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The Editorial Board has the pleasure of releasing this issue of the *NRB Economic Review (Volume 24, Number 1)*. This issue incorporates analytical articles on contemporary issues of the Nepalese economy.

Though the articles are reviewed by the Editorial Board, the views and interpretations included in the articles are those of the authors and do not necessarily reflect and represent the views and policies of NRB.

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NRB ECONOMIC REVIEW

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Modelling and Forecasting Fiscal Policy and Economic Growth in Nepal*

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Abstract

This paper develops a macroeconomic forecasting model focusing on fiscal policy and economic growth in Nepal. The structure of the model, which comprises a total of 14 equations, allows alternative policy options for maintaining fiscal stability and promoting economic growth as well as switching deficit financing between domestic and foreign loans. We use annual data from 1992/93 to 2009/10 to estimate the model and provide out-sample forecasts for 2010/11 to 2012/13, consistent with the current Three Year Plan period, in order to evaluate the plan performance. The empirical evidence suggests that fiscal policy, particularly governments' capital expenditure affects economic growth positively and also crowds-in private investment. However, there exists a trade-off between fiscal stability and high level of economic growth as the policy goal of achieving both objectives seems to be unattainable. Finally, the out-sample forecast suggests that it is unlikely to attain the targeted economic growth in the Three Year Plan period from the planned fiscal outlay even if it is realized.

JEL Classification: C5, E63, O5

Key words: Fiscal Policy, Macroeconomic Modeling, Economic Growth

I. INTRODUCTION

Fiscal policy plays a crucial role for enhancing socio-economic activities and economic growth at least in developing countries (Jones, 1995 and Mehrotra and Peltonen, 2005). Despite policy efforts towards achieving a high and sustainable economic growth, the Nepalese economy, however, suffered from a low growth-trap in its history. In quantitative term, public expenditure surged up to 22.2 percent of GDP in 2009/10 from as low as 9.1 percent in 1974/75 while average annual GDP growth at constant price remained at 4.3 percent during this period (MoF, 2011). This poses a serious concern whether public expenditure helps to accelerate economic growth. It is also equally important to assess the degree of trade-off between fiscal stability and a high level

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economic growth as it is unlikely to attain both of them together. These issues are largely untouched in the context of Nepal, while theoretical literature provides ambiguous linkages between fiscal policy and economic growth.

There are primarily two streams of theoretical literature in this area, generally known as exogenous and endogenous growth family models (Esterly and Rebelo, 1993). The former literature, often labeled with neoclassical growth models, suggests that steady state economic growth is driven by exogenous factors that include dynamics of population and technological progress while fiscal policy affects the rate of economic growth during transition to the steady state (Chamley, 1986 and Alam and Rogers, 2011). It means fiscal policy does not have a long run impact on economic growth.

On the other hand, endogenous-growth literature argues that transitional effects of fiscal policy transforms into permanent effect, meaning that fiscal policy has a long lasting impact on economic growth (Romer, 1986; Jones et. al. 1993; Rebelo, 1991 and Turnovsky, 2000 and 2004). The level of impacts, however, depends on the effectiveness of fiscal instruments, elasticity of labour supply and on technology to accumulate human capital and to create new goods (Easterly and Rebelo, 1993).

With regard to fiscal instruments, a distortionary tax policy weakens the incentive to invest in physical and human capital which ultimately reduces economic growth while non-distortionary taxation provides incentive to invest on capital items which, in turn, helps to promote economic growth (Benos, 2009). Likewise, productive expenditure boosts economic growth if that helps to enhance marginal product of private capital. Consequently, unproductive expenditure does not affect or even distort the marginal productivity of private capital and hence reduces economic growth (Barro, 1990).

The impact of government budget deficit is even more complex. If the deficits tend to reduce the growth of savings, there will be adverse impact on economic growth in the long run. Similarly, if a higher deficit today will later be compensated by higher consumption or income taxes the rate of economic growth will decline in the long run (Peretto, 2003 and Pelagidis and Desli, 2004).

Given this context, we develop a comprehensive, consistent and robust macroeconomic model to analyze the impact of fiscal policy on economic growth. Our work contributes to the literature in various ways. First, it explores a forecasting model for fiscal planning in Nepal and provide fiscal and growth outlook consistent with the existing Three Year Plan (2010/11 to 2012/13) period. Second, unlike in a developed economy, we justify that public investment *crowds-in* private investment in Nepal. And finally, we provide evidence to support the endogenous growth models that fiscal policy promotes economic growth, but there exists a trade-off between maintaining fiscal stability and accelerating economic growth.

The rest of the paper is structured as follows. The next section presents the structure of the model followed by description of data in section III. Section IV estimates the model while section V presents the forecast results. Finally, section VI concludes the paper.

II. SPECIFICATION OF THE MODEL

We develop a fiscal model to explore a nexus between fiscal outlay and economic growth together with various propositions for maintaining fiscal stability and promoting economic growth (Jones and Skinner, 1992). The model has two main blocks - real sector and fiscal sector. The real sector block starts with specifying sources of economic growth followed by fiscal sector which provides estimates for government resources, expenditure, budget deficits and sources of deficit financing. The model develops strong inter-linkages between these two blocks as government capital expenditure becomes one of the important sources of economic growth while revenue is the function of Gross Domestic Product (GDP) in the public finance block. In addition to this, budget deficits and domestic borrowings are linked to GDP. Thus, the model comprises both the direct and feedback effects.

Real sector block: It is obvious that output is the function of all possible inputs that includes land, labour, capital, technology, management, productivity, among others. Most of the empirical studies, however, consider labour and capital as the function of output (for instance see Khatiwada et. al., 2002). It is mainly because capital and labour are important determinates of output while other factors of production are associated with the use of these two variables either directly or indirectly. Further, quantitative information of other inputs are also unavailable in a systematic way. For this reason, we define output, represented by gross domestic product (Y_t), as the Cobb-Douglas function of labour (L_t) and capital (K_t) as follows;

$$Y_t = e^A L_t^{\tau}, K_t^{1-\tau} U_t \qquad (1a)$$

Where, t is the time subscription, e is exponential term, A is the constant term (shift factor), τ is the share of L_t, $1 - \tau$ is the corresponding share of K_t and U_t is a random walk which represents other factors of production unexplained by L_t and capital K_t. Dividing both side by L_t, taking log and re-arranging terms yields:

$$\log(Y_t / L_t) = A + \tau \log(K_t / L_t) + U_t \qquad (1b)$$

Eq (1b) is a Cobb-Doglas type of linear production function expressed in per capita labour term where K_t is capital accumulation which is defined as previous period capital stock (K_{t-1}) and current investment (I_t) as

$$K_t = K_{t-1} + I_t \qquad (2)$$

We then decompose total investment, I_t into private investment (PI_t) and public investment (GI_t) as

$$I_t = PI_t + GI_t \qquad (3)$$

Then, following Keynesian setting PI_t is defined as the function of interest rate (r_t) and public investment (CE_t).

$$PI_t = f(r_t, CE_t) \quad (4)$$

Here, we make a strong assumption that public investment *crowds-in* private investment[1]. As the country is undergoing through peace process after a long political deadlock, it is rational to expect that government needs to invest more on economic infrastructure for attracting private investment in Nepal (Khan and Kumar, 1997). This assumption may hold for next few years until the country makes progress on achieving a high level of economic growth.

Finally, we complete the real sector block with specifying public investment (GI_t). Theoretically, GI_t is identical with government capital expenditure (CE_t) but it is not the case in practice as capital expenditure includes investment and associated administrative costs. Hence, GI_t is obtained from CE_t using escalating factor (γ) as follows:

$$GI_t = \gamma \cdot CE_t \quad (5)$$

Where, $\gamma = GI_{t-1} / CE_{t-1}$, represents administrative costs.

Public finance block: The government of Nepal has maintained fiscal stability after adopting economic liberalization policy since mid-80s. As one of the major indicators of fiscal stability is the budget deficit, we begin modeling public finance block by defining the identity for budget deficit (BD_t) as:

$$BD_t = TE_t - Z_t \quad (6)$$

Where, TE_t is the total public expenditure and Z_t is the total resources which includes government revenue and foreign grants. In this framework, $BD_t = 0$ implies that the government maintains a balanced budget while a negative number indicates a surplus and positive number implies deficit in the government's account.

There are two sources of financing BD_t, namely domestic loan (DL_t) including overdraft and foreign loan (FL_t) as follows.

$$BD_t = DL_t + FL_t \quad (7)$$

The domestic loan (DL_t) has important policy implications in the economy. A high level of domestic loans distorts macroeconomic stability, increases future liability of the government and *crowds-out* financial resources for private investment while a low level of domestic borrowings also minimizes scope of economic development through

1 Of course, this argument has to be supported by empirical analysis.

mobilizing possible available resources. For this reason, Fiscal Authority in many countries often limits the size of DL_t to a specific range of GDP or total expenditure or revenue. In Nepal, recent periodic plans and annual budgets show that government aims to keep annual domestic borrowing around 2.0 percent of GDP (NPC, 2011). In this context, we model DL_t as a positive fraction (β) of Y_t as given by Eq.(8).

$$DL_t = \beta \cdot Y_t \,, \qquad 0 < \beta < 1 \tag{8}$$

$$FL_t = BD_t - DL_t \tag{9}$$

Given the size of budget deficits and domestic borrowings, the foreign loan (FL_t) is then considered to be residual between budget deficit (BD_t) and domestic borrowings (DL_t) as given by Eq.(9). Under this framework, Fiscal Authority switches borrowing strategy between domestic sources and foreign sources by changing the parameter β .

The next step is to obtain the identity for government's total resources (Z_t) which is, in fact, the sum of total revenue (RV_t) and foreign grants (FG_t) as follows:

$$Z_t = RV_t + FG_t \tag{10}$$

The total revenue (RV_t) which comprises both taxes and non tax revenue, is considered to be the function of GDP as depicted by Eq(11) (Paudel, 2006).

$$RV_t = f(Y_t) \tag{11}$$

Foreign grant (FG_t) depends on various factors including commitment of donors, efficiency of the government for mobilizing foreign aid, development plan of the country and foreign relationships, among others. In order to capture those past behaviors in practice, we define FG_t as the function of its own lag as.

$$FG_t = f(FG_{t-1}) \tag{12}$$

We then define the identity for total public expenditure (TE_t) which is considered to be the sum of recurrent[2] (RE_t) and capital (CE_t) expenditure (Ra and Rhee, 2005).

$$TE_t = RE_t + CE_t \tag{13}$$

RE_t is popularly known as the consumption expenditure of the government that goes mostly on payments for employees' salary and benefits, general administration, security

2 Include principal repayments of outstanding public debt.

and amortization (NRB, 2009). Therefore, it follows an autoregressive trend unless sudden policy changes take place.

$$RE_t = f(RE_{t-1}, Trend_t) \tag{14}$$

Now, the final and crucial step is to determine capital expenditure. Theory suggests various ways of determining it but in practice it largely depends on whether Fiscal Authority aims to (a) control the size of budget deficit; or (b) adopt an aggressive investment plan without controlling budget deficit. The former option helps to maintain fiscal stability while the latter option promotes economic growth. In this context we propose three alternative propositions in order to reflect fiscal policy in practice.

Proposition 1: Fiscal Authority does not adopt ambitious expenditure plan so that capital expenditure follows a historical trend.

$$CE_t = f(trend) \tag{15a}$$

It is a conservative scenario where the size of total expenditure and budget deficit depends on the historical growth of CE_t. This scenario does not care about the size of total expenditure and budget deficits.

Proposition 2: Fiscal Authority is cautious about the size of total expenditure while determining the capital expenditure.

$$CE_t = \lambda \cdot Y_t - RE_t \qquad 0 < \lambda < 1 \tag{15b}$$

$$\text{Where, } \lambda \cdot Y_t = TE_t$$

Under this scenario, total expenditure is derived as the fraction of GDP $(\lambda \cdot Y_t)$ and then CE_t is obtained as residual after allocating recurrent expenditure (RE_t). This strategy is guided by international practices which states that the size of public expenditure should be at least 20 percent of GDP, i.e. λ should take a value of 0.2 in Eq. (15b) (Parker and Jespersen, 1994).

Proposition 3: Fiscal Authority is sensitive with the size of budget deficit irrespective to the demand for expenditure.

$$CE_t = Z_t + \psi \cdot Y_t - RE_t \quad 0 < \psi < 1 \tag{15c}$$

$$\text{Where, } \psi \cdot Y_t = BD_t$$

Under this scenario Fiscal Authority sets budget deficit to a fraction of GDP without considering the size of total expenditure and revenue mobilization. Then, capital expenditure is obtained as residual after allocating RE_t from available total resources at disposal. Generally, International Monetary Fund suggests to keep ψ under 0.055.

III. DATA GENERATING PROCESS AND EMPIRICAL STRATEGY

As quarterly GDP series is unavailable in Nepal, we use annual time series data from 1992/93 to 2009/10 to estimate the model. There are several reasons for choosing a short sample period starting from 1992/93 although most of the annual times series data are available from 1974/75 onwards. First, this period avoids structural break in most of the time series data that appears in early 90s or late 80s (Shrestha, 2008). Second, the exchange rate of the Nepalese currency vis-à-vis Indian currency has remained unchanged since February 1993 which gives a meaningful sample period for our analysis. And finally, fiscal policy is consistent towards achieving fiscal stability since early 1990s. The model contains 16 variables. All variables except for employment and interest rate are obtained from Economic Survey, 2011 (MoF, 2011) and converted them into constant price of 2009/10 using GDP deflator. As time series data for employment is unavailable in Nepal, we interpolate discrete data obtained from population census 1991 and 2001 to obtain annual series from 1991 to 2001 (CBS, 1991 and CBS, 2001). Likewise, annual employment data from 2002 to 2010 is derived by extrapolating the same information but using a revised labour growth as depicted from Nepal Living Standard Survey, 2011 (CBS, 2011). In the case of lending interest rate, we use average lending rate of agriculture, industrial and commercial loans obtained from Quarterly Economic Bulletin (NRB, 2011). Besides, time dummy variables are also used while estimating the model in order to correct data outliers.

Although most of the macroeconomic variables in Nepal are considered to be non-stationary (Shrestha, 2008), combinations of those variables may also produce co-integrating relationship (Kharel and Koirala, 2011). Due to this fact and considering the objective of this paper, we use variables at level but take care with residual of estimated equations. Depending upon the nature and specification of the behavioral equation, we introduce a first order autoregressive process [AR(1)] and alternatively a first order moving average process [MA(1)] to correct serial correlation in the residual (Ra and Rhee, 2005).

IV. EMPIRICAL ESTIMATES

There are two blocks and 14 equations[3] in the system including 6 behavioral equations and 8 identities. While real sector block comprises 2 behavior equations and 3 identities, public sector block contains 4 behavioral and 6 identities. We estimate all behavioral equations using common sample period starting from 1992/93 to 2009/10.

The estimate of Eq (1b) is presented in the second row of Table 1. We include time dummy for 2001 to estimate this equation in order to correct data outlier which was generated due to the change in labour growth between 1991-00 and 2001-10. This dummy also captures the change in the base year of GDP. The estimate is robust as parameters are taking expected sign and are significant at 5 percent. Further, the

[3] Excluding double counting of BD_t.

predicting power of the estimated equation is very high as indicated by $\overline{R}^2$. The Durbin Watson (D-W) statistics remain in the acceptance region while LM test rejects the null hypothesis that residual is serially correlated.

The estimate of Eq (4) is presented in the third row of Table 1 where private investment (PI_t) is determined by nominal interest rate (r_t) and capital expenditure CE_t. The estimate shows that one percent rise in r_t reduces PI_t by 0.17 percent while the same percent rise in CE_t increases PI_t by 0.67 percent, *ceteris paribus*. In this equation the first order moving average, MA(1), is introduced in order to correct serial correlation in the residual. The estimate justifies the fact that public capital expenditure *crowds-in* private investment in Nepal.

The time dummy variable (D_t) is also used for estimating Eq(11), (12) and (15a) subsequently as depicted by 4th, 5th and 7th row of Table 1 respectively. Eq.(11) estimates government's total revenue (RV_t) while Eq.(12) estimates foreign grants (FG_t). Eq(14) estimates recurrent expenditure (RE_t) which is explained by both lag dependent and trend. Finally, Eq(15a) estimates capital expenditure (CE_t) for scenario 1 while it is assumed to be policy variable in other scenarios. All estimates are robust with taking very high explanatory power as indicated by $\overline{R}^2$. There is no sign of autocorrelation in the residuals as suggested by D-W statistics and LM test.

Table 1: Estimate of the model (Sample period: 1992/93 to 2009/10)

Estimated Equation	Estimates	$\overline{R}^2$	D-W test	LM test*
1b	$\log(Y_t/L_t) = \underset{(0.053)}{3.014} + \underset{(0.009)}{0.251}\log(K_t/L_t) - \underset{(0.004)}{0.015}D_t$	0.98	1.76	0.18
4	$\log(PI_t) = \underset{(1.775)}{7.155} - \underset{(0.021)}{0.166}r_t + \underset{(0.163)}{0.671}\log(CE_t) + [MA(1) = 0.697]$	0.93	1.79	0.59
11	$\log(RV_t) = \underset{(0.702)}{5.005} + \underset{(0.051)}{1.355}Y_t - \underset{(0.024)}{0.130}D_t$	0.98	1.71	0.42
12	$\log(FG_t) = \underset{(0.081)}{1.451} + \underset{(0.116)}{0.472}\log(FG_{t-1}) + \underset{(0.113)}{0.689}\log(FG_{t-2}) - \underset{(0.075)}{0.415}D_t$	0.93	1.91	0.89
14	$\log(RE_t) = \underset{(1.916)}{4.680} + \underset{(0.212)}{0.504}\log(RE_{t-1}) + \underset{(0.018)}{0.382}Trend_t$	0.96	1.88	0.71
15a	$\log(CE_t) = \underset{(0.865)}{2.171} + \underset{(0.079)}{0.802}\log(CE_{t-1}) - \underset{(0.026)}{0.201}D_t$	0.92	1.87	0.49

* *F statistics of Breusch-Godfrey's serial correlation LM test. Figures in parenthesis are standard error of parameters. All parameters are significant at 5 percent.*

Once the model is calibrated and estimated, the next step is to examine whether the model as a whole is stable and it produces a reliable out-sample forecast (Ra and Rhee, 2005).

To check this, we compile the model and generate in-sample forecast using Gauss-Siedel algorithm to compute Root Mean Square Percentage Error (RMSPE) as:

$$RMSPE = \sqrt{\frac{\sum[(y^s - y^a)/y^a]^2}{n}} * 100$$

Where n is the number of periods, y^s is the forecasted value of variable Y, and y^a is the actual value of variable Y.

Annex 2 presents RMSPE of 15 variables, out of which six variables contain the values less than 5 percent while remaining nine variables take values between 5 to 10 percent. Given the size of model and objective of the paper, we conclude that the model is robust and it provides a reliable out-sample forecast.

V. POLICY SIMULATION AND OUT-SAMPLE FORECAST

One of the major objectives of the current Three Year Plan (2010/11 to 2012/13) is to attain a high, broad based and inclusive economic growth in which the average annual GDP growth at producer price is targeted to be 5.9 percent at 2009/10 constant price. The average size of total public expenditure is projected to be 25.5 percent of GDP while total resource mobilization (revenue and foreign grants) is expected to be 21.4 percent of GDP during the plan period (NPC, 2010), creating annual average budget deficit as high as 4.1 percent of GDP.

Given this context, the model is run to generate out-sample forecasts starting from 2010/11 to 2012/13. One of the prerequisites for out-sample forecast is to set assumptions for exogenous variables as interest rate and employment are determined exogenously in this model. We assume that employment (L_t) grows by the same rate as it was during in-sample period and interest rate (r_t) remain the same at the level of 2009/10 for the entire out sample forecasting period.

Table 2 depicts out sample forecasts of GDP growth (Y_t), total expenditure (TE_t) and total resources (Z_t) for three alternative propositions. Proposition 1 is based on historical growth of capital expenditure while proposition 2 sets total expenditure to be 25.5 percent of GDP ($\lambda = 0.255$) as per the allocation of existing plan. Likewise, proposition 3 sets budget deficit to be 5 percent of GDP (ψ =0.05). The size of domestic borrowing is fixed at 2 percent of GDP ($\beta = 0.02$) for all scenarios, implying that foreign borrowing is residual after budget deficits.

Under the first proposition, the average growth of total expenditure would be 24.5 percent of GDP and creates the budget deficit as high as 5.6 percent of GDP during the plan

period. The average GDP growth rate, however, will short fall by 1.5 percent than the target growth of 5.9 percent.

Table 2: Out sample forecast of key variables (as % of GDP)

Year\Propositions		Proposition 1 [$\beta = 0.02$]			Proposition 2 [$\lambda = 0.255$ $\beta = 0.02$]			Proposition 3 [ψ =0.05 $\beta = 0.02$]		
		Y_t^*	TE_t	Z_t	Y_t^*	TE_t	Z_t	Y_t^*	TE_t	Z_t
Base year	2009/10 *(Actual)*	4.6	22.2	18.6	4.6	22.2	18.6	4.6	22.2	18.6
Out-Sample Forecast	2010/11	4.8	23.1	18.7	5.1	25.5	19.8	4.6	23.1	18.1
	2011/12	4.3	24.6	18.9	5	25.5	20.1	3.9	23.7	18.7
	2012/13	4.1	25.8	19.1	5.3	25.5	20.4	3.8	24.1	19.1
	Annual Average	4.4	24.5	18.9	5.1	25.5	20.1	4.1	23.6	18.6

* *Growth rate in percent.*

Under the second proposition, when the size of public expenditure is fixed at 25.5 percent of GDP in each year for the entire plan period, the average GDP growth goes up to 5.1 percent but still remains below the target. This scenario will also threat fiscal stability as the size of budget deficit will be as high 5.4 percent of GDP. Finally, if the government maintains the budget deficit at 5 percent of GDP for the entire plan period as depicted by proposition 3, the annual GDP growth will be maintained at 4.1 percent of GDP. Under this scenario, the size of total expenditure will increase marginally to 23.6 percent of GDP compared to 22.2 percent in the base year.

The forecast results, therefore, suggest that the average annual GDP growth of 5.9 percent as targeted by the Three Year Plan is unlikely to be attained even if the planned fiscal outlay is realized.

VI. CONCLUSION

This paper develops a comprehensive, consistent and robust macroeconomic forecasting model focusing on fiscal policy and economic growth in Nepal. It provides policy options for choosing fiscal stability and promoting economic growth and also provides options for switching borrowings between domestic loan and foreign loans. The model is estimated using annual data from 1992/93 to 2009/10 and provide out sample forecasts for three years starting from 2010/11, which is consistent with the existing Three Year Plan period.

The empirical evidences suggest that (a) fiscal policy has a positive impact on economic growth, supporting the view of Endogenous Growth Models (Romer, 1986 and Kneller and Gemmell, 1999), (b) the Three Year Plan is ambitious in achieving it targeted growth from the planned fiscal outlay even if it is realized, (c) public investment *crowds-in* private investment, and finally, (d) fiscal policy promotes economic growth but there

exists a trade-off between maintaining fiscal stability and accelerating economic growth in Nepal.

The present work can be extended in many ways. First, labour supply and interest rates are considered to be exogenous in this model. Thus, the performance of the model can be improved by making them endogenous. Likewise, the model can be extended by incorporating major sectors of the economy in order to analyze multi-dimensional policy impact on economic growth.

REFERENCES

Alam, J and J. Rogers, 2011. "Do State Fiscal Policy Affect State Economic Growth?" Tulane University, Working Paper 1107. April.

Barro, R. J. 1990. "Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy*, vol. 98.

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.

Chamley, C. 1986. "Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives." Econometrica, 54, p.607-22.

Easterly, W and S. Rebelo. 1993. "Fiscal Policy and Economic Growth: An Empirical Investigation." National Bureau of Economic Research, Working Paper No 4499.

Engen, E. M. and J. Skinner. 1992, "Fiscal Policy and Economic Growth." National Bureau of Economic Research, Working Paper No 4223.

Jones, C. I. 1995. " Time Series Tests of Endogeneous Growth Models." Quarterly Journal of Economics, Vol. 110, PP. 495-525.

Jones, L., R. Manuelli and P. Rossi. 1993. "Optimal taxation in Convex Models of Equilibrium Growth." Journal of Political Economy, Vol. 101, PP – 485-517.

Khan, S. M. and M. S. Kumar. 1997. "Public and Private Investment and the Growth Process in Developing Countries." Oxford Bulletin of Economics and Statistics, Vol. 59(1).

Kharel, R. S. and T.P. Koirala. 2011. "Spatial Price Integration in Nepal." Economic Review Occasional Paper, No. 23, Nepal Rastra Bank.

Khatiwada, Y. R., R. S. Kharel, S. K. Aryal and B. Satyal. 2002. "Nepal: Sources of Economic Growth." Paper presented at South Asia Network of Economic Research Institute, Bangladesh.

Kneller, R., M. F. Bleaney and N. Gemmell. 1999. Fiscal Policy and Growth: Evidence from OECD Countries." Journal of Public Economics, Vol. 74, PP. 171-190.

Mehrotra, A. N. and T. A. Peltonen (2005), "Socio-Economic Development and Fiscal Policy Lessons from the Cohesion Countries for the New Member States." European Central Bank, Working Paper - 467, April.

MoF. 2011. "Economic Survey 2009/10" Ministry of Finance, Kathmandu.

NPC. 2010. "Three Year Plan: 2010/11 – 2012/13" National Planning Commission, Singha Durbar, Kathmandu.

NRB. 2009. "Economic Report 2008/09" Nepal Rastra Bank, Central Office, Baluwatar, Kathmandu, Nepal.

NRB. 2011. "Quarterly Economic Bulletin" Nepal Rastra Bank, Central Office, Baluwatar, Kathmandu, Nepal. Vol 45 (3 &4).

Parker, D. and E. Jespersen. 1994. "20/20 Mobilizaing Resources for Children in the 1990s." UNICEF.

Pelagidis. T., and E. Desli. 2004. "Deficits, Growth and the Current Slowdown: What Role for Fiscal Policy?" Journal of Post Keynesian Economics, Vol. 26(3), PP. 461-69.

Peretto, P. F. 2003. "Fiscal Policy and Long-Run Growth in R&D-Based Models with Endogenous Market Structure." Journal of Economic Growth, Vol. 8(3).

Paudel, D. 2006. "Revenue Implications of WTO Regime and Alternative Measures for Revenue Mobilization." Economic Policy Network, Policy Paper No. 29.

Ra, S. and C. Y. Rhee. 2005. "Nepal Macroeconomic Model" Asian Development Bank, working Paper No. 1.

Robelo, S. 1991. "Long Run Policy Analysis and Long Run Growth." Journal of Political Economy, Vol. 99.

Romer, P. 1986. "Increasing Returns and Long Run Growth." Journal of Political Economy, Vol. 94, PP: 1002-1037.

Shrestha, M. B. 2008. "Testing Unit Roots in Nepalese Macroeconomic Data." Economic Review Occasional Paper, No. 18, Nepal Rastra Bank.

Turnovsky, S. J. 2000. "Fiscal Policy, Elasticity labour Supply and Endogenous Growth." Journal of Monetary Economics, Vol. 185-210.

Turnovsky, S. J. 2004. "The Transitional Dynamics of Fiscal Policy: Long-Run Capital Accumulation and Growth." Journal of Money, Credit and Banking, Vol. 36(5).

Annex 1: Description of Variables used in the Model

Serial Number	Variables	Description	Type
1	Y_t	Gross Domestic Product at Basic Price	Endogenous
2	L_t	Total Employment in Million	Exogenous
3	K_t	Capital Stock	Endogenous
4	r_t	Average Nominal Lending Rate of Agriculture, Industry and Commercial Loan (in Percent)	Exogenous
5	I_t	Total Investment	Endogenous
6	GI_t	Government Investment	Endogenous
7	PI_t	Private Investment	Endogenous
8	Z_t	Total Resources	Endogenous
9	RV_t	Government Revenue	Endogenous
10	FG_t	Foreign Grants	Endogenous
11	TE_t	Total Expenditure	Endogenous
12	RE_t	Recurrent Expenditure	Endogenous
13	CE_t	Capital Expenditure	Endogenous
14	BD_t	Budget Deficit	Endogenous
15	FL_t	Foreign Loan	Endogenous
16	DL_t	Domestic Loan	Endogenous

Note: Variables other than total employment and interest rate are measured in million of NRs. at 2009/10 price.

Annex 2: Root Mean Square Percentage Error (RMSPE) (Sample period: 1992/93 to 2009/10)

Serial Number	Variables	RMSPE
1	Y_t / L_t	3.58
2	K_t	4.98
3	r_t	6.21
4	I_t	4.72
5	GI_t	2.57
6	PI_t	7.83
7	Z_t	5.01
8	RV_t	3.99
9	FG_t	9.54
10	TE_t	7.04
11	RE_t	6.22
12	CE_t	8.88
13	BD_t	9.56
14	FL_t	4.65
15	DL_t	9.43

Nepal's Trade Flows: Evidence from Gravity Model

Surya Bahadur Thapa*

Abstract

This study is carried out to estimate the trade potentiality of Nepal using gravity model. The gravity model simply explains that the volume of trade between pairs of countries is a positive function of the size of two countries and negative function of the distance between them. The study has used coefficients of the model to predict Nepal's foreign trade for the year 2009. The trade potentiality is calculated with the help of the ratio of predicted trade to actual trade. The result is fluctuating: some countries crossed the limits whereas some countries are still below the potential trade. The study has used gravity model to evaluate the determinants of foreign trade of Nepal using secondary data including 19 major trade partners. The estimated result of Nepal's trade potentiality shows that Nepal has exceeded trade potentiality with her 10 trading partners, including giant neighbors India and China, and there remains trade potentiality with 9 trade partners including another neighbor Bangladesh.

JEL Classification: C31, F10, F14, F17

Keywords: Nepal, GDP, Distance, Gravity Model, Determinants of Trade, Trade Potentiality

I. INTRODUCTION

The theoretical importance of trade for development is very well known since the writings of David Ricardo. According to him, international trade enables a country to take comparative advantage and benefits through specialization both statically and dynamically performing the function of international exchange of goods. Acknowledging the significance of trade in economic development, Nepal has been shifting towards liberal and market-oriented trade policy since the mid-1980s that was accompanied by various reform programs in 1992 (Pant, 2005). Under it, the country has introduced export-oriented policies in order to increase the volume of exports. Likewise, import substitution policies have been removed.

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Trade is a multi-dimensional phenomenon. It is determined by many factors at a time. Both economic (income of a country, tariff structure) and non-economic factors (distance, language, culture) determine it. Various studies have been undertaken on trade. Most of them are concerned with a qualitative question of identifying the trade pattern. Following this modular, the studies on Nepal's foreign trade are qualitative in nature as they focus on volume, direction, composition of trade as tariff rate and tariff structure. Questions such as which countries should trade what goods have also been analyzed. However, a question as to how much of those goods are traded remains an important unsettled issue. Regarding this issue, only very few studies have been carried out by using quantitative methods that contain gravity model (Bhatt, 2005). The importance of gravity model is increasing very fast. This model explains volume of trade between pairs of countries as a positive function of the size of two countries and negative function of the distance between them. The model is popular for empirical research because it explains a very large portion of actual trade flows observed in the world (Berg and Joshua, 2007). Foreign trade is a crucial element in the process of economic development. In view of the crucial role that volume of trade plays in the process of development, it is important to understand its various determinants.

The gravity model is widely used in the empirical literature to evaluate the determinants of bilateral trade. Hassan (2001) examined the issues of whether intra SAARC trade flow is under-rated or over-rated than as predicted by the gravity model. Batra (2004) estimated a gravity model of bilateral trade between India and her 146 trade partners. Sohn (2005) fitted a gravity model of bilateral trade between Korea and her 30 trading partners. Rahman (2010) examined the causative factors of Bangladesh's exports to 35 countries using gravity model. Hatab et al. (2010) examined the determinants of Egyptian agricultural exports using gravity model. In this regard, this study uses the gravity model to evaluate the determinants of foreign trade of Nepal and contributes to the literature on the application of gravity model in Nepal for the researchers, learners, policy makers in particular and for all other interested persons. This study is also valuable, as it evaluates whether Nepal still has some untapped trade potential with its major trading partners. Furthermore, it provides useful indicators for current negotiations for the country specific trade promotional policies and bilateral trade.

To the best of my knowledge, there is no any empirical research using gravity model with latest data of 2009 in understanding the factors influencing Nepal's trade flows with her major trading partners. In this context the general objective of the present study is to estimate the gravity model of Nepal. The specific objectives of the study are as follows: (i) to evaluate the determinants of bilateral trade flows of Nepal and (ii) to explain Nepal's trade potential. The determinants of bilateral trade flows are evaluated in terms of equation 5 and 6 and the second objective has been explained only with the equation 6 as given under the research methodology of the study. This study could include additional explanatory variables such as openness indicator, trade complementary index etc. in the model. However, it has been limited only to independent variables including GNI, per capita GNI and distance. The study is based only on cross section data of merchandise trade at an aggregate level, and not on product specific disaggregated data.

The rest of the paper is structured as below. Section 2 presents an overview on Nepalese foreign trade. Section 3 provides research methodology including theoretical review, present approach, definition and the nature of the data and the selection of the 19 countries. Section 4 outlines results of the empirical analysis. Section 5 addresses conclusions and important policy implications.

II. NEPALESE FOREIGN TRADE: AN OVERVIEW

Nepal is a small country of South Asia. The country is located between China and India. Since the country adopted liberal economic policies from the beginning of 1990s, the government of Nepal has promoted private investment and encouraged foreign direct investment with several institutional and economic reforms. Nepal entered into the WTO in 2004 as a first among the least developed countries, WTO offers substantial potential for its integration with South Asian and other regional as well as global economies.

Nepal's external sector has historically been weak. Its major component, balance of trade, has appeared in deficit continuously (Acharya, 2010). In terms of composition, the merchandise trade constitutes the largest portion of foreign trade of Nepal. The value of the merchandise trade increased rapidly in the last decade of the 20th century and followed the same pattern in the first decade of the 21st century. Its volume increased up to $ 2,256 million in 2000 and reached at $ 6,453 million in 2010 from $ 884.5 millions in 1990. As a result, the trade volume has increased by 2.5 times during the period of 1990 to 2000 and by 2.86 times during the period of 2000 to 2010. During the period from 2000 to 2010 the trade deficit increased very rapidly as compared to the increase in volume of trade. The deficit of trade balance increased from $ 826 million in 2000 to $ 4,551 million in 2010. In this decade the trade deficit has increased by 5.5 times. In 2010, the value of goods imported was equal to $ 5,502 million while the value of goods exported was just equal to $ 951 millions. During this decade, the value of exports increased by just 1.35 times while that of imports increased by 3.6 times.

There are several features of Nepalese foreign trade. First, the commodity pattern of imports and exports indicate that Nepal's foreign trade confirms to comparative advantage theory of international trade. The country's comparative advantage lies in labor intensive manufacturing and agricultural products (Ministry of Industry, Commerce and Supplies; 2004). This type of trade illustrates traditional theory of trade also known as 'inter industry trade.' Second, Nepal's foreign trade is India dependent. About two-thirds of Nepal's trade is with India. Third, there is continuous deficit in Nepalese foreign trade. The volume of trade deficit is continuously increasing. Fourth, Nepal's share in total world trade has been declining. Fifth, Nepal remains dependent on a relatively small basket of exports and a few destination markets (Karmacharya, 2005).

The year 2009 remained a special year in that the world economy experienced steepest global recession after the Great Depression (World Bank, 2011a and Khanal, 2010). World gross domestic product (GDP) contracted 1.9 percent in 2009, with high economies contracting 3.3 percent and developing economies expanding just 2.7 percent down, from 8.6 percent in 2008 (World Bank, 2011a). In 2009, Nepal's gross national

income (GNI) increased by 13 percent and per capita GNI grew by 10 percent. Nepal's total merchandise trade decreased by about 11 percent in 2009 from US$ 5205 million in 2008. The imports followed the same pattern indicating a decrease by 14.5 percent but exports grew nearly by 9 percent. Table 1 presents the summary of the volume of Nepal's foreign trade for the year 2009 while other details are presented in Table 2.

Table 1: Nepal's Foreign Trade in 2009 (in million US $)

Country	Exports	Imports	Trade Volume	Trade Balance
Major countries	837.11 (94.5)	3106.22 (82.7)	3943.11 (85)	- 2268.89
Other Countries	48.89 (5.5)	648.18 (17.3)	697.07 (15)	- 599.29
World	886.0 (100)	3754.40 (100)	4640.4 (100)	- 2668.4

Source: UNCOMTRADE data.
Note: The numbers in parentheses represent percentage.

The volume of Nepal's foreign trade is presented in terms of major countries and other countries. Table 1 shows that Nepal exported almost 95 percent to her major countries and only about 5 percent to other countries. In 2009, Nepal imported 83 percent of her total imports from major countries and only 15 percent from other countries. Out of total trade volume, 85 percent was with major countries and the remaining 15 percent was with other countries.

In 2009, Nepal traded with almost 190 countries (Trade and Export Promotion Centre, 2010). The imported commodities ranged from basic goods to luxurious goods as well as labor intensive goods to capital intensive goods. Being an agricultural country, Nepal imported large amount of agricultural goods from India and China. Such goods included meat, milk, rice, vegetables from India and onion, fish, butter, garlic, apples from China. From Japan, Nepal imported bulldozers, mechanical shovels and excavators. The import list did not show any input type commodities. In the exported items there is an overwhelming domination of woolen goods (carpets, woolen shawls, scarves, mufflers) and cotton goods (cotton dresses, suits) as well as agricultural products such as lentils, skin and hides of goats, and paintings, drawings and pastels.

III. RESEARCH METHODOLOGY

3.1 Theoretical Review

The history of gravity model of international trade starts with the Newton's Law of Gravitation (Head, 2003). The gravity model of international trade is similar to Newton's gravity equation. In 1687, Newton proposed the "Law of Universal Gravitation." This law argues that the attractive force between two objects 'i' and 'j' is given by

$$F_{ij} = G M_i M_j / D_{ij}^2 \quad (1)$$

Where,
F_{ij} = Attractive force,
M_i and M_j = Masses,
D_{ij} = Distance between the two objects, i and j.
G = Gravitational constant.

Following the Newton's gravity equation as given above, Jan Tinbergen (1962) proposed, more or less, similar functional relation to explain international trade as follows.

$$F_{ij} = G\, M_i^{\alpha}\, M_j^{\beta} / D_{ij}^{\theta} \quad (2)$$

Where,
F_{ij} = Volume of trade between two countries 'i ' and 'j' (i.e. the sum of the flows in both direction: i. e. exports plus imports). F_{ij} is measured in monetary value.
$M_{i\,(j)}$ = Relevant economic size of country 'i(j)'.
D_{ij} = Distance between the countries i and j (usually measured between centre to centre).

The gravity model of international trade is a simple empirical model for analyzing trade flows between countries. The model states that the bilateral trade flows is directly proportional to the product of the economic size (GDP or GNI) of country 'i' and 'j' and inversely proportional to the distance between the two countries. The simplest form of the gravity model appears in the following form.

$$T_{ij} = A\,(Y_i Y_j)/(D_{ij}) \quad (3)$$

Where,
T_{ij} = Bilateral trade flows (exports plus imports) between country i and j.
$Y_{i\,(j)}$ = GDP or GNI of country i(j).
D_{ij} = Distance between country i and j.
A = Constant of proportionality.
Taking logarithm, the equation (3) can be written as

$$\text{Ln}\,(T_{ij}) = \beta_0 + \beta_1\, \text{Ln}\,(Y_i * Y_j) + \beta_2\, \text{Ln}\,(D_{ij}) \quad (4)$$

3.2 The Present Approach

This research is based on basic and augmented gravity models. The model is basic because it considers only GNI and distance as independent variables. The model is augmented in the sense that several other variables that may affect bilateral trade have been included in addition to the GNI and distance. The augmented gravity model incorporates GNI per capita as additional variable in the basic model. The basic and augmented gravity models are presented in equation (5) and (6) respectively. The present study fits both the equations. However for the purpose of Nepal's trade prediction for the year 2009, only equation (6) has been considered.

$$\text{Ln}\,(T_{ij}) = \beta_0 + \beta_1\, \text{Ln}\,(Y_i * Y_j) + \beta_2\, \text{Ln}\,(D_{ij}) + U_{ij} \quad (5)$$

$$\text{Ln}\,(T_{ij}) = \beta_0 + \beta_1\, \text{Ln}\,(Y_i * Y_j) + \beta_2\, \text{Ln}\,(Y/P_i * Y/P_j) + \beta_3\, \text{Ln}\,(D_{ij}) + U_{ij} \quad (6)$$

Where,
T_{ij} = Bilateral trade flows (exports plus imports) between country i and j.
Yi (j) = GNI of country i(j).
Pi(j) = Total mid year population of country i(j)
Y/Pi(j) = Per capita GNI of country i(j)
β_0 = Constant of proportionality.

β_1, β_2, and β_3 are the parameters to be estimated.
D_{ij} = Distance between countries i and j.
Ln = Natural logarithm

3.3 Definition of the Data

Bilateral Trade Flows

The bilateral trade flows refer to the sum of monetary value of both exports and imports between Nepal and each trading partner.

Gross National income

Gross National income (GNI) measures total domestic and foreign value added claimed by residents. GNI comprises gross domestic product (GDP) plus net receipts of primary income (compensation of employees and property income) from nonresident sources. When calculating GNI in U.S. dollars from GNI reported in national currencies, the World Bank follows the World Bank Atlas conversion method, to smooth the effect of transitory fluctuations in exchange rates.

Gross National Income (GNI) per capita

Gross National Income (GNI) per capita is GNI divided by the mid-year population. GNI per capita in US dollars is converted using the World Bank Atlas method.

Distance

The distance refers to the distance between Nepal and its trading partners' capital cities measured in terms of kilometer.

The rationale of the independent variables is explained below. The product of GNI serves as a proxy for the two countries' economic size, both in terms of production capacity and the size of the market. Larger countries, in terms of GNI, possess both higher production capacity as well as large domestic markets for the imports. Therefore, an increase in the product of the two countries' GNI is expected to increase bilateral trade volume. Thus, it is expected that our estimated coefficient of β_1 is positive. The product of per capita GNI is an another independent variable that serves as a proxy for the income level as well as purchasing power of the exporting and importing country. Regarding the coefficient to the variable β_2, we do not have any priory information on its sign. The distance between two countries serves as a trade barrier variable such as transport cost, time and other such variables. It is argued that as distance increases, the volume of trade flow between two countries decreases, so that the negative sign of the coefficient on log of distance (β_3) is expected.

3.4 The Nature of the Data

As per the model the study has used quantitative approach based on the cross section data, for the year 2009, of bilateral trade (merchandise) flows between Nepal and her major trading partners, Nepal and her trading partners' GNI, per capita GNI, and the distance between Nepal and its trading partners' capital cities. The units of measure are as follows. The values of bilateral trade flows are measured in terms of millions of US$, the GNI is expressed in terms of billions of US$ and the value of per capita GNI is expressed in terms of US$. The distance is measured in kilometers.

The data have been obtained from the following sources. Data on distance (in kilometers) between Kathmandu (capital city of Nepal, country 'i') and other capital cities of country 'j' (as the crow flies) are obtained from an Indonesian Website:www.indo.com/distance and the Website:www.cepii.fr. The Data on GNI and GNI per capita have been taken from the *World Development Indicators 2011* published by the World Bank. The data of the total trade value is collected from UN COMTRADE data base. The data on trade value, GNI, per capita GNI and distance of Nepal and her trading partners' have been shown in Table 2.

3.5 Sample Countries

This study covers Nepal's 19 trading partners. The selection process of these 19 countries is as follows. According to *A Glimpse of Nepal's Foreign Trade* published by Trade and Export Promotion Centre (2010) there are 30 major exports partners and 30 major imports partners of Nepal in 2010. Among them, 21 are common countries involved in both the exports and imports lists. So at the first stage, the countries which were not involved in both the exports and imports lists were eliminated. Thus, it gave 21 countries. However, the *World Development Indicators 2011* published by the World Bank lack the trade figure of two countries: Taiwan and Saudi Arabia. Finally, this study covers only 19 countries for the study. The names of these countries have been presented in Table 2.

Table 2: Trade Volume, GNI, GNI Per Capita and Distance between Nepal and her Major Trading Partners

Country	Trade Value (Tij) β	GNI*	GNI/Pc*	Dij♣
Australia	35.1	957.5	4377	9744
Bangladesh	66.2	93.5	580	670
Brazil	1.95	1564.2	8070	15053
Canada	22.28	1416.4	41980	11671
China	445.26	4856.2	3650	3148
Denmark	7.42	326.5	59060	6444
France	46.18	2750.9	42620	7245
Germany	64.96	3476.1	42450	6411
Hong Kong	24.57	221.1	31570	3065
India	2694.73	1407.5	1220	806
Italy	16.91	2114.5	35110	6633
Japan	86.32	4857.2	38080	5161
Malaysia	64.18	201.8	7350	3237
Nepal	--	13.0	440	--
Netherlands	13.02	801.1	48460	6984
New Zealand	11.96	124.3	28810	11943
Singapore	98.17	185.7	37220	3523
Switzerland	29.25	505.8	65430	6924
UK	102.41	2558.1	41370	7339
USA	112.28	14233.5	46360	12395

Source: β UN COMTRADE data

* World Development Indicators 2011.

♣ Website:www.indo.com/distance and the Website:www.cepii.fr.

Note:

1. Trade value (Tij) is the sum of total exports and imports, between Nepal (i) and its trading partners, in million US$.
2. The unit for GNI is one billion US$.
3. The unit for per capita GNI is one US$.
4. The distance means great circle distance between Kathmandu, the capital city of Nepal, and the capital city of its trading partners. The unit is in kilometer.

IV. EMPIRICAL RESULTS

4.1 Determinants of Foreign Trade of Nepal

The gravity model of international trade is a popular technique to identify the determinants of bilateral trade flows between countries. The model has both sound theoretical foundations and empirical success. This research employs the gravity model to evaluate the determinants of foreign trade of Nepal. The estimated results of equation 5 and 6 are presented in the Table 3.

Table 3: Estimated Results of Two Gravity Models for Nepal

Dependent Variable: natural log of total trade between countries

Explanatory Variables	Equation 5		Equation 6	
	OLS coef.	Std. coef.	OLS coef.	Std. coef..
Constant	2.461* (3.768)		2.037** (4.163)	
PGNI	0.623** (0.166)	0.567	0.626** (0.171)	0.569
PPGNI	--------	--------	0.064*** (0.226)	0.057
Distance	-1.534* (0.279)	-0.831	-1.608** (0.391)	-0.871
N	19		19	
R^2	0.680		0.682	
Adj R^2	0.640		0.618	
F	16.990		10.705	

Source: Results of equation 5 and 6 as the data given in Table 2 were processed through SPSS 16.

Note:

1) PGNI and PPGNI mean product of GNIs and product of per capita GNIs
2) The numbers in parentheses are standard errors.
3) * means significant at 1% level of significance.
4) ** means significant at 5% level of significance.
5) *** means not significant.

Table 3 presents OLS estimates of the gravity model. From the statistical viewpoint, the estimated regression lines fit the data well and explain more than 60 (actually 64 and 61.8 percent in equation 5 and 6 respectively) percent of the variation in bilateral trade across the countries.

The basic features of the gravity model work well: for the model the GNI and distance have the expected signs with GNI possessing the positive and the distance negative sign and statistically significant; and per capita GNI plays an insignificant role. The positive sign of the GNI explains that as the size of the economies increases the trade value between the countries increases. Likewise the negative sign of the distance indicates that as the distance between two countries increases the trade value between the countries decreases. The coefficient on the GNI variable is positive and statistically significant; other things remaining constant, this explains that the higher the GNI product, the higher is the bilateral trade between the countries and vice versa.

The economic meaning of the OLS coefficient of 0.626 in equation 6 is that holding other things constant, a one percent increase in the size of GNI of given country pairs would increase bilateral trade approximately by 0.626 percent (less than proportionate increase). The estimated coefficient on log of distance has an expected negative sign, statistically significant and approximately near 1.6, indicating that other things holding constant, trade between pairs of countries falls by about 1.6 percent (actually 1.608 percent) for every 1 percent increase in the distance between them and vice versa. The estimated coefficient of

per capita GNI gives it an insignificant role. The coefficients of explanatory variables in equation 5 are similarly defined.

4.2 Nepal's Trade Potentiality with Major Trading Partners

After estimating the gravity model for bilateral trade flows with major trading partners, the present study has also estimated trade potential for Nepal. The value of potential trade (P/A) has been calculated as a ratio of predicted trade (P) to actual trade (A). For this, the data on actual trade were obtained from UN COMTRADE data base. The data on predicted trade were estimated with the help of the coefficients of the gravity model as given in equation 6 in Table 3. The value of trade potential is finally used to analyze the trade direction for Nepal. The implication of the value of P/A is that if it is greater than one (i.e. P/A > 1) this implies that there is room for further increase in trade with the countries. If it is less than one (i.e. P/A < 1) it indicates that there no potentiality of further increase in trade with the countries concerned.

Table 4: Nepal's Actual Trade, Predicted Trade (both in US $ millions) and Potentiality of Trade

Serial No.	Country	Actual Trade Flow (A) ♣	Predicted Trade Flow (P) γ	P/A
1	Australia*	35.10	15.58	0.44
2	Bangladesh**	66.20	236.15	3.56
3	Brazil**	1.95	10.94	5.61
4	Canada*	22.28	17.2	0.77
5	China*	445.26	261.77	0.59
6	Denmark**	7.42	18.24	2.46
7	France**	46.18	56.19	1.22
8	Germany**	64.96	79.16	1.22
9	Hong Kong**	24.75	45.35	1.83
10	India*	2694.73	136.03	0.05
11	Italy**	16.91	54.24	3.2
12	Japan**	86.32	137.38	1.6
13	Malaysia*	64.18	35.74	0.56
14	Netherlands**	13.02	27.76	2.13
15	New Zealand*	11.96	3.52	0.29
16	Singapore*	98.17	32.85	0.33
17	Switzerland*	29.25	21.51	0.74
18	UK*	102.41	52.49	0.51
19	USA*	112.28	66.65	0.59

Source:

♣ UN COMTRADE data base.

γ Authors calculation based on the coefficients of equation 6 as given in Table 3.

* means over rated countries and there is no possibility of trade expansion with these countries.

** means under rated countries and there is possibility of trade expansion with these countries.

Table 4 presents Nepal's actual trade, predicted trade and trade potential with different countries. Nepal's trade potentiality is presented in the fifth column as indicted by P/A ratio. Based on the value of P/A, Nepal's trade partners could be divided into two groups: countries with which there is potential for trade expansion (under rated: i. e. P/A >1) and countries with which Nepal has already exceeded trade potentiality (over rated: i.e. P/A < 1). The conclusions are as follows. Table 4 shows that the extent of trade potential is feasible for Brazil, Italy, Bangladesh, Denmark, Hong Kong, the Netherlands, Japan, France, and Germany. The countries with which Nepal has already exceeded potential trade, as predicted by the gravity model, are Australia, Canada, China, India, Malaysia, New Zealand, Singapore, Switzerland, UK, and USA. It is indicated that Nepal has already exceeded trade potentiality with her two giant neighbors.

V. CONCLUSION AND POLICY IMPLICATIONS

Nepal adopted trade diversification policies from the second plan. The country followed market-oriented trade policies since the mid-1980s. Since that date, all the governments have tried to integrate Nepalese economy with regional and world markets. In this process Nepal became a member of WTO, signed on the SAFTA agreements and joined BIMSTEC. In this paper, an attempt has been made to estimate Nepal's trade potential for the year 2009. The paper has evaluated the determinants of trade flows of Nepal with major trading partners using the gravity model approach and the coefficients thus obtained have been used to predict trade potential for Nepal with respect to 19 countries in the sample.

The OLS results reveal that the gravity equation fits well for the data and provides statistically significant income and distance elasticity coefficients. Trade volume between Nepal and her 19 trading partners is positively affected by economic size of the countries while distance plays a negative role and the variable per capita income plays insignificant role. Based on the gravity model the estimation of the Nepal's trade potential confers that Bangladesh, Brazil, Denmark, France, Germany, Hong Kong, Italy, Japan, and the Netherlands reveal potential for expansion of trade. To increase the trade and exploit the trade gap with these countries Nepal needs to adopt suitable trade promotional strategies. The estimation of the trade potentiality indicates that the Nepal's actual volume of trade with rest of the countries in sample has exceeded trade potential. The countries with which Nepal has already exceeded potential trade, as predicted by the gravity model, are Australia, Canada, China, India, Malaysia, New Zealand, Singapore, Switzerland, UK, and USA. However, it does not mean that Nepal can not extend the trade relations with the countries that exceeded her trade potential at present. As a result of increase in the GNI in the future on the one hand and reduction of distance by adopting appropriate trade facilitation measures on the other hand, the volume of trade with a particular country may be increased in the future.

REFERENCES

Acharya, S. 2010. "Import Liberalization and Revenue Replacement: Impacts in a Small Asian Developing Economy." *European Journal of Development Research.* Switzerland: European Association of Development Research and Training Institute.

Batra, A. 2004. "India's Global Trade Potential: The Gravity Model Approach." ICRIER Working Paper No.151, New Delhi: Indian Council for Research on International Economic Relation (ICRIER).

Berg, H. and Joshua. J. L. 2007. *International Trade and Economic Growth*. New Delhi: Prentice – Hall of India

Bhatt, S. 2005. *Nepal's Trade Potential and Negotiation Strategy for WTO Accending Countries*. Downloaded from: www. entrec.org.np/publication 2/report. Downloaded on 20th January, 2011.

Hassan, M. K. 2001. "Is SAARC a Viable Economic Block? Evidence from Gravity Model." *Journal of Asian Economics*, 12, 263-290.

Hatab, A., E. Romstad and X. Huo. 2010. "Determinants of Egyptian Agricultural Exports: A Gravity Model Approach." Japan: *Modern Economy.* pp. 134 – 143.

Head, K. 2003. "*Gravity for Beginners."* Downloaded from http://pacific.commerce.ubc.ca/ Keith/gravity .pdf on 1st January 2011.

Karmacharya, B. 2005. "Country Perspectives: Nepal." *SOUTH ASIAN FREE TRADE AREA: Opportunities and Challenges.* USAID.

Khanal, D. 2010. "Neo- Liberalism, Global Financial Crisis and Lessons for Nepal." *The Journal of Development and Administrative Studies*. Vol (19). Number 1-2. Kathmandu: Centre for Economic Development and Administration (CEDA)

Ministry of Industry, Commerce and Supply. 2004. *Nepal Trade and Competitiveness Study 2004*. Author.

Pant, B. 2005. "Nepal's Trade Sector: Review, Repercussions and Recommendations." *Economic Review* (Occasional Papers). No.17, April 2005. Kathmandu: Nepal Rastra Bank.

Rahman, M. 2010. "The Factors Affecting Bangladesh's Exports: Evidence from the Gravity Model Analysis." *The Journal of Developing Areas*. Vol. 44, (1), 229-244. Tennessee State University College of Business.

Sohn, C. 2005. "Does the Gravity Model Explain South Korea's Trade Flows?" *Japanese Economic Review* Vol. 56, (4), 417- 430.

Tinbergen, J. (1962). *Shaping the World Economy: Suggestions for an International Economic Policy*. New York: The Twentieth Century Fund.

Trade and Export Promotion Centre. 2010. *A Glimpse of Nepal's Foreign Trade.* Pulchowk: Trade and Export Promotion Centre.

World Bank (2011). *World Development Indicators 2011*. Washington D.C.: The World Bank.

World Bank (2011a). *World Development Report 2011*. Washington D.C.: The World Bank.

Modelling Monthly International Tourist Arrivals and Its Risk in Nepal

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Abstract

The volume of international tourist arrivals is the prime concern for both the tourism entrepreneurs and policy makers, as the arrivals is directly associated with foreign exchange earnings or export benefits, and tourism induced economic activities. The overall average annual growth of international tourist arrivals in the country over the last 40 years is about 6.65 percent. The mean contribution of tourism sector as a percentage of GDP was 2.67 percent during the last 35 years. This paper explores the risk associated in the Nepalese tourism industry taking account of monthly international tourist arrivals. The symmetric and asymmetric conditional mean and volatility models, GARCH, GARCH-GJR and EGARCH with exogenous ARMA terms were applied for data analysis. The empirical results showed that the long run risk or volatility is persistence in monthly international tourist arrivals and estimated coefficients are statistically significant. The volatility can be inferred as risk or uncertainty associated with international tourist arrivals in Nepalese tourism industry. Therefore, this empirical study envisages sufficient room for intervening or amending the tourism policy to better attract international visitors and promote tourism as a business.

JEL Classification: C 22

Key words: International tourist arrivals, Growth, and Conditional Mean and Volatility

I. INTRODUCTION

Over the time, the substantial growth in the tourism business in the world clearly marks tourism as one of the most remarkable economic and social phenomena of the last century. The number of international tourist arrivals illustrated an evolution from a mere 25 million international arrivals in 1950 to an estimated 806 million in 2005, corresponding to an average annual growth rate of 6.5% (UNWTO, 2009a). Moreover,

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international tourist arrivals in the world grew by 6.9% in 2007, highest growth in Middle East (15.3%), followed by Asia Pacific (10.5%), Africa (8.5%), Europe (5.2%) and Americas (4.9%) in the same year (UNWTO, 2009b).

Apparently, tourism exports have become an important sector and a growing source of foreign exchange earnings in many developing countries (Seddighi & Theocharous, 2002). It is a demand-driven, service-oriented industry, experiencing rapid growth and innovation and plays a key role in the growth of the country's economy (Chu, 2008). The tourism industry, which benefits the transportation, accommodation, catering, entertainment and retailing sectors, has been blooming in the past few decades (Cho, 2003). Furthermore, international tourists have increasingly sought exotic destinations in their pursuit of relaxation, escape, and adventure in the preceding century and recognizing the opportunity to earn valuable foreign currency, developing countries have catered to these desires by encouraging tourism development (Werner, 2003).

Economic literature on economic growth and tourism argues that international tourism may affect growth through several ways beyond the direct revenues receipts from tourist. For example, the foreign direct investment associated with this sector can bring managerial skills and technology with potential spillover benefits to other sectors as well. National policies designed to foster tourism, by improving security, stability, and openness, can also enhance growth in other sectors of the economy (Arezki, Cherif, & Piotrowski, 2009). Undeniably, risk or volatility in international tourist arrivals in Nepal would have several impacts on the economy mostly on foreign exchange receipts, imports and exports, and service sectors.

1.1 An Overview of Nepalese Tourism Industry

Nepal has ancient history of tourists arrival. So far, Sir Edmund Hillary and his travel companion in the 1953 from the British Mt Everest expedition were among the first foreigners to visit the region. Presently, this area is one of the Himalaya's premier centers for mountaineering and trekking tourism, as well as a national park (Sagarmatha National Park), and a World Heritage (Stanley, 1993). Some literature argued Boris Lissanevitch was the pioneer of Nepalese tourism industry. "The booming Nepalese tourism industry owes its rise to Boris Lissanevitch-a Russian emerge, when Nepal was still a forbidden mountain kingdom, a Shangri-La out of bounds to the western tourist" (Himalaya, 2008). Himalaya (2008) also mentioned that King Tribhuvan was acquainted with his Club-Club 300 in Kolkata and Boris was invited during King Mahendra's wedding because of his hospitality. Boris was, eventually, arrived in Nepal in 1951 and opened the country's first international class hotel -"The Royal Hotel," presently, known as the Yak & Yeti Hotel. Boris realized Nepal is potential destination for tourists and was also succeed to grant a 15-day visa for a group of 20 foreigners by requesting King Mahendra. He played host to the country's first batch of tourists in 1955 (Himalaya, 2008). During the more than half a century, Nepalese tourism industry became a country's biggest industry.

The volume of tourist-visitors totaled 602,855 in the year 2010 and this figure is more than 18 percent as compared to year 2009. The composition of tourist arrival comprises

34.63 % from Asian countries except India; 18.46% from Europe; 19.30 % from India; 7.86% from America and Canada; 3.27% from Australia and territories 5.9% from U.K. and remaining 10.58% from the rest of the world (Appendix 1: Table 1).

The country is well known for the Mt. Everest and the high Himalayan regions of Nepal have established as a foremost center of mountaineering and trekking route in Asia with an immense potential for tourism development. The small-scale of adventure tourism product of Nepal is able to link this country, possibly, most remote part of the globe, with the global economy and provides new opportunities for country's economic development. So far, the pace of tourism industry development could not be considered promising from the perspective of economic development. Even if, this sector is contributing substantial share in foreign exchange receipts with unlimited potentiality.

Tourism industry is one of the major sources of foreign receipt for Nepal. In the year 2008/09, the foreign earning amounted to NRs.27.96 billion. This figure is 40% of total merchandize export value and 22.8% of total value of exports of goods and non-factorized services (Appendix 1: Table 2). The annual contribution of tourism industry in the national economy during the last 35 years (1975/76–12009/10) as percentage of GDP is depicted in the (Annex 2: Figure 1). The figure reveals that the percent share of value of foreign exchange earnings from tourism in national GDP fluctuated over the time and in 1980, 1981 and in between 1988-1999 was more than 3 percent and reached more than 4 percent in 1992 and 1993. However, the mean contribution of this industry as a percentage of GDP was 2.67.

The revised government policies have shown greater concerns about the real value of tourism and its contribution in economic growth and overall tourism development in the country. Furthermore, tourism industry is considered as a major element for poverty alleviation and social equity. The Nepal Tourism Vision 2020, has been issued from the Ministry of Tourism and Civil Aviation with the collaboration of Nepal Tourism Board and concerned industries targeting to attract two millions of tourist by 2020 (MOF, 2009).

1.2 Nepal - A Potential Destination for Tourism

Nepal has a wide range of adventurous and mind blowing tourism products and the county holds eight of the world's ten highest peaks in the northern Himalayas. Climbing and mountaineering policy has been revised to explore major adventure products and more than 300 mountain peaks have been opened (NTB, 2009). Despite conventional adventure tourism products (such as mountaineering, trekking and rafting), Nepal holds prospects for promoting many other equally important adventure events such as soft trekking, hiking, paragliding, mountain biking, high altitude marathon, and kayaking (Dahal, 2009). Instead of that, Nepalese tourism could be the one of the principal paths that country can follow to overcome the persistence rural poverty and unemployment in the remote rural life. The policies of tourism commoditization and commercialization in the remote-rural areas may utilize the "potential embedded in its enchanting natural sceneries, mountainous terrain, relatively unadulterated rural-agrarian life, and artistic heritage" (Bhattarai, Conway, & Shrestha, 2005).

National efforts to develop tourism infrastructures, for example, travel sites with modern recreational facilities (casinos, amusement parks, complex skyscrapers, and so on), is one of a number of feasible strategies to promote the tourism industry. However, abundance diversity of natural and cultural resources should not be overlooked and widely recognized as essential tourism assets for a country to develop its tourism industry. More specifically, tourist sites which are listed as World Heritage Sites by UNESCO are treated as catholicons in promoting the tourism industry (Yang, Lin, & Han, 2010). The adage "Atithi Devo Bhava" (guests is God)[1] and "Atithi Satkar, Nepaliko Sanskar" (hospitality is Nepalese culture) deeply rooted in our culture. Hence, the unparalleled scenic beauty and landscape; cultural and artistic heritages are additional tourist attractions and the country become a popular destination all over the world (MOF, 2001).

II. LITERATURE SURVEY

Most of the previous studies that were undertaken on the tourism subjects in Nepal were focused on policy, management; conflicts; energy and environmental issues. Adams focused on cultural approach to tourism capitalism considering Sherpa community (Adams, 1992). Shackley did research in upper mustang (a remote Village in the Himalaya region of Nepal) focusing on the management and socioeconomic aspects of tourism (Shackley, 1994).

Hepburn, et al (2002) used ethnographic data, elaborated the ideas of Wittgenstein and Winch, and argues that tourism must be understood in terms of a range of touristic "forms of life" that encompass local cultural meanings (Hepburn, 2002). Additionally, (Nepal, 2000) argued that lack of sufficient management and coherent data, the ecological and environmental; socioeconomic and cultural problems associated with tourism industry will be significantly increased and the author pointed out population growth, poverty, environmental deterioration, and politics are certainly linked with tourism induced environmental problems (Nepal, 2000).

Bhattarai et al (2005) mentioned that adventure tourism is a viable economic activity to develop remote areas, but the industry had faced many obstacles because of Maoist war and September 11 impacts, along with its dependency on foreign capital, uneven growth, monopolistic class character, and neglect of rural impoverishment are all preventing it from taking off (Bhattarai, Conway, & Shrestha, 2005). Nyaupane et al (2006) concentrated the study on community involvement and number/type of visitors on tourism impacts in controlled Annapurna region of Nepal and north-west Yunnan, China and explored that level of host involvement in management and number/type of tourists helped explain these destinations' varying degrees of economic leakage, local control, and socio-economic inequity (Nyaupanea, Moraisb, & Dowlerc, 2006).

Study on tourism and rural settlement in Nepal focusing on Annapurna region had been undertaken and concluded that the effects of international tourism on a remote Third

[1] http://en.wikipedia.org/wiki/Atithi_Devo_Bhav

World destination are similar to the effects of counter urbanization as in Western countries and changes in the growth, distribution, hierarchies, and appearance of settlements in this region are no different than in other areas affected by increased urban–rural migration (Nepal, 2007). Similarly, research on tourism-induced rural energy consumption in the Annapurna region had been also carried out and findings showed that energy consumption patterns are influenced by altitude; accommodation capacity; energy cost; diversity of energy sources; access to energy-saving technologies; and institutional rules and regulations. The author also claimed that there is clear tourism-induced growth in accommodations and on changing characteristics (Nepal, 2008). The Khumbu Himal was influenced by tourism and modernization as a result, political, social, cultural, and economic factors affect the traditional Buddhist values (Bjønness, 1983). The Mt Everest region has become a premier international mountaineering and trekking destination and that had brought prosperity to many Sherpas. "It, however, had adverse impacts on landscape due to the tremendous growth in tourism since the early 1970s"(Byers, 1987).

The majority of visitors were attracted by Nepal's natural resources and exclusively, "these visitors came to trek in the mountains and for some combination of trekking, jungle safaris, river rafting or ethnic tourism" (Zurick, 1992). Nepal's spectacular parks and reserves have attracted a large numbers of foreigners and it might be expected that these protected areas would be nurtured as valuable and unique economic assets. (Wells, 1993). The tourism industry requires an element of planning and control to limit the overall supply and location of accommodation, in order to protect the attractiveness of Pokhara as a destination and to secure the profitability of the industry (Pagdin (Divino J.A. and McAleer, 2009), 1995).

The tourism industry has left the military and agricultural fields in the area unpopular because of the economic gap it has produced. Marginal social groups are vulnerable but elites are enjoying in Annapurna Region and there are some sign of return of migrated family from Lahure community in Ghandruk (Pandey, Chettri, Kunwar, & Ghimire, 1995). The two economies of Maldives and Nepal were dependent on tourism. Although these countries offer very different attractions to tourists, they are faced with similar problems in terms of adverse environmental impacts of tourism (Brown, Turner, Hameed, & Bateman, 1997). Paudyal studied the determinants of demand share of individual member states in total SAARC arrivals from seven major tourism markets and empirically demonstrated the interdependency among the SAARC countries and found that relative price and regional share are two important link factors for the individual states in the region (Paudyal, 2003).

III. SOURCES OF DATA AND NATURE OF STUDY

Availability of data about various aspects of tourism in Nepal is still constrained as in other developing countries because of low capability of data generation and management. Data used for this study were gathered from the authorized sources namely, Government of Nepal, Ministry of Tourism and Civil Aviation, Nepal Tourism Board, and Government of Nepal, Central Bureau of Statistics. The nature of the data is explained in Appendix 2: Figures 2-4. This study is an attempt of quantitative analysis in Nepalese

tourism industry in terms of risk associated with international tourist arrivals and other theme, for instance, seasonality, tourism demand analysis, role of tourism in economic development etc. Thus, the purpose of this paper is to explore and model the present scenarios of international tourist arrivals and its volatility in Nepalese tourism industry. The government of Nepal had revised previous tourism policies and the tourism vision 2020 has already been issued. Therefore the findings of this study could be useful for policy implication.

IV. THEORETICAL FOUNDATION AND MODELS

Recent practices suggest that the researchers have been paying attention towards the risk associated with tourism industry and widely adopted conditional volatility models of ARCH family to predict the risk associated with tourism business and to capture symmetric and asymmetric effects in this industry by using data of daily, weekly or monthly tourist arrivals, for example, (Divino J.A. and McAleer, 2010; McAleer M. and Lim C., 2000; Yang, Lin, & Han, 2010). Therefore, in this research paper, the univariate time series models of ARCH family are adapted to analyze the monthly international tourist arrivals time series data from January 1982 to December 2010.

4.1 Unit Root Test

A standard time series model assumes linearity and symmetric adjustments. However, many economic variables display asymmetric adjustment paths over time. The Dickey Fuller test is considered more powerful in approximately symmetric time series (Enders & Granger, 1998). A tourist arrival series (y_t) is said to be stationary if the mean, variance and covariance of the series remain constant over time (Lim & Michael McAleer, 2009). The formulation of an ADF test using p lags of y_t, is presented in equation (1), where Δy_t is the first difference and p is the lag-length. The lags of Δy_t captures any dynamic structure present in the dependent variables, to ensure that ε_t is not autocorrelated. The, $\ln y_t$ is the logarithm of the monthly international tourist arrivals in Nepal at time t, $\Delta \ln y_{t-1}$ is the lagged first difference, ε_t is error term and α, δ, φ and θ, are the parameters need to be estimated.

$$\Delta y_t = \alpha + \delta trend + \beta y_{t-1} + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta ln y_t = \alpha + \delta trend + \beta \ln y_{t-1} + \sum_{i=1}^{p} \theta_i \Delta \ln y_{t-i} + \varepsilon_t \quad (2)$$

The output of the ADF and Phillips-Perron (PP) unit root test for null hypothesis, $H_0 : \beta = 0$, against $H_1 : \beta < 0$ is presented in Table 1. The results reveal that monthly international tourist arrivals series in Nepal is found to be non-stationary in both level and natural logarithm variables. As we know, many researchers argued classical

methods for unit root test suffer from the low power and size distortion (Brooks, 2008; Divino J.A. & McAleer, 2010). Therefore, we used yearly difference in monthly tourist arrivals and yearly logarithm difference of the same variable, as adopted by (Bartolomé, McAleer, Ramos, & Rey-Maquieira, 2009). The model is presented in equation 3. To confirm the ADF and PP unit rood test, we also adopted Ng-Perron Modified AR spectral GLS detrended and ADF-GLS- Modified Akaike information criteria for unit root test with and without a deterministic trend.

The output of the test is presented in Table 2.

$$\Delta_{12} y_t = \alpha + \beta \Delta_{12} y_{t-1} + \varepsilon_t \quad (3)$$

Table 1: Unit root test statistics for monthly international tourist arrivals in Nepal

Variables	ADF statistics		PP statistics	
	Z={1}	Z= {1,t)	Z={1}	Z= {1,t)
y_t	-0.57	-2.39	-6.12*	-9.90*
$log y_t$	-1.533	-2.24	-5.83*	-8.47*
$\Delta_{12} y_t$	-5.44*	-5.48*	-7.64*	-7.67*
$\log \Delta_{12} y_t$	-6.31*	-6.30*	-8.17*	-8.17*
Critical Values				
1%	-3.449	-3.985	-3.449	-3.985
5%	-2.869	-3.423	-2.869	-3.423

Note: coefficients are calculated in lag length 10

Table 2: Unit root test statistics for monthly international tourist arrivals in Nepal

Variables	$MADF^{GLS}$ statistics			MPP^{GLS} statistics		
	Z{1}	Z {1,t}	lag	Z {1}	Z {1,t}	lag
y_t	-3.11*	-9.82*	2	-22.29*	-112.83*	2
$log y_t$	-4.40*	-4.38*	5	-48.93**	-47.58*	5
$\Delta_{12} y_t$	-2.27*	-7.63*	2	-11.29**	-124.35*	2
$\log \Delta_{12} y_t$	-4.92*	-5.42*	3	-50.38*	-63.19*	3
Critical Values						
1%	-2.57	-3.47		-13.80	-23.80	
5%	-1.94	-2.90		-8.10	-17.30	

Note: The variable y_t and $\Delta_{12} y_t$ denotes the monthly and yearly difference of monthly international tourist arrivals in Nepal. * and ** denotes the null hypothesis of a unit root is rejected at 1% and 5% level of significance respectively.

4.2 The Conditional Mean and Conditional Volatility Models

The conditional mean and conditional volatility models are widely adapted by many scholars to illustrate the time varying conditional variances of varied range of time series data, empirically. The stochastic autoregressive conditional heteroskedasticity (ARCH) process had introduced by Engel in 1982 (Engle, 1982). The generalized ARCH(p, q)

model, termed as GARCH (p, q) by Bollerslev (Bollerslev, 1986) consists both autoregressive (AR) and moving average (MA) process.

The AR model is a random process and explains the dependency behavior of current observation on its own previous values, whereas MA model is used to describe a time series process as a linear function of current and previous random errors. The autoregressive moving average process of order (p, q), ARMA (p, q), is the combined model for AR and MA components in a stationary time series (Brooks, 2008; Lima & McAleer, 1999; Madala, 1992).

An autoregressive integrated moving average (ARIMA) model is a generalization of an ARMA process and have become popular in empirical time series since the work of Box and Jenkins (1976) (Chu, 2008). The AR (p); MA (q); ARMA (p, q) and ARIMA (p, d, q) processes are mentioned in following equations (Chang, Sriboonchitta, & Wiboonpongse, 2009; Gil-Alana, 2005; Lima & McAleer, 1999; Wong, Song, & Wu, 2007). The AR (p) and MA (q) process are defined in equation (4) and (5) respectively.

$$Y_t = \alpha + \sum_{i=1}^{p} \varphi_i Y_{t-i} + \varepsilon_t \tag{4}$$

$$Y_t = \mu + \varepsilon_t + \sum_{j=1}^{q} \theta_j \varepsilon_{t-j} \tag{5}$$

and, the generalized ARMA (p, q) process can be written as,

$$(1 - \varphi_1 B - \cdots - \varphi_p B^p) Y_t = C + (1 - \theta_1 B - \cdots - \theta_q B^q)\varepsilon_t \; ; \; t = 1, \cdots, n \tag{6}$$

or, $$\left(1 - \sum_{i=1}^{p} \varphi_i B^i\right) Y_t = C + \left(1 - \sum_{i=1}^{q} \theta_i B^i\right)\varepsilon_t$$

$$C = (1 - \varphi_1 - \cdots - \varphi_p)\mu$$

Where, Y_t is number of tourist arrivals at time t ; μ denotes the mean of time series observation; φ_i is AR parameter $(i = 1, \cdots, p)$; θ_j is MA parameter $(j = 1, \cdots, q)$; B Backshift operator; and ε_t is white noise which is independently and identically distributed.

The simple form of conditional heteroskedastic model is proposed by Engel (1982) is represented as: $\varepsilon_t = v_t \sqrt{\alpha_0 + \alpha_1 \varepsilon_{t-1}^2}$. Where, v_t is white noise process; the conditional and unconditional means of $\varepsilon_t = 0$, $\alpha_0 > 0, \; 0 < \alpha_1 < 1$ and $\varepsilon_{t-1} \sim iid$ (Enders, 2008).

The conditional variance of the error terms is time varying and the residual series of selected models should follow the white noise process. The choice of the appropriate lag structure of the model can be determined by adopting Akaike and Schwarz information criteria, although it is very common to impose GARCH (1, 1) specification in advance (Coshall, 2009; Divinoa & McAleer, 2010). The stationary AR (1) – GARCH (1, 1) model for monthly tourist arrivals in Nepal or their transformed variables are represented as Y_t :

$$Y_t = \omega + \alpha Y_{t-1} + \varepsilon_t ; \qquad |\alpha| < 1 \tag{7}$$

for t = 1, …, n, where the risk or shock of international tourist arrivals are given by

$$\begin{aligned} \varepsilon_t &= v_t \sqrt{h_t} \qquad v_t \sim iid\ (0,1) \\ h_t &= \omega + \alpha\, \varepsilon^2_{t-i} + \beta h_{t-1} ; \end{aligned} \tag{8}$$

The conditional variance of ε_t is h_t and $h_t > 0$, is satisfied if $\omega > 0$; $\alpha \geq 0$ and $\beta \geq 0$ condition is fulfilled. The general form of (p, q) order GARCH process can be written as:

$$h_t = \omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{i=1}^{p} \beta_i h_{t-i} \tag{9}$$

The squared residual (ε^2_{t-i}) is the ARCH term and it is the news about volatility. The forecast variance (h_{t-i}) is the GARCH term of the model (QMS, 2007). "The ARCH (or α) effect indicates the short run persistence of the shock, while the GARCH (or β) effects indicates the contribution of the shock to the long run persistence that is $\alpha + \beta$ " (Divinoa & McAleer, 2010). It is possible to extend the AR process represented in equation (7) to univariate or multivariate ARMA (p,q) form and the GARCH process in equation (8) is a function of the unconditional shocks, the moments of ε_t need to be investigate (Ling & McAleer, 2003). The parameters of aforementioned models as in equation (7) and (8) can be estimated by adopting the maximum likelihood method to obtained quasi-maximum likelihood estimators (QMLE) in the absence of normality of standardized residuals, v_t (the conditional shock). However, QMLE is efficient only if v_t is normal (Divinoa & McAleer, 2010; Huang, Chen, Chang, & McAleer, 2009).

Ling and McAlleer (2003) established that the adaptive estimation method can be execute to get efficient estimators for univariate non stationary ARMA process with GARCH (p, q) when v_t is not normal (Ling & McAleer, 2003). Asymptotic normality and consistency of the QMLE is obtained under only the second moment condition of unconditional errors and the finite fourth-order moment of the conditional errors which can be extended for univariate ARCH and GARCH (Ling & McAleer, 2003). The well known necessary and sufficient condition for the existence of the second moment has been well established for

the general ARCH (q); GARCH (1,1); and GARCH (p, q) and the necessary and sufficient condition for the existence of the second moment of ε_t for GARCH (1, 1) is, $\alpha + \beta < 1$, for details see (Bollerslev, 1986; Ling & McAleer, 2002a; Ling & McAleer, 2002b).

\The asymmetric behavior of the time series is captured by the GJR-GARCH (1, 1) model postulated by Glosten et al. (1993) to depict the negative or positive shock (downward or upward movement) (Enders, 2008). The model is defined as:

$$h_t = \omega + (\alpha + \gamma(\delta_{t-1}))\,\varepsilon^2_{t-i} + \beta h_{t-1} \qquad (10)$$

Where, $\delta_{t-1} = 1$, if $\varepsilon^2_{t-i} < 0$, otherwise, 0. The asymmetric effect of the variable is captured by the coefficient γ and γ measures the contribution of shock to both short run $\{\alpha + \left(\frac{1}{2}\right)\gamma\}$ and long run $\{\alpha + \beta + \left(\frac{1}{2}\right)\gamma\}$ persistence respectively. If, $\alpha + \beta + \left(\frac{1}{2}\right)\gamma$ < 1, the regularity condition for the existence of second moment for GARCH-GJR (1, 1) is satisfied (Ling & McAleer, 2002a).

Conversely, the exponential GARCH or EGARCH model presented in equation (11) is suggested to capture the asymmetric effect in the data series. EGARCH is the logarithm of the conditional variance, which implies that no restrictions on the parameters (α, β and γ) are required to ensure $h_t > 0$ and it depends on lagged conditional shocks (or standardized residuals) (McAleer, Chan, & Marinova, 2007). The sufficient condition for consistency and asymptotically normality of QMLE of the EGARCH (1, 1) is established, if $|\beta| < 1$ (Divino J.A. & McAleer, 2010)

$$\text{Log}\, h_t = \omega + \alpha|v_{t-1}| + \gamma v_{t-1} + \beta \log h_{t-1} \qquad (11)$$

It was noted that GARCH and GJR models are dependent upon lagged unconditional shocks, while EGARCH depends upon lagged conditional shocks to the standardized residuals ($v_i(t-1)$) . Extensions of several of these results for asymmetric conditional volatility models are given in ref. (McAleer, Chan, & Marinova, 2007).

V. EMPIRICAL RESULTS

The yearly first difference and yearly logarithm difference variable of monthly international tourist arrivals are stationary and the null hypothesis of unit root is statistically rejected (Table 1 and 2) and permits us to apply univariate time series models. Therefore, various ARMA-GARCH models were adopted based on the information criteria (AIC and SIC), residual test (correlogram, Q statistics and ARCH LM test) after imposition of ARMA models. The estimated conditional mean and conditional volatility models with estimated parameters and their respective standard errors for monthly international tourist arrivals are presented in Table 3 and 4.

The estimates of lagged dependent variables in the equation (7), (8), (10) and (11) are supported by the empirical findings and most of the estimated coefficients are statistically significant. The GARCH term i.e. β for the GARCH (1, 1) estimates of logarithm of monthly international tourist arrivals is only significant at 10% level of significance. However, the same term is statistically significant for GJR and EGARCH model at 1% level of significance (Table 5.1). The second moment condition, $\alpha + \beta < 1$, and $\left\{\alpha + \beta + \left(\frac{1}{2}\right)\gamma < 1\right\}$ are also valid for both GARCH (1,1) and GARCH-GJR model with the value of 0.313 and 0.583 respectively. The EGARCH model is based on the standardized residuals. The regularity and asymptotic normality conditions for QMLE are satisfied if $|\beta| < 1$. Hence, the estimated coefficient $|\beta| = |0.568|$ is statistically consistent.

Table 3: Estimated models and parameters and their respective standard errors

Parameters	Logarithm of monthly international tourist arrivals		
	GARCH	GJR	EGARCH
Constant	10.144*	10.243*	10.236*
	(0.0404)	(0.0349)	(0.0321)
AR(3)	0.3504*	0.2715*	0.2741*
	(0.0530)	(0.0627)	(0.0535)
MA(1)	0.5634*	0.5619*	0.5549*
	(0.0396)	(0.0547)	(0.0400)
ω	0.0444	0.0262*	-0.9898**
	(0.0297)	(0.0115)	(0.4362)
GARCH/GJR α	-0.0788**	-0.1205*	-
	(0.0371)	(0.0338)	
GJR γ	-	0.1823*	-
		(0.0660)	
GARCH/GJR β	0.5614***	0.6979*	-
	(0.3305)	(0.1515)	
EGARCH α	-	-	-0.1105
			(0.0871)
EGARCH γ	-	-	-0.1912*
			(0.0716)
EGARCH β	-	-	-0.5680*
			(0.1744)
Diagnostic test			
Second moment	0.313	0.583	-
LM(1):nR^2[Prob.]	0.314[0.575]	0.050[0.822]	0.312[0.576]
LM(2) nR^2[Prob.]	2.638[0.267]	2.877[0.237]	2.709[0.258]

Note: *, ** and *** denotes the estimated coefficients are statistically significant at the 1%; 5% and 10% level of significance respectively. Figures in parenthesis are standard errors and figures in bracket are probabilities.

Table 4: Estimated models and parameters and their respective standard errors with diagnostic test statistics

Parameters	Yearly difference of monthly tourist arrivals			Yearly log difference of monthly tourist arrivals		
	GARCH	GJR	EGARCH	GARCH	GJR	EGARCH
Constant	1722.4*	1688.29*	1210.15*	0.0689*	0.0704*	0.0678*
	(415.50)	(413.78)	(415.74)	(0.0175)	(0.0174)	(0.0175)
AR(3)	0.2697*	0.2660*	0.2943*	0.2284*	0.2212*	0.2395*
	(0.0679)	(0.0670)	(0.0713)	(0.0659)	(0.0631)	(0.0622)
MA(1)	0.3850*	0.3824*	0.4261*	0.3783*	0.3925*	0.3958*
	(0.0674)	(0.0673)	(0.0574)	(0.0785)	(0.0730)	(0.0704)
ω	2878820*	3010741*	0.0631	0.0100*	0.0095*	-1.3531*
	(1057788)	(1113953)	(0.1470)	(0.0037)	(0.0031)	(0.4634)
GARCH/GJR α	0.3192*	0.2876*	-	0.2245*	0.0389	-
	(0.0895)	(0.0957)		(0.0792)	(0.0492)	
GJR γ	-	0.0845	-	-	0.2824*	-
		(0.1132)			(0.1073)	
GARCH/GJR β	0.5679*	0.5519*	-	0.4397*	0.4762*	-
	(0.1087)	(0.1129)		(0.1628)	(0.1435)	
EGARCH α	-	-	0.1220**		-	0.2561*
			(0.0509)			(0.095)
EGARCH γ	-	-	0.0080		-	-0.1799*
			(0.0258)			(0.0547)
EGARCH β	-	-	0.9908*		-	0.6822*
			(0.0098)			(0.1170)
Diagnostic test						
Second moment	0.887	0.882	-	0.664	0.627	-
LM(1):nR^2[Prob.]	0.719[0.718]	0.700[0.699]	0.109[0.108]	0.360[0.548]	0.195[0.659]	0.093[0.759]
LM(2) nR^2[Prob.]	0.941[0.940]	0.943[0.943]	0.1061[0.105]	0.695[0.70]	0.289[0.865]	0.416[0.812]
Jarque-Bera [Prob.]	20.75 [0.000]	18.23 [0.000]	24.887 [0.000]	139.79 [0.000]	105.97[0.000]	94.92[0.000]

Note: *, ** and *** denotes the estimated coefficients are statistically significant at the 1%, 5% and 10% level of significance respectively. Figures in parenthesis are standard errors and figures in bracket are probabilities.

Similarly, the estimated parameters of conditional mean and conditional volatility models for yearly first difference and yearly logarithm difference of the monthly international tourist arrivals are also statistically significant (Table 5.2). The GARCH (1, 1) estimates for both dependent variables (i.e. $\Delta_{12} y_t$ and $\log \Delta_{12} y_t$) of monthly international tourist arrivals in Nepal reveals that the short run persistence of shock or risk are 0.391 and 0.224, while the long run persistent of the risk i.e. $\alpha + \beta$, are 0.887 and 0.664 respectively and statistically significant at 1% level of significance. The second moment condition is also satisfied. Therefore, estimated QMLE are asymptotically normal.

Additionally, the GARCH-GJR (1, 1) estimates demonstrate the asymmetry behavior of the positive or negative shocks of the monthly international tourist arrivals. The estimated coefficients are positive for GJR (1, 1). This results revels that there is more positive shock than negative shock in monthly international tourist arrivals in Nepal over the time and estimated parameter i.e. γ is not statistically significant for yearly first differenced variable. However, the γ is statistically significant for the variables $log y_t$ and $\log \Delta_{12} y_t$ at 5% and 1% level of the significance respectively. The regularity and asymptotic normality condition for consistent estimators of QMLE, i.e. $\left\{\alpha + \beta + \left(\frac{1}{2}\right)\gamma < 1\right\}$, is also satisfied.

As we know, the EGARCH (1, 1) is treated as the logarithm of the volatility and the coefficient, α represent the magnitude (size effect), which is positive and statistically significant at 5% level of significance for yearly first difference and yearly log difference of monthly international tourist arrivals in Nepal. The coefficient γ is negative and statistically significant at 1% level of significance for logarithm and yearly log difference variables, while γ is not satisfied for yearly first differenced variables. The coefficient of the lagged dependent variable $|\beta|$ is estimated to be 0.568, 0.990, and 0.682 for logarithm, yearly first difference and yearly logarithm difference variables respectively and coefficient are statistically significant, which suggests that the statistical properties of the QMLE for EGARCH (1, 1) will be consistent and asymptotically normal.

VI. CONCLUSION

The natural heavenly landscape and biodiversity, the Mount Everest and high Himalayas, incomparable cultural heritage and other numerous peculiarities have made Nepal a potential tourist destination of the world. Explicitly, the country is also considered as a trekker's paradise throughout the world. However, the pace for tourism development is still lagging behind as compared to other destinations of the world. The number of the international tourist arrivals in Nepal had been increased sharply by more than 13 folds during last forty years (45,970 in 1970 to 6,02,855 in 2010). The big shock in the annual growth rate of international tourist arrivals was experienced in 2001 and 2002 and the growth rate was dramatically fall down by 22.1 percent and 23.7 percent respectively. This could be because of the security as well as other adverse situation in the country. The overall average annual growth of international tourist arrivals in the country over the

last 40 years is about 6.65 percent per annum. The annual mean contribution of foreign receipt from tourism industry as a percentage of GDP was 2.67 percent during the last 35 years. The tourism sector provides a potential room to earn the foreign receipts and poverty reduction by creating employment opportunities. However, the tourism sector has not established as an important economic activity of the Nepalese economy, yet. The potential negative impacts of the international tourism needs to be investigated to administer future tourism demand appropriately. Therefore, it is necessary to model tourism growth over time and volatility of the arrivals to manage tourism industry as a business and for policy improvement.

Empirically, the long run risk or volatility of international tourist arrivals is persistence in the Nepalese tourism industry based on the modeled symmetric and asymmetric conditional volatility models (GARCH, GJR and EGARCH) with exogenous ARMA (3, 1) terms. The estimated coefficients are statistically significant and the second moment condition for GARCH (1, 1) and GJR (1, 1) and $|\beta| < 1$ in case of EGARCH (1, 1) are satisfied for asymptotic normality of QMLE. Therefore, the volatility can be inferred as risk or uncertainty associated with international tourist arrivals in Nepalese tourism industry. These empirical results envisage sufficient room for intervening or amending the tourism policy to address the problems associated with Nepalese tourism industry and to harness the essence of tourism benefit by promoting tourism as a sustainable business.

Further research on volatility by using daily data and extension of modeling considering spatial destination could be an important attempt for policy implications. The quantitative analysis of tourism demand in the Nepalese tourism industry including volatility modeling could be beneficial to translate the tourism policy in its real meaning.

REFERENCES

Adams, V. 1992. "Tourism and Sherpas, Nepal : Reconstruction of Reciprocity." *Annals of Tourism Research,* 19 (3): 534-554.

Arezki, R., Cherif, R., & Piotrowski, a. J. 2009. "Tourism Specialization and Economic Development: Evidence from the UNESCO World Heritage List." *IMF working Paper*, WP/09/167: 1-22

Bartolomé, A., McAleer, M., Ramos, V., & Rey-Maquieira, J. 2009. "A risk map of international tourist regions in Spain." *Mathematics and Computers in Simulation* 79 (9) : 2741–2758.

Bhattarai, K., Conway, D., & Shrestha, N. 2005. "Tourisim, Terrorism and Turmoil in Nepal." *Annals of Tourism Research 32* (3): 669–688.

Bjønness, I.-M. 1983. "External Economic Dependency and Changing Human Adjustment to Marginal Environment in the High Himalaya, Nepal." *Mountain Research and Development* 3 (3) : 263-272.

Bollerslev, T. 1986. "Generalised Autoregressive Conditional Heteroscedasticity." *Journal of Econometrics* 31 (3): 307-327.

Brooks, C. 2008. Introductory Econometrics for Finance. New York: Cambridge University Press.

Brown, K., Turner, R. K., Hameed, H., & Bateman, I. 1997. "Environmental Carrying Capacity and Tourism Development in the Maldives and Nepal." *Environmental Conservation* 24 (3) : 316-325.

Byers, A. 1987. "An Assessment of Landscape change in the Khumbu Region of Nepal Using Repeat Photography." *Mountain Research and Development* 7 (1) : 77-81.

Chang, C.-L., Sriboonchitta, S., & Wiboonpongse, A. 2009. "Modelling and Forecasting Tourism from East Asia to Thailand under Temporal and Spatial Aggregation." *Mathematics and Computers in Simulation* 79 (5) :1730–1744.

Cho, V. 2003. "A Comparison of Three Different Approaches to Tourist Arrival Forecasting." *Tourism Managemen* 24 (3): 323–330.

Chu, F.-L. 2008. "Analyzing and Forecasting Tourism Demand with ARAR Algorithm." *Tourism Management* 29 (6) : 1185– 1196.

Coshall, J. T. 2009. "Combining Volatility and Smoothing Forecasts of UK Demand for International Tourism." *Tourism Management* 30 (4) : 495–511.

Dahal, B. 2009. Adventure All the Way, Friday Suppliment . Kathmandu Nepal: Gorkhapatra Daily:http://www.gorkhapatra.org.np/detail.gopa.php? article_id=9891&cat_id=10.

Divinoa, J. A., & McAleer, M. 2010. "Modelling and Forecasting Daily International Mass Tourism to Peru." *Tourism Management* 31 (6) : 846-854 .

Enders, W. 2008. Applied Econometrics Time Series (Second Edition). U.K: Wiley and Sons Inc.

Enders, W., & Granger, C. 1998. "Unit-root Test and Asymmetric Adjustment with an Example using the Term Structure of Interest Rates." *Journal of Business and Economic Statistics* 16 (3) : 304-311.

Engle, R. F. 1982. "Autoregressive Conditional Heteroskedasticity with Estimates of the Varience of United Kingdom Inflation." *Econometrica* 50 (4) : 987-1007.

Gil-Alana, L. 2005. "Modelling International Monthly Arrivals using Seasonal Univariate Long-memory Processes." *Tourism Management* 26 (6) : 867–878.

Hepburn, S. J. 2002. "Touristic Forms of Life in Nepal." *Annals of Tourism Research* 29 (3): 611–630.

Himalaya. (2008, December 15). Boris Lissanevitch – Pioneer of Nepalese Tourism Industry. Retrieved November 5, 2010, from Explore Himalaya: http://www.explorehimalaya. com/blog/boris-lissanevitch-pioneer-nepalese-tourism-industry/ 05 Nov 2009

Huang, B.-W., Chen, M.-G., Chang, C.-L., & McAleer, M. 2009. "Modelling Risk in Agricultural Finance: Application to the Poultry Industry in Taiwan." *Mathematics and Computers in Simulation 79* (5) : 1472-1487.

Lim, C., & Michael McAleer, J. C. 2009. "ARMAX Modelling of International Tourism Demand." *Mathematics and Computers in Simulation* 79 (9) : 2879–2888.

Lim, C., & McAleer, M. 1999. "A Seasonal Analysis of Malaysian Tourist Arrivals to Australia." *Mathematics and Computers in Simulation* 48 (4-6) : 573-583.

Ling, S. & McAleer, M. 2003. "Asymptotic Theory for a Vector ARMA–GARCH Model." *Econometric Theory* 19 (02): 278–308.

Ling, S., & McAleer, M. 2002b. "Necessary and Sufficient Moment Conditions for the GARCH (p,q) and Asymmetric Power GARCH (p, q) Models." *Econometric Theory* 18(03):722-729.

Ling, S., & McAleer, M. 2002a. "Stationarity and the Existence of Moments of a Family of GARCH Processes." *Journal of Econometrics* 106(1) : 109–117.

Maddala, G. 1992. Introduction to Econometrics (Vol. II edition). New York: Macmilian Publishing Company.

McAleer b, M., Chan, F., & Marinova, D. 2007. "An Econometric Analysis of Asymmetric Volatility: Theory and Application to Patents." *Journal of Econometrics* 139 (2): 259-284.

McAleer M. and Lim C. 2000. A Seasonal Analysis of Asian Tourists Arrivals to Australia. *Applied Economics* 32 (4) : 499–509.

MOF. 2001. Economic Survey. Kathmandu: Government of Nepal, Ministry of Finance (MOF); Shinga Durbar, Nepal

MOF. 2009. Economic Survey. Kathmandu: Government of Nepal, Ministry of Finance, Shingha Durbar, Nepal

Nepal, S. K. 2007. "Tourism and Rural Settlements Nepal's Annapurna Region." *Annals of Tourism Research* 34 (4) : 855–875.

Nepal, S. K. 2000. "Tourism in Protected Areas: the Nepalese Himalaya." *Annals of Tourism Research* 27 (3): 661-681.

Nepal, S. K. 2008. "Tourism-induced Rural Energy Consumption in the Annapurna Region of Nepal." *Tourism Management* 29 (1) : 89–100.

NTB. 2009. Nepal Tourism Year 2011. Kathmandu: Secretariate of Nepal Tourism Year 2011, Nepal Tourism Board, Tourism Service Centre.

Nyaupanea, G. P., Moraisb, D. B., & Dowlerc, L. 2006. "The Role of Community Involvement and Number/type of Visitors on Tourism Impacts: A Controlled Comparison of Annapurna, Nepaland Northwest Yunnan, China." *Tourism Management* 27 (6) : 1373–1385.

Pagdin, C. 1995. Assessing Tourism Impacts in the Third World:a Nepal Case Study. *Progress in Planning, Elsevier Science Ltd* , 44; No 3, pp.185-266.

Pandey, R. N., Chettri, P., Kunwar, R. R., & Ghimire, G. 1995. The Effects of Tourism on Culture and The Environment Nepal. Bangkok: UNESCO Principal Regional Office for Asia and the Pacific, Thailand.

Paudyal, S. 2003. "Applicability of Smeral's Model in Explaining Tourism Share of Member States in SAARC Region." *Economic Review: Occasional Paper* 15: 58-69.

QMS. 2007. User's Guide Eviews 6. Irvine, CA 92612-2621, USA.

Seddighi, H., & Theocharous, A. 2002. "A Model of Tourism Destination Choice: A Theoretical and Empirical Analysis." *Tourism Management* 23 (5) : 475-487.

Shackley, M. 1994. "The Land of Lo, Nepal/Tibet : The First Eight Months of Tourism." *Tourism Management* 15 (1) : 17-26.

Stanley, F. S. 1993. "Tourism, Change and Continutity in the Mount Everest Region, Nepal." *The Geographical Review* 83 (4) : 410-427.

UNWTO. (2009a). Historical Perspective of World Tourism. World Tourism Organization (UNWTO)) Retrieved November 23, 2009, from http://www.unwto.org/facts/eng/historical.htm

UNWTO. (2009b). 2009 Tourism Forcast Marked by Uncertainty. *7* (1).

Wells, M. P. 1993. "Neglect of Biological Riches: The Economics of Nature Tourism in Nepal." *Biodiversity and Consevation* 2 (4) : 445-464.

Werner, C. 2003. "The New Silk Road: Mediators and Tourism Development in Central Asia." *Ethnology* 42 (2) : 141-159.

Wikipedia. 2010. Autoregressive Moving Average Model. (Wikipedia:The free encyclopedia) Retrieved 01 20, 2010, from Wikipedia:The free encyclopedia: http://en.wikipedia.org/wiki/Autoregressive_moving_average_model

Wong, K. K., Song, H., & Wu, S. F. 2007. "Tourism Forecasting: To Combine or not to Combine?" *Tourism Management* 28(4): 1068–1078.

Yang, C.-H., Lin, H.-L., & Han, C.-C. 2010. "Analysis of International Tourist Arrivals in China: The Role ofWorld Heritage Sites." *Tourism Management* 31 (6) : 827–837.

Zurick, D. 1992. "Adventure Travel and Sustainable Tourism in the Peripheral Economy of Nepal." *Annals of the Association of American Geographers* 82(4) : 608–28.

Appendix 1 : Tables

Table 1: Number of International Tourist Arrivals in Nepal*

S.N.	Nationality	Year		Change (%)	Share in 2010 out of total (%)
		2009	2010		
1	Australia and Territories	17,900	19,716	10.15	3.27
2	European	96,009	111,309	15.94	18.46
3	U.S.A and Canada	41,008	47,387	15.56	7.86
4	U.K	35,382	35,539	0.44	5.90
5	SARC (except India)	55,713	71,239	27.87	11.82
6	India	93,884	116,321	23.90	19.30
7	Other Asian	120,934	137,537	13.73	22.81
8	Others	49,126	63,807	29.88	10.58
	Total	509,956	602,855	18.22	100.00

* Table summarized by Author and data source: (MTCA, 2010)

Table 2: Foreign exchange earnings from tourism

Year	Value of foreign exchange earnings from Tourism (NRs. Billion)*	Percent of merchandise value exports	Percent of value of exports of goods and non-factor services	Percent of foreign exchange earnings
2004/05	10.464	17.5	12.2	6.1
2005/06	95.56	15.5	10.9	4.6
2006/07	10.125	16.1	10.7	4.5
2007/08	18.653	30.1	17.9	6.7
2008/09	27.960	40.0	22.8	6.5
2009/10**	16.767	40.0	23.1	6.0

* Currency exchange: 1US $= Approx. NRs. 71- 72.00 and

** First eight months figure of FY 2009/10, Data Source: Economic Survey (MOF, 2009/10)

Table 3: Summary statistics of monthly international tourist arrivals in Nepal

S.N.	Name of Statistics	Statistics
1	Mean	28876.60
2	Median	27263.00
3	Maximum	79186.00
4	Minimum	7901.00
5	Std. Dev	12441.44
6	Skewness	0.943
7	Kurtosis	4.153
8	Jarque-Bera	70.92
9	Probability	0.000
10	Observations	348

Appendix 2: Figures

Figure 1: Total value of foreign exchange earnings from tourism industry as a percent of GDP in between 1975/76 and 2009/10.

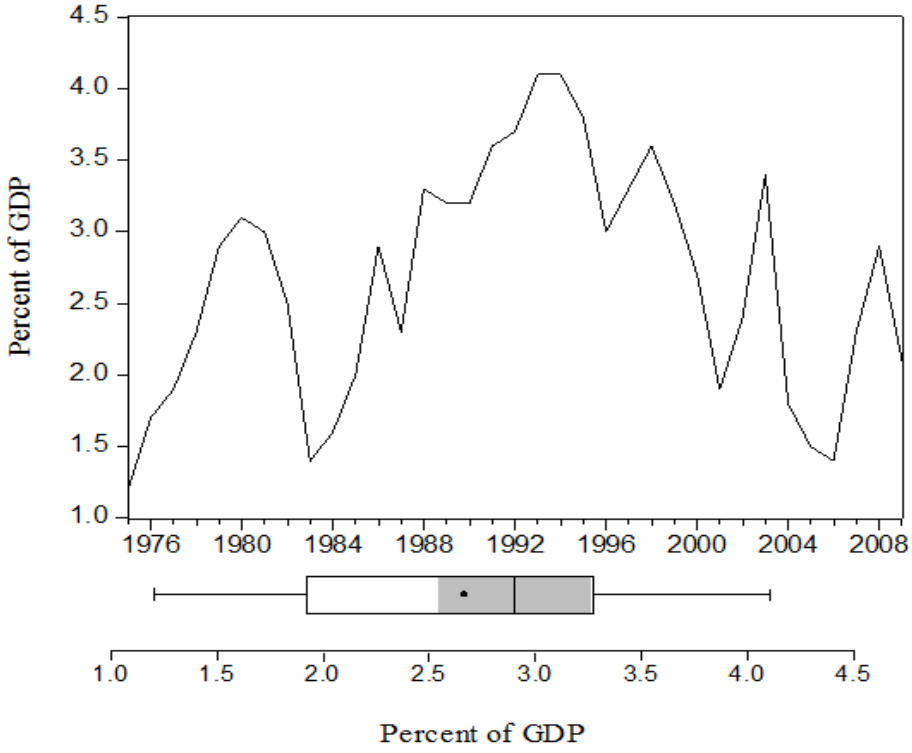


Figure 2: Monthly international tourist arrivals in Nepal (A. Raw data and B. natural logarithm) in between Jan. 1982 and Dec. 2010

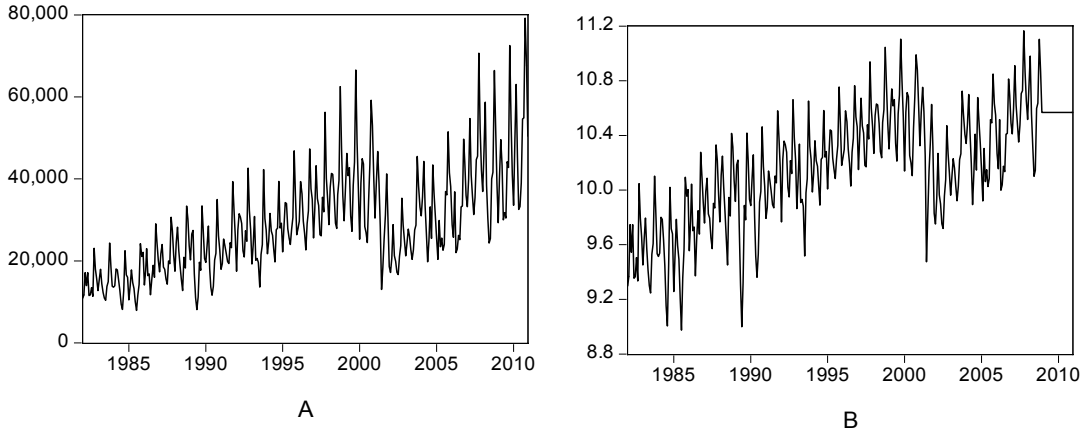


Figure 3: Yearly first difference monthly international tourist arrivals (A) and log difference (B)

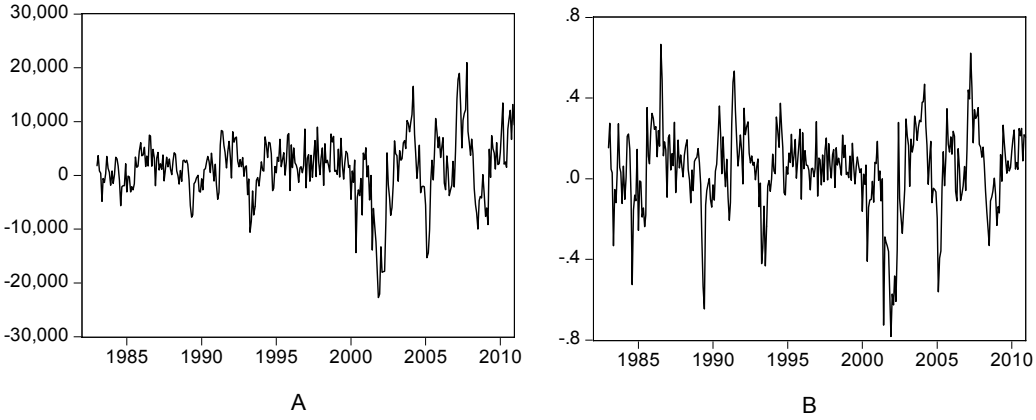


Figure 4: Volatilities of international tourist arrivals (A. yearly difference of monthly arrivals and B. yearly logarithm difference)

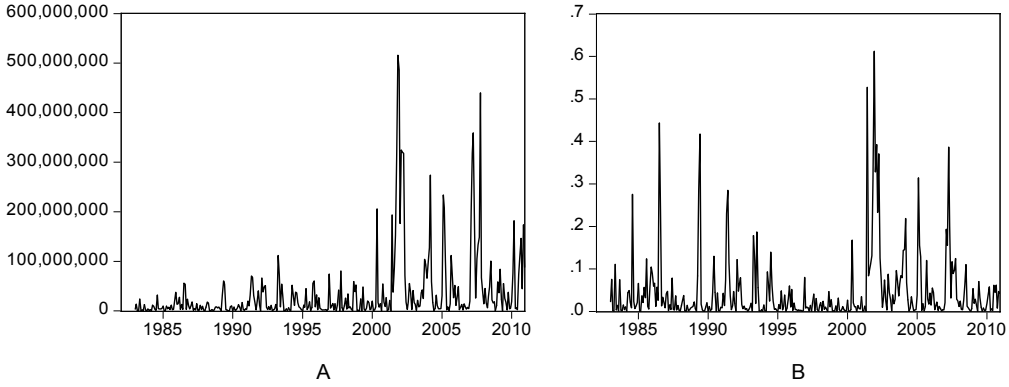
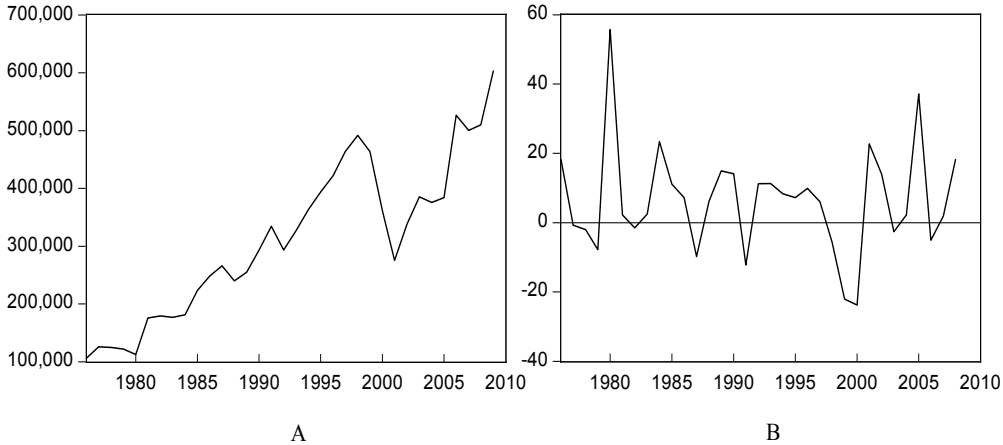


Figure 5: Yearly international tourist arrivals (A) and annual growth rates in percent (B)



Does Tourism Really Matter for Economic Growth? Evidence from Nepal

Shoorabeer Paudyal, Ph.D.*

Abstract

Tourism seems to be widely recognized as the one among a few sectors in Nepal which can be an engine of economic growth. However, there are few empirical studies about Nepalese tourism. This paper, thus, attempts to examine the impact of tourism and other related macroeconomic variables on the economic growth of Nepal by deriving tourism income multiplier from the Keynesian macroeconomic model. The three stage least square and seemingly unrelated regressions are the techniques employed for estimating the value of multiplier. The estimated value of multiplier based on regression results over thirty six year period from 1975 to 2010 is estimated at 1.21. In addition, Granger causality tests are used to confirm the direction of the impact of one variable on another variable, which reveals that there exists bi-directional impact in the case of tourism receipts and GDP. In addition, tourism receipts are found to have bi-directional relationship with some other variables such as GNI, exports, private consumption, imports and so on. Thus, tourism multiplier and the Granger causality tests show that tourism is important component for economic growth in Nepal.

JEL Classification: C13, L83, O47

Key words: Tourism receipts, tourism income multiplier, three stage least square

I. INTRODUCTION

Tourism is one of the biggest industries in the world which seems to have played a vital role in the process of the economic development of the several countries. Evidence from the past studies for other countries revealed that tourism can contribute to the economic growth and development of a country if it is properly planned and managed. Its contribution to the structural change of the economy from traditional farming to service is thus widely recognized. Tourism's help on solving the adverse balance of payments is a recent one. It is imperative that benefits are generated from tourism but its social and environmental costs including opportunity costs are also high on the other side. So, there has been growing awareness toward reducing the social costs accruing from tourism so that social benefits outweigh the social costs. It is understandable that travelling by a non-resident does not in itself result in benefits to local economies. It is the purchase of goods and services by the visitors which provide benefits to the local economy. Therefore, the use and supply of local commodities with good quality and hygiene in catering tourists is always more desirable

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than the supply of imported goods. The supply of locally produced goods has backward and forward linkages to other sectors of the economy that generate more income and employment, both direct and indirect. Tourists purchase transport services such as those from taxis, buses, railways, and aeroplanes and other transport services, and pay for entertainments, amenities such as hotels, resorts, bars and restaurants, sales of handicrafts and souvenirs, and so on. These expenditures by tourists become, at least in part, the incomes of local people leading to an increase in their incomes. English views, thus, that one person's enjoyment becomes the livelihood for others (English, 1986). This increase in income will make an upward shift in the demand curve of local people for goods such as food and clothing, because of the high income elasticity of demand for goods in a poor society such as Nepalese.

Nepal with its enormous potentiality for the tourism development has been effortful to develop the tourism sector. In this context, the government of Nepal itself invested for the tourism infrastructure development and institutional buildings and encouraged private sector to invest in this sector by ways of various policy intervention. Tourism not only contributes to the economic growth through multiplier effects but also supplies the foreign currency required for major investment, which is used to import much needed modern technology, machines/equipments and management/skills. The government, thus, has taken initiation and a lead role in investing in the development of tourism facilities and infrastructures which can be used by the other sectors of the economy. Government of Nepal has also received foreign aid from the Asian Development Bank for the up-gradation of Tribhuvan international airport and other tourism facilities and infrastructures. The high requirements of capital for the development of tourism infrastructures/facilities force the government in the destination to seek foreign capital. Some of the standard hotels and tourist enterprises are run by foreigners under foreign direct private investment. There are altogether 96 joint venture tourism enterprises currently operating in Nepal with Rs 6637.90 million project costs by mid April, 2009(FNICC, 2009: 61) and additional 113 tourism projects are under construction.

Constrained by underdevelopment of infrastructures, unskilled labour, traditional technology, energy shortage and small size of domestic market, Nepal's industrial products always lacked competitiveness in the international markets. For this reason, only a few entrepreneurs ventured manufacturing products and alternatively, unlike in other developing countries, a fair amount of private capital has been invested since the beginning. Bank and financial institutions have also been forced to invest in tourism by the lack of other big projects from the manufacturing, infrastructure and other sectors. Nepal Industrial Development Corporation (NIDC) had advanced a huge amount of long term loan (Rs 445.88 million in 2007) to the hotel sector from the very beginning, followed by short term loans by Nepal Bank Ltd and Nepal Rastria Banijya Bank.

Recently "Nepal Visit Year 2011" was observed as a joint initiation of the government and private sector. Tourism today in Nepal is widely viewed as one among the few that have greater development potentialities. In this backdrop, this paper aims to examine the relationship between tourism and economic growth in Nepal.

II. TOURISM RECEIPTS

Tourism receipts[1] today are viewed as major contributor in maintaining the balance of payments in developing countries such as Nepal. Tourism receipts in any country, primarily depends on its demand in the world tourism market. The demand for Nepalese tourism is governed by words of mouth, income, own price, and cross price variables in the long run, and words of mouth and instabilities in the short run (Paudyal, 1993, 2012). Tourism receipts not only one of the earners of foreign exchanges but also the contributor to the government exchequer. Tourism thus can have a major effect on a country's balance of payments, especially in a country like Nepal.

Tourism, thus, had increasingly contributed in the past to the foreign exchange earnings in Nepal, and thereby made substantial contribution to correct the adverse balance of payments. However, it has taken a different course in later years and the tourism contribution to total foreign exchange earnings in terms of percentage share in 2009/10 is still at the level of 2000/01. As a consequence, the tourism contribution to balance of payments via total foreign exchange earnings did not increase in the later years despite continued increments in tourism receipts. Nepal's huge trade deficit with India and overseas countries can be corrected by attracting more visitors and thereby make the overall balance of payments more favourable.

Table 1: Changing pattern of major contributors to foreign exchange earning
(in Rs 10 millions)

Fiscal years	Tourism receipts	Worker's remittance	Exports	Foreign exchange (forex)	Tourism receipts as a % forex	Workers' remittance as a % of forex	Exports as a % of forex
2000/01	1171.7	4721.61	6978.85	16663.80	7.03	28.33	41.88
2001/02	865.43	4753.63	5798.35	15164.90	5.71	31.35	38.24
2002/03	1174.77	5420.33	5076.07	15504.50	7.58	34.96	32.74
2003/04	1814.74	5858.76	5522.83	17900.60	10.14	32.73	30.85
2004/05	1046.38	6554.12	5995.61	18726.80	5.59	35.00	32.02
2005/06	955.58	9768.85	6148.24	21881.40	4.37	44.64	28.10
2006/07	1012.53	10014.48	6148.84	22676.40	4.47	44.16	27.12
2007/08	1865.31	14268.27	6197.11	28967.00	6.44	49.26	21.39
2008/09	2795.98	20969.85	6990.68	38019.80	7.35	55.16	18.39
2009/10	2813.86	23172.53	6317.75	40206.90	7.00	57.63	15.71

Source: HMG/N, Economic Survey, fiscal year 2010

[1] Tourism receipts are expenditures by international inbound visitors, including payments to national carriers for international transport.

Table 1 shows the changing pattern of major contributors of foreign exchange earnings. Workers' remittances (58%), merchandise exports (16%) and tourism receipts(7%) are the major sources of the foreign exchange earnings in the country which together made about 81% of total foreign exchange earnings in 2009/10. Tourism's contribution to the total foreign exchange earnings has remained almost at the same level in 2009/10 compared to 2000/01. But it is highly fluctuating over the years between the two points of time mentioned. Its share of foreign exchange shot up to 10% in 2003/04 but fell to 4% by 2005/06, which, compared to that of 1980/81-1984/85 (28.6%), was a big fall. However, some improvements in the percentage share of tourism receipts in foreign exchange earnings were witnessed in 2007/08, 2008/09 and 2009/10 (6.4%, 7.4% and 7.0% respectively), and as a consequence, the average share of tourism receipts for 2005/06-2009/10 came to 6.1% . However, tourism maintained third place after workers' remittances and merchandised exports over the period.

Table 2: Share of tourism receipts in foreign exchange earnings

Year	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Current account balance	1816	1161	1460	1154	1422	-90	2368	4144	-2814
Trade balance	-7029	-7768	-8576	-11006	-12895	-15599	-20932	-30352	-20297
Exports	5798	5076	5523	5996	6148	6149	6197	6991	6318
Service net	394	705	907	-203	-682	-838	-1109	-1048	-1639
Service receipts	2351	2652	3432	2600	2647	3208	4224	5283	5112
Tourist expenditures	865	1175	1815	1046	956	1013	1865	2796	2814
Merchandise exports and services	8149	7728	8954	8596	8795	9357	10421	12274	11430
Balance of goods & services	-4942	-6324	-6861	-8780	-11688	-13733	-16708	-21980	-31990
Tourist expenditure/exports	15	23	33	17	16	16	30	40	45
Tourist expenditure/services	37	44	53	40	36	32	44	53	55
Tourist expenditure /goods + services	11	15	20	12	11	11	18	23	25
Tourist expenditure /trade balance	-12	-15	-21	-10	-7	-6	-9	-9	-14

Source: Author's calculation from MOF, GoN, Economic Survey, FY 2010/11, vol. II.

Table 2 presents that tourism is important in the current account in the balance of payments of the country since it contributed 45% of the merchandise exports, 55% of the service exports and 25% of the goods and service exports. So tourism so far one of the major contributors of the foreign exchange earnings in the country. It is interesting that tourism receipts comprises over the half of the service exports in the balance of payments of the country. Tourism expenditures are used for financing trade deficit in several countries including Nepal. The widening gap between exports and imports has been bridged by the tourism expenditures and remittances in the country. The tourist expenditure or receipts as a ratio of trade deficit accounted for 14% in 2009/10 for Nepal, which accounted for 40% in

1980 for Thailand (Harrison, 2001:196). So tourism receipts can contribute to various areas of an economy.

III. DATA USED AND METHODOLOGY

This paper used the time series data, from 1975 to 2010, for the quantitative analysis extracted from the Economic Survey, 2011 published by the government of Nepal. The following macro variables of the Nepalese economy are used for the regression analysis: gross national incomes, private consumption, private investment, total imports, total exports, government expenditure, direct taxes and tourism receipts.[2]

Tourism multiplier is an important tool to measure impact of tourism. Input-output framework is widely used for calculation of tourism multiplier. It is not possible here to go for such a broad based input output framework and thus, we attempted to calculate the value of the multiplier with the help of the Keynesian macroeconomic model. Various formulae to estimate the multiplier are used by the writers; a popular one of these is as follows:

Tm = (1-TPI) ⁄(MPS + MPI), where Tm=tourism multiplier, TPI = marginal propensity to imports for touristic goods, MPS=marginal propensity to save and MPI = marginal propensity to import. The tourism multiplier can be derived from the popular Keynesian model of income and employment as follows:

$$C = c_0 + c_1 Yd + € \quad \text{(i)}$$

$$I = i_0 + i_1 Y + € \quad \text{(ii)}$$

$$M = m_0 + m_1 Y + € \quad \text{(iii)}$$

$$T = t_0 + t_1 Y + € \quad \text{(iv)}$$

$$Yd = Y - T \quad \text{(v)}$$

$$Y = C + I + G + X + R_t - M \quad \text{(vi)}$$

Where C = consumption, I = investment, M= imports, X = exports, Yd = disposable income, T=taxes, Rt = tourism receipts. In these equations C, I, M, T are the endogenous variables and G, X and Rt are exogenous variables. Equations (v) and (vi) are identities defined by economic theory. Eq. (i) shows that consumption (C) is the function of marginal propensity to consume (c_1) and disposable income (Yd) whereas Eq. (ii) that is, investment function says investment (I) depends on marginal propensity to invest (i_1) and income (Y). Likewise, Eq. (iii) represents that imports (M) are the function of the marginal propensity to import

[2] As time series of macroeconomic variables were used in this paper for the analysis, unit root tests were carried out. Almost all series were found to be non-stationary at level and found to be stationary at first difference. The regression results passed all tests such as normality, Wald coefficient tests and so on in the majority cases.

(m1) and income (Y). Eq (iv) shows that taxes (T) depend on income(Y) and tax rate (t_1) where c_0, i_0, m_0 and t_0 are autonomous components of consumption, investment, imports and taxes respectively. €s is the error terms in the equations. In the system of equations, C, I, M and T are endogenous variables and G, X and Rt are the exogenous variables. Substitution from equation (i) to (vi) gives the following equation:

$$Y = \frac{A_0 + G + X + Rt + \varepsilon}{1 - c_1(1 - t_1) - i_1 + m_1} \qquad \text{(vii)}$$

Now, one can derive the tourism multiplier as follows:

$$\frac{\partial Y}{\partial \mathrm{Rt}} = \frac{1}{1 - c_1(1 - t_1) - i_1 + m_1} = \frac{1}{1 - c_1 + c_1 t_1 - i_1 + m_1}$$

The marginal propensities of consumption, investment, import and tax are defined as following:

$MPC = \delta C/\delta Y = c_1$ $\quad MPI = \delta I/\delta Y = i_1$ $\quad MPM = \delta M/\delta Y = m_1$
and $MPT = \delta T/\delta Y = t_1$

Marginal propensities can be calculated by the regression analysis of (i) to (iv).
Given the above Keynesian model, we used the technique of Three Stage Least Square Method[3] and Seemingly Unrelated Regression[4] for estimating tourism income multiplier for Nepal. Another common method widely used by the researchers for the impact analysis is the Granger causality test. We also used this technique for the analysis of the impact of tourism to the Nepalese economy in conjunction with multiplier.

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3 Three stage least square is a combination of two stage least squares and seemingly unrelated regression. It provides consistent estimates for linear regression models with explanatory variables correlated with the error term. It also extends ordinary least squares analysis to estimate system of linear equations with correlated error terms.

4 In a system of equations which consist of a set of endogenous variables considered as a group, error terms of two or more equations are correlated; in such case more efficient estimates can be obtained using seemingly unrelated method and other more sophisticated estimation techniques. (Zellner, 1062: 348-368; Ramanathan,1989:498; Chow, 1983:81, and Pinydick, 1991:298-308). SUR is appropriate when all the right-hand side regressors are assumed to be exogenous, and the errors are heteroskedastic and contemporaneously correlated.(Eviews5:699)

IV. CONCEPT OF TOURISM MULTIPLIER

As foresaid, tourism demand for goods and services can have much implication in a country such as Nepal. In the case of Nepal and other least developed countries, the increase in demand is satisfied by importing goods and services from abroad, benefitting local economy to a lesser degree. A big chunk of earnings from tourism are remitted abroad for importing goods. In such cases, net earnings of foreign currency may be very small compared to gross earnings. It is always desirable that an increase in demand for goods and services by tourists is met by domestic goods as far as possible. The larger the use of domestic goods in catering to the tourists, the greater is the contribution to the economy since it helps to retain the foreign exchange earnings in the economy. The supply of goods and services through imports from abroad is a leakage in the process of generating income. The higher the leakage such as imports the lower is the size of the multiplier and so obviously the process of increasing income becomes weaker. However, there is always value added in the import goods but they do not have the strong backward and forward linkages which are considered to be fundamental for making a greater contribution of tourism to the local economy.

The experience of Europe, North America and Japan indicates that tourism and economic developments are closely linked (Harrison, 2001:33). Tourism contributes to the growth of GDP and helps earn foreign exchange, both of which are directly or indirectly linked to employment generation, balance of payments, and poverty alleviation in the country. Tourism is further beneficial since it is regarded as smokeless labour intensive in nature. It is largely concerned with small and medium enterprises which are suitable for a small country like ours and forms the basis for the development of a market economy. It does not require a special type of infrastructure but utilizes the same infrastructure which is common to other sectors as well that are widely used by local people. Moreover, tourism is an export industry which is the least affected by the land-lockedness of the country, and does not generate terms of trade which remain always in favour of the developed countries and is not subject to packaging and transport costs.

Nonetheless, evidence from the experiences of Latin American, Caribbean and other countries shows that a significant contribution of the tourism industry can only be realized at the optimal level if the subsequent planning can reduce the disadvantages of international tourism by means of counter measures and efficient management of resources so as to meet the demands of tourism on a sustainable basis. In this context, it is worth quoting Lundberg (1995:44):

> *If the area being considered for tourism development has high unemployment, the virtues of tourism are more apparent. Tourism income, though perhaps less than from other sources, may be the best possible choice under existing conditions, serving to produce tax revenues, reduce unemployment, and enhance the quality of life for many residents. The opportunity cost of tourism under these circumstances is small or may not exist.*

Tourism impact on an economy is widely analyzed by multiplier effects, based on the input-output analysis. It determines the benefit to the economy for every unit of currency spent by

the tourist. Every unit of currency spent by the tourist creates primary and secondary effects. The primary (direct) expenditures of tourists create secondary effects of the multiplier such as indirect and induced expenditures. Direct effects are the production changes due to the immediate effects of the changes in tourism expenditures. For instance, an increase in the number of the tourist arrivals or in the length of stay in hotels leads to increased sales of hotels and thereby a rise in receipts of the hotels from tourists and payments into the wages, salaries, taxes and so on. In other words, an increase in the sales of the tourism industry is the direct effect of the tourism, which in turn resulted in the increase in incomes, jobs, wages, interest, rents and profits within the industry. While indirect effects of tourism are the increase in the sale in other backward linked industries such as suppliers of tourism goods and services.

Direct effect combined with indirect and induced effects are called the total effects of multipliers. In other words, the tourism multiplier implies that tourism spending by the visitors not only brings new dollars in a local economy, but that as new dollars are circulated their effect is multiplied (Lundberg, 1995: 137). So new money stimulates the economy not once but several times, and such an effect on the economy is popularly called a multiplier. So to capture all these economic impulses a well thought macroeconomic input-output model which includes inter-sectors backward and forward linkage in the economy is necessary.

Tourism contribution to gross domestic product is often measured with the help of satellite accounting but such an accounting system has yet to be developed in the country. So, the contribution is simply calculated as the ratio of tourism receipts to GDP, which is used as a proxy measure of tourism's contribution to the national economic growth and development. It is not the best measure of tourism's contribution to economic growth and the national economy. The satellite accounting system can examine the actual contribution of tourism and other sectoral contributions to the national economy. Nepal has yet to establish such an accounting system to measure the real contribution of each sector, such as tourism, to the national economy.

Tourism has been contributing to economic growth and thereby helping to raise the standard of living of the people. The correlation between tourist arrivals and per capita income is found to be high and positive. The granger causality test shows that the relationship between tourist arrivals and per capita income is unidirectional, i.e., from tourist arrival to per capita income. This implies that tourist arrivals in the country bring a positive impact on the per capita income (PCIN) of the people.

Tourism receipts, as aforementioned, can contribute to the national economic growth through backward and forward linkages. Tourism is service industry and receipts from it are payments to the people involved directly or indirectly in catering to the needs of visitors in various stages. It can have widespread and wide coverage and so results in a more equitable distribution of incomes and has multiple effects through which more and more incomes are generated in different sectors of the economy. Such effects are categorized as direct effects, indirect effects and induced effects. With several rounds, a rupee received from the tourists, if invested in the economy, can generate many more rupees within one year. Such a type of

behaviour of investment is called the multiplier effect, so a rupee income from a tourist is not only one rupee but it creates more incomes and jobs.

V. THE VALUE OF TOURISM MULTIPLIER AND IMPACT ANALYSIS

Nepal is, no doubt, one of the popular tourist destinations with full potentialities. However, with an underdevelopment of high value tourist products, Nepal is said to have been catered to mostly by budget tourists. The global spread of tourism in industrialised and developed states has produced economic and other benefits in many related sectors - from construction to agriculture to the telecommunication sector. The magnitude of multiplier depends on the higher earnings from tourism, retention of earnings, strong backward and forward interlinked among major sectors of an economy. Prior to the calculation of multiplier effects, unit root tests for individual series were performed and found to be stationary at first difference.

The value of tourism income multiplier for Nepal is estimated using following formula derived in the previous section.

$$\frac{\partial Y}{\partial \mathrm{Rt}} = \frac{1}{1 - \mathrm{c}_1(1 - \mathrm{t}_1) - \mathrm{i}_1 + \mathrm{m}_1} = \frac{1}{1 - c_1 + c_1 t_1 - i_1 + m_1}$$

To estimate the marginal propensities of consumption, investment, imports and tax rate, Three Stage Least Square Method was used and the regression results are displayed in Table 4.

$$\frac{\partial Y}{\partial \mathrm{Rt}} = \frac{1}{1 - \mathrm{c}_1 + \mathrm{c}_1\mathrm{t}_1 - \mathrm{i}_1 + \mathrm{m}_1} = \frac{1}{1 - 0.89 + 0.89 \times 0.04 - 0.12 + 0.48} = 1.21$$

The marginal propensities of consumption (0.89), investment (0.12), imports (0.48), and tax rate (0.04) were calculated with the help of the Keynesian model given above, which gave the 1.21 income multiplier for tourism. The values of marginal propensities reveal that there is positive effect of consumption, investment, imports and tax rates in gross domestic product. The value of marginal propensity to consume shows that an increase in GDP by one Rupee leads to a 89 paisa increase in consumption. So new money injected from exports, remittances and tourism has stimulated the consumption of imported goods. The value of marginal propensity to import tells that out of one Rupee increase in GDP, 48 paisa is spent for imports of goods and services. The greater effect of the high marginal propensity to import resulted in the lower value of the tourism multiplier. Taxes and imports are regarded as the leakages on the multiplier analysis.

Table 4: Regression results

C=--217.3456 +0.891308(GNP-Ty)***   (-1.331881) (27.96872)   Adj R^2 = 0.954987 DW=1.845299
I=-104.3308+ 0.125098GNP***   (1.306756)(8.357015)   Adj R^2 =0.6508730 DW=1.534223
M=--351.6505**+ 0.480666GNP***   (-2.502944)(18.24747)   Adj R^2 =0.900020 0 DW=1.858325
Ty=--48.59833***+ 0.045689 GNP***   (-3.211696)(16.10448)   Adj R^2 = 0.976768 DW=1.346513

The figures in parenthesis are t values and *** and **significant at 1% and 5% level respectively

Overall output multiplier for Nepalese tourism was calculated at 1.16 by another study (NRB, 1989: 263) which is comparable with 1.21 estimated by this study. The value of multiplier reported at 1.24 for tea shops along with the trekking routes followed by travel agencies (1.43) (NRB, 1989: 264). The values of multiplier are reported 2.5 for Canada, 1.96 for Turkey,1.73 for UK, Hong Kong(1.02), Egypt(1.23), and Iceland(0.64) (Lundberg, 1995: 137). Since intersectoral linkages are very strong in the developed countries, new money injected into local economy stimulates various sectors within a given period of time. As a consequence, the value of the multiplier is seen to be higher. On the other hand, such linkages are weaker in the case of small import based economies such as Nepal, and the value of multiplier is expected to be small. Thus, the low value of the multiplier estimated above for the Nepalese economy can be viewed as per our prior expectation. Marginal propensities of investment and tax revenue are weaker in case of Nepal, it is indicative that only a small portion of tourism revenue has been spent on investment. But a greater portion of such revenues was spent on imports of goods of tourist consumption and daily consumption goods of local residents. The higher values of marginal propensity to imports and consumption reveal this fact. Although gross tourism receipts have been substantial, the net retention of such earnings in the economy is very low. The growth of business of the domestic tourism sector (airlines, hotel, restaurants, travel and trekking agencies) generates more tourism receipts for the economy. However, that a large chunk of international airline business in Nepal has been captured by the foreign airlines is revealed by the reduced business of NAC, to about 5% of total arrivals of tourists by air, together with an increasing role of foreign tour-operators in bringing the foreign tourists to Nepal, indicates the low retention of net tourism receipts in the economy. The Seemingly Unrelated Regression (SUR) method was used for the reduced form of equations estimating consumption, investment, import and GDP as the function of exogenous variables such as government expenditure, exports and tourism receipts. However, government expenditure and tourism receipts were found highly correlated and so government expenditure variable was dropped from the equations. The regression results presented in Table 5 show that import and national income (GNI) in Nepal are highly affected by tourism receipts.

Table 5: Regression results

C=-335.5697 + 0.072461X + 0.501386R (1.109881) (0.793698) (0.826175) Adj R^2 = 0.157931 DW=2.172882
I = 79.42406 + 0.065134X -0.200899R (0.536712) (1.457658) (-0.676353) Adj R^2 = 0.030507 DW=2.065000
M = -121.9940 - 0.135818 X + 1.689568R*** (-0.415767) (-1.532957) (2.868748) Adj R^2 = 0.199363 DW=1.807265
GNI = 348.5771 -0.016885 X*** + 1.367208 R*** (1.432624) (-0.229829) (2.799457) Adj R^2 = 0.385591 DW=1.540584

The figures in parenthesis are t values and ***significant at 1% level.

Where C= private consumption, I = private investment, M = imports, X = exports, R = tourism receipts and GNI = gross national income.

Another important contribution of the tourism is to employment generation. As developing economies have pressing underemployment and unemployment problems, one of the major objectives of economic development is to find gainful employment for all people who are actively looking for jobs. It is said that labour requirements in the tourism industry are often suited to the conditions prevailing in developing countries. The ability of the tourism industry to use labour intensively from the labour market is an important virtue of this industry. Tourism contributes extensively to generating employment for different categories of people. Because of tourism, jobs are directly created in hotels and restaurants, travel/tour agencies, trekking and mountaineering agencies, airlines, museums, and in amusement parks. Moreover, many more jobs are generated by tourist service providers and intermediaries in both tourist destination and tourist generating countries. Airlines businesses are in rise because of tourists. They create thousands of jobs. Other means of transportation such as roads, railways, ropeways and waterways are also connected with tourism development. Tourism business is indirectly linked with the several other businesses in an economy such as the suppliers of intermediate goods used for the production of touristic goods and services. So, with an increase in the flow of tourists the demand for goods and services in the tourist consumption also increases, which in turn gives rise to the demand for intermediaries used for the production of the touristic goods: that is new jobs are generated directly in tourism business and indirectly in tourism intermediaries. So tourism not only creates jobs directly in its own but also induced other businesses and thereby generates jobs indirectly. Thus, it is a tradition to calculate the tourism multiplier.

Tourism is regarded as a labour intensive industry since it employed 127 million people around the world in 1996, that is one job created for every 15 tourists (Holloway, 1998: 41). One can estimate roughly the number of jobs generated by the tourism sector with the help of the above formula for calculation, dividing the total number of international arrivals in the country by fifteen, i.e., one job is created by every fifteen tourist arrival. Accordingly only about 34 thousand persons are directly employed in tourism sector of Nepal. However, NRB reports (NRB, 1989:200) that employment created per bed was higher (1.4) in five star

hotels, compared to four star hotels (1.3) and three star hotels (0.9). South Asia regional level committee reported 44 thousand persons were employed in 1996 (SARTHRDC, 1997). Moreover, the Ninth Plan of Nepal reported that tourism in the country generated 182 thousand direct and seasonal employments in 1997, of which 75 thousands are estimated to be direct employment. This implies that every 5.6 tourist arrivals create one direct employment in Nepal. By these counts, jobs created by Nepalese tourism can be estimated. Accordingly, over 91 thousand persons were directly employed by the tourism sector in 2009. The difference between two estimates is huge and hardly comparable. However, Three Years Plan (2010-13) reported that a 90, 000 people were directly employed by the tourism sector in 2010 (NPC, 2011: 132). The number of direct employment in the tourism sector is estimated at 90,000 jobs in mid-January, 2010 and 100, 000 jobs in mid-January 2011 (MoF, 2011: 144). This is very close to our estimation shown in the last column of Table 5.

As per NLFS (2008) report, a 6.7% of the labour force is time related unemployment. It is hard to estimate the exact numbers of employment generated by the tourism sector in the country. Employment by this sector is not simply the direct ones but also indirect employment and induced employment that are generated by the tourism activities.

Annex 1 presents direct employment generated by the tourism sector. Tourism all over the world is known for its seasonality nature and so employs many peoples in the tourist season only and is categorised as seasonal or temporary employment. Many tour guides, trekking guides, porters, and other associated are left unemployed in off tourist season. In addition, tourism provides jobs for skilled professionals in hotels, restaurants, travel and trekking agencies around the year.

Tourism has thus become one of the country's most important sources of employment, which increased with the increase in tourism activities. Given a drastic decline in international tourism volumes and values in recent years, it might reasonably be expected that the total receipts and employment opportunities have been reduced and continue to decline drastically.

Mountaineering and group trekking offer jobs for many porters, and in some routes such as Simikot to Hilsa in Humla district, and other parts of Karnali, mule transport is used for carrying the bag and baggage of tourists. One of the issues in the tourism sector is that mostly jobs are created for only the tourist season and in the off-season most of them are laid off. So, greater efforts toward creating more full time jobs are desirable from this point, which could be possible from the promotion of domestic tourism. Nepal is fortunate enough to receive overseas tourists and Indian visitors in alternative seasons, which help in smoothing out the seasonal variations and thereby generating more full time jobs in the tourism sector.

VI. THE GRANGER CAUSALITY TESTS AND IMPACT ANALYSIS

The Granger causality tests on several macro economic variables from the Nepalese economy are discussed in this section. This test could establish the direction of causality between two variables. Annex 2 presents the Granger causality tests on several macro economic variables from the Nepalese economy.

The Granger causality tests for tourism receipts and GNI show that there is bidirectional relationship between these two variables. Another measure of tourism activity is the influx of the tourist arrivals in the country. The Granger causality tests for tourist arrivals and per capita income (PCI) reveals that there is unidirectional relationship that is the former causes the latter. Similarly, the Granger causality tests between GDP and tourism were carried out to examine the directional relationship between two, which further confirm the relationship and linkage between the two was bidirectional since the Granger causality tests to GDP and tourism receipts show that both have impacted by each other. It seems logical that the more developed economy can attract the more up-market tourists and generate more receipts and revenue and vice-versa. Countries like Israel and Singapore are the good examples in this context. On the other hand, tourism receipts can generate funds for the development of finance and foreign exchange earnings for investment and development, so tourism receipts can affect positively the GDP. The Granger causality tests on GDP and tourist arrivals also confirm that tourism affects the GDP positively. So this is consistent with the causality tests between GDP and tourism receipts.

Tourism promotes exports of goods and services, because visitors purchase many goods and services in the destination country. A visitor in Nepal purchases services such as transport, hotel/restaurants, entertainment, trekking and mountaineering, and commodities such as carpets, *thankas*, handicrafts and others. It is also true the other way around in the case of tourism. There is some relationship between tourism receipts and export earnings. In addition, trade itself promotes tourism since frequent visits of business people between trade partner countries is a rule. The Granger causality test also confirms this type of bidirectional effects of exports and tourism.

Tourism receipts are important from the perspective of development and growth, because tourism activities cannot be grow without the government initiative for infrastructure development. International air linkage is the most important institution and infrastructure for the growth of tourism, for the reason, government investment in the manpower training for tourism has utmost importance. When tourism starts generating additional tax revenues, new jobs and incomes in the economy, then government expenditures on tourism can be encouraged. So there can be two ways relationships. It is examined here whether there is a causal relationship between tourism receipts and government expenditure. The Granger causality test on development expenditure of the government and tourism receipts reveals that the former is impacted by the latter. As 'tourism receipts do not Granger cause development expenditure' is accepted, but 'development expenditure do not Granger cause tourism receipts' is rejected. This indicates there is only a one-way directional relationship between the two.

Tourism does not seem to cause development expenditure. But government expenditure on the tourism sector can lead to the greater increase in tourism receipts. So as a priori expectation, a greater investment in tourism development infrastructures causes more tourism receipts. So with the better infrastructures, the quality of the tourist destination can be enhanced inducing more tourist arrivals or length of the stay. Moreover, the number of up-market tourists can increase with the better infrastructures, services, tourist goods, and environments. The Granger causality test on total government expenditure and tourist arrivals reveals that there is unidirectional impact. The direction is from tourist arrival to government expenditure. The latter is impacted by the former; the null hypothesis was rejected at 1%.

The Granger causality test on development expenditure of the government and tourist arrivals reveals that the two are impacted by each other. The null hypotheses are rejected at 5% in both cases. It implies that tourist arrivals lead to the development activities of the government, such as investment in airports, road, and communities and other infrastructure which is common to both locals and tourists. On the other hand, development activities of the government add to the attractions of the tourists and induce the number of visitors to the destination.

The Granger causality test between tourism receipts and regular expenditure of the government shows that there are two-ways relationships between the two. It appears logical on the ground that government expenditure on the securities and regulatory activities can enhance the quality of the tourism products and impact positively on tourism receipts. On the other hand, tourism receipts can increase the fund in the government treasury and so the former affects positively on the regular expenditure.

Tax revenue is one of the important segments of total revenue of the government. We examine the Granger causality in the case of tax revenue also to see whether the results are consistent or not. The results show that there is a positive correlation between tourist receipts and government tax revenues. The direction of causality is from tourist receipts to government tax revenue. The null hypothesis that tourism receipts do not the Granger cause tax revenue was rejected at the 1% level. So tourist receipts contribute to increase the government tax revenue of Nepal. The casual relationship between tourism receipts and tax revenues shows that two have bi-directional relationship. The contribution of the tourism receipts on tax revenues is understandable since a proportion of the tourism expenditure contributes to government tax revenue such as VAT, airport tax, air fuel tax and so on.

Similarly, the Granger causality tests confirm that direct taxes, private consumption, and imports are heavily affected by the tourism receipts and viceversa but in the case of private investment and tourism receipts direction of causality flows from the former to the latter and thus unidirectional relationship. It reveals that tourism receipts statistically do not affect private investment.

VII. CONCLUSION

Tourism has impacted the Nepalese economy by virtue of demand for goods and services, transportation and communication, purchase of handicrafts, trekking and mountaineering, rafting, sight-seeing, city tours and involving in varied other activities. This is reflected in the value of the tourism receipts multiplier calculated for Nepal, estimated at 1.21, which seems to be reasonable as compared to similar studies in the past. However, it is a rough estimate, since it is not based on broad based input output analysis. The multiplier formula was derived from the Keynesian model of income and employment. The techniques of Three Stage Least Square and Seemingly Unrelated Regression were applied for the estimation of value of multiplier. Because of the high import content in the touristic consumption of goods and services, the magnitude of the multiplier effects on the income and employment generation through the backward and forward linkages is gauged at less effective in making the economy vibrant than it might be. However, on the basis of the Granger causality tests tourism effects on exports, government revenue generation such as taxes and expenditure are a good indication that tourism can be an engine of growth in the country in the days ahead. In addition, the Ganger causality tests carried out between tourism receipts and GDP, per capita income, GNI, service, and so on also show the linkage and causal relationships between these variables. Tourism receipts and tourist arrivals both show that tourism has impacted positively on the Nepalese economy. So from the above discussion of multiplier and the Granger causality tests it can be concluded that tourism does really matter for the economic growth of Nepal.

REFERENCES

Burger, V. 1978. The Economic Impact of the Tourism in Nepal: An Input Output Analysis. A Ph.D. Thesis submitted to Faculty of the Graduate School, Cornell University. University Microfilms. Michigan: Ann Arbor.

CBS. 2008. *Nepal Labour Force Survey*. Kathmandu: NPC Statistics Bureau of Nepal**.**

CBS. 2004. *Nepal Living Standard Survey*. Kathmandu: Central Bureau of Statistics.

Chow, Gregory C. 1983. Econometrics. Singapore: McGraw-Hill Book Co.

English, E. Philip. 1986. The Great Escape: an examination of North-South Tourism. Ottawa: The North South Institute.

Eviews 5 User Guide, USA: Quantitative Micro Software, LLC.

FNCCI. 2010. Nepal and World: A Statistical Profile 2009. Kathmandu: Federation of Nepalese Chambers of Commerce and Industries.

FNCCI. 2009. Nepal and World: A Statistical Profile 2008. Kathmandu: Federation of Nepalese Chambers of Commerce and Industries.

Harrison, David, eds. 2001. Tourism and Less Developed World: Issues and Case Studies. CABI Publishing Ltd, USA.

Harrison, David, eds. 1992. Tourism and the Less Developed Countries. London: Belhaven Press.

Holloway, J Christopher 1998. The Business of Tourism. London: Addison Longman Limited.

IPK International 2010. ITB World Travel Trends Report. Messe Berlin GmbH, Germany.

Lundberg, Donald E., M. Krishnamoorthy and Mikh H. Stavenga 1995. Tourism Economics. London: John Wiley and Sons, Inc.

Mathiesor, Alister and Geoffrey Wall 1982. Tourism: Economic, Physical and Social Impacts. Singapore: Longman Scientific and Technical.

MoF/GoN. 2011. The *Economic Survey: Fiscal Year 2010/2011, volume I.* Kathmandu: Ministry of Finance.

MoF/GoN. 2010. *The Economic Survey: Fiscal Year 2009/2010*.

MoF/GoN. 1992. *The Economic Survey: Fiscal Year 1991/92*.

MoTCA/GoN. 2011. Nepal Tourism Statistics 2010. Kathmandu: Ministry of Tourism and Civil Aviation.

MoTCA/GoN. (2010): *Nepal Tourism Statistics 2009*.

MoTCA/GoN. 2006. *Civil Aviation Policy 2006*.

MoTCA/GoN. 1970, 1980, 1991, 2007, 2008 and 2009. *Nepal Tourism Statistics*.

NRB. 1989. *Income and employment generation from tourism in Nepal. Kathmandu*: Nepal Rastra Bank.

NRB. 2008. Report on Household Budget Survey Nepal.

Paudyal Shoora Beer. 1993. An Econometric Model of Demand for Tourism in Nepal. MA (Economics) unpublished thesis submitted to Dalhousie University, Halifax, N.S. Canada.

Paudyal, Shoorabeer. 2012: Tourism in Nepal: Economic Perspectives, Chapter 7. Unpublished book. Kathmandu.

Pindyck, Robert and Daniel L. Rubinfeld. 1991. *Econometric Models and Economic Forecasts.* New York: McGraw-Hill Inc.

Ramanathan, Ramu. 1989. Introductory Econometrics with applications. Orlando: Harcourt Brace Jovanovich inc.

SARTHRDC. 1997. South Asia Integrated Tourism Human Resource Development Programme Phase II, Draft Programme Proposal (monograph).

Zellner, A.1962. "An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias", *Journal of the American Statistical Association. Vol.57.*

Annex 1: Direct employment generated by tourism sector
(in number)

Year	Total number of tourist	Direct employment (by 15:1 ratio)	Direct Employment (by 5.6:1 ratio)
1980	162,897	10,860	29,089
1985	180,989	12,066	32, 319
1990	254,885	16,992	45,515
1995	363,395	24,226	64,892
2000	463,646	30,910	82,794
2005	375,398	25,027	67,035
2008	500,277	33,352	89,335
2009	509,956	33,997	91,063

Source: Nepal Tourism Statistics, 2009 and other issues; NPC, Ninth Plan and Tenth Plan.

Annex 2: Granger causality tests

Null Hypothesis	F-Statistic	Decision
GNI does not Granger cause tourism receipts	6.32193***	Rejected
Tourism receipts do not Granger cause GNI	10.3359**	Rejected
PCI does not Granger cause total tourist arrivals	1.7135	Accepted
Total tourist arrivals does not Granger cause PCI	16.039***	Rejected
Tourism receipts do not Granger cause GDP	3.68859*	Rejected
GDP does not Granger cause tourism receipts	7.59335**	Rejected
GDP does not cause tourist arrivals	1.5593	Accepted
Tourist arrivals does not Granger cause GDP	26.6054***	Rejected
Tourism receipts do not Granger cause service receipts	13.4396***	Rejected
Service receipts do not Granger cause tourism receipts	3.76744**	Rejected
Exports do not Granger cause tourism receipts	6.00005***	Rejected
Tourism receipts do not Granger cause exports	6.66445***	Rejected
Exports do not Granger cause tourist arrivals	0.0249	Accepted
Tourist arrivals do not Granger cause exports	13.5136***	Rejected
Tourism receipts does not Granger cause development expenditure	1.3925	Accepted
Development expenditure does not Granger cause tourism receipts	18.3310***	Rejected
Tourist Arrival does not Granger Cause development expenditure	3.1249**	Rejected
Development expenditure does not Granger Cause tourist arrival	3.7404**	Rejected
Tourism receipts does not Granger cause regular expenditure	7.7297***	Rejected
Regular expenditure does not Granger cause tourism receipts	5.5429***	Rejected
Tourism receipts do not Granger cause tax revenues	22.60***	Rejected
Tax revenues does not Granger cause tourism receipts	9.57***	Rejected
Tourist receipts does not Granger cause private investment	0.87667	Accepted
Private investment does not Granger cause tourism receipts	8.66725***	Rejected
Tourist receipts does not Granger cause direct taxes	5.13350**	Rejected
Direct taxes does not Granger cause tourism receipts	5.90965***	Rejected
Tourist receipts does not Granger cause private consumption	9.82592***	Rejected
Private consumption does not Granger cause tourism receipts	5.60010***	Rejected
Tourism receipts do not Granger cause imports	8.34203***	Rejected
Imports do not Granger cause tourism receipts	6.33399***	Rejected

***, ** & * Rejected at 1, 5 and 10% level.

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