Chapter-3

Foreign Aid and Economic Growth in Bhutan

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3.1: Introduction

Economic development in Bhutan can be explained with the help of economic theories of growth and development. According to the classical and neo-classical theories of economic growth, growth rate is directly related to the saving or investment rate of the country at a given rate of capital formation. These theories leave huge room for using foreign savings for domestic economic development in the form of foreign aid. While the neoclassical growth theories put priority in technological development, neoclassical growth theories rather pinpoint policy issues and human capital formation in the growth process. The theory of economic development incorporates some additional issues like equalities in income, structural transformation and institutional reforms of the economy. Foreign trade is another important instrument for economic development in these theories. In this chapter, we make an attempt to explore the role of foreign aid and foreign trade in the economic development of Bhutan, keeping the role of all other factors aside.

Foreign aid refers to Official Development Assistance (ODA) undertaken by official sectors of the donor countries for promotion of economic development of the recipient developing countries at concessional financial terms, where the grant element is at least 25 percent[1]. In addition to these financial flows, technical co-operation costs for foreign experts, advisory personnel, training through workshops, foreign missions etc. are also included in ODA. However, grants and loans for military purposes, transfer payments to private individuals, private charity by the Non-Governmental Organizations (NGOs), commercial loans and Foreign Direct Investment (FDI) are excluded from the definition of ODA. Development Assistance Committee (DAC) of the Overseas Economic Co-operation and Development (OECD) is the principal body relating to ODA for the developing countries.

Aid to the developing countries comes in different ways, two broad categories being the project aid and programme aid. The project aid is basically used for financing public investment programmes, while

programme aid is used for structural adjustments, balance of payment distortions, budgetary supports and so on. These two categories of aid exert significant impacts on economic growth of the recipient countries. Literature on effectiveness of aid on growth shows that project aid usually positively impact on economic growth, while programme aid has negative impact.

Traditional aid literature primarily highlights the impact of aid on economic growth rather than economic development of a country during the assessment. It is worth mentioning that the two sub disciplines viz. growth economics and development economics have to be treated separately for the assessment of development aid. Growth economics is emerged from the issues related to the growth of national income with the preservation of full employment in the capitalist countries. Thus, it is macroeconomic in orientation. Development economics focuses mainly on growth initiation and its acceleration in the developing countries incorporating structural transformation, demographic transition, income distribution etc. It is more microeconomic in orientation. Thus the impact of aid on mere economic growth is not a very good instrument for assessing the effectiveness of aid. Even though, it may appear that the relation between aid and growth is negative, the issue should be assessed more intuitively in the context of complex issues of development economics. The new endogenous growth theories however narrow down the gap between growth economics and development economics by endogenizing economic policy issues and human capital formation in the process of economic growth.

3.2: Foreign Aid and Growth: the Relevant Theories and Models

The earliest growth models linking aggregate output growth and resource mobilization was Harrod–Domar growth model. In the Harrod–Domar model, output (Y) growth is proportional to incremental capital–

output ratio(v),

$$Y=vK \tag{3.1}$$

where K= capital stock. The model assumes that capital is the only factor of production. Differentiating equation (3.1) w.r.t. time (t) and dividing by Y, yields the equation of growth rate (g)

$$g=\dot{Y}/Y = v.dK/dt.1/Y = v.I/Y \; [I=dK/dt] \tag{3.2}$$

The impact of aid on growth is seen as increment to the stock of physical capital. In this model, aid variable is captured in the planned investment identity

$$I=S_d + A + OF \tag{3.3}$$

where S_d = domestic savings, A= inflow of foreign aid and OF =other sources of capital inflows. Combining equation (3.2) and (3.3) we get,

$$g = v/Y \; [S_d + A + OF] \tag{3.4}$$

Equation (3.4) is extensively used for empirical research using econometric tools by holding v=constant. The empirical model in various studies takes the following form:

$$g = \beta_o + \beta_1.S_d/Y + \beta_2.A/Y + \beta_3.OF/Y + \varepsilon. \tag{3.5}$$

where ε is an white noise error term with zero mean and constant variance. β_is are coefficient of savings–GDP ratio(S_d/Y), aid-GDP ratio (A/Y) and the ratio of GDP to other capital inflows(OF/Y). However, following two are the most important assumptions of the Harrod-Domar model, which are subject to empirical tests:

- There is a constant and stable short–run proportional relationship (i.e no decreasing returns) between investment and growth.
- Aid is not used for consumption purpose and does not reduce domestic savings. That is, aid increases investment one-for-one.

The first application of Harrod–Domar model, for the analysis of impact of aid on economic growth was undertaken by Chenery and Strout[2] in 'Two–gap' model, one 'Savings-gap' and the other 'Trade-gap'. There are four possible phases of constraints of growth – IA, IB, II and III

respectively. IA is the initial stage of development, when savings–gap will be larger than the trade–gap due to the country's inability to invest. Once the investment constraint is no longer binding, phase II is likely to follow in which growth is set by the target so that foreign capital is required to fill the savings-gap. As growth proceeds, imports growth will exceed export growth and the economy will move to phase III, where trade-gap is binding.

The impact of aid in the dual-gap model depends on the existing phase faced by the aid receiving country. The impact of aid is determined by, according to Chenery and Strout[3], the marginal productivity of aid as shown in the folioing two equations

Savings-gap (phase-II): $dY_{T+1}/d\Sigma A_t = 1/k\text{-}b\tau$ (3.6)

Trade-gap(phase-III) : $dY_{T+1}/dA_t = 1/\mu\tau$ (3.7)

where Y=output, τ=target growth rate, b=mpc, μ=marginal propensity to imports and $\tau=\{T-(1-(1+r)-1/r\}/r/T+1\}$.

Using median values of parameters for 31 countries, Chenery and Strout derived the savings-gap and trade-gap regimes showing that aid is more effective under foreign exchange gap.

Impact of aid in the Solow model acknowledges decreasing return of aid[4]. Solow model uses Cobb-Douglas production function of the form:

$$Y_t = K_t^{\alpha}(A_tL_t)^{1-\alpha} \quad (3.8)$$

which implies decreasing returns to capital K because $\alpha \leq 1$. In case of the above production function,

$$L_t = L_o e^{nt} \quad (3.9)$$

$$A_t = A_o e^{gt} \quad (3.10)$$

$$I = sY_t - (n+g+\delta)K_t \quad (3.11)$$

Combining (3.8-3.11) yields an empirical growth model

$$g_{yt} = \beta_o + \beta_1 \ln i_t - \delta \ln Y_0 \quad (3.12)$$

where g_{yt}=growth rate of GDP, I_t= interest rate and Y_o = initial GDP. Like the Harrod-Domar model, aid enters this model through investment

$$i_t = \gamma_0 + \gamma_1 s_t + \gamma_2 a_t \quad (3.13)$$

Combining equations (3.12) and (3.13) then log linearazing using a first order Taylor approximation, we get an empirically testable Solow model with the role of foreign aid:

$$g_{yt} = \beta_o + \beta_1\gamma_1/\hat{I} \ln i_t + \beta_1\gamma_1/\hat{I} \ln a_t - \delta \ln Y_o \qquad (3.14)$$

In the empirical studies, equation (3.14) is often approximated as a quadratic relationship between aid and growth which is also written as

$$g_{yt} = \beta_o + \beta_1 a_t + \beta_2 a_t^2 + e_t \qquad (3.15)$$

In case aid shows decreasing returns, $\beta_1 > o$ and $\beta_2 < o$ must be statistically significant.

Papanek[5] provides the first study to disaggregate foreign capital flows into foreign aid, foreign investment and other form of foreign flows. In this model, domestic capital formation as well as foreign capital formation has been separated as follows:

$$G = \beta_0 + \beta_1 S_i + \beta_2 A_i + \beta_3 Fi + \beta_4 O_i + e_i \qquad (3.16)$$

where G=growth rate of per capita income of ith recipient, S=domestic savings, A=aid inflows, F=foreign investment, O=other form of foreign capital and e_i= error term.

In order to improve the estimation coefficients of the aid growth regression, many studies incorporated institutional and policy variables in the aid growth regression[6]. In these models, aid-growth regressions take the following form:

$$\dot{Y}/Y = \beta_o + \beta_1 A/Y + \beta_2 S_d/Y + \beta_3 OF/Y + \beta_4 Z + e \qquad (3.17)$$

where z is a vector of institutional policy variables affecting growth. The components of institutional or policy variables in the Z vector are indictors of trade openness, export growth, literacy rates, human capital, terms of trade, rate of inflation etc. as the proxies for policy variables.

Since the mid-1990s, new wave of aid effectiveness studies emerged. The studies are different from traditional studies in that these studies base their empirical analysis on a general equilibrium growth model, address the endogeneity of aid, deal with linear effects of aid and link the impact of aid to economic policies, institutional environmeant and external

conditions of the recipient countries[7]. Generally, the model used the variants of the following specification:

$$G_g=\beta_0+\beta_1 A_i+\beta_2 A_i^2+\beta_3 P_i+\beta_4(A^*_g P^*_g)+\beta_5 z_i+\varepsilon_i \quad (3.18)$$

where p_g=measure of the domestic policy and institutional environment, Zi=vector of variables that are normally included in the models explaining per capital growth rate. The variable A_i^2 takes into account the non-linearity of aid while $(A_g{*}P{*}_g)$ deals with linking aid to economic policies and institutional environment.

A number of studies were based on specification (3.18). In a study by Burnside and Dollar[8], interacting time effects of aid and economic policy on growth, shows that aid is effective only in good policy environment. Their analytical framework endogenized the aid variable and policy index to tackle the simultaneity issues. Their analytical framework consists of following three equations:

$$\dot{Y}/Y=\beta_{0y}+\beta_{1y}YPC+\beta_{2y}A/Y+\beta_{3y}P+\beta_{4y}AP/Y+\beta_{5Z}+\varepsilon_y \quad (3.19)$$

$$A/Y=\beta_{0A}+\beta_{1A}YPC+\beta_{2A}P+\beta_{3A}Z+\varepsilon \quad (3.20)$$

$$P=\beta_{0P}+\beta_{1P}YPC+\beta_{2P}A/Y+\beta_{3p}Z+\varepsilon_p \quad (3.21)$$

where YPC =per capita income, P=index of measuring distortion of macroeconomic policies and Z is a vector of cantrol variables including government consumption spending, institutional quality index, political instability and country-region variables. However, Burnside and dollar did not include the aid-squire term (A_i^2) in their model specification, thereby failing to explain scale returns of foreign aid.

An alternative argument for the impact of aid effectiveness popularly known as displacement theories developed since the early 1970s. Displacement theories suggest that excessive aid inflows may displace domestic savings and crowd-out private investment. Aid may increase government consumption expenditure or could erode export earnings[9]. These effects are captured under the savings debate, fiscal response and Dutch Disease literature.

The aid savings debate was initially introduced by Griffin and Eons[10].

According to them, the marginal propensities to save and consume are between zero and one. Thus aid inflows will be allocated between savings and consumption, by treating aid inflows as mere increase in income. They estimated the following aid-savings regression model:

$$S/Y=\beta_0+\beta_1 A/Y+\varepsilon \qquad (3.22)$$

Subsequently, many researchers incorporated more variables in order to avoid omitted variable bias and obtain more efficient estimations. One form is as follows:

$$S/Y=\beta_0+\beta_1 A/Y+\beta_2+\varepsilon \qquad (3.23)$$

where Z/Y is a vector of variables affecting savings.

The above models are structural models because they are all based on economic theories.

One alternative model known as non-structural model based on time series data does not rely on economic theories. Vector autoregressions (VARs) are such non-structural models where data, rather then economist, specify the dynamic structure of a model[11]. Generally, in the VAR models, all the variables are endogenous and the largest number of lags is needed to capture the mutual effects on each other variable. Following is the form of a VAR model:

$$X_t = \beta_1 X_{t-1}+\beta_2 X_{t-2}+\ldots+\beta_k X_{t-k}+\mu+ \varepsilon_t \qquad (3.24)$$

where X_t is an nx1 vector of variables under study, β_i (i=1,2,..,k) is an nxn matrix of parameters, μ is a vector of deterministic component and ε_t is a white noise error term. According to Granger's representation theorem, if there is co-integration, VAR model can be formulated into a vector error - correction model (VECM) incorporating both short run and long run dynamics[12], and takes the following form:

$$\Delta X_t = \mu+\Gamma_1\Delta X_{t-1}+\Gamma_2\Delta X_{t-2}+\ldots.+\Gamma_{k-1}\Delta X_{t-k-1}+ \Gamma_k X_{t-k}+\varepsilon_t \qquad (3.25)$$

where ΔX_t is a vector of growth rates, Γ_j =-[I-$\Sigma\beta_i$] is an nxn matrix containing information on short- run djustments of changes in X_t, Γ_k =-[I-$\Sigma\beta_i$] is nxn impact matrix of parameters containing information on long-run adjustments, μ is a vector of constants, ε_t is nx1 vector of white noise

errors and I is an identity matrix.

3.3: Empirical Findings

Several research works have so far been conducted by eminent scholars on the effectiveness of foreign aid in economic growth. Their findings, however, substantially vary because some used single country data, while others used multi–country data. Their findings regarding the effectiveness of foreign aid belong to three distinct categories-positive effects, negative effects and no effect.

While most of the studies based on single country data pointed out positive effects of foreign aid on economic growth, studies with cross-country data highlighted mixed results. A number of studies show that project aid has positive impact on economic growth while programme aid show mixed results. The variability of different findings, to a large extent, is caused by the different statistical techniques used by various researchers and heterogeneity in cross-country data[13].

The Initial empirical studies on effectiveness of aid were based on the Harrod-Domar assumptions. Such a study by Chenery and Strout[14] shows that aid is effective in raising economic growth by filling dual gap- 'savings-gap' and 'foreign exchange-gap'. Griffin and Enos[15] first challenged the 'two-gap" model showing a negative relationship between savings and aid with the help of an econometric study. This study reported a negative relationship between capital inflows (as percentage of national income) and the savings rate between -0.73 and -0.84 by using cross-country data. On the other hand, Papanek[16] obtained a significant positive impact of aid on economic growth for a sample of 34 LDCs. Mosley[17] incorporated lagged aid variables into his model and accounted for the potential endogeneity of aid. Mosley finds a negative relationship between aid and growth, but the coefficients being statistically insignificant. Burnside and Dollar[18] in their most influential paper finds that aid has a positive impact on growth in

developing countries with good fiscal, monetary and trade policies but has little effect in the presence of poor policies. Dalgard et, al.[19] found out that aid is effective with diminishing returns and is less effective in tropical regions. They also find that aid effectiveness does not depend on the policy environment. The findings of the important studies of aid-growth relations have been captured in Table-3.1.

Table-3.1: Results of Selected Aid Growth/ Savings Regressions

Studies	Dependent Variabes	Explanatory Variables	Estimation Methods	Results
Griffin (1970)	Saving (S)	Aid (A)	OLS	Foreign capital has a negative impact on domestic savings.
Griffin and Enos (1970)	Savings (S)	Aid (A)	OLS	Foreign capital has a negative impact on domestic savings.
Papanek (1973)	Growth (g^y)	S,A,FDI,OF,IS	OLS	Aid has a positive impact on growth.
Mosley (1980)	Growth (g^y)	S,A,I	3SLS	No relationship between aid and growth.
Mosley et al. (1987)	Growth (g^y)	S,A,OF,GX,GL	3SLS	No relationship between aid and growth.
Mastey et al. (1992)	Growth (g^y)	S,A,FDI,GX,GL,PI	OLS	Aid has a positive impact on growth.
Hadjimichael et. al. (1995)	Growth (g^y)	A,A^2, IP,IG,H_k, N, tot, RER, INF,BD	GLS	Aid has a positive impact on growth.
Hansen and Tarp (1999)	Growth (g^y)	A, A^2, OP,INF, CG, FD, YPC	Intrumental Variable (IV)	Aid has a positive impact on growth.
Burnside and Dallar (2000)	Growth (g^y)	A,PI,AP,Z	OLS and 2SLS	Aid is effective only in countries with good policies.
Dalgdard and Hansen (2001)	Growth (g^y)	A^2, A.P	_	Aid is effective with diminishing returns and is independent of the policy environment.
Lensink and White (2001)	Growth (g^y)	A^2, AP, INF,OP,INSQ, TRL,A		Aid is effective with diminishing returns and is independent of the policy environment.
Dalgard et al. (2004)	Growth (g^y)	-	GMM,OLS	Aid is effective with diminishing returns, less effective in tropical regions is independent of AP.
Easterly et al. (2004)	Growth (g^y)	A.P	_	Aid effectiveness does not depend on the policy environment.
Mallik (2008)	Growth (g^y)	A,I,OP	Cointegratio n	In the short- run aid has no significant effect on growth while long-run effect is negative.
Yamashita and Khanchi (2003)	Growth (g^y)	I, FDI, A, ER,MR	Unit root and Granger causality under VAR Model	Domestic savings and foreign exchange gap are not restraining factors on growth.
Eris (2008)	Growth (g^y)	ODA,Y0,IMR,Assn. ,ICRGE Index,H_k	Bayesian Model Averaging (BMA) technique	The Burnside Dollar results do not hold up and aid flows are not very effective in boosting growth regardless of the quality of the policy environment.

Abbreviations: I: total investment, IG: public investment, IP: private investment, S: domestic savings, A: aid inflows, FDI: foreign direct investment, OF: other foreign inflow, OP: openness index, T: tax revenue, CG: government consumption spending, FD: financial deepening, GX: growth rate of exports, GL: growth rate of literacy, YPC: income per capita, BD: budget deficit, INF: inflation, AP: interactive effect between aid and policy , PI: policy index, OLS: ordinary-least-squares, 2SLS: two-stage-least-squares, 3SLS: three-stage-least-squares, GLS: generalised-least-squres, IV: instrumental- variables, H_k = human capitals, GL= growth rate of labour, ER= Exchange rate, INF: inflation. Z= exogenous variables that might affect growth and the allocation of aid, INSQ= instituational quality, TRL= fraction of land in tropics, Assn= Assassination, Y_0= initial income, IMR= infant mortality rate and ICRGE= institutional variation across countries.

All the studies in Table-3.1 are based on cross-country data analysis. Studies show that for some cases impact of aid on growth is negative. But for most of the cases, the impact is positive. Burnside and Dollar's study[20] is very influential because, policy issues matter in economic growth via aid. Eris' study[21] is a strong counter attack on the Burnside-Dollar study by raising questions about the selection of policy variables.

Recently, interest is growing in single-country data analysis instead of cross-country data, particularly with time series statistical techniques. One interesting feature of these studies is that most of the studies find a positive impact of aid growth. Ouattara[22] fitted an autoregressive distributed-lag model (ARDL) with the data for Ivory Coast covering the period 1975-1999. This study differentiated foreign aid into two different categories-project aid and programme aid. The study finds that in the long-run, project aid negatively affects domestic savings while the impact of programme aid is positive. In the short-run, programme aid inflows are associated with increases in domestic savings, whilst the impact of project aid is negative but insignificant. Another study by Amanja and Morrissey[23] with the help of VAR model on the economy of Kenya shows that foreign aid in the forms of loans play a positive role, directly or indirectly through private investment, in promoting growth.

For the economy of Nepal, a study by Srivastava and Choudhary[24] shows that the role of foreign aid on GDP growth rate is positive and

statistically significant. Al- khaldi[25] shows that the impact of foreign aid on the economy of Jordan is positive. The study also supports the "two-gap" model. Khan and Rahim's study[26] on Pakistan economy finds out a positive but insignificant impact of foreign aid on economic growth. The authors conclude that pure statistical analysis is unable to capture the complex effects of aid. The impact of foreign aid on poverty and human wellbeing in Papua New Guinea is positive[27]. For Pakistan, Mohey-ud-din's[28] study shows positive and decreasing returns to aid. His study also shows that aid adversely affected domestic savings in Pakistan. Prasad et al.[29] fitted a regression equation with the help of cross-country industry level data. The major finding is that industrial countries benefited more with aid. They mentioned the limited absorptive capacity of aid to the non-industrial countries.

The selected aid effectiveness studies mentioned above suffer from several lacunae. The first is that cross country data analysis in most of the aid effectiveness literature cannot capture qualitatively distinct attributes of different countries. In order to overcome these problems, one has to include several dummy variables in the regression model. Even in the case of single country data analysis, the model shows highly aggregative picture of aid effectiveness. Most of these studies are macro-econometric, showing overall impact of aid or aid associated with policy variables. At this juncture, distinction between microeconomic effect and macroeconomic effect of aid is highly essential. Project aid and programme aid are associated with micro-econometric and macro-econometric in orientation. Concerning project aid, statistical insignificance of the coefficients of aid does not nullify the impact of aid on growth. One possibility here is to displace some project aid for recurring expenditure of the established projects or direct government consumption. In this case, utility obtained by the people from government's tax rebate, resulting from increased aid receipts of the recipients is to be accounted for.

Most importantly, impact of aid should be assessed in terms of economic development, rather than economic growth, by making aid more

microeconomic in orientation. One possible way is to assess the impact of aid on different sectors of the economy viz. agriculture, industry or service sector or even for sub-sector of the economy such as infrastructure, trade, tourism, education, health or even human development. This type of disaggregation has been considered in very few numbers of empirical studies. The following section shows the impact of aid on economic growth of Bhutan, which is obviously a macroeconomic assessment. However, the studies on the impact of aid on various sectors of the economy of Bhutan have also been undertaken in the next chapter.

3.4: Foreign Aid in Bhutan

It has been mentioned that the Indian Prime Minister Nehru visited Bhutan in September 1958. During his visit, Nehru expressed his concerns about Bhutan's security and emphasized the need of a road link between Bhutan and India, offering at the same time financial and technical assistance. Immediately after this visit, the issue was discussed in the National Assembly. The decision was to forego Indian assistance in order to avoid increased dependency on India. Instead, resolution was to seek financial assistance from third countries.

However, Bhutan's attitude changed during the year 1959 as a clear consequence of events in Tibet. In the spring of 1959 the Tibetan revolt was suppressed by the Chinese, which resulted in the flow of several thousand Tibetan refugees into Bhutan. By autumn of the same year Chinese actions began to be directed against Bhutan. Revolutionary propaganda material was sent into the country and the Chumbi valley, a triangular-shaped part of Tibetan territory between Sikkim and Bhutan, through which the most important trade route from Bhutan to India was connected, was sealed off. In the following National Assembly session, the construction of roads became the main issue of discussion. Due to the entire absence of diplomatic relations with third countries, India was considered the only possible source of aid. This was the beginning of foreign aid into the country.

Bhutan belongs to the category of least developed country-the classification made by the UNDP on the basis of levels of development. Development process in such a least developed country is hampered by several constraints. In case of Bhutan, these constraints are in the form of shortage of labour, capital and technical know-how. The country is least populated, the density of population being 18 only per square km. Total population being 671.1 thousands even in 2008, shortage of technical, managerial and skilled labour is likely to prevail. Technical and managerial manpower were supplied as assistance from the government of India along with the financial assistance.

Despite being a natural resource rich country, physical and material constraints in Bhutan arise from the underutilization of resources caused by the lack of economic infrastructure and manpower constraint. Therefore, during the inception of planned development in the early 1960s, emphasis had to be given on infrastructure development, development of agriculture, public administration etc. The economy of Bhutan being least monetized and per capita income being very low, it had to depend on foreign aid, particularly from India for complementing domestic savings.

Financing constraint seems to be the most important development constraint in Bhutan. Bhutan's internal resources for investment and development are constrained by the low domestic savings and low tax revenue collected by the government. In this initial stage of development, imports of equipments were inevitable for implementing development projects and programmes. Due to petty export earnings from abroad, foreign assistance remained the only source of foreign exchange for meeting the import demands. Thus, both the 'savings-gap' and 'foreign exchange-gap' envisaged by Chennery and Strout[30] prevailed in Bhutan during the planned development era.

Development requirements of Bhutan were completely financed by foreign aid and this has been the trend till recently. Foreign aid consisted of two components-foreign grants and soft loans. Grants aid from the government of India and other international donors have traditionally

financed on average over 30 percent of fiscal outlay. In the revised estimates of 2007-08 budget, grant support is anticipated to finance 37.5 percent of total expenditure. The First Five Year Plan (1961-66) and the Second Five Year Plan (1966-71) were totally financed by Indian grants with the cost of Rs. 101.2 million and Rs. 200 million respectively[31]. In addition, Rs. 300 million grants for road construction were advanced during the first plan period. The year 1971 is a major landmark in the history of foreign aid because Bhutan became a member of UN and started receiving foreign aid from UN system, Colombo Plan and other bilateral agencies. Domestic investment too began to contribute to planned development since the third plan with as low as 3 percent of total plan expenditure. Since then, the share of domestic financing and other bilateral and multilateral agencies gradually increased while that of Indian aid showed a decreasing trend.

India has been Bhutan's largest donor followed by DANIDA, the UNDP, the World Bank, Swiss Development Cooperation and the Government of Netherlands. Table-3.2 shows the structure of foreign aid in Bhutan financed by various donors.

Table 3.2: Bilateral Foreign Aid in Bhutan (Nu. million)

Agency	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
Govt. of India	2551.2	945.3	2631.8	2287.2	2370.5	3087.3	3081.2	4671.1
DANIDA	394.8	534.8	525.8	579.2	432.1.	539.0	454.7.4	462.5
JICA	0.0	4.2	0.0	50.0	22.5	0.0	9.2	0.8
Govt. of Netherlands	147.6	274.5	201.0	331.7	253.9	234.1	136.3	27.0
UNDP	51.4	134,4	114.2	115.1	118.1	102.4	109.9	63.8
Govt. of Austria	174.2	44.2	68.7	32.7	56.6	61.9	66.0	6.3
HELVETAS	94.3	0.0	0.0	0.0	16.9	32.9	0.0	16.2
Swiss Dev. Cooperation	66.8	62.6	103.5	122.5	46.9	71.4	61.0	35.7
ECC	18.0	112.5	130.8	203.0	54.3	82.4	69.6	20.1
UNCDF	27.2	26.9	26.6	25.1	0.0	0.0	23.7	0.0
World Bank, IDF, IDA	o.o	11.8	28.6	17.5	35.3	771.2	662.9	42.0
Others	185.4	545.9	650.7	692.2	379.9	440.3	379.9	586.4
Total	3711.0	2696.9	4481.7	4456.2	3787.0	5422.88	5054.3	5931.9

Source: Royal Monetary Authority of Bhutan, *Annual Report*-2007-08, January, 2009.

Up to Fourth Five Year Plan (1976 – 1981) of Bhutan, whole foreign aid used to come from grants and there was no loan component. The loan component of foreign aid is highly concessional and emerged from the Fifth Five Year Plan (1981-86). Concessional loans began in 1981-82 with the first SDR loan disbursement from IFAD for the development of small farm projects. Since then, convertible currencies and Indian rupee loans have been disbursed in Bhutan provided by various foreign governments, multilateral, bilateral and private financing agencies. Indian programme aid was purely grants used mainly for the budgetary allocations. These programme aid are highly flexible in the sense that Bhutan government is free to allocate these aid according to its development priorities. On the other hand, project aid are soft loans with a grant component varying from project to project. For instance, the Chukha Hydel Project was established with Indian aid where 60 percent of total cost was grants and 40 percent loans at subsidized rate of interest. UN assistance was basically technical assistance, used mainly for advisory purposes. However, the recipient government emphasized capital aid. The composition of third country aid has changed significantly, with an increasing proportion supporting capital projects rather than technical assistance.

From the very beginning, development policy of the government of Bhutan envisaged achievement of self reliance. Priority has been assigned to raise domestic resources for development with less dependence on foreign aid. This was realized over the later stages of development. In the early 1980s, aid GDP ratio amounted to 50 percent. However, over the years, aid/GDP ratio decreased to only 20 percent in 1989-92. The government being conscious of repayment problems due to relatively low base of export earnings and the earnings from tourism sector, the government sought to avoid debt problems.

The government of Bhutan discusses its aid policies and aid requirements in the Round Table Meetings with its aid partners held every few years. While discussing, proposals are placed for least gestation period between the initial request and final disbursement of the project and

programme assistance not involving long period for investigation and approval. Bhutan government's aid policy is designed in such a way that maximum returns be generated at shortest possible time.

The Planning Commission, Gross National Happiness Commission at present, has the ultimate responsibility for the management and coordination of aid. Foreign aid are apprised in such way that economic benefit from aid is vigorous and significantly exceed the cost of loans. Initial debt burden not in any situation exceeds reasonable capacity of the economy. In order to avoid the possibility of any type of conflicts between the donors, efforts have been made to concentrate various donors into separate sectors.

3.5: Foreign Aid and Economic Growth of Bhutan: VAR Model

A large number of research works have been so far conducted by eminent scholars on the effectiveness of foreign aid in economic growth. In this section, a VAR model has been estimated for exploring the effectiveness of aid on economic growth for the economy of Bhutan.

The Model: Econometric models are in fact good tools for the assessment of the impact of foreign aid on economic development of a country. Various regression models are fitted for this causal relationship depending on the nature of variables and that of statistical data. For the multivariate time series data, among such models, popular one is the vector auto-regression (VAR) model developed by C. A. Sims[32]. At the very beginning, it is worth mentioning that for a VAR model estimation, all data series are required to be stationary.

A VAR model consists of at least two or more equations. Each equation contains one dependent variable and several independent variables and all the variables under consideration are endogenous variables. The current value of the dependent variable depends on the

lagged values of all the independent variables and lags of itself. Thus, a VAR model is suitable for Granger causality test because it is possible that the past may influence the present, but it is impossible for the present to influence the past[33].

Thus, it follows that the problems of interpretation that arises in the usual regression of Y_t on X_t, does not arise in case of the VAR model. Following VAR model has been used as an analytical tool for establishing causal relationship between GDP, Savings and foreign Grants for the economy of Bhutan:

$$\ln GDP_t = \alpha_1+\Sigma\beta_{1j}\ln GDP_{t-j}+\Sigma\emptyset_{1j}\ln SAV_{t-j}+\Sigma\theta_{1j}\ln GRT_{t-j}+u_{1t} \quad (3.26)$$

$$\ln SAV_t = \alpha_2+\Sigma\beta_{2j}\ln GDP_{t-j}+\Sigma\emptyset_{2j}\ln SAV_{t-j}+\Sigma\theta_{2j}\ln GRT_{t-j}+u_{2t} \quad (3.27)$$

$$\ln GRT_t = \alpha_3+\Sigma\beta_{3j}\ln GDP_{t-j}+\Sigma\emptyset_{3j}\ln SAV_{t-j}+\Sigma\theta_{3j}\ln GRT_{t-j}+u_{3t} \quad (3.28)$$

where GDP = Gross Domestic Product, SAV = gross national savings and GRT = total external grants in Bhutan. The above system is a VAR (q) model because each equation under study contains 'q' lags of all endogenous variables. If the number of lags for each equation is the same and the series of all variables are stationary, normal OLS estimation is feasible. This model can also be represented in growth form:

$$D\ln GDP_t = \alpha_1+\Sigma\beta_{1j}D\ln GDP_{t-j}+\Sigma\emptyset_{1j}D\ln SAV_{t-j}+\Sigma\theta_{1j}D\ln GRT_{t-j}+u_{1t} \quad (3.29)$$

$$D\ln SAV_t = \alpha_2+\Sigma\beta_{2j}D\ln GDP_{t-j}+\Sigma\emptyset_{2j}D\ln SAV_{t-j}+\Sigma\theta_{2j}D\ln GRT_{t-j}+u_{2t} \quad (3.30)$$

$$D\ln GRT_t = \alpha_3+\Sigma\beta_{3j}D\ln GDP_{t-j}+\Sigma\emptyset_{3j}D\ln SAV_{t-j}+\Sigma\theta_{3j}D\ln GRT_{t-j}+u_{3t} \quad (3.31)$$

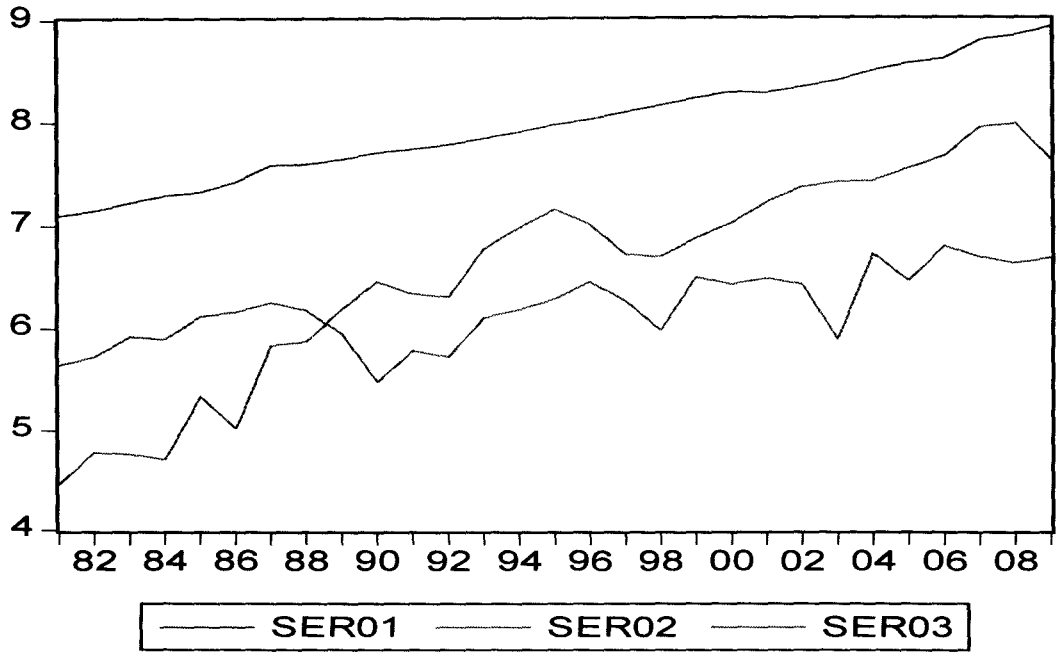
where D=first differencing.

In case of VAR model, if the variables are not stationary, appropriate differencing is to be made before estimating the VAR model. Standard error or usual 't' statistic will ascertain the significance of the individually estimated coefficients. If some of the original variables are not stationary or they are I(1) and at least one of them is cointegrated, Vector Error Correction Model (VECM) is the suitable model. Therefore, before

estimating a VAR model, proper tests of cointegration must precede.

Data: Annual time series data of Bhutan covering the period 1981-2009 has been used for fitting the VAR model. The source of data is the Key Indicators of Developing Asia and the Pacific Countries[34] (1999, 2007) published by the Asian Development Bank (ADB). Data have been collected also from ADB's official website (www. adb. org). Due to missing of some observations in the above reference, those have been collected from Selected Economic Indicators[35] published by the Royal Monetary Authority of Bhutan, the Central Bank of the country, as well as National Statistical Bureau of Bhutan.

Trends in Data: Figure 3.1 shows the trends of the three series viz. lnGDP, lnGRT and lnSAV, which give some indication of non-stationarity.



SER01=lnGDP, SER02= lnGRT and SER03 =lnSAV

Figure 3.1

Unit Root Test: Graphical analysis and correlogram has given some indications of data containing unit root. However, both these analyses may not assure the stationarity of data. More formal tests of stationarity, such

as unit root tests are inevitable. The test here followed is the augmented Dickey-Fuller test. For the logged income variable, the Augmented Dickey-Fuller test statistic is 1.9641542 in absolute value, much bellow even the 10 percent critical value of 3.2253343. Therefore, the null hypothesis of $\delta=0$ or that of nonstationarity is accepted. For the logged foreign aid variable, similar ADF test has been performed. Augmented Dickey-Fuller test satistic (τ) 3.8901161 in absolute value is much below the 1 percent critical value of 4.3239792. These results show that grant series is also nonstationary at the 1 percent level. For the logged saving series, the calculated ADF test statistic is 2.114770 in absolute value, below the 10 percent critical value of 3.2253342. Thus, the savings series is non-stationary. Phillips-Perron unit root tests also show the similar results.

The same test has been performed for DlnGDP, DlnGRT and DlnSAV series after their first differencing. The results of these tests indicate that all these three series become stationary after first differencing. These results have been shown in the appendix tables at the end of this chapter.

Co-integration Test Cointegration test is required for detection of cointegration among the variables. There are three popular tests for detecting cointegration among the variables. For two variables, Durbin-Watson test and Eagle-Granger tests are sufficient. However, for three or more variables, Johansen cointegration test is appropriate[36]. There are two types of test statistics-Trace statistic and Eigenvalue statistic. Results of this test for Bhutan's lnGDP, lnGRT and lnSAV series have been shown in the appendix table. At the 5 percent level of significance, both Trace statistic and eigenvalue statistic indicate that there is no cointegrating equation.

Results of VAR Estimation: It has been found that all the three variables viz. lnGDP, ln GRT) and lnSAV are nonstationary and their first difference is stationary. None of the series are cointegrated. Therefore, estimation of VAR model is appropriate with data in their first difference.

Lag length of VAR model has been selected on the basis of Akaike Information criteria (AIC) or SIC. Table 3.3 shows the results of VAR estimation.

Table-3.3: Results of VAR Estimation

	D(lnGDP)	D(lnGrant)	D(lnSaving)
D(lnGDP(-1))	0.187897	-1.027585	0.973668
	(0.21144)	(1.50367)	(1.75538)
	[0.88867]	[-0.68338]	[0.55468]
D(lnGDP(-2))	-0.285355	0.731378	-1.862856
	(0.19617)	(1.39513)	(1.62866)
	[-1.45461]	[0.52424]	[-1.14379]
D(lnGDP(-3))	0.185526	-5.315672	2.037023
	(0.25523)	(1.81513)	(2.11897)
	[0.72690]	[-2.92853]*	[0.96133]
D(lnGrant(-1))	0.001006	-0.320639	0.062858
	(0.02857)	(0.20322)	(0.23723)
	[0.03520]	[-1.57782]	[0.26496]
D(lnGrant(-2))	-0.001083	0.094119	0.208058
	(0.03023)	(0.21501)	(0.25100)
	[-0.03581]	[0.43775]	[0.82893]
D(lnGrant(-3))	0.081770	-0.009962	0.047452
	(0.02851)	(0.20276)	(0.23670)
	[2.86812]*	[-0.04913]	[0.20047]
D(lnSaving(-1))	-0.054781	-0.076495	-0.305306
	(0.03102)	(0.22063)	(0.25756)
	[-1.76578]	[-0.34671]	[-1.18537]
D(lnSaving(-2))	0.022154	-0.302780	0.098662
	(0.03191)	(0.22696)	(0.26495)
	[0.69419]	[-1.33406]	[0.37238]
D(lnSaving(-3)	-0.045308	-0.146230	-0.154590
	(0.03267)	(0.23231)	(0.27120)
	[-1.38700]	[-0.62946]	[-0.57003]
C	0.067190	0.447365	0.087398
	(0.02782)	(0.19786)	(0.23097)
	[2.41508]	[2.26107]	[0.37839]
R-squared	0.515968	0.578565	0.286340
S.E. equation	0.034812	0.247573	0.289015
F-statistic	1.776630	2.288077	0.668713
Log likelihood	54.85679	5.813130	1.943812
Akaike AIC	-3.588543	0.334950	0.644495
Schwarz SC	-3.100993	0.822500	1.132045

Estimated results in Table-3.3 shows that in the GDP growth equation, coefficient of foreign grants three periods lagged is positive and statistically

significant. This implies that the growth of past foreign grants raises GDP growth today. One percent increase in foreign grants today would raise growth of GDP by 0.8 percent after three years. In case of foreign grants equation, three periods lagged GDP is statistically significant. The negative sign of the coefficient implies that GDP growth is a vital mean for the achievement of self-reliance. This shows causality from both directions.

Table-3.4 shows the results of pair wise Granger causality tests for these three variables in growth terms:

Table-3.4: Results of Granger Causality Tests

Variables	Granger causes	Variables	Lags
D(lnGDP)	Causes	D(lnGRT)	3,4,5
D(lnGDP)	Causes	D(lnSAV)	6
D(lnGRT)	Causes	D(lnSAV)	8

Results show that foreign grant in Bhutan Granger causes its gross domestic savings. These results together indicate that foreign aid is effective both in terms of accelerating growth and raising domestic savings in Bhutan. Therefore, the country has to accept foreign aid for its domestic economic development. The results also support Harrod-Domar and Chennery-Strout models[37].

Reference

1. Tarp, Finn (2006): 'Aid and Development', *Swedish Economic Policy Review*, Vol. 13, pp. 9-61.
2. Chenery, H.B. and Strout, A.M. (1966): 'Foreign Assistance and Economic Development', *American Economic Review*, Vol. 56, No. 4, Part-1, Sept, pp. 679-733.
3. Ibid.
4. Sandefur, J. (2006): 'The Economics of Foreign Aid', Lecture I, Week 7, Centre for the Study of African Economies, Economics Department, Oxford University.

5. Papanek, G. F. (1973): 'Aid, Foreign Private Investment, Savings and Growth in Less Developed Countries', *Journal of Political Economy*, Vol. 81, pp. 120-130.
6. Xayavong, V. (2002): *A Macroeconometric Analysis of Foreign Aid in Economic Growth and Development in Least Developed Countries: A Case Study of the Lao People's Democratic Republic (1978-2001)*, Ph. D. Thesis, Massey University, New Zealand (*http//mro.massey.ac.nz*/05.06.2010).
7. Gillivray et al. (2005): 'It Works, It Doesn't, It Can, But that Depends....', Research Paper No. 2005/54, World Institute for Development Economics Research, United Nations University.
8. Burnside, C. and Dollar, D. (2000): 'Aid, Policies and Growth', *American Economic Review*, Vol. 90 No. 4, pp. 847-68.
9. Ibid 6.
10. Griffin, K. and Enos, J. (1970): 'Foreign Assistance: Objectives and Consequences', *Economic Development and Cultural Change*, Vol. 18, pp. 313-27.
11. Pindyck, R. S. and Rubinfeld, D. L. (1998): *Econometric Models and Economic Forecasts*, Irwin/Mc Graw Hill, p. 399.
12. Maddala, G. S. (2007): *Introduction to Econometrics*, Wiley Student Edition, New Delhi, p. 563.
13. White, H. (1992): 'Macroeconomic Impact of Development aid: A Critical Survey', *Journal of Development Studies*, Vol. 28, No. 2, pp. 163-240.
14. Ibid 2.
15. Ibid 10.
16. Ibid 5.
17. Mosley, P. (1980): 'Aid, Savings and Growth Revisited', *Oxford Bulletin of Economics and Statistics*, Vol. 42, No. 2, pp. 79-95.
18. Ibid 8.
19. Dalgaard, C. J. et al. (2004): 'On the Empirics of Foreign Aid and Growth', *Economic Journal*, Vol. 114, pp. F191-F216.
20. Ibid 8.
21. Eris, M. (2008): 'Foreign aid and growth', *Economics Bulletin*, Vol. 15, No. 14 pp. 1-14.
22. Ouattara, B. (2007): 'Foreign Aid, Public Savings Displacement and Aid Dependency in Cote d'Ivoire: An Aid Disaggregation Approach', *Taylor and Francis Journals*, Oxford Development Studies, Volume 35, Issue 1, pp. 33-46.
23. Amanja, D. and Morrissey, O. (2006): 'Foreign Aid, Investment, and Economic Growth in Kenya: A Time Series Approach', CREDIT Research Paper No. 06/05, Centre for Research in Economic Development and International Trade, University of Nottingham.
24. Srivastava, N. L. and Choudhary, S. K. (2007): 'Role of Remittance in Economic Development of Nepal', *The Journal of Nepalese Business Studies*, Vol. 4, No. 1, pp. 28-37.
25. Al-khaldi, M. D. (2008): 'Impact of Foreign Aid on Economic Development in Jordan (1990-2005)', *Journal of Social Sciences*, Vol. 4, No. 1, pp. 16-20.
26. Khan, N. Z. and Rahim, E. (1993): 'Foreign Aid, Domestic Savings and Economic Growth (Pakistan: 1960-1988)', *The Pakistan Development Review*, Vol. 32, No. 4, Part-II, Winter, pp. 1157-1167.
27. Feeny, S. (2003): 'The Impact of Foreign Aid on Poverty and Human Well-Being in Papua New Guinea', *Asia-Pacific Development Journal*, Vol. 10, No. 2, December.

28. Mohey-ud-din, G. (2005): 'Impact of Foreign Aid on Economic Development in Pakistan [1960-2002]', Posted on 18 December, 2006 at Personal Archive *(http:// mpra.ub.uni-muenchen.de/* 1211*)*.
29. Prasad, E. et al. (2006): 'Foreign Capital and Economic Growth', Research Department, IMF, August 11 (*http//cep.lse.ac.uk/*30.01.2011).
30. Ibid 2.
31. Belfliglio, Valentine, J. (1972): 'India's Economic and Political Relations with Bhutan', *Asian Survey*, Vol. 12, No. 8, pp. 676-685.
32. Sims, C. A. (1980): 'Macroeconomics and Reality', *Econometrica*, Vol. 48, pp. 1-48.
33. Koop, Gary (2002): *Analysis of Economic Data*, John Willey and Sons, p. 104.
34. Asian Development Bank (1999, 2007): *Key Indicators of Developing Asia and the Pacific Countries.*
35. Royal Monetary Authority of Bhutan (1989). *Selected Economic Indicators*, Royal Government of Bhutan, December.
36. Wang, Peijie (2009). *Financial Econometrics*, Routeledge, pp. 49-51.
37. Ibid 2.

Appendix Tables

Unit root tests

Table-A

Null Hypothesis: lnGDP has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.964154	0.5948
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				
R-squared	0.143849	Mean dependent var		0.065562
S.E. of regression	0.035995	Akaike info criterion		-3.709927
Durbin-Watson stat	1.903003	Prob(F-statistic)		0.143509

Table-B

Null Hypothesis: D(lnGDP) has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.688048	0.0004
Test critical values:	1% level		-4.339330	
	5% level		-3.587527	
	10% level		-3.229230	
*MacKinnon (1996) one-sided p-values.				
R-squared	0.574124	Mean dependent var		0.001043
S.E. of regression	0.039008	Akaike info criterion		-3.545635
Durbin-Watson stat	2.031182	Prob(F-statistic)		0.000036

Table-C

Null Hypothesis: ln Grant has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.890116	0.0262
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				
R-squared	0.377253	Mean dependent var		0.037235
S.E. of regression	0.234897	Akaike info criterion		0.041614
Durbin-Watson stat	2.052219	Prob(F-statistic)		0.002685

Table-D

Null Hypothesis: D (lnGrant) has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.787183	0.0000
Test critical values:	1% level		-4.339330	
	5% level		-3.587527	
	10% level		-3.229230	
*MacKinnon (1996) one-sided p-values.				
R-squared	0.716461	Mean dependent var		-0.001098
S.E. of regression	0.273756	Akaike info criterion		0.351278
Durbin-Watson stat	1.993505	Prob(F-statistic)		0.000000

Table-E

Null Hypothesis: lnSaving has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.114770	0.5158
Test critical values:	1% level		-4.323979	
	5% level		-3.580623	
	10% level		-3.225334	
*MacKinnon (1996) one-sided p-values.				
R-squared	0.202108	Mean dependent var		0.113786
S.E. of regression	0.242767	Akaike info criterion		0.107530
Durbin-Watson stat	2.205775	Prob(F-statistic)		0.059471

Table-F

Null Hypothesis: D(lnSaving) has a unit root				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.749551	0.0000
Test critical values:	1% level		-4.339330	
	5% level		-3.587527	
	10% level		-3.229230	
*MacKinnon (1996) one-sided p-values.				
R-squared	0.655515	Mean dependent var		-0.024829
Adjusted R-squared	0.626807	S.D. dependent var		0.413124
S.E. of regression	0.252375	Akaike info criterion		0.188640
Sum squared resid	1.528639	Schwarz criterion		0.332622
Log likelihood	0.453357	F-statistic		22.83456
Durbin-Watson stat	1.877670	Prob(F-statistic)		0.000003

Cointegration Test

Table-G

Trend assumption: Linear deterministic trend				
Series: lnGDP lnGrantln lnSaving				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.318305	17.59103	29.79707	0.5964
At most 1	0.188741	6.862189	15.49471	0.5937
At most 2	0.035273	1.005489	3.841466	0.3160
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.318305	10.72884	21.13162	0.6743
At most 1	0.188741	5.856700	14.26460	0.6317
At most 2	0.035273	1.005489	3.841466	0.3160
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Roots of Characteristic Polynomial

Table- H

Endogenous variables: X Y Z	
Root	Modulus
-0.781151 - 0.573952i	0.969339
-0.781151 + 0.573952i	0.969339
-0.029742 - 0.863840i	0.864352
-0.029742 + 0.863840i	0.864352
0.697966 - 0.449999i	0.830455
0.697966 + 0.449999i	0.830455
-0.709382	0.709382
0.248594 - 0.411824i	0.481038
0.248594 + 0.411824i	0.481038
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

■X, Y, Z refers to the residuals from GDP,GRT and SAV