Private Savings Behaviour in Nepal: Long-term Determinants and Short-run Dynamics

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With a view to explain the long-run and cyclical behaviour of private savings in Nepal during the period 1974-2005, the study employs an error-correction framework. The study estimated 0.309 as marginal propensity to save with the corresponding value of 0.365 in the long-run. The estimation results reveal that real income, real government savings, real foreign savings, real interest rates, and labour market constraints play important roles in determining private savings in the short and long-run. The findings of the study suggest that there is a need to focus on development policy which increases productive base of the economy in order to increase income growth and reduce unemployment. It is also important to note that the real interest rates have a positive influence on the private savings and can be taken as an important policy variable in Nepal.

I. INTRODUCTION

The mobilization of savings is important for economic growth. It is considered to be a precondition for many developing countries. Many of the periodic plans in Nepal have also emphasized the need for accelerating the growth and mobilization of domestic saving. Increasing growth means needs for capital accumulation which requires savings. "The central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 percent of its national income converts itself into an economy where voluntary saving is running about 12 to 15 percent of the national income or more" (Lewis, 1954:416). The growth of domestic savings, by facilitating the process of capital accumulation, ensures the realization of economic growth.

The critical role of savings and capital in creating income growth has been well established in industrial countries. The sources of growth analysis in nine countries (Great Britain., Germany, Sweden, Canada, Italy, U.S, Japan France and Norway) have shown that expansion in physical capital input alone has been responsible for about half the growth in the aggregate income of nine developed countries from 1960-1975. Many

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studies point out to the very low investment rate in the United States in the 1970's and early 1980's as a prime reason, along with a lagging productivity growth for its low rates of per capita income growth since 1970, relative to Japan and Western Europe. Indeed by 1983, gross domestic investment was 17 percent of GDP in the United States, a ration well below the 20 percent figure for 1965, and one of the lowest of all the industrial countries.

As in Ricardo's theory, any thing that raises urban wages cuts into profit, and hence into savings and economic growth. Some of the factors that could have this effect include a rise in the price of food relative to the price of manufactured goods, by trade unions or government to bargain for or legislate increased modern sector wages.

Various sources of savings are available to meet the development requirements. The total available savings (S) constitutes simply the sum of domestic savings (S_d) and foreign savings (S_f). Domestic savings may be grouped under two components, government savings (S_g) and private sector savings (S_p). Government savings consists primarily of budgetary savings (S_{gb}) that arises from any excess of government revenues over government consumption. The private domestic savings arises from two sources: corporate savings (S_{pc}) and household savings (S_{ph}). The corporate savings involve corporate retained earning after taxes and dividend to shareholders. Similarly, household savings includes household income not consumed nor paid in tax.

Foreign savings also come in two basic forms: official savings or foreign aid (S_{fo}), and private foreign savings (S_{fp}) which indicates for external commercial borrowing and foreign direct investment. It means debt and equity finance. Hence Savings (S) is a sum of domestic and foreign Savings $(S_d + S_f) = (S_g+S_p) + (S_{fo}+S_{fp})$. The status of various types of savings in Nepal is given in the table below.

TABLE 1 : Sources and Status of Savings in Nepal
(Rs in Million and Constant Price, 2000/01)

Year	GDP	Govt Saving As % of GDP	Private Saving As % of GDP	Foreign Saving As % of GDP	Year	GDP	Govt Saving As % of GDP	Private Saving AS % of GDP	Foreign Saving As % of GDP
1974	128371	-1.50	11.53	0.52	1991	257714	1.11	10.08	5.05
1975	134022	-1.03	12.75	0.84	1992	266315	0.15	13.86	3.31
1976	138060	0.36	13.13	1.18	1993	287279	1.88	13.38	5.60
1977	144138	0.56	12.31	1.15	1994	295436	2.05	13.41	4.19
1978	147555	-0.35	11.98	1.31	1995	312158	2.04	12.34	3.09
1979	144138	1.35	9.75	2.47	1996	327818	2.00	12.53	3.11
1980	156164	1.82	9.07	2.32	1997	338941	1.70	12.60	3.10
1981	162057	0.13	9.83	2.50	1998	354506	2.04	12.06	2.16
1982	157239	-1.70	10.25	2.75	1999	375868	2.44	13.28	2.16
1983	172455	-0.60	10.46	3.06	2000	394052	2.22	13.52	1.57
1984	183053	-1.02	15.07	2.86	2001	390743	2.00	10.63	1.40
1985	181650	-0.97	12.64	3.59	2002	408425	2.26	10.26	1.23
1986	189394	-1.00	13.59	3.19	2003	425555	2.52	10.62	0.31
1987	209193	0.62	9.77	5.97	2004	427941	3.09	9.96	0.31
1988	220558	-1.36	13.19	6.90	2005	439856	2.34	9.26	0.56
1989	231413	0.33	7.84	5.91					
1990	246314	-0.31	10.22	5.43					
Average Before Restoration of Democracy	*173281*	*-0.29*	*11.30*	*3.41*	*Average After Restoration of Democracy*	*353507*	*2.07*	*11.71*	*2.23*

Source: Ministry of Finance.

The average GDP at constant price for the period 1991-2005 increased by two times as compared to the average GDP for the period 1974-1990. Before the restoration of democracy, the government savings was found to be very poor and remained at a negative growth rate while it has been positive at 2.07 percent of the GDP after the restoration of democracy. The private savings as percent of GDP has remained to be more or less the same with nearly 11.30 percent for the period 1974-90 and 11.60 percent for the period 1991-2005. In the case of foreign savings, the status remained good before the period of restoration of democracy. It was on average 3.41 percent as compared to 2.23 percent in 1991-2005.

TABLE 2 : Average Size of Savings (Rs. in million constant price, 2000/01)

Period	GDP	Govt. Saving	Private Saving	Foreign Saving	Govt Saving as % of GDP	Private Saving as % of GDP	Foreign Saving As % of GDP	Real Interest Rates
1974-75	131197	-1650	15947	898	-1.26	12.15	0.68	0.74
1976-80	146011	1118	16354	2483	0.77	11.20	1.70	4.35
1981-85	171291	-1424	20129	5080	-0.83	11.75	2.97	1.08
1986-90	219374	-719	23715	12155	-0.33	10.81	5.54	-0.46
1991-95	283781	4212	35892	11992	1.48	12.65	4.23	-0.49
1996-00	358237	7486	45948	8525	2.09	12.83	2.38	2.22
2001-05	418504	10243	42398	3117	2.45	10.13	0.74	-0.20

Sources: Ministry of Finance.

Table 2 shows that the savings performance in Nepal is relatively better in the mid 1990s and late 1980s with regard to all the sources of savings. The government savings together with private and foreign savings was found to be encouraging.   The major part of private savings constitutes household savings.

Based on the above background, the objective of this paper is to ascertain the factors affecting savings behavior by formulating an empirical model of private savings behavior to identify the long-run determinants and short run dynamics adjustment of saving around its long run trend from the Nepalese data-base. The next section examines some theoretical considerations followed by a review of some empirical studies. This is preceded by a discussion on the model specification as well as sources of data. The regression results are presented next. The last section concludes the paper.

II. THEORETICAL CONSIDERATIONS

Theories of household savings behaviour were initially developed as part of the post war Keynesian revolution in economic thought to explain savings patterns in industrial countries. The study on household savings behaviour received a substantial focus as they were large and there was an increasing share of net savings in the rich countries (50 percent in 1964 and 93 percent in 1981), and by indications that similar patterns might prevail in less-developed countries (LDCs) as well (World Bank, 1983 as cited in Gillis et al. 1987).

Following the work of Keynes (1936), it was believed that the level of income exerts a positive influence on savings. It means savings was viewed as directly dependent upon current disposable income. The propensity to save out of current disposable income was thought to rise with income. This was known as the Keynesian Absolute Income Hypothesis.

The standard Keynesian short run saving function $S = \alpha + \beta Y^d$ where, S=savings, Y^d = current disposable income. α = constant ($\alpha < 0$), and β = the marginal propensity to save ($0 < \beta > 1$). The constant, α is generally taken to be negative, signifying that at low levels of income, savings will be negative. Under this formulation, savings ratios (savings as a fraction of GDP) should be expected to rise over time in all countries where income is growing. But the historical record in both developed and developing countries provide very weak support for the Keynesian hypothesis (Gillis et al. 1987). It is argued that the Keynesian formulation depicts savings behaviour over the very short term, but it breaks down as a long run proposition. Moreover, the model also does not give importance to the role of interest rates. The economists under Keynesian tradition do not find role of interest rate on private sector decision to allocate income between consumption and saving. Therefore, economists under Keynesian tradition, in both industrial and developing countries, are considered to be the leading interest elasticity pessimists.

The other explanations of household savings behaviour are also made under the Duesenberry Relative Income Hypothesis *(*Gillis et al. 1987*)*, the Friedman Permanent-Income Hypothesis (Friedman, 1957), the Kaldor Class-Saving Hypothesis (1959), and Life Cycle Hypothesis of Savings (Ando and Modigliani, 1963). The relative income hypothesis argues that savings does not only depend on current income but also on the previous levels of income and past consumption habit i. e. $C_t = \alpha + (1-s)Y^d t + \beta C_{t-1}$. Where C_t =consumption at time t, $Y^d t$ = income at time t, C_{t-1}=previous level of consumption, $0<s<1$, $0<b<1$. Under this hypothesis, the short run consumption (savings) function in an economy tends to ratchet upward over time. As income grows over the long term, consumers adjust their spending habits to higher levels of consumption. But in the short run, they are reluctant to reduce consumption level even if the income falls temporarily.

The arguments under permanent income hypothesis lies in the fact that individuals expect to live for many years; they make consumption decisions over a horizon of many years. In the most restrictive variant of the permanent income hypothesis, consumption tends to be a constant proportion of permanent income, approaching to 100 percent of permanent income. Thus, any savings that occur primarily may be out of transitory income: unexpected, nonrecurring income such as those arising from changes from assets values, changes in relative prices, lottery winnings, and other unpredictable windfall gains. This is expressed as: $S = \alpha + \beta_1 Y_p + \beta_2 Y_u$, where S = savings, α= constant, Y_p = permanent income, and Y_u= unexpected income, $0< \beta_1 < \beta_2 <1$.

The class theory of savings views consumption (savings) habits to be sharply differentiated by the economic class (Kaldor, 1959). Workers, who mainly receive labour income, are thought to have weaker saving propensities than do capitalists, who primarily receive property income (profits, rents, and interests). It is expressed as: $S = s_w L + s_c P$, where, s_w=workers' savings propensities out of labour income, s_c=capitalists' savings propensities out of property income, L =labour income, P= property income, and $0< s_w < s_c <1$.

The life cycle model of consumption (savings) postulates that an individual maximizes the present value of his life time utility, subject to an intertemporal budget constraint that is equal to the current net worth plus the present value of his labour income over the remaining working life (Ando and Modgiliani, 1963). The intertemporal optimization yields a solution in which the current consumption is a function of the current non-human wealth and the present value of the expected future labour income (Wee-beng Gan and Lee-Ying Soon, 1995).

One implication of the life cycle permanent income theories is that the ratio of consumption to income and the ratio of wealth income remain constant along a given long run growth path, but vary once the steady state growth changes. One important framework that reproduces the life cycle consumption-income relationship in steady state is the error–correction model (Davidson et. al, 1978) i.e. $\Delta C = \beta_0 + \beta_1 \Delta Y + \beta_2 (C_{t-1} - Y_{t-1}) + \varepsilon_t$, where, C = consumption, C_{t-1}= lagged consumption, Y= income, and Y_{t-1}= lagged income. The steady state relationship between consumption and income can be derived from following formula: $C = \frac{((1-\beta_1)g-\beta_2)}{\beta_2}$, where g = steady state growth. Hence, C/Y= $\exp\{[1-\beta_1)g-\beta_0]\}/\beta_2$ which indicates that the long run consumption-income ratio, and hence savings ratio remains constant so long as the steady state growth rate, g, is unchanged. The ratio rises as g increases so long as $\beta_2 >$ and $\beta_1 > 1$.

All the hypotheses as mentioned above view income, whether current, relative or permanent, as the principal determinant of savings behaviour. It has been well established that the level of income exerts a positive influence on savings. But income is by no means the only determinant of aggregate private sector savings behaviour particularly in LDCs.

III. EMPIRICAL STUDIES

Theoretical and empirical studies conducted on savings behaviour in developing countries have identified activity variables such as the real interest rates and some measures of capital inflows (or foreign saving) as the important variables determining domestic savings (Arrieta, 1988). In addition to the above mentioned determinants, some of the studies also included demographic variables, government savings and labour market constraints into their model to investigate their influence on private savings.

The interest rate sensitivity of savings has been the subject of much debate in the literature relating to LDCs. Many economists remain doubtful that interest rates, whether nominal or real, have any significant impact on private sector consumption behaviour in either developed or developing countries. Since savings is defined as not consuming, economists who do not believe on the role of interest rates conclude that interest rates have little impact on private savings decision to allocate income between consumption and savings: the interest elasticity of savings is held to be zero or insignificantly small. The influence of real interest rate on savings and consumption decisions has been a matter of considerable controversy (Wood, 1995).

At the theoretical level, the influence of real interest rates on savings depends on the relative strengths of the offsetting substitution and income effect. A rise in the rate of return may increase savings by making future consumption cheaper relative to current consumption (substitution effect). At the same time, higher real interest rates may reduce the savings necessary to purchase a given amount of future consumption (income effect).

Given the theoretical ambiguities, whether or not savings behaviour is interest elastic is a matter for empirical analysis.[1]

With the persuasion of economic liberalization by many countries of the world, it can be safely argued that capital inflow (or foreign savings) should be an important determinant of national savings.[2] In the early post war period, development economists, writing in the context of the 'Two Gap Model' of economic development, asserted that foreign assistance was essential if LDCs were to break the savings deadlock and achieve some meaningful degree of economic progress (see, for example, Rosenstein-Roden, 1961 and Chenery and Strout,1966 c.f. Wood, 1995). However, the above view of complementary role of foreign capital has been put under scrutiny. The experience of many of the LDCs in the last two or three decades does not support the complementary and essential role of foreign capital. Many economists have demonstrated that foreign capital and national savings are substitutable resources, and that foreign capital can affect growth adversely (Griffin and Enos, 1970 and Weiskopf, 1972, c.f. Wood, 1995). Foreign borrowings induced by large government budget deficits imply lower national savings. Further access to subsidized external savings may help recipient countries to neglect internal economic determinants of savings formation (Fisher, 1989).

The population structure has also been identified as a factor affecting savings behaviour in LDCs. Leff (1969, 1980) found a significant inverse relationship between dependency rates and saving rates in LDCs. He concluded that rapidly growing population (as found in LDCs) was characterized by a high ratio of dependents (young people) to the working age population, who because they contributed to consumption but not to the production, imposed a severe constraint on the society's potential for savings. Similarly, people in the very high age groups were seen as putting a strain on society's resources with out making a concomitant contribution to production. However, a number of authors including Billsborrow(1979, 1980) and Ram (1982), have questioned Leff's conclusions on the ground of specification and sample biases, and in general on the reliability of data (Wood, 1995). Similarly, Ross (1989) also questioned the theoretical framework upon which the existing evidence of dependency rates and savings behaviour is based.

Unemployment as a proxy of labour market constraint may also influence savings behaviour. As a measure of constraint in the labour market, unemployment may reduce the ability of individuals to save. Conversely, current employment, by increasing expectation of future unemployment, may lead to a higher level of savings via the precautionary motives (Deaton, 1992, c.f. Wood, 1995). The net effect of unemployment of savings can be established empirically.

Empirical studies on savings behaviour in LDCs have concentrated on analyzing total domestic (or national) savings without distinguishing between private and public savings. The use of aggregate savings obscures the fact that an important relationship might exist between private and public savings. Making a distinction between private and public

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[1] This literature is also controversial. For a brief survey, see Arrieta (1988) and Rossi (1988)

[2] Indeed the paper is interested to resolve the conflicting view on the role of foreign capital in capital accumulation process ascertaining how this variable affects savings behaviour. This is a very important issue, since one of the problems likely to be faced by the economy in the future will be the diminishing importance of foreign capital in the capital accumulation process.

savings is a valid procedure when Recardian Equivalence holds, which suggest that variation in government savings are neutralized by opposite movements in private savings. Government savings is, therefore, included as an explanatory variable in private savings model to see whether or not Recardian Equivalence holds in the economy. In the empirical analysis, the present study also considered government savings as an exogenously determined policy variable.

Identifying the different factors involved in the process of savings mobilization in developing countries is an important aspect of understanding the structure of such economies and in determining the policy mechanisms for encouraging domestic flows for investment purpose. The present study is an attempt to estimate the effect of income, real interest rates, labour market constraints, government savings, foreign savings and population structure on the level of private savings in Nepal, and inform policy makers to consider the status of savings behaviour for the purpose of economic planning in Nepal.

IV. MODEL SPECIFICATION

The objective as mentioned above requires an appropriate specification of the saving behaviour including time series data of the variables included in the model so that the valid estimation and inference could be made for economic planning. Econometrically, the modeling of such behaviour requires a stationary data process which is absent in many of the economic variables (Wood, 1995). The stationary data process indicates for constant mean and variance of each of the data series of the variables included in the model. Valid estimation is not possible when a set of non-stationary variables is cointegrated and the test of views remains meaningless. It means the estimation based on non-stationary data series does not help to accept or reject the conjectures. The cointegrated regression shows the presence of long run equilibrium relationship. Theoretically, one should be careful in the use of the time series data, whether stationary or non-stationary, for specifications like savings behaviour. Modeling savings behaviour requires consideration of the fact. As savings is important for economic planning of the country, this requires knowledge of the status of savings and its behaviour.

The model employed in the paper is the co-integration approach. There are various literature on this approach. The important contributions are made by Engle and Granger (1987, 1991) and Dickey et al. (1991). Wood (1995) also argued for the need of the stationary data series to employ cointegration theory. As many of the economic variables do not possess the characteristics of being stationary, it is necessary to keep in mind the type of data series used in the model. Valid estimation and inference is not possible when a set of non-stationary variables is cointegrated.

The cointegration of a set of variables provides sufficient ground for specifying a corresponding error correction or dynamic equation for these variables based on the Granger Representation Theorem (Engle and Granger, 1985, 1987). The error correction model encompasses models in both levels and differences of variables and is compatible with a long- run equilibrium behaviour.

The steps involved in the model are as follows:
- Investigating the temporal characteristics of the variables in the savings function. This essentially involves the use of testing procedures such as those developed by

Dickey and Fuller (1979, 1981) to determine the degree of differencing required in order to induce stationary. This has been done with the following specification.

$$\Delta(PS)_t = \beta_1 + \beta_2 t + \delta(PS)_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta(PS)_{t-1} + \dots\dots + \varepsilon_t \dots\dots(1)$$

where, PS stands for real private saving, t for trend variable, $\Delta(PS)_{t-1}$ for $PS_{t-1} - PS_{t-2}$, $\Delta(PS)_{t-2}$ for $PS_{t-2} - PS_{t-3}$ etc., m is chosen to ensure that the residuals (u_t) are empirically white noise, when m=0, the Dickey-Fuller test is defined and m≠0 specifies the Augmented Dickey-Fuller test; ε_t stands for pure white noise error term, and Δ for change.

A similar specification has been done for time series data of each of the variables included in the model.

- Formulating the static `long-run' theoretical relationship and testing for a vector of co- integrated variables. It is being assumed that the normalization is on gross private savings, it uses the Dickey Fuller (DF), Augmented Dickey Fuller (ADF) to test the stationary of the error term in the static regression equation (Hall, 1986).

- Estimating the error correction or dynamic short-run representation of the relationship and testing for the adequacy of the resulting equation. This dynamic equation would include the lagged error term from the estimated long run equation as independent variables, which measures the extent of deviation from long run equilibrium. The model is specified as follows:

$$\Delta(PS)_t = \beta_1 + \beta_2 \Delta(Y)_t + \beta_3 \Delta(GS)_t + \beta_4 \Delta(FS)_t + \beta_5 \Delta(UP)t + \beta_6 \Delta(DP)_t + \beta_7 ECM\_1 + \beta_8 \Delta(PS\_1)\dots\dots(2)$$

where Y stands for real GDP at time t, GS for real government savings at time t, FS for real foreign savings at time t, UP for number of unemployed persons at time t, DP for dependent population at time t, ECM_1 for lagged error correction term, PS_1 for lagged difference in real private savings, and Δ for change.

V. DATA SOURCES AND CONSIDERATIONS

Most of the data employed in this study were obtained from various issues of *Economic Survey* of Ministry of Finance, *Quarterly Economic Bulletin* of Nepal Rastra Bank and Population Monographs and National Accounts prepared by the Central Bureau of Statistics, the Government of Nepal. The estimation period 1974-2005 was determined largely by the availability of adequate data on all variables included in the model. For the first time in Nepal, the estimate of unemployment rate was estimated by NPC in 1977. Therefore, the number of unemployed persons was extrapolated for 1974-76. The dependent variable is the gross national private savings adjusted with inflation (proxied by the GDP deflator) with a base of 2000=100. Gross savings measures tend to be more reliable than net savings because, in contrast to measures for net savings, they do not rely on the estimate for depreciation, which is subject to various statistical and conceptual problems (Ramsaran,1988).

The data on gross domestic savings have been obtained from national accounts statistics. In this study, private savings is estimated as the difference between gross

domestic savings and government savings. It means it is a residual after deducting government saving from gross domestic savings. This type of process was also adopted in Basyal (1994). Foreign savings is the savings obtained from the net movement on the capital account of the balance of payment, and government savings is the difference between government revenue and government consumption. All types of savings are deflated by GDP deflator. Data on foreign savings were obtained from various issues of *Economic Survey* published by the Ministry of Finance and Balance of Payment Statistics prepared by Nepal Rastra Bank.

The income variable is gross domestic product at factor cost based on GDP at a constant price (2000=100). The real interest rates variable is the nominal weighted average rate on time and saving deposits determined by Nepal Rastra Bank corrected for inflation. Since the calculation of real interest rates requires data on expected inflation, a non-observable variable, percentage change in GDP deflator has been used to calculate real interest rates. In the present study, the interest rate variable is not adjusted for taxes since taxes on interest income are only a recent phenomena (being introduced for the first time in the mid-1980s).

The age-dependency (population structure) variable is defined as the number of persons below age fifteen and over sixty. The population statistics were obtained from the population data prepared by the Central Bureau of Statistics. The unemployed persons as a proxy of labour market constraint have also been estimated from the reports of the CBS and NPC. The estimates of unemployment rates by CBS/NPC were 5.62 percent, 1.62 percent, 7.60 percent, and 8.1 percent in 1977, 1981, 1992 and 2001 respectively. Based on these estimates, the unemployed persons were projected for various years.

VI. EMPIRICAL REGRESSION RESULTS

Testing for Unit Roots

The time series behaviour of each of the series is presented in Table 3 using Dickey-Fuller and Augmented Dickey-Fuller[3]. For any series of variable say private savings (PS), the Dickey-Fuller test is based on the following regression model.

$$\Delta(PS)_t = \beta_1 + \beta_2 t + \delta(PS)_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta(PS)_{t-1} + \dots\dots + \varepsilon_t \dots\dots\dots(1)$$

where m is chosen to ensure that the residuals (u_t) are empirically white noise, when m=0, the Dickey-Fuller test is defined and m≠0 specifies the Augmented Dickey-Fuller test. The null hypothesis that PS has a unit root (i.e. PS is integrated of order one, denoted PS~I(1) is tested against the alternative that PS is stationary [i.e. PS~I(0)]. The null hypothesis is rejected if coefficient of autocorrelation (ρ) is negative and insignificant.[4] The appropriate significance points are provided by Fuller (1976).

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[3] All the results of this study were obtained using the Shazam package.
[4] Technically stability condition requires |ρ|<1.

TABLE 3 : Testing for Unit roots: Dickey-Fuller and Augmented Dickey-Fuller (ADF)

	DF	DF	ADF	ADF
Variables	H_0:I(3)	H_0:I(4)	H_0:I(3)	H_0:I(4)
Private Saving(PS)	-12.80	-16.83	-6.209	-7.542
Income (Y)	-8.567	-9.168	-12.08	-13.28
Government Saving (GS)	-13.44	-17.64	-6.272	-7.165
Foreign Savings (FS)	-10.27	-12.27	-8.458	-10.51
No. of Unemployed Persons (U)	-8.690	-12.38	-5.222	-7.674
Interest Rate (RI)	-7.458	-.8.838	-8.295	-9.286
Dependent Population (DP)	-5.523	-9.349	-3.875	-6492

Source: Computed Tau (τ) Values of the Variables

In Table 3, Y=real GDP, PS = real private saving, GS = real government saving, FS = real foreign saving, RI = real interest rate, UP = number of unemployed persons, DP = dependent population and R^2 = coefficient of determination

Table 3 indicates that all the series are integrable from order 3. The critical value (τ) with constant term in the model is -3.75 at 0.01 level. However, some of the series like GS and RI are integrable at order one in both tests, DF and ADF. It has also been demonstrated that the presence of an I(0) variable does not pose any problems for cointegration theory. In this regard, Johansen (1985) demonstrated that it is not necessary that all the variables in a multivariate regression have the same order of integrability to achieve cointegration.[5]

Cointegration Model

The long run or cointegrating private savings equations for Nepal were estimated using ordinary least square (OLS). The results are presented in Table 4. The R^2 is fairly high and DF and the ADF statistics generally indicate that the residuals are stationary.[6] The computed values for DF and ADF with the inclusion of constant term at 5 percent significance level are fairly higher than the critical values of DF and ADF. An examination of equation (1) reveals that the dependent population variable is statistically insignificant. However, the sign of the coefficient is found to be negative as per priory. The value of the computed t is the lowest of all. With the exclusion of the dependent population (DP), an I(0) variable, the model provides a stronger evidence of a cointegrated relationship. Similarly, exclusion of foreign savings variable also does not present a significant difference in the regression result.

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[5] Leon (1987), examining the demand for money function for Jamaica over the period 1953-1981, also found that in the multivariate context cointegrability is attainable even though the original series are of different orders of integrability, See Wood, 1995.

[6] The critical values have been calculated by Engle and Yoo (1987) using Mont Carlo simulation techniques and Blangiewicz and Charemza (1989) as a guide in reaching conclusion of cointegration variables based on the Dickey-Fuller test.

TABLE 4: Cointegration Regression for Real Private Saving (1974-2005)

Parameters/Variables	Equation 1	Equation 2	Equation 3
Constant	397.31	-5424.5***	-5760.7***
	(.0.265)	(-1.409)	(-1.548)
$\beta_1(Y)_t$	0.183*	0.1556*	0.161*
	(2.540)	(6.336)	(7.842)
$B_2(GS)_t$	-0.287	-0.219	-0.295
	(-(0.596)	(-0.494)	(-0.728)
$B_3(FS)_t$	0.156	0.881	
	(0.600)	(0.453)	
$B_4(R)_t$	249.12***	269.72***	261.380***
	(1.326)	(1.517)	(1.500)
$B_5(UP)_t$	-.0847*	-.0851*	-0.091*
	((-2.195)	(-2.244)	(-2.548)
$B_6(DP)_t$	-.0164		
	(-0.402)		
R^2	.3030	.9024	.9016
DF	25	26	27
CRDW	1.2939	1.3086	1.2319
DF(τ)	-3.819	-3.902	-3.702
ADF(τ)	-3.167	-3.204	-3.122

Note: *   Significant at 1 percent level.
 **   Significant at 5 percent level.
 ***   Significant at 10 percent level.

Error Correction Model

With the identification of cointegration set of variables, the dynamics of the savings processes was explored. Following the general to specific modeling methodology (for example, see Hendry and Richard, 1982, and Gilbert, 1986), an initially over parameterized model with one lag on the dependent and independent variables was continually specified and reparameterised until a parsimonious representation of the data generation process was obtained. The parsimonious representation of data generation is meant for obtaining careful and sufficient representation in terms of degree of freedom.[7] For example, an inclusion of larger number of lag length reduces the degree of freedom. The resulting dynamic equation for the period 1974 to 2005 is:

$$\Delta(PS)_t = \beta_1 + \beta_2\Delta(Y)_t + \beta_3\Delta(GS)_t + \beta_4\Delta(CI)_t + \beta_5\Delta(UR)t + \beta_7 ECM\_1 + \beta_8\Delta(PS\_1).......(2)$$

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[7] Ideally, one would like to have the freedom to include several lags of each differenced variables at the outset of the specification search process. However, because of the small sample size (and the need to preserve the degree of freedom) the initial model includes only one lag on the dependent and independent variables.

TABLE 5: Cointegrated Regression Results

$\Delta(PS)_t =$	B_0 +	$B_1\Delta(Y)_t$ +	$B_2\Delta(GS)_t$+	$B_2\Delta(FS)_t$+	$B_3\Delta(R)_t$
$\Delta(PS)_t =$	-1504.20	$0.3094\Delta Y^*$	$-0.9318\Delta GS^*$	$-0.1832\Delta FS$	$229.93\Delta R^{**}$
$t =$	(-1.205)	(3.004)	(-2.439)	(-0.6244)	(1.833)
			$- B_4\Delta(UP)_t$	$- B_5(ECM)_{t-1}$ +	$B_6\Delta(PS)_{t-1}$
			$-0.0862\Delta UP^{***}$	$-0.6012ECM\_1^*$	$0.153PS\_1$
			(-1.384)	(-2.745)	(0.8506)
	R^2= 0.5786	LM[$\chi2$ (9)]=13.026[8]	NRM[$\chi2(2)$]=3.2317	RR[$F_{1,22}$]=0.4692	ARCH[$\chi2(1)$]=.892
		GLEJSER[$\chi2(7)$]=3.128	CHOW[$F_{8, 15}$]=2.o2	HET[M=7]=1.1094	HAUSMAN[$F_{4,11}$]= 1.770
		PC1[$F_{15, 8}$)]=1.034	DF=23		

Note: * Significant at one percent level.
      ** Significant at five percent level.
      *** Significant at ten percent level.

Where Δ is the first difference operator, (ECM)_1 is the lagged error correction term from equation (2) of table (4), LM is Langrang Multiplier test for first order serial correlation, RR is Ramsey's (1969) specification error test, NRM is Bera-Jarque (1980) normality test, HET is a variant of White's (1980) test of heteroscedasticity, ARCH is Engle's (1982) autoregressive conditional hetroscedasticity test, CHOW is Chow's (1960) test for structural change or stability, PC1 is predictive accuracy test [(see Chow (1960) and Davidson et at (1981)] and Hausman is Hausman (1978) test for exogeneity.

The LM test for serial correlation of the residuals is not significant, satisfying a necessary condition for white noise residuals. Examination of residuals using Engle's ARCH test of first order suggest that the null hypothesis of constant variance should be accepted. The Ramsey's RESET test indicates that the functional form of the model is quite sound. The Chow statistic of 2.51 using 1990 as the breakpoint in the relationship is below the critical 5 percent value of 3.29 indicating that the model has good stability properties, that is, the model has stable coefficients. Finally, the Hausman test result reveals no evidence of simultaneous equation bias in the estimates.[9] Thus, the wide range of diagnostic tests suggests that the residuals do not violate classical assumptions. Furthermore, the lagged residuals from the second regression of Table 4, (ECM)_1, which represent the equilibrium error term, are statistically significant indicating the acceptable ground to take variables as a cointegrated set. The coefficient of the cointegration regression can therefore be appropriately interpreted as the long-run coefficients in the relationship.

Analysis of Estimation Results

An analysis of the estimation results for the long run and short-run private savings equations shows that the estimated coefficient of income variable in the error correction

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[8] Durbin-Watson `h' test is not required as LM test is a more powerful test than h test. See Gujarati (2004).
[9] The instrumental variables used in the Hausman test for exogeneity are lagged changes in income, government savings, foreign savings and unemployment.

model indicates that a one unit rise in real income will lead to a 0.309 unit increase in real private savings in the short run. The corresponding long-run unit is 0.365. It means short-run marginal propensity to save is 0.309, whereas it is found to be 0.365 in the long-run.

The estimated coefficient of the government savings variable (-0.9317) in the dynamic equation indicates that short-run variations in government savings are neutralized by opposite movements in private savings, suggesting that the strong assumption of Recardian Equivalence also holds true in the Nepalese case. This finding contradicts the study conducted in Barbados (Wood: 1995) and also the findings of Hutchinson (1992) conducted for five major industrial countries[10]. The long-run coefficient on government savings is statistically significant at the one percent level.

The empirical results indicate that foreign savings impact negatively on private savings in the Nepalese economy. However, the size of estimated coefficients (-0.1832 and -0.216 for the short and long run, respectively) provides support for the substitutable resources between foreign savings and national savings (see Griffin and Enos, 1970 and Weiskopf, 1972). However, the observed coefficient of foreign savings is not significant.

The relationship between the private savings and unemployment is observed with a negative sign as it was expected. It means increasing the number of unemployed persons will decrease savings. A one unit rise in the number of unemployment will lead to a 0.0862 unit reduction in private savings in the short run. Unemployment has even a stronger depressing influence on the private savings in the long run: a 1 unit change in the unemployment leads to a 0.102 unit change in private savings in the opposite direction. These results have important implications for the design of economy policy in Nepal. They suggest that the focus of development policy should be to increase the productive base of the economy, that is, to stimulate more activity in the industrial, tourism, and agricultural sectors in order to improve the employment prospects, especially in the longer term.

The regression results also indicate the importance of real interest rates in the determination of savings in Nepal, at least in the long run. The long-run coefficient is positive and statistically significant at the five percent level. This shows that the interest rates are encouraging private savings in Nepal. The observed positive relationship between real interest rates and private savings contradicts to the findings of Van Wijnbergen (1983) and Giovannini (1985) and Wood (1995) but is consistent to the popular view [(McKinnon, 1973) and Shaw (1973)] that higher real interest rates result in higher savings levels (leading to higher levels of investment and economic growth).

The statistical insignificance of the lagged private savings variable indicates that private savings in Nepal is neither a sluggish phenomenon in the short run nor in the long-run while it was found to be a sluggish phenomena in the short run in the Carribean countries (Wood, 1995). The size of the coefficient (0.154) on the ΔPS_1 variable implies a relatively slow speed of adjustment.

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[10] The countries covered in Hutchinson's study are United States, Japan, Germany, United Kingdom, and Canada.

VII. Conclusion

With a view to ascertain the factors affecting savings behaviour both in the short and long-run, a cointegration theory was used to model private savings behaviour in Nepalese economy.

The estimation results for the error correction model indicated that changes in income, government savings and interest rates are significant in explaining short run dynamics of private savings. These variables have also significant influence on private savings in the long run. The labour market constraints (proxied by the number of unemployed persons) experienced a negative relationship and is significant at 10 percent level. Unemployment has a depressing influence on the private savings in the long run; a 1 unit change in the unemployment leads to a 0.102 unit change in private savings in the opposite direction

A major conclusion drawn from the analysis is that the focus of development policy in Nepal should be to increase the productive base of the economy in order to promote real income growth and reduce unemployment. It is also important to note that the real interest rates have a positive influence on the private savings in Nepal and is also significant at 5 percent level. The policy makers should take explicit account of this result in the formulation of its financial policy. The estimates of short-run and long-run marginal propensities to save, which are essential for economic planning purposes, can also be used by other developing countries as a benefit transfer method (ADB, 1996). The findings also provide valuable inputs for policy makers towards greater mobilization of private savings.

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