneider (2004), referred to in the beginning of the analysis. It implies, that a model with a non-tradable sector, that is financed mainly via the domestic banking system, and a tradable goods sector, that has other forms of financing available is relevant for the economy of Nepal.
A question of central importance for a country that struggles with issues of poverty, income inequality and high unemployment rates is what this finding implies for welfare of the economy as whole.

Before addressing this question, it is important to note, that growth itself, even if uniformly distribute across sector and individuals, is not a concept that can easily discussed in the context of the welfare question. To grow means to invest now to be able to consume more later. A high growth path necessarily includes an intertemporal decision, where an initial consumption is lower, and future consumption is higher. It is therefore not a Pareto improvement to have higher economic growth. It requires an intertemporal utility function, as well as the assumption that the initial period of reduced consumption (and increased investment) is sufficiently short, that a given generation eventually is able to benefit from the increased future consumption opportunities. Finally, it is important that in the initial period, it does not fall below a minimum income level that is needed to sustain a living. This is where international financial liberalization - that is not discussed separately from domestic financial development in this paper - may actually help.

Accepting these shortcomings, it is important to understand what financial development implies for key variables that go beyond the analysis of average annual growth rates. As always, data availability is an issue, but in the case of Nepal, a quite good data base exists in form the National Labor Force Survey (NLFS). The pattern of inequality across sectors and between rural and urban areas are also widely documented in the literature, for instance in recent studies of Wagle (2010) and Sharma (2010). The two tables below show that there is reason to be concerned about Nepal's recent development, despite the relative stability and growth performance it has recently achieved.

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[8] Note however that these data refer to approved commitments, rather than actual FDI. The Manufacturing share, however, is likely to be larger in the actual values as well.

The previous sections have documented that only a very small share of total domestic credit - 3% - is lend to the agricultural sector. Furthermore the agricultural sector does not display a positive significant reaction to increases in domestic credit and it may even be vulnerable to sudden exchange rate depreciation, as it does not benefit from the export-link to the exchange, and might be characterized by the phenomenon of currency mismatch.

Against this background, it is worrisome that more than 70% of the total population and up to 80% in rural areas are employed in the agricultural sector. Table 4 shows, that only in urban areas; this number is substantially lower, with a share of 32%. The manufacturing sector on the other hand counts only for 6.6% of total employment - again with a higher concentration in urban areas - and the services sector accounts for 15% of employment.

Table 4: Employment shares in main sectors

	Total	Urban	Rural
Agriculture	73.9	32.2	80.1
Manufacturing	6.6	14.0	5.5
Services	15.0	45.2	10.3
Other	4.5	8.6	4.1

Source: NLFS 2008, Table 7.6 and own calculations

The problem of the uneven participation of the workers is enforced by the fact that the agricultural sector, and rural areas in general are endowed with rather low income levels and wages, when compared to other professions. Table 5 shows that average monthly incomes vary considerably by occupation. The average monthly income across all occupations is NRs. 5,117. In agricultural sector, however, they are estimated to be only at 4,276 in subsistence agriculture and 4554 in market agriculture. These are clearly below average values, not taking into account yet, the high unemployment rates in regions, where agriculture is among the few employment opportunities.

Table 5: Average monthly income across occupations (in Rs.)

Total	5117
Legislators, senior officials	16142
Professionals	9484
Technician and assoc. profess.	6001
Clerks or office assistants	7243
Service workers	6246
Market agriculture	4554
Subsistence agriculture	4276
Craft and related trades workers	5186
Plant and machine operators	6248
Elementary occupation	3032
Armed forces	7222

Source: NLFS 2008, Table 7.13

6. CONCLUSIONS

In this paper we have investigated the link between financial development and output growth at the sectoral level. *Our main finding is that while services react positively to increases in domestic lending, both agriculture and manufacturing are largely unaffected.*

The services sector shows a positive response that increases in magnitude, when considering shorter (more recent) time intervals, starting from 1980, 1985, and 1990.[9] The manufacturing sector, as well as agriculture show mainly insignificant reactions.

For the manufacturing sector and the services sector, the recent experience in Nepal is reminiscent of the patterns observed in a large cross section of other developing countries. The services sector is borrowing from the domestic banks, while the manufacturing sector has other financial instruments available, including foreign direct investment, as well as the domestic stock market. Accordingly the reactions of the services sectors to changes in domestic credit are more pronounced and we were able to identify this effect in set of simple bi-variate VAR regressions.

The agricultural sector, however, – that accounts for more than 70% of total employment - does not seem to participate proportionally in the increased investment opportunities that arise from financial development.[10] We argue that it is important to take this empirical fact into consideration, when discussing the policy options of future changes in regulation and public policy related to financial sector development.

Our findings complement and strengthen related arguments on inequality and growth by Bajracharya (2006) and Sharma (2010).[11] They are also consistent with a formal analysis by Shrestha and Chowdhury (2007), who analyse the link between financial liberalization and growth in a autoregressive distribute lag (ARDL) model. Focusing on the difference between rural and urban income, they report a general positive impact on employment, but a negative impact on credit to rural areas and income distribution.[12]

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9 This result is reminiscent of the findings by Gautam (2008) between tourism financing and economic growth. The tourism industry is a major part of total services.

10 Despite the efforts of the NRB, who directly and indirectly lends to the agricultural sector and rural credit co-operatives, the share of total bank lending to the agricultural sector by the major banks has only been 3%.

11 Sharma (2010) also points to the uneven growth pattern across sectors and discusses the lack of access to access to credit in rural areas. He points out for instance that lending rates in agriculture are above the average. In the paper he highlights the importance of agriculture for the poverty alleviation.

12 Note that their results refer to financial liberalization, rather than financial development, for instance as measured by real credit growth in our paper. However, as shown by Bhetuwal (2007), both concepts are closely related. The differential impact of rural and urban areas had also been pointed out by Acharya (2003). For aggregate GDP, a positive link between

Concrete proposals on how to include the agricultural sector in the ongoing process of financial development have been made for instance in Sharma (2003), who argues that there is a need for small credit co-operations to engage in lending to rural households and to support mirco-finance.

Further research might go in several directions. First, the empirical analysis presented in this paper only constitutes a first step. A wide range of alternative specifications, control variables and identification schemes could be used to further evaluate the presented evidence. Also firm-level and bank level data would be very helpful to uncover the exact mechanism that is behind the aggregate, sectoral co-movements.

REFERENCES

Acharya, Meena, 2003. "Development of the Financial System and Its Impact on Poverty Alleviation in Nepal" *Economic Review*, Occasional paper, NRB, Vol. 15, pp. 134-64.

Adhikari, Naveen, 2009. "Determinants of Formal Credit Market Participation in Nepal", *Nepalese Economic Review*, Vol.1, issue 2.

Bajracharya, Bhuban B, 2006. "Financing of Millennium Development Goals in Nepal" in *Achieving Millennium Development Goals: Challenges for Nepal,* Nepal Rastra Bank, Research Department, International Finance Division, October.

Bhetuwal, Khem R., 2007. "Financial Liberalization and Financial Development in Nepal", *Economic Review*, Occasional paper, No. 19, pp. 23-41.

Cheung, Y.-W. and Lai, K. S. 1993. "Finite-Sample Sizes of Johansen's Likelihood Ratio: Tests for Cointegration". *Oxford Bulletin of Economics & Statistics*, 55, Issue 3, pp. 313-328.

Dangal, Madhav 2009, "Empirical Analysis of the Relationship between Financial Development and Economic Growth in Nepal", *Nepalese Economic Review*, Vol.1, issue 1.

Demetriades, Panicos, O. and Kul B. Luintel, 1996. "Banking Sector Policies and Financial Development in Nepal", *Oxford Bulletin of Economics and Statistics*, vol. 58, issue 2, pp. 355-372.

Diekmann, Katharina and Frank Westermann, "Financial Development and Sectoral Output Growth in 19th Century Germany", *CESifo Working Paper 3283*, *Financial History Review*, forthcoming.

Eichengreen Barry and Poonam Gupta, 2009. "The Two Waves of Service Sector Growth*",* *NBER Working Paper* 14968.

Gautam, Bishnu, P., 2008. "Economic Impact of Tourism Finance in Nepal", *Economic Review*, Occasional paper, NRB, Vol. 20, pp. 62- 73.

Rana, Madhukar, S.J.B. and Stalin M. Pradhan.2005. "Implementation of Foreign Direct Investment Policy in Nepal", Economic Policy Network, Policy Paper 1.

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financial development and growth has also been established in Demetriades and Luintel (1996) and Dangal (2009).

Ranciere, Romain, Aaron Tornell and Frank Westermann. 2008. "Systemic Crises and Growth", *Quarterly Journal of Economics*, Vol. 123 (1), 359–406.

Schneider, Martin, and Aaron Tornell. 2004., "Balance Sheet Effects, Bailout Guarantees and Financial Crises", *The Review of Economic Studies*, Vol. 71, 883-913.

Sharma, Shiva. "Income Inequality in Nepal" in *Inequality and Social Justice in Asia, Chapter 7,* United Nations Development Program.

Sharma, Shalik R. 2003. "Microfinance Against Poverty: The Nepalese Scenario", *Economic Review*, Occasional paper, NRB,Vol. 15, pp. 166-90.

Shrestha, Ganesh, K.. 2004. "Financial Sector Reform in Nepal", *Economic Review*, Occasional paper, NRB, Vol. 16, pp. 75-90.

Shrestha, Ramesh. 2009. "Micro-Finance Sector in Nepal", *Nepalese Economic Review*, Vol.1, issue 2.

Shrestha, Min. B. and Khorshed Chowdury. 2007. "Impact of Financial Liberalization on Welfare: Evidence from Nepal", *Applied Econometrics and International Development*, Vol. 7-1.

Tornell, Aaron and Frank Westermann. 2005. "*Boom-Bust Cycles and Financial Liberalization*", MIT Press.

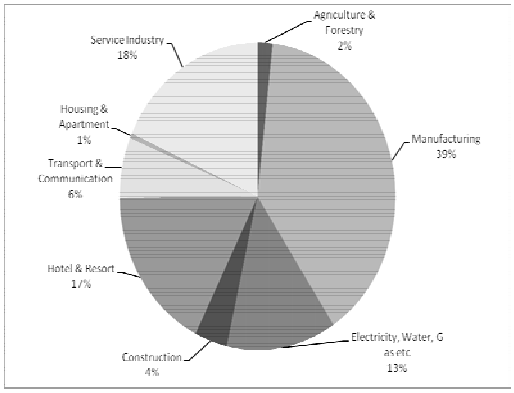
Tornell, Aaron, Frank Westermann and Lorenza Martinez. 2003. "Liberalization, Growth and Financial Crisis: Lessons from Mexico and the Developing World", *Workings Papers on Economic Activity*, Vol. 2, 1-112.

Tornell, Aaron and Frank Westermann. 2002. "Boom-Bust Cycles: Facts and Explanation", with Aaron Tornell, *IMF Staff Papers*, Vol. 49, 111-155.

Wagle, Udaya, R. 2010. "Economic Inequality in Nepal: Pattern and Changes During the Late 1990s and Early 2000s", *Journal of International Development*, vol. 22, p. 573-590.

APPENDIX

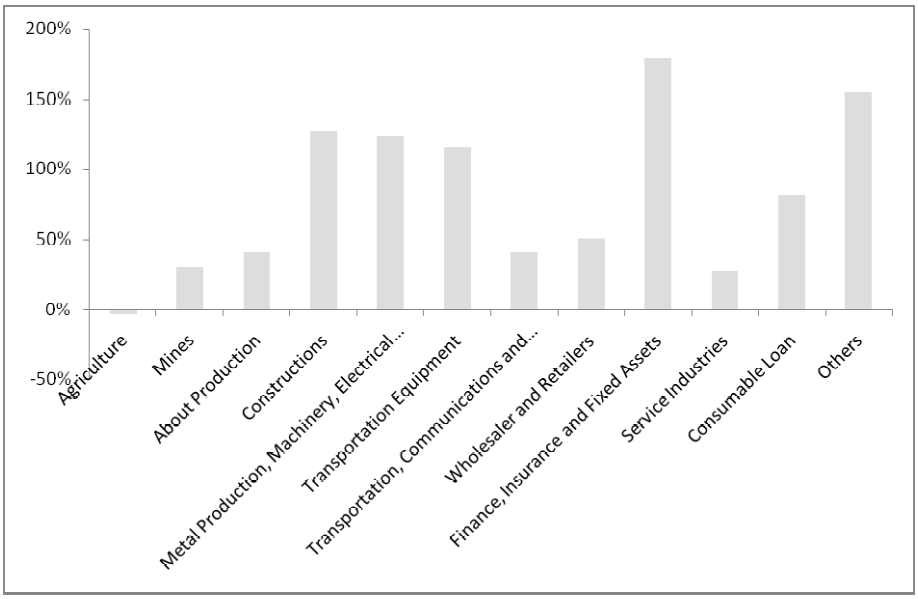
Figure A1: Decomposition of FDI by sector



Source: Department of industries, as in Rana and Pradhan (2005)

Figure A2: Market capitalization of listed companies (as a percentage of GDP

Figure A3: Sectoral lending (nominal) from 2007-2009 (cumulative percentage change)



Does Nepal's Financial Structure Matter for Economic Growth?

Ram Sharan Kharel, Ph.D.* and Dilli Ram Pokhrel, Ph.D.**

Abstract

Despite causality debate, a number of empirical literatures (Pagano, 1993 and Levine, 1997, among others) suggest a positive relationship between financial sector development and economic growth. Moreover, there remains further debate whether the country's financial structure exerts differential impact on economic growth. Empirical studies across the countries (Rajan and Zingales, 1999 and Arestis et. al. 2004) suggest that banking sector plays a key role in some countries while the capital market has a lead position in others for enhancing economic growth. In this context, this paper investigates the relative merits of banking sector vs. capital market in promoting economic growth in Nepal. The empirical results using Johansen's cointegrating vector error correction model based on aggregate annual data from 1993/9 to 2010/11 suggest that banking sector plays a key role in promoting economic growth compared to capital market in Nepal. It may be either the size of capital market is too small to seek the relationship or it is weakly linked to real economic activities. Our result implies that the policy should focus on banking sector development by enhancing its quality and outreach as it promotes economic growth in Nepal.

Key words: Financial structure, bank vs. capital market-based financial system, economic growth, error correction model

JEL classification: C51, E44, E47

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I. INTRODUCTION

There have been extensive research works on the relationship between financial structure[1] and economic growth. A large number of literatures suggest that financial structure significantly matters for explaining economic growth, while many others find that the country's financial structure itself does not exert differential impact on economic growth. Moreover, there remains further debate, among the proponents of finance-growth nexus, whether bank-based or capital market-based financial system can contribute equally to the economic growth.

There are four competing approaches explaining the relationship between financial structure and economic growth: bank-based approach, market-based approach, financial services approach and the law and finance approach (Arestis et. al., 2001). The bank-based view highlights the positive role of banks in mobilizing financial resources, identifying good projects, monitoring managers, and managing risk (Levine 1997, 2000) and, therefore, said to be more growth promoting than market-based system (Arestis et. al., 2001). Banks have advantages over markets particularly in the countries with weak legal and accounting systems. In such situation, banks can make firms reveal information and pay back their debts thereby facilitating expansion and long-run growth (Rajan and Zingales, 1999). From a development perspective, a bank-based system outperforms a market-based one because financial intermediation creates an environment more conducive for transforming a traditional economy into a modern one (Vitlos, 2001).

In contrast, the market-based view expresses a significant role of capital market for promoting economic growth. Although banks can effectively eliminate duplication of information gathering and processing, they can have less success dealing with uncertainty, innovation, and new ideas (Allen and Gale, 1999). This view emphasizes the growth enhancing role of the market for ensuring innovation, market discipline and better corporate governance practices and this system is supposed to reduce the moral hazard problem inherent in bank-based system.

The financial services and law of finance view, on the other hand, argue that markets and banks are alternatives as they perform more-or-less the same functions but in different ways and possibly with different degrees of success (Boyd and Smith, 1996 and Allen and Gale, 1999). For them, what matters for growth is the overall level and quality of financial services and, therefore, the best way to examine the connection between financial structure and growth is not to study how markets and intermediaries can substitute for each other, but rather how markets and intermediaries complement one another (Dolar, V. and Césaire M.,2002). The law and finance view, put forward by La porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), emphasizes the role of creditor and investor rights for financial intermediation. Evidence from cross-country growth analyses (Levine1999, 1998; Laporta *et. al*. 1998, 1997) supports this view. Further, Demiruc-Kunt and Levine (1996), using firm-level data, find that increase in securities market

[1] Refer to Annex I for more about the financial structure.

development actually tends to increase the use of bank finance in developing countries. This finding suggests that these two elements of the financial system may act as complements during the development process. Levine and Zervos (1998) show that higher stock market liquidity or greater bank development leads to higher growth, irrespective of the development of the other.

Demirguc-Kunt and Levine (2001), using a broad data set covering 48 countries from 1980 to 1993, find that the distinction between bank and market-based financial system is not important for explaining economic growth. Rather, elements of a country's legal system and the quality of its financial services are most important for fostering economic growth. Contrary to this, Tadesse (2001) finds significant difference between bank and market-based financial system in explaining economic growth. It suggests that for countries with underdeveloped financial system, bank-based system outperform market-based system, while for countries with developed financial system; market-based system outperform bank-based financial system.

Chakraborty and Ray (2001), in a model where financial structure arises endogenously, show that it is entirely possible for two countries to have distinctly different financial systems but enjoy similar growth rates over time (as in the case of Germany and the United States.) This supports Levine's (2000) and Demirguc-Kunt and Levine's (2001) empirical findings that the specific type of financial system is not important for explaining differential growth rates across nations. Both the panel as well as cross-section studies (Demirguc-Kunt and Levine, 1996; Levine, 2002 and 2003; Beck and Levine, 2002) find that financial structure is irrelevant to economic growth implying that neither bank nor the market-based financial system can explain economic growth. Rather, they argue that it is the overall provision of financial services which are important.

Given the countervailing arguments, this paper seeks to examine the relative merits of banking sector vs. capital market in promoting economic growth in Nepal. Although there is relatively a long history of evolution of the banking sector in Nepal, a formal and systematic capital market activities commenced from the early-1990s and data for the volume of market capitalization is available since 1994. Thus, the study uses time series data from 1993/1994 to 2010/11 and employs Johansen's cointegrating vector error correction model to investigate this issue. The empirical results suggest that financial sector development has positive impact in promoting economic growth in Nepal. Particularly, the banking sector development plays a pivotal role compared to the capital market. This suggests that the growth enhancing policy should focus on banking sector activities to channelize their impact on growth. The role of capital market seems to be insignificant. It may be either the size of market is too small to seek the relationship or it is poorly linked to real economic activities.

The structure of the rest of the paper is as follows: The subsequent section summarizes a brief overview of structure of the Nepalese economy and financial system followed by methodological discussions in section III. The section IV presents the data generating process and empirical estimates. Finally, section V concludes the paper.

II. BRIEF OVERVIEW OF STRUCTURE OF THE NEPALESE ECONOMY AND FINANCIAL SYSTEM

With the initiation of economic liberalization policies in the mid-1980s; the structure of Nepalese economy witnessed a significant transformation, particularly in the 1990s. The share of agriculture sector to GDP came down from 69 percent in 1975, 50 percent in 1995 to 35 percent in 2011. As a result of increasing private sector involvement in the economic activities, the share of non-agriculture sector to GDP surpassed the dominance of agriculture thereby making services sector as a leading contributor to GDP since 2000. However, the share of industry sector has been stable over the period. Still, the agriculture sector is dominant with more than one third of its contribution to GDP.

The annual average real economic growth rate of Nepal remained at around 5 percent in 1990s and further below at 4 percent during 2000-10. The economic growth in the former decade was led by non-agriculture sector, whereas the situation was reverse in the later decade. In the former decade, the agriculture and non-agriculture sector grew by 2.5 percent and 7.0 percent respectively whereas in the later decade these sectors witnessed annual average growth rate of 3.3 percent and 4.1 percent respectively (Annex II). The main reasons for such a differential growth performance in the past two decades are mainly attributed to the country's macroeconomic policy initiatives as well as political environment. Economic liberalization policies along with the stable political situation led to a higher growth rate of non-agriculture sector in the 1990s. Contrary to this, internal conflicts, prolonged political transition and supply side bottlenecks decelerated the growth performance of industry and services sector in the subsequent decade.

On the finance front, the Nepalese financial system is highly dominated by banking sector, particularly commercial banks. Although the capital market is still passing through the early stage of development, the Nepalese banking sector has relatively longer historical foundation, established institutional settings and relatively better growth and development trend. Until 1984, there were only two state-owned commercial banks in the country and the financial system was highly regulated.

With the initiation of economic liberalization in the mid-1980s and increasing private sector investment in the financial sector from 1990s, the number of banks and financial institutions (commercial banks, development banks and finance companies) surged up from 38 in 1994 to 197 in 2011. Consequently, the ratio of total banking sector assets to GDP went up to 78 percent from 35 percent during this period. Likewise, the ratio of private sector credit to GDP increased from 20 percent in 1994 to 64 percent in 2011 (Annex III).

Although the evolution of Nepalese capital market dates back to 1976 with the establishment of Securities Exchange Center (SEC), the modern capital market began only after the conversion of SEC into Nepal Stock Exchange Limited (NEPSE) in 1993.

As a result of some reform initiatives and gradual increment in the public participation in the market; the number of listed companies increased from 66 in 1994 to 209 in 2011. Likewise, the market capitalization to GDP ratio increased from 7 percent in 1994 to 24 percent in 2011 (mid-October). During this period, the paid up value of listed shares went up from Rs. 2.2 billion to Rs. 101.3 billion (Annex III). These indicators show that the Nepalese capital market, which was almost non-existent until 1994, witnessed a significant but steady growth path to arrive this stage. Nevertheless, in relation to its market share in the overall financial system, the Nepalese capital market is still passing through its infant stage of development.

Besides; insurance companies, Citizen Investment Trust, Employee Provident Fund and commodity exchanges are also a part of Nepalese financial system. Nepal Rastra Bank (NRB) is the apex regulatory authority to manage and supervise the banking sector activities, while the Securities Board of Nepal (SEBON) is the regulatory authority of capital market activities in the country. Insurance companies are regulated by "Insurance Board". Due to dominant presence of banking sector in the capital market, the policies and regulatory stances undertaken by the NRB largely affect the capital market activities and hence there is a sequential complementarity between capital market and banking sector development in Nepal.

As in other developing economies, there is also a large presence of informal financial transactions in Nepal. This sector comprises the local money lenders and credit & savings associations. This sector is poorly developed, limited in reach, and not integrated into the formal financial system. Its exact size and effect on the entire economy remain unknown and a matter of on-going research.

III. METHODOLOGICAL FRAMEWORK

The model

We start with specifying a general Cobb-Douglas production function, which states that output (Y_t) is the function of labour (L_t) and capital (K_t) as follows:

$$Y_t = e^A L_t^{\tau}, K_t^{1-\tau} U_t \tag{1}$$

Where, t is the time subscription, e is exponential term, A is the constant term (shift factor), τ is the share of L_t and $1 - \tau$ is the corresponding share of K_t and U_t is an error term.

Dividing both side by L_t , taking log and re-arranging terms yields:

$$\log(y_t) = A + \tau \log(x_t) + u_t \tag{2}$$

Where, A is the constant term, $y_t = Y_t / L_t$, $x_t = K_t / L_t$, τ is a coefficient of x_t and finally u_t is the white noise error term.

Eq. (2) is a Cobb-Douglas type of linear production function expressed in per capita labor term. This function, however, may be underspecified as recent literatures provide ample evidences that several factors such as factor productivity, technological progress, financial development and financial structure also affects the economic growth (Arestis, et.al.,2004). As this paper examines whether financial structure matters for economic growth, we define financial structure and then include them in the model on the assumption that overall financial system has a positive impact on growth. Our ultimate focus is, therefore, to examine the relative importance of financial structure.[2]

The literatures offer various ways of classifying financial system although the classification varies country to country. One of the popular ways is to segregate the overall financial system into bank-based and market-based (non-bank) financial system (Demirguc-Kunt and Levine, 2001). The banking sector comprises financial transactions of deposit taking institutions while the non-banking sector mostly covers the transactions of capital market.[3] In this sense, we model Eq. (2) as:

$$\log(y_t) = A + \tau \log(x_t) + \lambda(NBS_t) + \gamma(BS_t) + e_t \qquad (3)$$

Where, BS_t represents a leading indicator of banking sector development while NBS_t represents an indicator of non-bank financial system. Following Beck et. al. (2002), we consider total assets and alternatively total credit of banks as a proxy for banking sector development while market capitalization is taken as a proxy for capital market development.

In this setting, a significant and positive sign of λ indicates that capital market development has a positive impact on economic growth while a significant and positive sign of γ signifies the same impact from the development of banking sector. A negative sign of parameters implies contractionary impact and insignificant coefficient of both parameters denote no effect on economic growth. More importantly, capital market has dominant role influencing economic growth if $\lambda > \gamma$ while the reverse case implies that banking sector has a dominant role relative to capital market.

As discussed in the previous section, capital market indicators such as market capitalization and NEPSE index is available only since 1994, it will be unusual defining a large scale model for such a small sample size. We further compressed Eq. (3) as follows:

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2 The sample period we consider in this paper is not big enough to include other possible variables in the production function.

3 In a broad classification, insurance companies, contractual saving institutions and investment companies may also include under the definition of capital market.

$$\log(y_t) = A + \tau \log(x_t) + \varphi(s_t) + \nu_t \tag{4}$$

Where, $s_t = BS_t / NBS_t$ is the ratio of banking sector to capital market development indicator and represents the structure of the financial system. A higher value of s_t indicates more bank-based and a lower s_t means more capital market-based financial structure.

Eq.(4) is the final specification in which the parameter φ plays an important role. Under this framework, a significant φ coefficient implies that financial structure matters for economic growth and an insignificant φ implies that the structure does not matter. Further, a significant parameter with negative sign implies that capital market has a dominant role over banking sector development while positive sign signifies that banking sector has dominant role relative to capital market.

Econometric Approach

We employ a tri-variate cointegrated vector autoregressive model of order p to estimate Eq.(4) as follows (Johansen, 1988 and Johansen and Jueselius, 1990):

$$\Delta X_t = \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \prod X_{t-p} + \mu_t + \varepsilon_t \tag{5}$$

Where, $X_t [y_t, x_t, s_t]$ is a 3×1 vector of the first-order integrated [I(1)] variables; μ_t is an 3×1 vector of deterministic term; ε_t is a 3×1 vector of normally and independently distributed error terms, i.e., $\varepsilon_t \approx NP(0, \Omega)$; Γ_i are 3×3 coefficient matrix of lag variables, defined as $-\sum_{j=i+1}^{p} A_j$ and finally, $\prod$ is an 3×3 long run impact matrix, $-(I - \sum_{i=1}^{p} A_i)$ where A_i is an 3×3 matrix of vector autoregressive of order p and I is an 3×3 identity matrix.

The rank of $\prod$ determines the number of cointegrating vectors (r) among the variables in X_t. The model does not give cointegrating relationship among variables if r = 0. On the other hand, if r = 3 there exists a full rank. If $\prod$ is of rank r such that $0 < r < 3$ then we can decompose $\prod = \alpha\beta'$ where α is an $3 \times r$ matrix of error correction coefficients which provide the speed of adjustment towards long run equilibrium and β' is an $3 \times r$ unrestricted cointegrating vectors. Now, Eq. (5) can be re-arranged as:

$$\Delta X_t = \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \alpha(\beta' X_{t-p}) + \mu_t + \varepsilon_t \tag{6}$$

Testing number of cointegrating relationships (r) is an important issue in Eq. (6) because the long run relationship among variables cannot be indentified if $r \neq 1$. Following Johansen (1988), we employ two likelihood ratio tests namely eigenvalue [$\lambda_{\max}(r/r+1)$] and trace statistic [$\lambda_{trace}(r/p)$] tests for the determination of r as follows:

$$\lambda_{trace}(r/p) = -T\sum_{i=r+1}^{p}\log(1-\hat{\lambda}_i) \tag{7}$$

$$\lambda_{\max}(r/r+1) = -T\log(1-\hat{\lambda}_{r+1}) \tag{8}$$

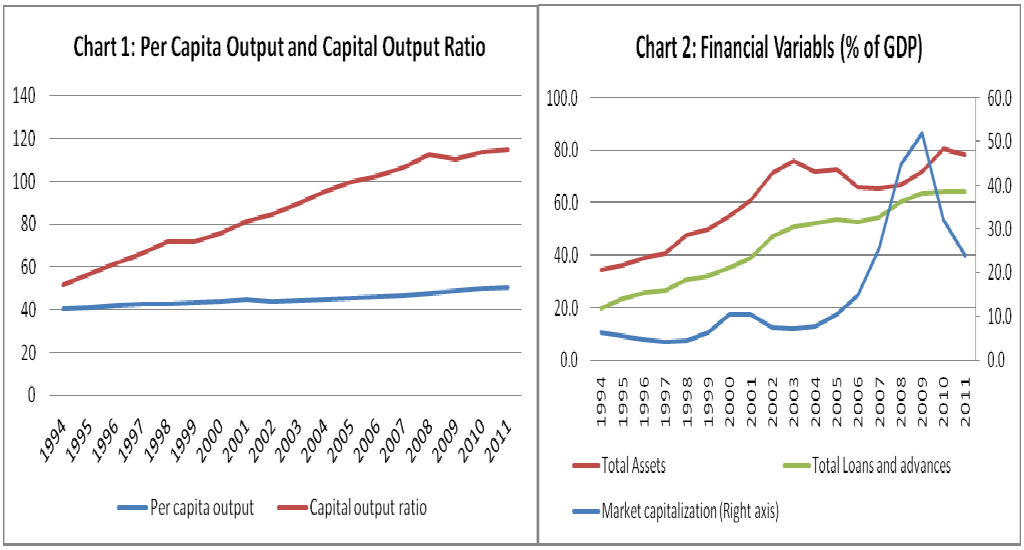
where $\hat{\lambda}$ is computed eigenvalue up to p lags and p is chosen up to the level which removes serial correlation. Eq. (7) tests the null hypothesis that there are at most r cointegrating vectors against k where k is number of variables used in the model, whereas Eq. (8) tests the null hypothesis of r cointegrating vectors against the alternative of $r+1$. The critical values for examining the $\lambda_{\max}(r/r+1)$ and $\lambda_{trace}(r/p)$ are taken from Osterwald-Lenum (1992).

IV. THE DATA AND EMPIRICAL ANALYSIS

We use annual data from 1993/1994 to 2010/2011 for estimating the model as some of the data including market capitalization is unavailable prior to this period. As shown in Annex 3, output per capita, y_t, is defined as Y_t/L_t where Y_t is Gross Domestic Product (GDP) at constant price of 2000/01 and L_t is the total labor force. Again, as time series data of labor force is unavailable in Nepal; we obtained the series by interpolating discrete information available from population census 1991 and 2001 for the period from 1994 to 2001 and extrapolating from 2002 onwards using population census 2001 and Nepal Living Standard Survey, 2010. On the other hand, capital labor ratio, x_t, is defined as K_t/L_t where K_t is the accumulation of total investment at constant price but without adjusting depreciation. As initial capital stock is unknown, we accumulate total investment from 1974/75 to obtain the figure (Kharel, 2012).

The structure of financial system (s_t) is defined as the ratio of banking sector to (BS_t) capital market (NBS_t) development indicators. Following Arestis et. al. (2004) and Beck and Levine (2002), we employ market capitalization over GDP as the representation of capital market development (NBS_t). On the other hand, total assets of commercial banks, development banks and finance companies over GDP is considered to be a leading indicator of the banking sector development (BS_t). As literature debates on the measurement, we also consider the total loans and advances of same institutions as an alternative indicator of the banking sector development (Levine, 2002). Therefore, we define $s_t = s_t^1$ when BS_t is the ratio of total assets to GDP and $s_t = s_t^2$ when BS_t is considered to be the ratio of loans and advances of banking system over GDP.

Chart 1 and 2 depict historical trend of variables, which sow that capital output ratio has been accelerating over the years while per capita labor has increased at a very slow pace indicating the fact that the growth of investment is not encouraging in Nepal compared to the growth of labor supply. Regarding the financial variables, the ratio of total assets to GDP and total loans to GDP of the banking sector increased from 34.5 percent and 19.9 percent respectively in 1994 to 78.3 percent and 64.1 percent in 2011. The market capitalization ratio, which had been increasing at a slower rate in the first decade since 1994, followed by a bullish trend and reached to 52 percent of GDP in 2009. It then started declining thereafter, mainly due to a crash in housing market, among others.



The plot of variables shows that they are auto-correlated at level except for market capitalization which seems to be mean-reverting in the first few years followed by a bullish trend till 2009 and then declined thereafter (Chart 1 and 2). Table 1 shows the time series properties of variables which confirm that variables are stationary at the first difference. This gives us a strong basis for employing cointegrating vector error correction model as discussed in the previous section.

We then proceed to test the number of cointegrating relationship among the variables used in the model employing the Johansen's test procedure as discussed in Eq. (7) and Eq. (8) (Johansen, 1992). In this process, choosing lag order (p) of variables is crucial for which the literature proposes a number of alternative procedures. But superimpose p =1 not just because we are using annual data but also because our sample size is not big enough to expand the lag horizon.

Table 1: Augmented Dickey-Fuller (ADF) Test for Stationary

Variables	Level		First difference	
	Constant	Constant and Trend	Constant	Constant and Trend
y_t	0.22	-1.64	-3.89*	-4.16*
x_t	0.90	-1.20	-3.13**	-4.85*
s_t^1	-0.62	-1.02	-3.09**	-4.73*
s_t^2	-1.52	-2.70	-3.92*	-4.58*

*Note: Critical values for rejecting the null hypothesis at 1%, 5% and 10% significant level are -3.88, -3.05 and -2.66 respectively. * and ** indicate that the variable is significant at 1%, and 5% respectively.*

Table 2 demonstrates the test result of number of cointegrating vectors. The estimated $\lambda_{\max}(r/r+1)$ and $\lambda_{trace}(r/1)$ are reported in column 5 and 8 respectively. Likewise, critical values of $\lambda_{\max}(r/r+1)$ and $\lambda_{trace}(r/1)$ are reported in column 6 and 9 respectively. The motivation of selecting variables in this particular order corresponds to the literature.

Table 2: Johansen Maximum Likelihood Procedure (p=1)

Model	H_0	Eigen-values	Maximal Eigen Value			Trace		
			H_1	λ_{max}	critical value	H_1	λ_{trace}	critical value
y_t, x_t, s_t^1	$r = 0$	0.78	$r = 1^*$	24.38	21.13	$r \geq 1^*$	33.82	29.79
	$r \leq 1$	0.43	$r = 2$	9.25	14.26	$r \geq 2$	9.44	15.49
y_t, x_t, s_t^2	$r = 0$	0.81	$r = 1^*$	26.46	21.13	$r \geq 1^*$	35.73	29.79
	$r \leq 1$	0.39	$r = 2$	8.07	14.26	$r \geq 2$	9.26	15.49

*Note: r denotes the number of cointegrating vectors. The critical values are obtained from MacKinnon-Haug-Michelis (1999). *denotes rejection of the null hypothesis at 5%.*

Starting with the null hypothesis of no cointegration $(r = 0)$ for a model with $s_t = s_t^1$, the null hypothesis of r = 0 is rejected at 5% level of significance in favor of at least one cointegrating relationship (r = 1) suggested by both $\lambda_{\max}(r/r+1)$ and $\lambda_{trace}(r/p)$ criteria. Both tests, however, accept the null hypothesis that r = 2 or $r \geq 2$. Likewise, both tests exhibit the same phenomena for a model with $s_t = s_t^2$. Hence, based on the empirical literature and econometric properties, we confirm that there exists unique cointegrating relationship (r = 1) for determining y_t in both models.

Table 3: Cointegrating Vector and Loading Factor

Model	Cointegrating Vector		Loading Factor
	β_{12}	β_{13}	(α_{11})
y_t, x_t, s_t^1	0.281 (0.023)*	0.119 (0.010)*	0.031 (0.008)*
y_t, x_t, s_t^2	0.215 (0.091)*	0.071 (0.013)*	0.022 (0.005)*

*Note: Figures within parenthesis are standard errors. * indicates that the coefficient is significant at 1 percent level.*

Table 3 reports the cointegrating vectors normalized to y_t. As expected, we obtain a positive sign with significant coefficient of β_{12} (which is similar to τ in Eq. 4) in both models. The loading factor (α_{11}) which is also known as the speed of adjustment is significant at 1 percent and takes the negative sign in the original model which confirms that both models are stable and robust. The speed of adjustment is, however, relatively faster in a model with $s_t = s_t^1$ compared to the speed of adjustment in a model with $s_t = s_t^2$.

The coefficient of financial structure (β_{13}) is the central focus of this study which is found to be positive and significant in both models. This implies that financial structure matters for economic growth in Nepal. More specifically, financial development led by banking sector is more acute for economic growth in Nepal in relation to capital market. One of the reasons for getting this finding could be the fact that capital market in Nepal is concentrated in the capital city which is overwhelmingly dominated by the banking sector. On the other hand, banking service is relatively more diversified and expanded beyond the capital city. Thus, in the present scenario, banking sector development outperforms the capital market led financial development in Nepal.

We also verify our estimate in number of ways. First, we use gross national product (GNP) as an alternative to GDP. In another estimate, total labor force is replaced by total population. Further, banking sector development is measured by total assets and alternatively claims on private sector of commercial banks which excludes development bank and finance companies. Nevertheless, empirical results using the above mentioned variables, and hence the main conclusion, is similar to the reported estimates.[4]

V. CONCLUSION

This paper focuses on the long standing debate regarding the relative merits of bank vs. capital market-based financial system in promoting economic growth in the context of Nepal. Using Johansen's cointegrating vector error correction model based on annual data from 1993/1994 to 2010/2011; we conclude that financial structure matters for economic

[4] The alternative estimates are not reported in this paper to save the space.

growth in Nepal. Particularly, our empirical result suggests that Nepalese banking sector is more growth enhancing relative to capital market.

The main implication of our findings is that the policy should focus on banking sector development by enhancing products and service quality along with the expansion of its outreach as it better promotes economic growth compared to capital market. The banking sector development does not necessarily mean the increment of number of banks and financial institutions, but also expansion in the outreach of their financial services and product in terms of quality as well as quantity. The insignificant impact of capital market on growth may be attributed to its size and poor linkage with the real sector implying that capital market should be further expanded to real economic activities so as to channelize its impact on growth. The conclusion of this paper, however, should be analyzed cautiously as the empirical analysis is based on a small sample size. This paper can also be extended by incorporating the data of other financial institutions including provident fund and insurance companies in the measurement of financial structure.

REFERENCES

Allen, F. and D. Gale. 1999. "Diversity of Opinion and Financing of New Technologies." *Journal of Financial Intermediation* 8: 68-89.

Arestis, P., A. D. Luintel and K.B. Luintel (2004). "Does Financial Structure Matter?" *The Levy Economics Institute of Bard College, Annandale-on-Hudson, NY.*

Arestis, P.,P. Demetriades, and K.B. Luintel. 2001. "Financial Development and Economic Growth: The Role of the Stock Markets." *Journal of Money, Credit, and Banking,* 331: 16-41.

Beck, T. and Levine R. 2002. "Stock Markets, Banks and Growth: Panel Evidence." *NBER Working Paper Series No. 9082.* Cambridge, National Bureau of EconomicResearch.

Boyd, J.H. and B.D. Smith. 1996. "The Co-Evolution of the Real and Financial Sectors in the Growth Process." *World Bank Economic Review* 102: 371-96.

CBS. 1991. "Population Census – 1991", Central Bureau of Statistics, Kathmandu, Nepal.

CBS. 2001. "Population Census – 2001", Central Bureau of Statistics, Kathmandu, Nepal.

CBS. 2011. "Nepal Living Standard Survey 2010", Central Bureau of Statistics, Kathmandu, Nepal.

Chakraborty, S. and T. Ray. 2001. "Bank Finance versus Market Finance: A Growth- Theoretic Analysis". *University of Oregon*. Manuscript.

Demirguc-Kunt, A. and Levine, R. (1996). "Stock Markets, Corporate Finance and Economic Growth: An Overview", *World Bank Economic Review*. 10(2), 223-239.

Demirguc-Kunt, A. and Levine, R. (2001). "Financial Structures and Economic Growth: A Cross-Country Comparison of Banks, Markets and Development". Cambridge, MA: *MIT Press*.

Dolar, V. and Césaire Meh. 2002. Financial Structure and Economic Growth: A Non-Technical Survey, *Bank of Canada Working Paper 2002-24*.

Johansen, S. 1988. "Statistical Analysis of Cointegration Vectors," *Journal of Economic Dynamics and Control*, 12, 231-54.

Johansen S., and K. Juselius. 1990. "Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money". *Oxford Bulletin of Economics and Statistics*, 52,169-206.

Johansen, S, and K. Juselius. 1992. "Testing Structural Hypotheses in a Multivarite Cointegration Analysis of PPP and the UIP for UK", *Journal of Econometrics,* 53, 211-44.

Kharel, R.S. (2012)."Modeling and Forecasting Fiscal Policy and Economic Growth in Nepal". *Nepal Rastra Bank Working Paper 9.*

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. W. 1998. "Law and Finance." *Journal of Political Economy* 106(6): 1113-1155.

Levine, R 1999. "Law, Finance, and Economic Growth." *Journal of Financial Intermediation* 8 (1-2): 8-35.

Levine, R, and Sara Zervos. 1998. "Stock markets, banks, and economic growth", *American Economic Review* 88(3):537-558, June.

Levine, R. (1997). "Financial development and economic growth: Views and agenda", *Journal of Economic Literature.* 35, 688-726.

Levine, R. 2000. "Bank-Based or Market-Based Financial Systems: Which is Better?" Carlson School of Management, University of Minnesota, *Working Paper*.

Levine, R. 2002. "Bank-based or Market-based Financial Systems: Which is Better?" *Journal of Financial Intermediation* 11 (4): 398-428.

Levine, R. 2003. "More on Finance and Growth: More Finance More Growth?" *Federal Reserve Bank of St. Louis Review* 85 (4): 31-46.

Levine, R., Norman, L. and Beck, T., (2000). "Financial Intermediation and Growth: Causality and Causes", *Journal of Monetary Economics*, 46: 31-77.

MoF. 2011. "Economic Survey 2009/1**1**", Ministry of Finance, Kathmandu.

NRB. 2011. "Quarterly Economic Bulletin", Nepal Rastra Bank, Central Office, Baluwatar, Kathmandu, Nepal. Vol 46 (1).

Pagano, M. (1993). "Financial Markets and Growth: An Overview", *European Economic Review*. 37, 613-622.

Rajan, R. and Luigi Zingales (1999). "Financial Systems, Industrial Structure and Growth", mimeo, *University of Chicago*.

Tadesse, S. (2001). "Financial Architecture and Economic Performance: International Evidence". *University of South California*, Manuscript.

Vitols, S. 2001. "The Origins of Bank-Based and Market-Based Financial Systems: Germany, Japan and the United States" , Discussion Paper FS I 01-302, *Wissenschaftszentrum Berlin für Sozialforschung.*

Zysman, J. 1983. "Governments, Markets and Growth: Financial Systems and the Politics of Industrial Change", Ithaca: *Cornell University Press.*

Annex I: Concept of Financial Structure

So far as finance-growth nexus is concerned, 'financial structure' and the 'financial system' are two different concepts as they exert differential impact on economic growth. It has been conventionally agreed that financial system development and economic growth are positively linked. However, the impact of financial structure on economic growth has been a long standing debate. This paper is focused on examining the growth impact of financial structure rather than that of financial system development.

Financial structure is an institutional framework of any financial system which may be either bank-based or capital market-based depending upon the different economic and financial indicators. 'Financial structure' is the mixture of financial instruments, markets, and institutions operating in an economy (Goldsmith, 1969). Financial system, on the other hand, is a set of specialized organizations and institutions dealing with the transfer of payments and mediating the flow of savings and investment (Vitlos, 2001). While all industrial societies have such a specialized financial system, cross-national comparison of these systems indicates considerable structural diversity (Zysman,1983). One key difference is the degree to which financial systems are bank-based or market-based.
In bank-based systems, the bulk of financial assets and liabilities consist of bank deposits and direct loans. In market-based systems, securities that are tradable in financial markets are the dominant form of financial asset. Bank-based systems appear to have an advantage in terms of providing a long-term stable financial framework for companies. Market-based systems, in contrast, tend to be more volatile but are better able quickly to channel funds to new companies in growth industries (Vitols, 2001). In the bank-based system intermediation plays a key role while in a market-based system, fund is directly created through the market.

The market capitalization and the total banking sector credit in relation to the size of respective economy, as measured by GDP, are commonly used indicators for quickly examining whether a country's financial system is bank-based or market-based. A higher ratio of market capitalization to GDP (Mcap/GDP) compared to that of bank credit to GDP (Loans/GDP) indicates a more market-based financial system, while a higher ratio of bank loans to GDP compared to that of market capitalization to GDP indicates a bank-based financial system. Based on this, and other indicators (Levin, 2002), a number finance-growth analyses have put Japan and Germany under bank-based systems, and the U.S. and UK as market-based systems. Following this tradition, Nepal's financial system can be categorized under bank-based system.

Annex II (A): Sectoral Contribution to GDP (in percent)

Sectors	1980/81	1990/91	2000/01	2010/11
Agriculture	65	48	37	35
Industry	6	18	17	15
Service	29	35	46	50

Source: Central Bureau of Statistics

Annex II (B): Growth rate of real GDP (annual average, %)

Particulars	1990-2000	2001-2010
GDP	5.1	3.7
Agriculture	2.5	3.3
Non-agriculture	7.0	4.1

Source: Central Bureau of Statistics

Annex III: Key Indicators of Nepalese Financial System

Indicators	1994	2005	2011*
Banking Sector			
Number of Banks	62	180	272
Commercial Banks	8	17	32
Development Banks	2	26	87
Finance Companies	28	60	79
Microfinance Development Banks	2	11	21
Cooperatives**	9	20	16
NGOs**	13	46	37
Bank Assets/GDP#	35	73	78
Bank Credit to Private Sector/GDP#	20	54	64
Capital Market			
Number of listed companies	66	125	209
Paid-up value of listed shares (NRs. in billion)	2.2	16.8	101.3
Market Capitalization (NRs. in billion)	13.9	61.4	302.1
Market Capitalization/GDP	7	10	24
NEPSE Index	226	286.7	331

** As of October, ** Licensed by NRB for limited banking, # Includes Commercial Banks, Development Banks and Finance Companies*
Source: Quarterly Economic Bulletin, Mid-Oct. 2011, Nepal Rastra Bank; Central Bureau of Statistics

Annex IV: Measurement and Source of Variables

Variables	Definition	Data Source	Measurement
Y_t	Gross Domestic Product (GDP) at 2000/01 price	Economic Survey 2011	Rs. in million
K_t	Capital stock at constant price. The capital stock is obtained accumulating the investment without adjusting depreciation from 1974/75 onward.	Economic Survey 2011	Rs. in million
L_t	Total labor force – interpolated from population census and Nepal Living Standard Survey (NLSS) as time series data on labor force is unavailable.	Population census (1991 and 2001) and NLSS, 2010	Number
y_t	Output labor ratio (Y_t / L_t)	Self computation	Ratio
x_t	Capital labor ratio (K_t / L_t)	Self computation	Ratio
s_t	Financial structure defined as the ratio of banking sector (BS_t) over capital market (NBS_t) development indicators	Self computation	Ratio
BS_t	Total assets of banks/GDP*100. Alternatively, it is defined as Total loans and advances of banks/GDP*100. Banks include commercial banks, development banks, finance companies, agriculture development banks and Nepal Industrial Development Corporation.	Self computation based on information available at Quarterly Economic Bulletin and Economic Survey, 2011	Ratio
NBS_t	Market capitalization/GDP*100	Self computation based on data available at Quarterly Economic Bulletin and Economic Survey	Ratio

Source: Population Census, 1991 and 2001, Central Bureau of Statistics; Quarterly Economic Bulletin 2011, Nepal Rastra Bank; Nepal Living Standard Survey 2010, Central Bureau of Statistics.

Government Revenue Forecasting in Nepal

T. P. Koirala, Ph.D.*

Abstract

This paper attempts to identify appropriate methods for government revenues forecasting based on time series forecasting. I have utilized level data of monthly revenue series including 192 observations starting from 1997 to 2012 for the analysis. Among the five competitive methods under scrutiny, Winter method and Seasonal ARIMA method are found in tracking the actual Data Generating Process (DGP) of monthly revenue series of the government of Nepal. Out of two selected methods, seasonal ARIMA method albeit superior in terms of minimum MPE and MAPE criteria. However, the results of forecasted revenues in this paper may vary depending on the application of more sophisticated methods of forecasting which capture cyclical components of the revenue series. The prevailing forecasting method based particularly on growth rate method extended with discretionary adjustment of a number of updated assumptions and personal judgment can create uncertainty in revenue forecasting practice. Therefore, the methods recommended here in this paper help in reducing forecasting error of the government revenue in Nepal.

Key words: Data generating process, forecast bias, seasonal pattern, under-or-over estimation, government revenue, seasonality

JEL Classification: H2, O23

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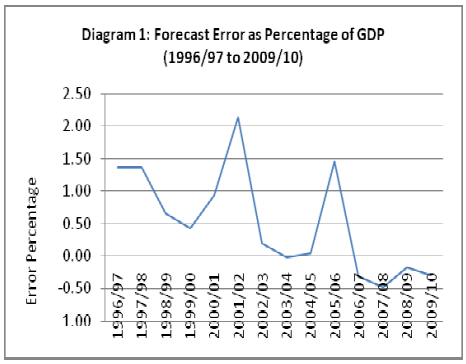
I. INTRODUCTION

The revenue forecasts by the national government are carried out in course of budget preparation. An accuracy of revenue forecasts is one key issue in the design and execution of fiscal policies (IMF, 2001). Under or over-prediction of revenue forecast creates budget planning vulnerable. Revenue forecast provides necessary discipline for negotiations between the executive and legislative branches of the government. It helps in setting up performance targets for revenue departments and agencies (Auerbach, 1999, Danninger, 2005). One of the major sources of error (or bias) in revenue forecasting is the methods adopted in forecasting revenue in addition to variety of political and institutional factors determining such bias (Golosov and Kind, 2002, Kyobe and Danninger, 2005).

In Nepal, revenue forecasts is an important task of Ministry of Finance (MOF) in the course of budget preparation and specifying performance targets of revenue collection offices. Major institutions involved in forecasting revenue in the country are MOF and Nepal Rastra Bank (NRB) as their work of forecasting is an essential part of the budgetary process. The IMF, especially its Fiscal Affairs Department (FAD) often gives advice for a systematic analysis of forecasting in low-income countries in the context of reforms on the budget planning process (Kyobe and Danninger, 2005). However, forecasting techniques are generally not put down in formal documents, and country practices are often a mix of idiosyncratic budget practices and influences from legacy systems. Too much reliance on few methods in forecasting revenue of the government of Nepal is considered to be less efficient in capturing true DGP of revenue sequence. Not a remarkable exercise has been carried out in identifying appropriate methodology of revenue forecasting from those institutions involved in revenue forecasting at present and there is a lack of private institutional forecaster of revenue in the economy.



As a result, there is an over-estimation or under-estimation of the revenue of the government. The forecast error as percentage of GDP shows downward trend with erratic movement as represented by forecast error or bias as shown in Diagram 1. Revenue forecast shows upward biased before FY 2001/02 and downward biased thereafter in Nepal. Realizing the facts that any misspecification of appropriate forecasting techniques that leads to much error in revenue forecasting as motivating factor of this study. In light of this fact, the objectives of this paper is to identity appropriate methods for revenue forecasting using monthly total revenue sequence and rank the methods under scrutiny based on some statistical criteria.

Following five important methods of forecasting under consideration, this study found two methods namely SARIMA and Winter as the representative methods of revenue forecasting in Nepal. The rest of the paper is organized as follows. Next section presents

explanation of each of the five methods under the heading methodology. Section III provides results and analysis. Finally, the last section draws the conclusion.

II. METHODOLOGY

In categorizing forecasting methodologies, two broad approaches can be distinguished. Time series forecasting attempts in predicting the values of a variable from the past values of the same variable. In contrast to the time series approach econometric forecasting is based on a regression model that relates one or more dependent variables to a number of independent variables. The time series approach has generally been found to be superior to the econometric approach when short-run predictions are made (Ramanathan, 2002). In this paper, use is made of time series forecasting approach utilizing level data of monthly total revenue series starting from 1997 to 2012. Last 24 out of total 192 observations are taken to check the accuracy of the forecasting methods employed in this paper. An ex-ante forecasts of 24 observations are presented in the Appendix. Both the cumulative as well as net monthly forecasts are presented utilizing each of the methods of forecasting employed. The initial period of sample in FY 1997/98 has been chosen based on the year when the government of Nepal adopted Value Added Tax as a landmark reform in revenue structure in Nepal. Followings are the explanation of basic characteristics of each of the selected set of methods that are used for forecasting in this paper.

Holt Method : The forecasting method developed by Holt (1957) is one popular smoothing technique of forecasting. The two-parameter exponential smoothing technique developed by Holt is a modified method of simple exponential smoothing formula of $\tilde{y}_t = \alpha y_t + (1-\alpha)\tilde{y}_{t-1}$; where $1 > \alpha > 0$ incorporating average changes in the long-run trend (increase or decline) of the sequence $\{y_t\}$. Here, $\{\tilde{y}_t\}$ is smoothed sequence. Holt methods is superior to exponential smoothing technique that former method incorporates trend in the smoothing series. The smoothed or estimated series is derived by using two recursive equations as given in equation (1) and (2). The smoothness of the series depends on two smoothing parameters, α and β both of which must lie between 0 and 1, that is, the smaller are α and β the heavier is the smoothing (Makridikis, Wheelwright and Hyndman, 1998).

$$\tilde{y}_t = \alpha y_t + (1-\alpha)(\tilde{y}_{t-1} + r_{t-1}) \text{ ;where, } 1 > \alpha > 0 \quad (1)$$

$$r_t = \beta(\tilde{y}_t - \tilde{y}_{t-1}) + (1-\beta)r_{t-1} \text{; where, } 1 > \beta > 0 \quad (2)$$

$$\hat{y}_{t+l} = \tilde{y}_T + lr_T \quad (3)$$

Here, $\tilde{y}_t$ denotes an estimate of the level of the series at time *t* and r_t denotes an estimate of the slope of the series at time *t*. Equation (2) adjusts $\tilde{y}_t$ directly for the trend of the previous period, r_{t-1} by adding it to the last smoothed value $\tilde{y}_{t-1}$. Equation (3) is used to forecast l.

Winter Method: Winter (1960) extended Holt method by treating seasonal effect in the forecasting equation. Winter method is based on three smoothing equations- one for the level, one for trend, and one for seasonality as.

$$\tilde{y}_t = \alpha \frac{y_t}{s_{t-s}} + (1-\alpha)(\tilde{y}_{t-1} + r_{t-1}); \quad \text{where, } 1 > \alpha > 0 \tag{4}$$

$$r_t = \beta(\tilde{y}_t - \tilde{y}_{t-1}) + (1-\beta) r_{t-1}; \quad \text{where, } 1 > \beta > 0 \tag{5}$$

$$s_t = \gamma \frac{y_t}{\tilde{y}_t} + (1-\gamma) s_{t-s} \quad \text{where, } 1 > \gamma > 0 \tag{6}$$

$$\hat{y}_{t+m} = (\tilde{y}_T + r_{Tm}) s_{t-s+m} \tag{7}$$

Where, s is the length of seasonality, $\tilde{y}_t$ represents the level of the series, r_t denotes the trend, s_t is the seasonal component, and $\hat{y}_{t+m}$ is the forecast for m periods ahead.

Decomposition Method: Classical decomposition is one of the oldest commonly used forecasting methods. This method is used to decompose a time series into trend, cyclical and seasonal components presented in a time series. An essential part of this method includes the concept of seasonal index. The strong seasonality of some series makes it difficult to measure their trend and cyclical movements (Gujarati, 2004). In the regression decomposition method, dummy (dichotomous) variables are utilized to measure seasonal influences on high frequency data. The seasonal influence can be modeled using either an additive model, or a multiplicative model. The selection of either model depends on the magnitudes of the seasonal peaks and troughs of the level of the series. The formulas for additive and multiplicative models are represented in equations (8) and (9) respectively.

$$y_t = \alpha + \beta_1 T_t + \beta_2 X2_t + \beta_3 X3_t + ... + \beta_n Xn_n \tag{8}$$

$$\ln(y_t) = \alpha + \beta_1 T_t + \beta_2 X2_t + \beta_3 X3_t + ... + \beta_n Xn_n \tag{9}$$

Where, y_t is level of the series, T_t time value in period t, $X2_t, X3_t + ... + Xn_n$ are dummy variables for each period (i.e. monthly), $\ln(y_t)$ is the logarithm of the series to the base of the natural number e. The anti-log form of the multiplicative model of equation (9) is used to transform logarithmic values to level values using formula represented in equation (10).

$$\hat{y}_t = e^{\alpha} + e^{\beta_1 T_t} + e^{\beta_2 X2_t} + e^{\beta_3 X3_t} + ... + e^{\beta_n Xn_n} \tag{10}$$

Seasonal Autoregressive Integrated Moving Average (SARIMA) Method: Popularly known as Box-Jenkin (1994) methodology, the ARIMA model building method consists of four steps: identification, estimation, diagnostic checking and forecasting (Gujarati, 2004). ARIMA model contains the use of simple and versatile model notation designated by the level of Autoregressive (AR), Integration (I), and Moving Averages (MA)

(DeLurgio, 1998). The standard notation identifies the order of AR by *p*, I by *d* and MA by *q*. An extension of seasonal influence in ARIMA model is represented by SARIMA specification. A mixture of AR, I and MA formulation is known as ARMA *(p,d,q)* where difference (*d*) is done before ARMA is specified. The general form of ARIMA model is:

$$y_t = \beta_1 y_{t-1} + \beta_2 y_{t-2} + \ldots + \beta_p y_{t-p} + \varepsilon_t - \phi_t \varepsilon_{t-1} - \phi_t \varepsilon_{t-2} - \ldots - \phi_q \varepsilon_{t-q} \qquad (11)$$

Seasonality in a time series is a regular pattern of changes that repeats over S time periods, where S defines the number of time periods until the pattern repeats again. The ARIMA notation can be extended readily to handle seasonal aspects, and the general shorthand notation is ARIMA (p,d,q) (*P,D.Q*)*s* (Pindyck and Rubinfeld (1997). In a seasonal ARIMA model, seasonal AR and MA terms predict y_t using data values and errors at times with lags that are multiples of S (the span of the seasonality). With monthly data (S=12), and seasonal first order autoregressive model would use y_{t-12} to predict y_t. Variance nonstatinary in the time series is handled by logarithmic transformation before SARIMA method is adopted.

Growth Rate Method: Revenue forecasting based on year-on-year growth rate is supposed to capture seasonal influence. The forecast of period t+s is calculated based on average of past five years (year-on-year) growth rates from period t. The increase/decrease of the forecasted revenue determines increase/decrease of forecast revenue from period t, that is, conditional forecasts. The formulas for growth method are presented in equation (11) and (12).

$$\bar{r} = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_t - y_{t-n}}{y_{t-1}}\right) * 100 \qquad (12)$$

$$\hat{y}_{t+1} = y_t + (y_t * \bar{r})/100 \qquad (13)$$

Measures of accuracy for forecasting which are free of scale of the data are adopted in this paper. Two popular relative measures as frequently used in measuring accuracy of forecast are Mean Percentage Error (MPE) and Mean Absolute Percentage Error (MAPE) where Percentage Error (PE) is calculated using the formula

$$PE = \left(\frac{Y_t - F_t}{Y_t}\right) * 100 \qquad (14)$$

$$MPE = \frac{1}{n}\sum_{t=1}^{n} PE_t \qquad (15)$$

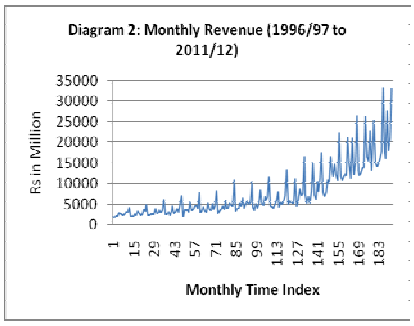
$$MAPE = \frac{1}{n}\sum_{t=1}^{n} \left|PE_t\right| \qquad (16)$$

The methods explained above are considered appropriate to capture data generating process of total historical revenue series in this paper. While selecting appropriate methods, due emphasis will be given to those methods that incorporate trend and seasonal

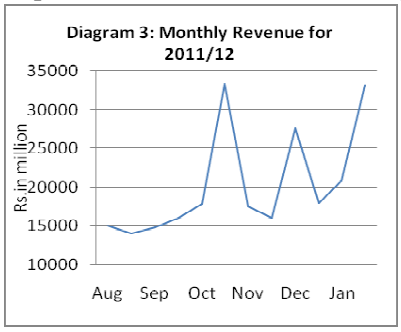
component in a time series analysis. The cyclical component has not been decomposed from trend component in this analysis.

III. RESULTS AND ANALYSIS

In the present paper, I have conducted short-term revenue forecast of the government of Nepal for 24 months starting from August 2012 to August 2014 (i.e. two years) based on 192 historical monthly revenue series beginning from August 1997 to July 2012. A visual inspection of revenue series in Figure 2 reveals some stylized facts that the data generating process of monthly revenue series clearly shows upward trend accompanied with monthly seasonal pattern. Revenue series shows also time varying variance over the period.



The seasonal pattern is not clearly visible in the Diagram 2 as the diagram covers whole sample period. In order to be more specific, the seasonal pattern is displayed by the monthly data for the FY 2011/12 reveals clear seasonal pattern in the month of January (six month), April (nine month) and July (twelve month). Such seasonal pattern can be applicable for the inference of monthly seasonal pattern for other FYs as depicted in Figure 3. The reason for such seasonal influence of revenue mobilization in those months is that the corporate entities in Nepal are directed to pay declared tax into three-installment each year including 40% till mid-January (six month), 70% till mid-April (nine month) and 100% till mid-July (Twelve month).



I have utilized five equally competitive methods that are applicable for forecasting in case of a time series data characterizing period-to-period upward trend, seasonal pattern and time-varying variance. Those methods include (a) Holt method, (b) Winter method, (c) decomposition method (d) SARIMA method, and (e) growth rate method.

Among those methods, Holt and Winter are the smoothing methods of forecasting time series. The estimated values of the smoothing parameters of α, β and γ determine the forecast values in these methods. As α, β and γ represent smoothing, trend and seasonal parameters respectively, the estimated values of those parameters utilizing whole sample data of present analysis are presented in Table 1. The criterion for the selection of those parameters is the minimum mean sum of squared error.

Table 1: Estimated Smoothing and Seasonal Parameters (1996 August to 2012 July)

Smoothing and Seasonal Parameters	Holt's two parameter (no seasonal)	Winter's Three Parameter (Seasonal)
α	0.04	0.08
β	0.15	0.08
γ	-	0.65

Substituting the values of smoothing parameters in the corresponding equations of Holt and Winter methods for revenue forecasting looks like:

Holt Method:

$$\tilde{y}_t = 0.04 y_t + (1-0.04)(\tilde{y}_{t-1} + r_{t-1}); \quad \text{where, } 1 > \alpha > 0 \tag{17}$$

$$r_t = 0.15(\tilde{y}_t - \tilde{y}_{t-1}) + (1-0.15) r_{t-1}; \quad \text{where, } 1 > \beta > 0 \tag{18}$$

Forecasting for l period ahead as: $\hat{y}_{t+l} = \tilde{y}_T + l r_T$ (19)

Winter Method:

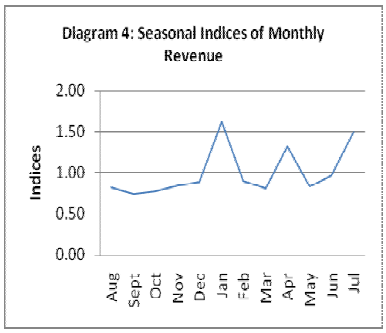
$$\tilde{y}_t = 0.8 \frac{y_t}{s_{t-s}} + (1-0.8)(\tilde{y}_{t-1} + r_{t-1}); \quad \text{where, } 1 > \alpha > 0 \tag{20}$$

$$r_t = 0.8(\tilde{y}_t - \tilde{y}_{t-1}) + (1-0.8) r_{t-1}; \quad \text{where, } 1 > \beta > 0 \tag{21}$$

$$s_t = 0.65 \frac{y_t}{\tilde{y}_t} + (1-0.65) s_{t-s} \quad \text{where, } 1 > \gamma > 0 \tag{22}$$

Forecasting for m period ahead as: $\hat{y}_{t+m} = (\tilde{y}_T + r_{Tm}) s_{t-s+m}$ (23)

The monthly revenue forecasts using Holt and Winter methods for the FY 2012/13 and the FY 2013/14 are presented in Table 1 of Appendix I. As shown in Diagram 1 of Appendix II, Holt method could not capture true data generating process of government of Nepal as revenue series of the government characterizes seasonal effect. Winter method includes seasonal parameter γ, the notable seasonal picks are found in the months of January, April and July as shown in Diagram 4. The ex-ante revenue forecasts under this method are found more accurate than that of Holt method as displayed in Diagram 2 of Appendix II.



Under decomposition method, regression method of decomposition has been used to decompose revenue series into trend and seasonal component in this paper. The variant of multiple decomposition formula is considered plausible here because the revenue series under review characterizes variance non-stationarity. Twelve monthly dummies are introduced to capture seasonal influence. Except the dummy for the second month, all

other coefficients of monthly dummies including constant term and trend component are found statistically significantly different from zero. Substituting the values of estimated parameters in the corresponding regression equaton looks like:

$$\ln(\text{Re}v) = 7.33 + 0.01T + 0.01D2 + 0.09S2 + 0.11D4 + 0.16D5 + 0.66D6 + 0.14D7$$
$$\text{t} = (145.9)\ (47.38)\ \ (0.17)\ \ \ (1.54)\ \ \ (4.81)\ \ \ (2.80)\ \ (9.61)\ \ \ (2.1)$$
$$0.13D8 + 0.40D9 + 0.23D10 + 0.34D11 + 0.89D12 \qquad (24)$$
$$(1.98)\ \ \ (6.26)\ \ \ (3.63)\ \ \ (5.30)\ \ \ (13.8)$$

As shown in Diagram 3 of Appendix II, ex-post forecasts of revenue are tracking well to the actual revenues from this method too. The revenue forecasting under this method are presented in Table 1 of Appendix I.

The ARIMA method extended with seasonal components represented by SARIMA has been utilized in this paper by assuming that the revenue series under review characterizes seasonal influence. While using SARIMA method, revenue series has been converted into logarithm to the base 'e' before its use in the analysis to capture variance nonstationary. The SARIMA $(0,0,0)(1,0,0)_{12}$ is the final specification based on identification and diagnostic checking of the method. As such the logarithmic 12^{th} order difference without constant term is the robust representation of the model as:

$$\ln(\text{Re}v)_t = 1.02 * \ln(\text{Re}v)_{t-12} \qquad (25)$$
$$\text{t} = (688.55)$$

Above specification yields very good tracking of revenue forecasts to actual revenue as shown in Diagram 4 of Appendix II.

Applying the growth rate method, revenue forecasting is determined by the increase/decrease of five years average of year-on-year growth rates of monthly revenue. The ex-ante forecast for consecutive months in the future date are considered conditional forecast based on the forecasted revenue at the same month last year, that is, it is the iterative process. Based on this method, the forecasted revenue during the in-sample period is found satisfactory as depicted by the forecast revenues that are well tracking the actual revenues as shown in the Diagram 5 of Appendix II.

The basis for the selection of appropriate methods of revenue forecasting in this paper, as quantitative measure, is the minimum values of MPE and MAPE statistics for each method. For this purpose, MPE and MAPE have been calculated based on latest 24 observations of forecast errors derived from the difference of actual and estimated values. The method that obtains values of MPE and MAPE close to zero is considered the best method. The MPE and MAPE for each method are presented in Table 2.

Table 2: Statistical Measures of Model Accuracy (1996 August to 2012 July)

S. No.	Statistical methods	Mean Percentage Error (MPE)	Mean Absolute Percentage Error (MAPE)
1.	Holt Method	-11.51	25.35
2.	Winter Method	-1.27	6.24
3.	Regression Decomposition Method	14.31	15.78
4.	SARIMA Method	-0.74	6.22
5.	Growth Rate Method	-7.50	11.14

Out of five competing methods, two methods including Holt method, Decomposition method are found less satisfactory methods in terms of minimum MPE and MAPE criteria. On the remaining three methods, growth rate method is ranked third. SARIMA method and Winter methods rank first and second position respectively. The MPE and MAPE for SARIMA method are -0.74 and 6.22 respectively whereas for Winter mehod they are -1.27 and 6.24 respectively. As both the Winter and SARIMA methods have built-in character to capture the seasonal influence in forecasting, these methods can be the representative methods of forecasting government revenue in Nepal.

Both the monthly net and monthly cumulative forecasts for the FY 2012/13 and FY 2013/14 are presented in Table 1 and 2 of Appendix I. The cumulative forecast revenues for the FY 2012/13 and FY2013/14 incorporating all the five methods are dragged in Table 3 from Table 2 of Appendix I to interprete some interesting conclusions. As SARIMA method is ranked first among the five alternative methods under trial, the cumulative revenue forecasts accounts to Rs.280.19 billion and Rs. 324.21 billion respectively in the FY2012/13 and FY2013/14. It yields year-on-year growth rates of 14.8 percent and 15.7 percent respectively in FY 2012/13 and FY2013/14.

Table 3: Cumulative Revenue Foecasts and Growth Rates

FY	Cumulative Forecast (Rs in Million					Percentage Change				
	Holt	Winter	Decomp-osition	ARIMA	Growth Rate	Holt	Winter	Decomp-osition	ARIMA	Growth Rate
2011/12	244148.7	244148.7	244148.7	244148.7	244148.7					
2012/13	286241.9	279383.1	270179.0	280191.4	307917.3	17.2	14.4	10.7	14.8	26.1
2013/14	328128.1	308535.7	295603.0	324205.8	380028.0	14.6	10.4	9.4	15.7	23.4

Similarly, the cumulative forecast revenues using Winter method, as it is found second best method in this paper, are Rs.279.38 billion and 308.54 billion for the FY2012/13 and FY2013/14 respectively. The growth rate is projected to be increased by 14.8 percent in FY 2012/13 and 15.7 percent in FY2013/14 according to this method.

Last but not the least, what it can be concluded in this paper is that Growth rate method is found overly optimistic whereas Decomposition method underestimates the forecasts. Holt method is ruled-out because it does not capture seasonal influence. Therefore, among the five competitive methods under scrutiny in this paper, Winter and ARIMA are found suitable for revenue projection based on statistical criteria specified in this paper.

However, the conclusion drawn in this paper depends on the use of five methods of forecasting only. Complex forecasitng mehtods which capture cyclical influence in revenue mobiliation are out of perview in this paper. Since the motivation of the study is to use time series analysis in revenue forecsting as against the conditional foecasts mehtod, latter method may obtain different results.

IV. CONCLUSION

Government revenue forecasting is an important aspect in the design and execution of sound fiscal policies. The forecast error as percent of GDP over the study period is downward trending. As a consequence, there is an over-estimation of revenue followed by under-estimation. Further, there is an erratic movement of forecast error too. As the existing methods of revenue forecasting in Nepal is limited to growth rate basis and hence miss the target, the objective of the paper is to identify appropriate methodology of revenue forecasting. This paper utilizes monthly revenue series including 192 observations starting from 1997 to 2012 or the analysis. Out of the five popular techniques scrutinized in this paper, two competing methods including Winter and SARIMA methods are found to be appropriate for the revenue forecasting in Nepal. However, SARIMA method is found albeit superior than Winter method in term of minimum MPE and MAPE criterion. Using SARIMA method, total revenue is forecasted to be increase by 15.7 in FY 2012/13 and 14.8 percent in FY 2013/14. The results of revenue forecasting in this paper may vary depending on the use of methods that capture cyclical component of revenue series. Further, the methods of conditional forecasting are not applied here and hence may give different results. Therefore, in light of these limitations, the forecasting attempts in this paper have opened an avenue for the systematic analysis of revenue forecasting using several methods rather than depending on existing growth rate method.

REFERENCES

Auerbach, A J. 1999. "On the Performance and Use of Government Revenue Forecasts." University of California, Berkeley and NBER, USA.

Box, G.P.E. and G. M. Jenkins. 1994. *"Time Series Analysis, Forecasting and Control."* 3rd ed. Englewood Cliffs, NJ: Prentice-Hall.

Danninger, S. 2005. "Revenue Forecasts as Performance Targets." *IMF Working Paper* No. WP/05/14, IMF, Washington, D.C.

DeLurgio, S.A. 1998. *"Forecasting Principles and Applications."* Irwin McGraw-Hill Book Co., Singapore.

Gujarati, D.N. 2004. *"Basic Econometrics"* 4th edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

Holt, C.C. 1957. "Forecasting Seasonal and Trends by Exponentially Weighted Moving Averages, *Office of Naval Research*, Research Memorandum No.52.

Golosov, M. and J. King. 2002. "The Revenue Forecasts in IMF-Supported Programs." *IMF Working Paper* No.WP/02/236, Washington D.C., USA.

International Monetary Fund. 2001. *"Revised Manual of Fiscal Transparency."* Washington D.C. USA.

Kyobe A, and S. Danninger. 2005. "Revenue Forecasting-How is it Done? Results from a Survey of Low-Income Countries." *IMF working paper* No.WP/05/24, IMF, Washington D.C., USA

Makridikis, S., Wheelwright, S.C., and R.J. Hyndman. 1998. *"Forecasitng Mehtods and Applications.*" John Wiley and Sons (Asia) Pte.Ltd. Singapore.

Pindyck, R.S. and D.L. Rubinfeld. 1997., *"Econometric Models and Economic Forecastings."* 4th Edition, McGraw-Hill, International Edition, Singapore.

Ramanathan R. 2002. *"Introductory Econometrics with Applications.*" 5th Edition, Thomson Asia Pte Ltd., Singapore.

Winters, P.R. 1960. "Forecasting sales by exponentially weighted moving averages." Management Science- 6, p.p.324-342.

Appendix I: Tables

Table 1: Monthly Revenue Forecasts for 2012/13 and 2013/14

(Rs in million)

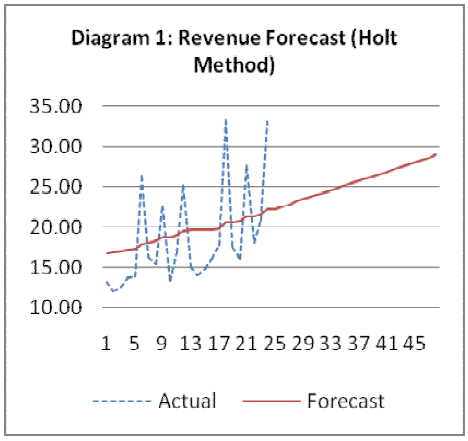
Mid-Months	Holt Method	Winter Method	Decomposition Method	ARIMA Method	Growth Rate Method
Net Forecasted Revenue for the FY 2012/13					
August	22253.7	17513.8	13358.1	17883.9	18849.0
September	22544.6	16143.2	13664.4	16136.3	17052.2
October	22835.4	17087.8	15083.9	16918.6	18196.0
November	23126.3	18622.4	15526.2	18650.0	20846.7
December	23417.2	19818.4	16406.0	18851.2	22854.9
January	23708.1	36627.4	26192.7	36458.9	41654.9
February	23998.9	20639.7	16430.9	22353.9	23452.1
March	24289.8	18795.0	16408.7	20988.6	20300.2
April	24580.7	30900.8	21842.4	31285.5	35087.3
May	24871.6	19550.3	18657.5	18109.7	21869.4
June	25162.4	23018.3	21001.6	23126.8	25886.4
July	25453.3	35925.3	36709.4	35055.3	38459.5
Net Forecasted Revenue for the FY 2013/14					
August	25744.2	19816.6	15283.7	20922.7	23075.3
September	26035.1	18242.7	15634.1	18847.0	21716.8
October	26325.9	19286.3	17258.2	19775.7	22331.8
November	26616.8	20993.0	17764.3	21833.6	28381.8
December	26907.7	22314.7	18771.0	22072.9	28215.5
January	27198.6	41193.1	29968.5	43143.5	51161.3
February	27489.5	23186.1	18799.4	26245.9	30331.3
March	27780.3	21090.1	18774.0	24617.9	26636.1
April	28071.2	34636.3	24991.0	36930.9	45136.1
May	28362.1	21890.1	21347.1	21191.1	26872.4
June	28653.0	25745.9	24029.0	27168.1	30858.0
July	28943.8	40140.7	42001.1	41456.5	45311.7

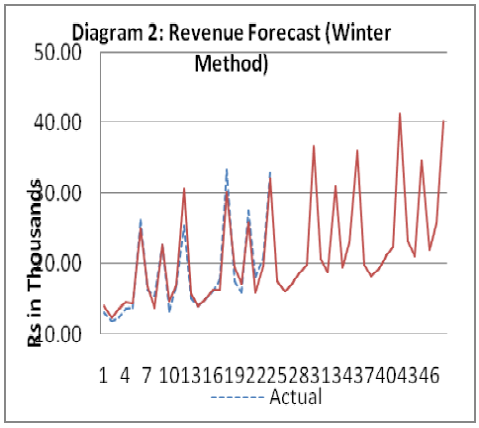
Table 2: Monthly Revenue Forecast (Cumulative) for 2012/13 and 2013/14

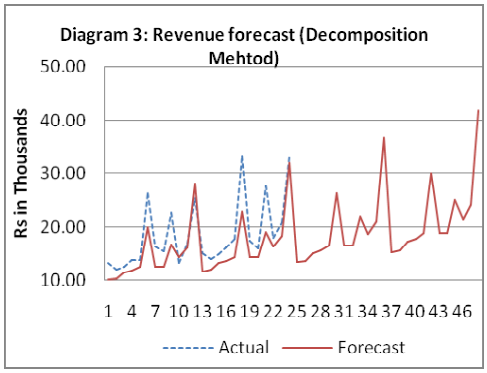
Rs in million

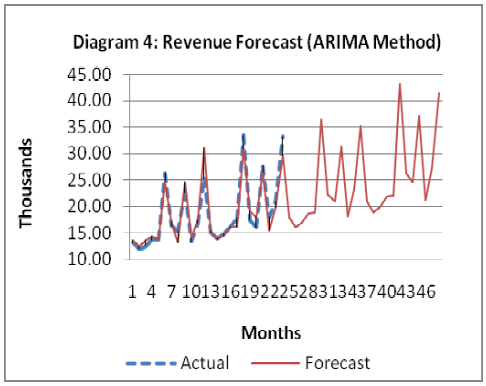
Mid-Months	Holt Method	Winter Method	Decomposition Method	ARIMA Method	Growth Rate Method
Monthly Revenue Forecast (Cumulative) for 2012/13					
August	22253.7	22254.7	22255.7	22256.7	22257.7
September	44798.2	38397.8	35920.1	38393.0	39309.9
October	67633.7	55485.6	51003.9	55311.6	57505.8
November	90760.0	74108.0	66530.1	73961.6	78352.5
December	114177.1	93926.3	82936.1	92812.8	101207.4
January	137885.2	130553.7	109128.8	129271.7	142862.4
February	161884.1	151193.4	125559.7	151625.6	166314.5
March	186173.9	169988.4	141968.4	172614.1	186614.7
April	210754.6	200889.2	163810.8	203899.6	221701.9
May	235626.2	220439.6	182468.3	222009.3	243571.4
June	260788.6	243457.9	203469.9	245136.2	269457.7
July	286241.9	279383.1	270179.0	280191.4	307917.3
Monthly Revenue Forecast (Cumulative) for 2013/14					
August	25744.2	19816.6	15283.7	20922.7	23075.3
September	51779.3	38059.3	30917.8	39769.7	44792.1
October	78105.2	57345.6	48176.0	59545.4	67123.9
November	104722.0	78338.6	65940.4	81379.0	95505.7
December	131629.7	100653.3	84711.3	103452.0	123721.2
January	158828.3	141846.4	114679.8	146595.4	174882.5
February	186317.7	165032.5	133479.2	172841.3	205213.8
March	214098.1	186122.6	152253.2	197459.2	231849.9
April	242169.3	220758.9	177244.2	234390.1	276986.0
May	270531.4	242649.1	198591.3	255581.2	303858.4
June	299184.3	268395.0	222620.3	282749.3	334716.4
July	328128.1	308535.7	295603.0	324205.8	380028.0

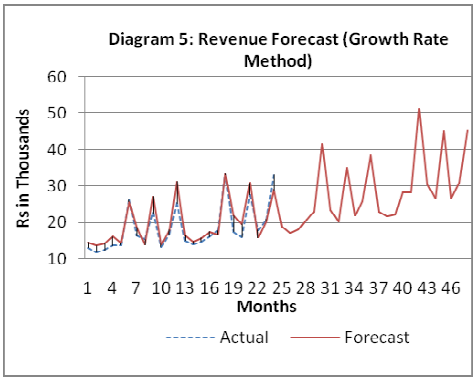
Appendix II: Diagrams











Effects of Dividends on Stock Prices in Nepal

Rabindra Joshi*

Abstract

This paper examines the impact of dividends on stock price in the context of Nepal. A majority of earlier studies conducted in developed countries show that dividend has a strong effect than retained earnings. The study examines whether this is consistent in the context of Nepal (or not) and the implication particularly to the banking and non-banking sector. To achieve the objective of the study, a descriptive and analytical research design has been administered. The secondary data are used to test this impact. In order to examine the impact of dividends on stock prices, a multivariate linear regression analysis has been implied in which current market stock price is taken as a dependent variable and four other variables namely Dividend Per Share (DPS), Retained Earnings Per Share (REPS), Lagged Price Earnings Ratio (P/E ratio) and Lagged Market Price Per Share (MPS) as the explanatory variables. This attempt has been made to test the dividends retained earning hypothesis and to examine the estimated relationship over the period of time. The overall conclusion drawn in this study reveals that, the impact of dividends is more pronounced than that of retained earnings in the context of Nepal. Dividend has a significant effect on market stock price in both banking and non-banking sector.

Key words: Dividends, stock price, banking and non- banking sector, multivariate linear regression analysis

JEL Classification: D53, G10, G14

I. INTRODUCTION

Dividend is the result of a discretionary decision made by the board of directors of a firm. Generally, a firm announces dividend on the profit. Corporate dividend policy is one of the most enduring issues in modern corporate finance. Dividend policy determines the division of earnings between payments to stockholders and reinvestment in the firm (Weston, Copeland & Shatri: 2004). Miller and Modigliani (1961) have given a theory

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stating that the shareholders should be indifferent between amount distributed and retained in the firm. However, in practice, the assumption of capital market perfection does not exist that lead to the situation where dividend policy is relevant.

Friend and Puckett (1964) studied dividend and stock prices using cross section data to test the effect of dividend payout on share value using regression model. Chawla and Srinivasan (1987) studied the relationships between dividend and share price in the Indian context. The result concluded that the impact of dividends is more pronounced than that of the retained earnings.

Similarly, Kumar and Mohan (1975) concluded that the stock market has started recognizing the impact of retained earnings in Indian stock market. The study of Lintner (1956) revealed that the determinants of changes in dividends are current earnings and the dividends distributed in the past are subject to mitigate the dividend cash flow relationships. Khan (2009) found the evidences that dividends, retained earnings and other determinants have dynamic relationship with market share price. The study suggests that the overall impact of dividends on stock prices is comparatively better that of retained earnings.

There are two different views regarding the dividend policy and stock price. Those who think dividends have more impact in determining share price, argues that shareholder prefers current return rather than future return and dividend distribution is an indicator of earning capacity in future. The other views are based on the importance of retained earnings. They argue that retained earnings are indicator of future investment opportunities. The shareholders can enjoy tax advantages in retained earnings. For tax purpose, retained amount is not treated as income until it is realized.

A number of studies on impact of dividends on stock price have been carried out in different parts of the world particularly in developed countries. Most of the earlier studies show the significant role of dividend policy on stock price. The corporate firms should follow the appropriate dividend policy to maximize the shareholders' value. Dividend policy is considered as one of the important and critical variables affecting the share price. In the context of Nepal, limited studies (such as Pradhan :2003, Manandhar: 1998) have been carried out by research scholars. Still there is a gap in the financial literature concerning the effect of dividends on stock prices particularly in banking and non-banking sectors of Nepal.

The overall objectives of this paper are to observe the impact of dividends on stock price in Nepal. On top of that this paper has been written to determine the relationships of market price per share with related financial indicators such as earnings per share, retained earnings, lagged prices earnings ratio and lagged market price per share.

II. REVIEW OF PREVIOUS STUDIES

After the dividend irrelevance theory proposed by Modigliani and Miller (MM) in 1961, many theories have emerged over the time such as Gordon (1962), Walter (1963), Friend

and Puckett (1964). Some theories supported MM's theory of dividend irrelevance whereas most of the theories opposed.

MM theorized that the dividend policy is irrelevant like in the capital-structure irrelevance proposition with no taxes or bankruptcy costs. This is known as the "dividend-irrelevance theory", indicating that there is no effect from dividends on a company's capital structure or stock price. MM argued that the value of the firm is based on its basic earning power and its business risk, not how it distributes earnings to shareholders.

The dividend preference theory holds that the firm's value will be maximized by a high dividend payout ratio because investors regard cash dividends as being less risky than potential capital gains. Higher payout ratio leads to the increase in firm value and decrease in cost of capital.

The common assumptions this theory is explained below.

- There is a perfect capital market in which all investors behave rationally.
- Corporation tax does not exist therefore there is no differences between tax rates in capital gains and dividends.
- The floatation costs on securities are ignored.
- There is neither a constant dividend policy of firm, which will not change the risk complexion nor the rate of return even in cases where the investments are funded by the retained earnings.

Based on these assumptions and using the process of arbitrage Miller and Modigliani have explained the irrelevance of the dividend policy. Firms have two options for utilization of its profit after tax i.e. (i) to retain the earnings and plough back for investment purposes (ii) distribute the earnings as cash dividends. If the firm selects the second option and declares dividend then it will have to raise capital for financing its investment decisions by selling new shares. Here, the arbitrage process will neutralize the increase in the share value due to the cash dividends by the issue of additional shares. This makes the investor indifferent to the dividend earnings and the capital gains since the share value of the firm depends more on the future earnings of the firm than on its dividend policy. Thus, if there are two firms having similar risk and return profiles the market value of their shares will be similar in spite of different payout ratios.

In line with the dividend irrelevance hypothesis, Black and Scholes (1974) examined the relationships between dividend yield and stock returns in order to identify the effect of dividend policy on share prices. Their results showed that the expected return either on high or low yield stocks are the same. Black and Scholes, therefore, concluded that neither high-yield nor low-yield payout policy of firms seemed to influence stock prices.
Gordon (1962) gave importance to the dividend policy of the firm. Gordon used the dividend capitalization approach to study the effect of the firm's dividend policy on the stock price. Gordon's model is based on the following assumptions:

- No external financing is available for the corporation and retained earnings would be used to finance expansion as well.

- Return on Investment (r) and the cost of equity capital (k_e) remain constant.
- Firm has an infinite life.
- The retention ratio remains constant and hence the growth rate is also constant (g=br).
- k > g i.e., cost of equity capital is greater than the growth rate.

Gordon concluded that dividend policy of a firm affects its value. The conclusion of the study is that investors give more value to the present dividends rather than future capital gain. This argument insisted that an increase in dividend payout ratio leads to an increase in the stock price for the reason that investors consider the dividend yield (D_1/P_0) is less risky than the expected capital gain.

James E. Walter (1963) considers that dividends are relevant and they do affect the share price. He showed the relationship between the internal rate of return (r) and the cost of capital of the firm (k), to give a dividend policy that maximizes the shareholders' wealth. The Walter's model is based on following assumptions

- Retained earnings are the only source of finance available to the firm, with no outside debt or additional equity used.
- r and k are assumed to be constant and thus additional investments made by the firm will not change its risk and return profiles.
- Firm has an infinite life.
- For a given value of the firm, the dividend per share and the earnings per share remain constant.

The model studied the relevance of the dividend policy in three situations: (a) $r > k_e$, (b) $r < k_e$, and (c) $r = k_e$. When the return on investment is greater than its cost of equity capital, the firm can retained the earnings, since it has better and more profitable investment opportunities than the investors. It implies that the return of re-investment of the earnings is higher than what they earn by investing the dividends income. In the second case, the return on investment is less than the cost of equity capital and in such situation the investors will have a better investment opportunity than the firm. This suggests an optimal dividend policy of 100% payout. This policy of a full pay-out ratio will maximize the value of the firm. Finally, when the firm has a rate of return equal to the cost of equity capital, the firms' dividend policy will not affect the value of the firm.

Lintner (1956) presented a view to identifying the determinants of corporate dividend payment practice with the interview of the top managements of 28 firms. The study concluded that corporate management tends to establish target dividend payouts as a proportion of earnings and to set their dividend payments to adjust over time toward the desired fraction of earnings. Establishing a stable dividend hypothesis, Lintner showed the following relation between dividends and earnings:

$$D_t^* = rE_t \quad (1)$$

Where,
D_t^* = dividend payment per share during the period t
r = the payout ratio
E_t = firm's earnings per share during period t.

Lintner then developed his above observation as under:

$$D_t - D_{t-1} = a + c\,(D_t^* - D_{t-1}) \quad (2)$$

Where,
a = constant
c = constant speed of adjustment factor.

However, Lintner further developed the equation to explain the corporate dividends payment practice by adjusting the above observations to obtain a partial adjustment model as follows:

$$D_t = a + b_1E_t + b_2D_{t-1} + E_t \quad (3)$$

Where,
$b_1 = cr$
$b_2 = 1- c$
E_t = error term during period t

Lintner used the above equation to explain the behavior of corporate dividend policy along with other variables explaining the stock prices using aggregate data in most of his tests.

Friend and Puckett (1964) provided the relationships between dividends and stock prices using regression analysis of 110 firms from five industries for the period of 1956 to 1958. The regression results $P_t = a + bD_t + CR_t$ exhibited the strong dividends effect and relatively weak retained earnings effects on three of the five industries, i.e. chemicals, foods and steels. Again, the study tested regression equation by adding lagged earnings price ratio $P_t = a + bD_t + CR_t + d\,(E/P)_{t-1}$. The result showed that more than 80% of the variation in stock prices explained by these three independent variables. Dividends have a predominant influence in stock prices. The study also reveals the dividends and retained earnings coefficients are closer to each other than first set of regression.

Chawla and Srinivasan (1987) carried out a study to identify the impact of dividend and retained earnings on stock price in the Indian context. They attempted to test the dividend retained earnings hypothesis and examine the structural changes in the estimated relations over time. The results indicate that incase of chemical industry both dividends and retained earnings significantly explain the variations in share price. The impact of dividends is more pronounced than that of the retained earnings. But the market has started the shifting towards more weight for retained earnings.
Kumar and Mohan (1975) hypothesized that the market price of share is a function of dividends and retained earnings and used the following regression equation:

$$P_{it} = a + bD_{it} + cR_{it} + e_{it} \quad (4)$$

Where,
P_{it} = price of stock i at time t,
D_{it} = dividend per share of stock i at time t and
R_{it} = retained earnings of stock i at time t.

The estimated coefficients for the two explanatory variables, dividends and retained earnings are more or less equally significant. They argued that the dividends hypothesis

has a little superiority over the retained earnings in determining the share. Consistently, Nishat (1995) attempted to evaluate the relative importance of the dividends vis-à-vis retained earnings hypothesis in determining the share prices. He developed the following model to compare the dividends and retained earnings influence on the share prices in highly profitable growth industries of Pakistan.

$$P_{it} = \alpha_0 + \alpha_1 D_{it} + \alpha_2 R_{it} \quad (5)$$

Where,

P_{it} = price of stock i at time t,

D_{it} = dividend per share of stock i at time t and

R_{it} = retained earnings.

The above model might cause an upward bias in the dividends coefficient due to two major reasons. Firstly, the relationship is misinterpreted as it assumed that the riskiness of the firm is uncorrelated with dividend payout and share prices. This problem should be eliminated by introducing a variable namely lagged P/E ratio to measure individual deviation from the sample average price earnings ratio in the previous year periods as follows:

$$P_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 R_{it} + \beta_3 [P/E]_{i(t-1)} \quad (6)$$

Where,

$P/E_{i(t-1)}$ = price earnings ratio of the previous year

Secondly, the income reported by a corporation in any particular period is subject to short-run economic and accounting factors. If prices were related to normal than reported income, it would produce biased results in favor of dividend payout. However, the difference between the dividends and retained earnings coefficient might be reduced by using the following model.

$$P_{it} = \lambda_0 + \lambda_1 D_{it} + \lambda_2 R_{it} + \lambda_3 P_{i(t-1)} \quad (7)$$

Where,

$P_{i(t-1)}$ = share price of the previous year

Khan (2009) found the evidences that dividends, retained earnings and other determinants have dynamic relationship with market share price in the context of Bangladesh. The study suggests that the overall impact of dividends on stock prices is comparatively better that of retained earnings. The expected dividends play an important role in the determination of stock prices whatever determinants, like lagged price earnings ratio or lagged price, are considered.

Akbar & Baig (2010) considered the sample of 79 companies listed at Karachi Stock Exchange to study the effect of dividend announcement on stock prices for the period of 2004 to 2007. The study shows that the announcement of dividends either cashes dividend or stock dividend or both have positive effect on stock prices. Nazir, Nawaz, Anwar, & Ahmed (2010) also study the effect of dividend policy on stock prices. Results of their study show that dividend payout and dividend yield have significant affect on stock prices while size and leverage have negative insignificant affect and earning and growth have positive significant affect on stock prices.

Hussainey, Mgbame, & Chijoke-Mgbame (2011) studied the impact of dividend policy on stock prices. The study shows the positive relations between dividend yield and stock

price changes and negative relations between dividend payout ratio and stock price changes. Their results further indicate that the firm's earnings, growth rate, level of debt and size also causes the change in stock price of UK.

In context of Nepal, few research works have been conducted in dividends payout. This study has been expected to find a pathway in dividend policy to affect market price per share providing useful information for all financial scholars. Moreover, the earlier studies on dividends need to be updated due to the rapid changes in financial market of Nepal.

Manandhar (1998) studied on dividend policy and value of firm to identify the determinants of dividend policy in the context of Nepal. The study found that dividend per share and return on equity have positive impact on market capitalization while earning per share, price-earnings ratio, and dividend yield have negative impact. It was also found a positive relationship between dividends and market capitalization.

Pradhan (2003) also carried out a study to determine the relative importance of dividend and retained earnings in determining the market price of stock. He found that dividend payment is more important as opposed to retained earnings in Nepal. The results revealed the customary strong dividends effect and a very weak retained earning effect indicating the attractiveness of dividends among Nepalese investors. The findings suggest that Nepalese stock market has not started recognizing the impact of retained earnings.

Chhetri (2008) has explained that there are differences in financial position of high dividend paying and low dividend paying companies. The study revealed that there is a positive relationship between dividends and stock prices. Further, the coefficient of dividends is higher as compared to the coefficient of retained earnings.

The empirical findings of dividend researches have produced mixed results. Some found positive relationship between the dividend theories and the corporate dividend policy, while others did not. The theories on behavior of corporate dividend policy suggest that dividend policy is a residual decision. The price reactions to dividend changes are stronger for high dividend-yields stock. Similarly, evidences are found on the existence of dividend signaling effects. The initiation and increase in dividends has a significant positive impact on stock price.
From the above studies, it is obvious that studies were more concerned with impact of dividends on stock price and dividend policy. The findings of these studies are not unanimous across all sectors and time periods for explanatory variables and its impact on stock price. The reason behind this is the difference in methodology, sample size, and time. However, studies found that the dividend has a significant impact on market stock prices than other explanatory variables.

III. SOURCES OF DATA AND NATURE OF STUDY

This study is based on secondary data obtained from published annual reports of sample firms. The secondary data has been collected from listed companies in Nepal stock exchange (NEPSE). The sample includes banking and non-banking firms of Nepal. It

includes the balance sheet, income statement and cash flow statement of sample banking and non-banking company listed in NEPSE. All listed companies are required to submit their annual report including audited financial statement within specific period as prescribed by the Security Exchange Act and Regulation in Nepal. Corporate firms are categorized in different industries such as commercial banks, development banks, finance companies, insurance companies, hydropower, manufacturing and processing industries, trading, hotels and others. Among these industry, commercial banks, development banks and finance companies are considered as banking sector and rest of the industries are considered as non-banking sectors. Several companies' shares are traded actively in stock market of Nepal.

Table 1: Sample banking and non-banking firms

Industry	Population (as per listed in NEPSE)	Sample Firms
Commercial bank	24	22
Development bank	61	34
Finance company	71	61
Hotel	4	4
Manufacturing and processing	18	14
Hydropower	4	4
Insurance	21	19
Trading Company	3	3
Others	4	2

The total population of the study is 210 companies which are listed in Nepal Stock Exchange for fiscal year 2010/11. Though there are 210 companies listed in Nepal Stock Exchange Ltd., all are of them are not provide scope for this study. On the other hand, many of them are new and have begun their operation. Therefore, out of 210 companies 163 have been selected for the study on the basis of accessibility of data which includes 117 companies from banking sector and 46 from non-banking sector. The higher number of sampled firms from banking sector is selected for the study due to the large number of listed companies are from banking sector in NEPSE.

IV. SPECIFICATION OF THE MODEL

Apparently the studies conducted by Miller and Modigliani (1961), Friend and Puckett's (1964) and Chawla and Srinivasan (1987) have influenced this paper. The Friend and Puckett's (1964) model can be taken as the key elements for determining the relationships of market price per share with concerned financial indicators such as retained earnings, lagged price earnings ratio and lagged market price per share in this study.

The hypothetical statements of the model is that the price of a share depends on dividends, retained earnings, earning per share, lagged price earnings ratio and lagged market price of share. This theoretical statement could be framed as:

In equation

$$P_{it} = a + b_1 D_{it} + b_2 R_{it} + e_{it} \quad (8)$$

Where,
P_{it} = Price of share in time't'
D_{it} = Dividend per share in time't'
R_{it} = Retained earnings per share in time't'
e_{it} = Error term

Modifying the above equation, this study uses lagged price earning multiplier (price earnings ratio). The modified equation for the study is:

$$P_{it} = a + b_1 D_{it} + b_2 R_{it} + b_3 P/E_{i(t-1)} + e_{it} \quad (9)$$

Where,
$P/E_{i(t-1)}$ = Lagged price earnings ratio in time't-1'
It is expected that the coefficient of both dividends and retained earnings should be positive in the price equation. The variable $P/E_{i(t-1)}$ is added to keep the firm effect constant.

Again, this research uses lagged market price instead of lagged P/E ratio and developed the following model.

$$P_{it} = a + b_1 D_{it} + b_2 R_{it} + b_3 P_{i(t-1)} + e_{it} \quad (10)$$

Where,
$P_{i(t-1)}$ = Lagged market price in time't-1'
The market price is considered as ending of each fiscal year.

V. EMPIRICAL ANALYSIS

Descriptive Statistics

In this study, descriptive statistics includes the information of dividend per share, retained earnings per share, market price per share lagged P/E ratios and lagged market price per share of each sample firms for the period of 2005 to 2010 which has been presented in pie-chart and bar diagrams.

With the help of descriptive analysis, the classification of sample firms and comparison of sample firms based on sector is presented. The mean value of sample firms under sector is computed to make comparison of sectors. The mean value gives the result of the average of each sector. The descriptive statistics are supported by bar diagram and pie-chart describing the related variable i.e. EPS, MPS, DPS, REPS etc.

Table 2: Classification of sample firms based on banking and non-banking sector

Institution	Population (as per listed in NEPSE)	Sample Firms	Observations
Banking sector	156	117	424
Non-banking sector	54	46	146
Total	**210**	**163**	**570**

The above table shows that out of 210 listed firms in NEPSE, 163 firms have been selected for the study on the basis of accessibility of data. Among them, the banking firms include 117 firms and 46 non-banking firms. The table reveals that the sample firms include 72% from banking sector and 28% from non-banking sector. The study focused on the dividends impact on stock price of banking and non-banking sector. The comparative descriptive statistics of these firms and their analysis are as follows:

Figure 1: Comparative Analysis

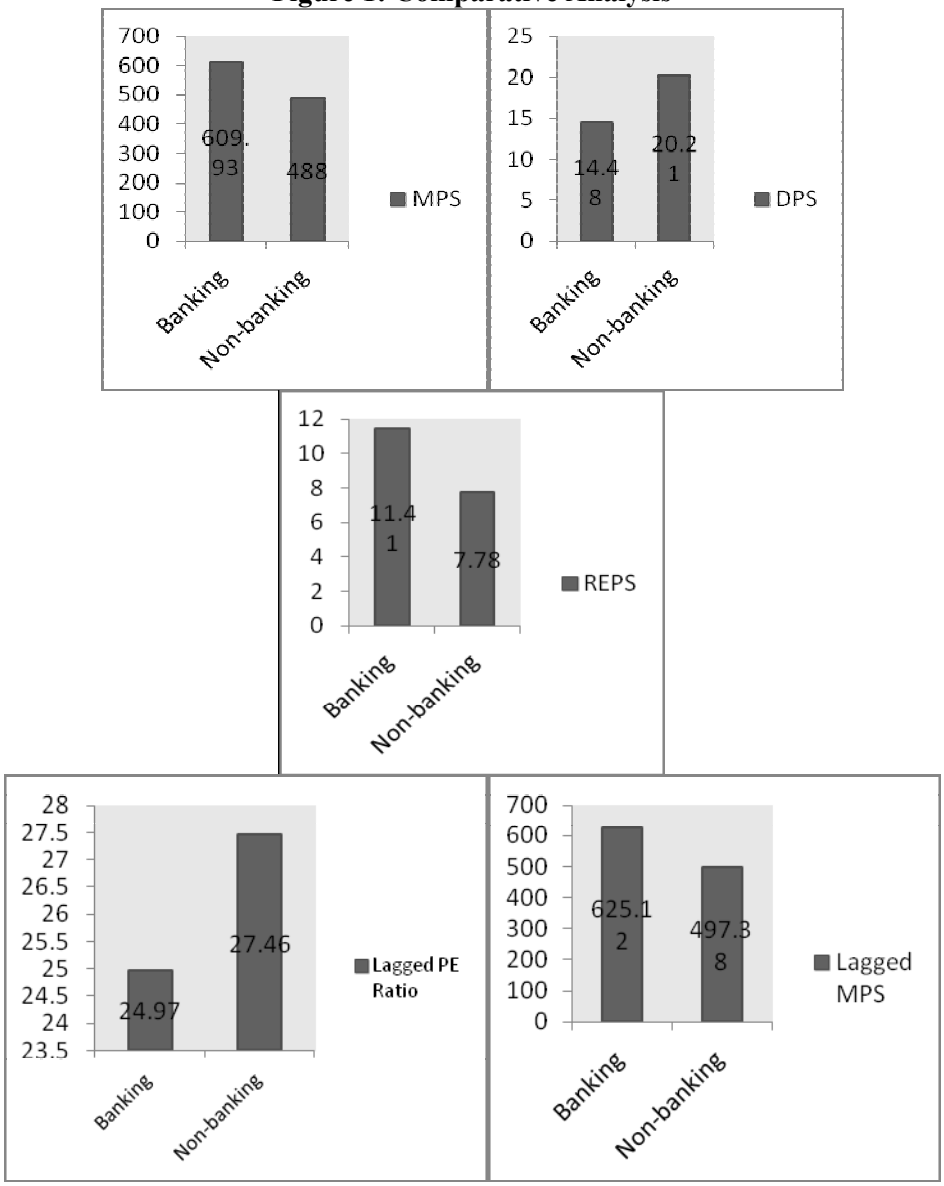

Figure-1 shows the comparative analysis of banking and non-banking sector in which the mean, DPS, and lagged P/E ratio is higher in non-banking sector. However, mean value of MPS, REPS, and lagged MPS is higher in banking sector.

Regression Analysis

A number of studies have noted that increase in dividends lead to share price appreciation. It is generally held that the share price depends upon the expectation of future profit. For sector-wise regression analysis this study mainly considers two sectors i.e. banking and non- banking sector. It is not to choose conclusive between linear and logarithmic results on statistical basis. The logarithmic reduces the problem of regression weight. The linear regressions, unlike the logarithmic relation, can handle satisfactorily very small and negative retained earnings (Friends and Puckett, 1964). Thus, the liner regression has been considered for the study.

1. Impact of Dividends and Retained Earnings on Stock Price

The regression results having two independent variables are presented as in the table below. It presents the multiple linear relationships between stock price, dividends and retained earrings.

Table 3: Regression of stock price on dividends and retained earnings

$$P_{it} = a + b_1D_{it} + b_2R_{it} + e_{it}$$

(P_{it},D_{it} and R_{it} represents market price per share , dividend per share and retained earnings per share respectively. The sign * and ** denote the significance of coefficient at 5% and 1% level of significance)

Sector (Observations)	Regression coefficient					
	a	b_1	b_2	R^2	SEE	F
Total Sector (n=554) 'p' value	341.78 (0.000**)	12.51 (0.000**)	3.04 (0.000**)	0.335	652.80	139.19 (0.000**)
Banking Sector (n=411) 'p' value	218.00 (0.000**)	22.68 (0.000**)	5.03 (0.000**)	0.365	650.67	117.33 (0.000**)
Non-banking sector (n=143) 'p' value	282.38 (0.000**)	9.15 (0.000**)	2.36 (0.000**)	0.588	484.19	100.78 (0.000**)

The result explain that one rupee increase in dividends leads to the 12.51, 22.68 and 9.15 rupees increase in market share price in total, banking and non-banking sector respectively. The result depicted that the coefficient of dividends and retained earnings is significant in banking, non-banking and total sector at 1% level of significance. The outcome of the regression analysis implies that there is a direct relationship between dividends and retained earnings with market share price in both sectors which is expected sign as previous studies. The important point to be noted here is that the F-statistics for the regression model is significant at 1% level of significance indicating that the regression equation provides statistically significant explanation of variation in the market share price of banking and non-banking sector. Regarding the regression model, $P_{it} = a + b_1D_{it} + b_2R_{it} + e_{it}$, coefficient of dividends is higher as compare to the coefficient of retained earnings in total, banking and non-banking sector as well. The result indicates that there is a strong positive relationship between dividends and share price. Further,

dividend has a predominant impact on stock prices in both banking and non-banking sector.

2. Impact of Dividends, Retained Earnings and Lagged P/E Ratio on Stock Price

As past earning shows the track of the company, these earning may benchmark for the investor to decides whether to hold or buy the share of the company at the prevailing price. It may now be practical to see the results of regression models by incorporating the lagged price earnings ratio as one of the more independent variable in the above mentioned equation. The table below presents the regression results of stock price on dividends, retained earnings and lagged price earnings ratio.

Table 4: Regression of stock price on dividends, retained earnings, and lagged price earnings ratio

$$P_{it} = a + b_1 D_{it} + b_2 R_{it} + b_3 P/E_{i(t-1)} + e_{it}$$

(P_{it}, D_{it}, R_{it} and $P/E_{i(t-1)}$ represents market price per share , dividend per share , retained earnings per share and lagged price earnings ratio respectively. The sign * and ** denote the significance of coefficient at 5% and 1% level of significance)

Sector (Observations)	Regression coefficient						
	a	b_1	b_2	b_3	R^2	SEE	F
Total Sector (n=383) 'p' value	344.07 (0.000**)	15.05 (0.000**)	2.27 (0.003**)	1.85 (0.001**)	0.397	705.40	83.51 (0.000**)
Banking Sector (n=289) 'p' value	104.99 (0.075)	27.23 (0.000**)	5.17 (0.001**)	4.94 (0.000**)	0.67	672.19	83.51 (0.000**)
Non-Banking Sector (n=94) 'p' value	288.05 (0.000**)	10.87 (0.000**)	1.79 (0.005**)	0.93 (0.053)	0.662	512.81	59.35 (0.000**)

The outcome presented in above table shows that the estimated coefficient has expected positive sign for dividends, retained earnings and lagged price earnings ratio in total, banking and non-banking sector. The result shows the strong dividends effect indicating attractiveness of dividends among Nepalese investors. In the case of total sector, the coefficient of dividend is 15.05, which signify that one rupee change in dividend leads to 15.05 rupees changes in market price per share. In the case of banking sector, the coefficient of dividend is 27.23, which indicates that one rupee increase in dividend leads to 27.23 rupees increases in market price per share. Similarly, in case of non-banking sector, coefficient of dividend is 10.87, which indicates that one rupee increase in dividend leads to 10.87 rupees increase in market price per share. The coefficient is statistically significant in total, banking and non-banking sector at 1% level of significance. In case of retained earnings, the sign of coefficient is positive as expected for total sector. The coefficient of retained earnings is 2.27, 5.17 and 1.79 in total, banking and non-banking sector respectively.

The retained earning coefficient is also significant in all categories at 1% level of significance. In addition, the dividend has greater impact than the retained earnings on stock price. The F-statistics for the regression model is significant at 1% level of significance indicating that the regression equation provides statically significant explanation of variation in the stock price of all categories i.e. total, banking and non-banking sector.

A lagged price earnings ratio is significant in total and banking sector at 1% level of significance however it is not significant in non-banking sector at 5% level of significance. There is a positive relationship between price and lagged price earnings ratio in total, banking and non-banking sector. The study consider the regression model, $P_{it} = a + b_1 D_{it} + b_2 R_{it} + b_3 P/E_{i(t-1)} + e_{it}$ where the result shows that the coefficient of dividends is higher than that of the coefficient of retained earnings in all sectors. There is a positive relationship between dividend and stock price. The dividend has a greater impact on stock prices in both banking and non-banking sector.

3. Impact of Dividends, Retained Earnings and Lagged Market Price on Stock Price

As in the past, market price shows the pathway of the company, these earning may benchmark for the investor to decide whether to invest or not at the prevailing price. It may now be practical to see the results of regression models by incorporating the lagged market price instead of lagged P/E ratio. Table-5 presents the regression results of stock price on dividends, retained earnings and lagged market price.

Table 5: Regression of stock price on dividends, retained earnings and lagged market price

$$P_{it} = a + b_1 D_{it} + b_2 R_{it} + b_4 P_{i(t-1)} + e_{it}$$

(P_{it}, D_{it}, R_{it}, and $P_{i(t-1)}$ represents market price per share, dividend per share, retained earnings per share and lagged market price per share respectively. The sign * and ** denote the significance of coefficient at 5% and 1% level of significance)

Sector (Observations)	Regression coefficient						
	a	b_1	b_2	b_3	R^2	SEE	F
Total (n=382) 'p' value	102.64 (0.000**)	5.35 (0.000**)	0.65 (0.111)	0.84 (0.000**)	0.829	374.89	618.74 (0.000**)
Banking (n=288) 'p' value	46.31 (0.131)	12.10 (0.000**)	1.37 (0.116)	0.77 (0.000**)	0.829	380.61	462.55 (0.000**)
Non-Banking (n=93) 'p' value	49.36 (0.083)	2.10 (0.000*)	0.62 (0.030*)	0.97 (0.000**)	0.934	225.85	433.11 (0.000**)

The outcome presented in above table-5 shows; the coefficient of dividend is 5.35 in total sector, which signify that one rupee change in dividend leads to 5.35 rupees change in market price per share. In the case of banking sector, the coefficient of dividend is 12.10, which indicates that one rupee increase in dividend leads to 12.10 rupees increases in price per share. Similarly, in case of non-banking sector, coefficient of dividend is 2.10, which indicates that one rupee increase in dividend leads to 2.10 rupees increase in market price per share. The coefficient is statistically significant and the sign of coefficient is positive as expected for total, banking and non-banking sector at 1% level of significance. (First estimate regressions using total sample and then classify the total sample into different sub-samples).

In the case of retained earnings, the sign of coefficient is positive as expected for all sectors. The coefficient of retained earnings is 0.65, 1.37 and 0.62 in total, banking and non-banking sector respectively. The retained earning coefficient is also significant in non-banking sector at 5% level of significance however it is not significant in total and banking sector at same level of significance.

In case of lagged market price, the sign of coefficient is positive as expected for all sector. The coefficient of lagged market price is 0.84, 0.77 and 97 in total, banking and non-banking sector respectively and the coefficient is significant for all sectors at 1% level of significance.

The F-statistics for the regression model is significant at 1% level of significance indicating that the regression equation provides a statistically significant explanation of variation in the market share price of total, banking and non-banking sector.
As consider in the regression model, $P_{it} = a + b_1D_{it} + b_2R_{it} + b_3P_{i(t-1)} + e_{it}$, the coefficient of dividends is higher than the coefficient of other variables in all sectors. The dividend has a strong impact on market stock prices in both banking and non-banking sector. The overall result shows that the value of R^2 is increased when explanatory variable lagged market price is substitute for lagged P/E ratio. The result is consistent with the study of Pradhan (2003) and Chawla and Srinivasan (1987).

VI. CONCLUSION

After having observed the impact of dividends on stock price of Nepalese stock market, it is found that DPS is a motivating factor in the Nepalese financial sector which is strong enough to increase market price per share of the banking and non-banking firms. Comparatively, it is also found that the effect of DPS greater than REPS on the impact of market price per share. Lagged market price per share is an accelerator to increase market price per share in subsequent years. Finally, the study shows that dividends and retained earnings significantly explain the variations in share price in both banking and non-banking sectors. The impact of dividend, however, is much more pronounced than that of the retained earnings. The relation of dividends and retained earnings on share price is positive in all cases.

REFERENCES

Akbar, M., & Baig, H. H. 2010. "Reaction of Stock Prices to Dividend Announcements and Market Efficiency in Pakistan". *The Lahore Journal of Economics*, 15 (1), 103-125.

Banking and Financial Statistics, No. 55, Mid-July 2010, www.nrb.org.np

Banking and Financial Statistics, No. 54, Mid-Jan 2010, www.nrb.org.np

Black, F., & Scholes, M. S. 1976. "The Dividend Puzzle". *The Journal of Portfolio Management*, 2, 5-8.

Black, F., & Scholes, M. S. 1974. "The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns". *Journal of Financial Economics,* 1, 1-22.

Chawla, D., & Srinivasan, G. 1987. "Impact of Dividend and Retention on Share Price- An Economic Study". *Decision,*14 (3), 137-140.

Chhetri, G.R. 2008. "Dividend and Stock Prices: A Case of Nepal". An unpublished M.Phil. thesis submitted to Tribhuvan University.

Friend. I., & Puckett, M. 1964. "Dividend and Stock Prices". *American Economic Review,* 54, 656-682.

Gitman, L.J. 1985. *Managerial Finance*. New York: Harper and Row Publishers.

Gitman, L.J. 2008. *Principles of Management Finance, 5/E*. New York: Harper Collins College Publishers. (What an old study?)

Gordon, Myron J. 1962. "Dividends, Earnings, and Stock Price". *Review of Economics and Statistic,* 41, 99-105.

Gujarati, D. N. 1988. *Basic Econometrics*, McGraw-Hill, Inc.

Hussainey, K., Mgbame, C. O., & Chijoke-Mgbame, A. M. 2011. "Dividend Policy and Share Price Volatility: UK Evidence". *Journal of Risk Finance,* 12 (1), 57 - 68.

Khan, Shohrab Hussain. 2009. "Determinants of Share Price Movements in Bangladesh: dividends and Retained Earnings." Available in:

http://www.seamist.se/fou/cuppsats.nsf/all/7a3a58f2c2af8ba1c1257695000a3b1d$file/Final%20Version. pdf

Kumar, S. and Man Mohan (July-September 1975). "Share Prices in India". *Indian Economic Journal*, Vol.23, pp. 23-27.

Lintner, J. 1956. "Distribution of Incomes of Corporations among Dividends, Retained Earnings, and Taxes". *American Economic Review,* 46, 97-113.

Manandhar, K. D. 1998. "A Study of Dividend Policy and Value of the Firm in Small Stock Market: A Case of Nepal". *Management Dynamics*, 8(1), 15-20.

Miller, M. H., & Modigliani, F. 1961. "Dividend Policy, Growth, and the Valuation of Shares". *Journal of Business Finance*, 34, 411-433.

Nazir, MS., Nawaz, M.M., Anwar, W. and Ahmed, F. 2010. "Determinants of Stock Price Volatility in Karachi Stock Exchange: The Mediating Role of Corporate Dividend Policy". *International Research Journal of Finance and Economics*, 55, pp 100- 107.

Nishat, M. 1995. "Share Prices, Dividend & Share Retained Earnings Behaviour in Pakistan Stock market". *The Indian Economic journal*, 40, 56-95.

Pradhan, R. S. 2003. "Effects of Dividend on Common Stock Prices: The Nepalese evidence". *Research in Nepalese Finance*. Katmandu: Buddha Academic Enterprises (P) Ltd.

Van Home, J.C. 2006. *Fundamentals of Financial Management.* New Jersey Prentice Hall Inc. pp. 280-300.

Weston, J. F., Copeland, Thomas E., and Shastri, K. 2004. *Financial Theory and Corporate Policy: International Edition, 4/E*. Pearson Publication.

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