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Elasticity and Buoyancy of Nepal's Tax System

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INTRODUCTION

This paper examines the responsiveness of Nepal's tax system for the period of twenty-five years (1968/69 to 1992/93). In measuring the responsiveness of taxes in a tax system, *elasticity* and buoyancy are two popular concepts, frequently referred to as automatic stabilizers. If the tax system is elastic, then the functioning of the economic system needs no deliberate or discretionary action of any external authority.

The first economist to explain sensitivity (responsiveness) was R. F. Bretherton in 1937. He defines sensitivity as a proportionate change in national income with given tax rate and coverage of tax base which may be called income elasticity in modern terminology. But the pragmatic approach of measuring responsiveness was given by response of revenue to income change, i.e. revenue increase, excluding the effects of discretionary changes, and buoyancy as the total response of tax revenue to change in income (Mansfield 1972).

In measuring the built-in-elasticity of tax, historical revenue series must be adjusted to eliminate the effects on revenue of discretionary tax measuring during the period under review. If no such adjustment is made one obtains the buoyancy of the tax, which reflects the growth in the base caused by the increase in income and from discretionary tax changes.

The distinction between these two concepts is that where elasticity coefficient measures what would happened to the tax revenue if there was no change in tax law over a time period, tax buoyancy measures what has actually happened. Thus, former can, therefore, be viewed as a partial account of responsiveness and the latter as an account of total responsiveness. Sometimes, they are also viewed as indicators of static and dynamic characteristics of a tax system. Built-in-elasticity is interpreted as a static function, for it measures the growth of tax revenues over a constant tax base and tax buoyancy as dynamic function for it measures growth of tax revenues unadjusted for any change in rates, bases etc. Alternatively, elasticity is termed as *built-in-flexibility'* or *stabilized co-efficient* and likewise *sensitivity* or *exploitation co-efficient* or *administrative flexibility* terms are used for buoyancy.

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In measuring the elasticity and buoyancy of a tax system, two general problems have been encountered:

- How should the effect of discretionary changes be separated from other tax revenue growth ? ; and
- What should be the form of equation used to estimate the tax-income relationship ?

To answer the first question, this paper applies the Proportional Adjustment Method given by Sahota. This method assumes that the discretionary changes in any given year may affect the over all automatic elasticity but in respect of revenue yields, they would influence the yield of the year in which they have taken place.

The Sahota expression to determine the actual tax receipts excluding discretionary effects in year may be written as:

$T_{i,} J = (Tj-Dj) / T_{j}-1 * T_{i,} j-1$

where,

$T_{i,} j$ = Adjusted series for the year j with reference to i^{th} period structure, Tj = Actual yield in year j

Dj = Effects of discretionary change for the year j

If we consider the first year as the base year, i.e. i = 1, we will have the net series as:

$T_{11} = T_1$

$T_{12} = T_2-D_2$

$T_{13} = (T_3-D_3) / T_2 * T_{12}$

$T_{14} = (T_4-D_4) / T_3 * T_{13}$ and so on.

CHOICE OF THE APPROPRIATE EQUATION

After separating the effects of discretionary change from normal growth the specification of the functional relationship that can reasonably be justified on theoretical grounds is a necessary pre-requisite to calculate the elasticity coefficients. If there is a linear relationship between two variables tax revenue and GDP a straight line can be used to summarize the data. One of the most commonly used procedures for fitting a line to the observations is the method of least squares which results in a line that minimizes the sum of squared vertical distance from the observed points to the line.

To answer the second question, the commonly used model is:

$T = ay^{b}e^{\mu}$ ..... (1)

as an adequate model referred by various tax analysts.

Taking logarithm of both sides, give

$\log (T) = \log (a) + b \log (y) + \mu$ ..... (2)

which gives the linear relationship between variables log (T) and log (y). The intercept term log (a), differs depending on the choice of base of the log, but that of *b* will not.

Though equation (2) is a very compact and useful procedure for the purpose, however, it demands the satisfaction of two basic assumptions to give better and meaningful results. It assumes that:

- responsiveness would remain constant over a time period, and
- the existence of a significant correlation between the two variables Y and T.

With respect to the first assumption the double logarithmic relationship has a very important characteristic that it is a constant elasticity function.

With respects to the second assumption, if it is not satisfied, the least square estimation of *b* in equation (2) does not give any meaning. But as such, an insignificant association between T and Y would be an important finding in its own sense. However, in such a case, the better alternative is to compare the time growth rate of T vis-a-vis Y.

If t denotes the time and r, the growth rate of T, then the equation employed to estimate r is:

$T = a\ (1+r)^{t}$ ..... (3)

Instead of T, if we use y, then r will give the time growth rate of y.

As an alternative to the elasticity and buoyancy of taxes, this paper examines the time-rate elasticity and time-rate buoyancy of taxes with the help of the relation r_t/r_y where, r_t gives the time growth rate of tax revenue (Ti) and r_y, the time growth rate of income (y_i).

CLASSIFICATION OF TAXES

In this study the total revenue is classified into tax and non-tax measures. Under tax revenue, direct tax and indirect tax are the major components. Following the conventional definition of direct and indirect taxes, whose incidence cannot be shifted, like taxes on income, profits and property, land revenue and registration duties are considered as direct where as customs duties and taxes on goods and services are considered as indirect taxes as their incidence can be shifted. In this sense sales tax, excise duties, contract tax, entertainment tax, hotel tax, air flight tax, etc, are categorized as indirect taxes. Remaining revenue sources like duties and fees, dividend, penalty, fines and forfeiture etc., are considered as non-tax revenue.

This study considers the following eighteen different categories of revenue heads as dependent variables and seven components of GDP as independent variables.

Dependent variables

TR	=	Total revenue.	TXR	=	Tax revenue.
NTR	=	Non-tax revenue.	DT	=	Direct tax.
IDT	=	Indirect tax.	IT	=	Income tax.
CD	=	Customs duties.	ET	=	Entertainment tax.
MPD	=	Import duties.	XPD	=	Export duties.
ED	=	Excise duties.	ST	=	Sales tax.
LT	=	Land tax.	RGD	=	Registration duties.
HT	=	Hotel tax.	CT	=	Contact tax.
AT	=	Air flight tax.	FR	=	Revenue from forest.

Independent Variables

Y = Total GDP.
YN = GDP from non-agricultural sector.
YT = GDP from trade, hotel and restaurants.
YMC = GDP from manufacturing and construction sector.
YA = GDP from agricultural sector.
YTC = GDP from transportation and communication sector.
YS = GDP from community and social services.

ELASTICITY OF NEPALESE TAXES 1968/69 - 1992/93

Elasticity of yield is an important aspect of the tax structure. An elasticity of *unity* implies that one percent change in GDP will be accompanied by one percent change in tax revenue, an elasticity *greater than unity* implies that the percentage change in tax revenue will exceed in GDP. Consequently, a tax system is said to be elastic if the coefficient exceeds unity, and inelastic if it is *less than unity*. For economic dynamism, an elastic tax system is highly advantageous for the public expenditure activities which helps to balance between equity, growth, and efficiency in an economy as well.

As shown in Table 1, the overall elasticity of the total revenue in Nepal's tax structure for the study period is 0.64 and is significant at one percent level. As R^{-2} equals 0.986, the fit is very good between total revenue and GDP, i.e. the regression model $\log(T) = \log(a) + b \log(Y)$ actually fits the data, which are linearly related. b=0.64 also indicates that one percent change in national income leads only 0.64 percent change in total revenue in the same direction. When the data are fitted in the log(Y) - log(AI) plane, the trend line of the elasticity makes an angle of 33^{0} ($\tan^{-1}$ 0.64) to log(Y) - axis, indicating that Nepal's revenue structure as a whole is regressive in nature, but the fit is very good as revealed by figure-1, where deviations of the observed points from the fitted trend line are not greater.

Figure -1
Elasticity and Buoyancy of Total Revenue
(1968/69 - 1992/93)

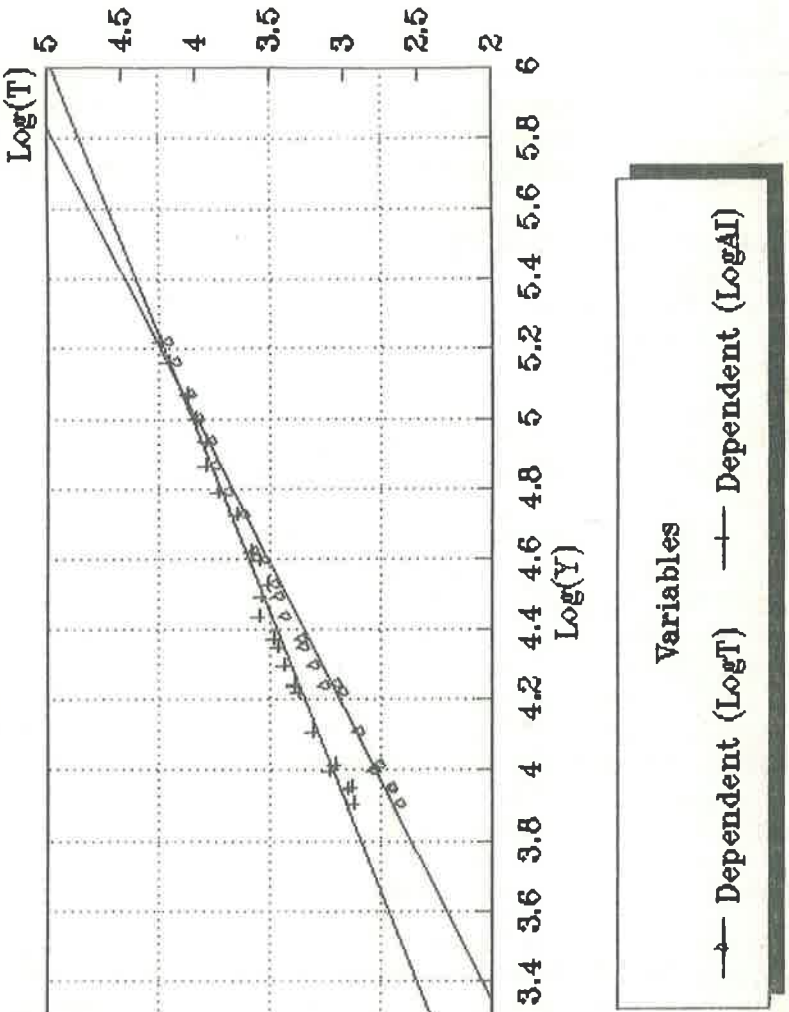

Table 1
Elasticity Coefficients (b) of Selected Groups of Taxes
1968/69 to 1992/93

Tax heads	Independent variable	Elasticity coefficient (b)	R^{-2}	F	t	DW
TR	Y	o.6356*	0.9856	1646.5	40.5771	0.61
TXR	Y	0.5113*	0.9719	829.7	28.8045	0.6794
NTR	Y	1.1351*	0.9731	870.2	29.4992	0.9191
DT	Y	0.1354*	0.4782	20.5	4.5276	1.0758
IDT	Y	0.6139*	0.9645	652.7	25.5480	0.4993
CD	YT	0.2706*	0.7874	89.9	9.4816	0.4607
CD	Y	0.4368*	0.8692	160.5	12.670	0.6868
IT	YN	0.4756*	0.8919	13.9	3.7286	0.8178

* Significant at 1 percent level.
Source : Computed by the Author from the Master Table at Appendix, using the formula (1-b/b1)*100.

The elasticities of selected group of taxes are rather divergent (Table 1). They are ranging from 0.14 for direct taxes to 1.14 for the non-tax revenue. As the elasticities of group of taxes other than non-tax revenue are less than that of total revenue, the tax system as a whole could not be considered elastic and responsive to national income. An efficient tax system ought to give better results, and for progressive tax system it should possess necessarily an elasticity greater that unity.

This intensifies the need to go for individual tax elasticity analysis to identify the specific taxes responsible for the emergence of these lacuna. The tax wise analysis become more significant as the elasticity of indirect taxes (0.61) is almost four times than that of direct tax (0.14). This is the greater challenge for Nepalese fiscal authorities, contrary to the general acceptance, as direct taxes is seemed to be more regressive than indirect one, which is really a paramount problem for direct taxes in total tax structure.

Elasticity of income tax (0.48) is even less than that of total tax revenue. This may be due to the exemption of agricultural income from tax net which leads to narrow the tax base, and due to high evasion caused by loopholes in tax laws.

The high elasticity of non tax revenue (1.14) obviously reflects the importance of user charges in the total revenue collection. Unlike taxes, most user charges do not involve the trade-off between revenue and efficiency. Greater reliance on user charges might also reduce instability in public revenue, because demand for services is much less volatile than revenue from custom duties, which is the major source of current revenue having elasticity coefficient 0.27 which is only about one fourth of the non-tax revenue.

Table 2 gives tax wise elasticity coefficients, which show rather gloomy picture of the Nepalese tax structure. Except contract tax (1.45) , the elasticity coefficients of all tax heads are below unity and even negative in the case of land revenue (-0.51) and export duties (-0.45). For none of the other taxes the revenue responses are commensurate with the changes in GDP, their range in elasticity coefficients is quite wide, ranging from 0.10, revenue from forest to 0.68, hotel tax. This low elasticity in the case of revenue from forest implies the declining or even negligible contribution of forest in total revenue which once became the major revenue source as emphasized by the slogan: *Hariyo Ban Nepal ko Dhan*. Its contribution in total revenue was 5.1 percent 1968/69 and declined to 1.2 percent in the end of the study period.

Other interesting result of Table 2 is that between two individual direct taxes, the elasticity of registration duties is higher (0.66) than that of land revenue (-0.51) suggesting that one of the major elements responsible for the sluggishness of direct tax yields is the land tax. The elasticities of the premier indirect taxes viz., customs, sales and excise are 0.27, o.57 and 0.13 respectively implying that sales tax is more responsive than other two component in relative terms. The higher elasticity of indirect tax than direct tax is due to the high responsiveness of contract tax (1.45) and hotel tax (o.69) but contribution of these components are not so much important as their contribution are only 1.5 percent and 1.4 percent of total revenue in 1992/93 . The coefficients of export (-0.45) and imports (0.42) reflect the reduction in the coefficient of customs.

The notable aspect of this analysis is the level of R^{-2} statistics which is essential to ascertain the statistical justification of hypothesized functional relationship and the association of selected tax heads with GDP. As revealed by the Table 1 and Table 2, the explanatory power of the hypothesized model is quite high for almost all tax items other than revenue from forest, land revenue, excise duties and export duties.

R^{-2} is statistically significant at 1 percent level for all the taxes with the exceptions of contribution of forest and land revenue.

Table 2
Elasticity Coefficients (b) of Selected Individual Taxes
1968/69 to 199/93

Tax heads	Indepe–ndent variable	Elasticity Coefficient (b)	R^{-2}	F	t	DW
ST	YT	0.5747*	0.8389	126.0	11.225	0.261
ED	Y	0.1348*	0.3489	13.9	3.7230	0.4117
ED	YMC	0.1348*	0.3489	13.0	3.6056	0.4117
ED	YN	0.2558*	0.3852	16.1	4.0040	0.3935
XPD	Y	-0.7041*	0.6154	39.4	-6.2770	0.78820
XPD	YT	-0.4541*	0.6069	38.0	-6.1644	0.8346
MPD	Y	0.6706*	0.8886	192.4	13.8708	0.4288
MPD	YT	0.4190*	0.8201	126.0	11.2250	0.3397
LT	YA	-0.5141*	0.6149	39.3	-6.2690	0.7350
RGD	Y	0.6619*	0.9526	482.9	21.9750	0.3462
FR	YA	0.1039	0.0805	1.2	1.0954	0.9227
ET	YS	0.2074*	0.6252	41.0	6.4031	0.5455
HT	YT	0.6856*	0.7261	64.6	8.0374	0.2135
CT	Y	1.4488*	0.9323	331.7	18.212	0.5545
AT	YTC	0.4196*	0.8259	114.8	10.7145	0.9227

* Significant at 1 percent level.
Source : As of Table 1

The DW statistic denoted by d, measures the autocorrelation which refers to the relationship, not between two (or more) different variables but between the successive values of same variable. Here $d<2$ indicates positive autocorrelation implying the economic growth and cyclical movement of the economy, or the variables Y and T tend to grow in periods of growth, or they tend to show cyclical patterns. In Table 1 and Table 2 the d-statistics are significant at 1 percent level in all cases.

The trend lines if fitted in the log(GDP) - log(AI) plane would make an angle ($Tan^{-1}b$) less than 45^{o} in almost all cases supporting the thesis that Nepal's tax structure is regressive in nature.

BUOYANCY ESTIMATE OF NEPALESE TAXES 1968/69 - 1992/93

It is observed from elasticity estimate that Nepalese tax system is not necessarily a automatic responsive type with respect to change in national income or GDP. To make the system more responsive, government efforts are needed in the form of additional taxation and improved administrative competency. These governmental efforts are called discretionary measures, and can be seen from buoyancy estimate

of a tax system. The buoyancy coefficient of a tax is given by the ratio of percentage change in the tax revenue to the percentage change in the national income, which gives an idea about the overall increase comprising the effects of the automatic increase and of increase attributable to discretionary measures.

Table 3 provides the buoyancy estimates of total revenue, tax revenue ,non-tax revenue and selected tax-groups covering the period 1968/69 to 1992/93. The buoyancy coefficient 1.21 for total revenue implies that every one percent change in GDP in an average is associated with 1.21 percent increase in total revenue. Similarly, buoyancy coefficient of total tax revenue, 1.16, reveals that tax structure during the study period is revenue buoyant. This high buoyancy but low elasticity of total tax revenue is attributed to the additional government efforts to rise the tax revenue. The F and t- ratios are highly significant at 1 percent level, and R^{-2} is high enough, indicating the assumed function is good to fit the data.

The goodness of fit of the buoyancy estimate of total revenue is shown in Fig 1 along with its elasticity component. The trend line of buoyancy coefficient makes an angle 50^0 degree ($Tan^{-1}1.21$) to log(Y) -axis supporting the argument that total revenue in our tax structure is fairly revenue buoyant.

Table 3

Buoyancy (b_1) Coefficients of Selected Groups of Taxes 1968/69 to 1992/93

Tax heads	Independent Variable	Buoyancy	R^{-2}	F	t	DW
TR	Y	1.2094*	0.9906	2535.0	50.3488	0.3976
TXR	Y	1.1634*	0.9901	2388.5	48.8723	0.45552
NTR	Y	1.4150*	0.979	1120.1	33.4679	0.7299
DT	Y	1.0012*	0.9858	1663.0	40.7799	1.3407
IDT	Y	1.2099*	0.9856	1645.2	40.5611	0.3999
CD	Y	1.0717*	0.9861	1697.7	41.2030	1.1030
CD	YT	0.6677*	0.9343	342.0	18.4932	0.4644
IT	YN	1.1971*	0.9543	502.4	22.4143	0.4670

* Significant at 1 percent level.

Source : As of Table 1.

As revealed by Table 3, the buoyancy coefficients of the selected groups of taxes are greater than unity except that of customs duties, 0.67 . Table 4, gives the buoyancy coefficients of individual taxes showing the high degree of divergence from 1.76, contract tax, to -0.06, land tax. Obviously, contract tax 1.76, air flight tax 1.56, registration duties 1.34,

and hotel tax, 1.26, are revenue buoyant having buoyancy coefficients greater than unity.

The buoyancy coefficients of major components of indirect taxes are less than unity and that of hard revenue is even negative (-0.06) These two tables indicate that the major reason for higher degree of buoyancy of tax -revenue is the substantial efforts put in by the government in direct tax sector . The contribution of discretionary measures in the total revenue, tax revenue and other components of various taxes is shown in Table 5. The percentage contribution of discretionary measures ranges from 86.48 percent in direct tax to 17.5 percent in contract tax. This high buoyancy, 1.0, but low elasticity, 0.14, of direct tax, indicates two things:

- His Majesty Government is eager to rise tax revenue through direct tax front despite its various imperfections in Nepal.
- Direct tax group in particular can mostly be held responsible for the sluggishness of aggregate tax yields.

The d- statistics, in the case of buoyancy estimate, are significant at 1 percent level in most of the cases and at 5 percent level in some cases . But for air flight tax, d=1.7408. >1.454=du, there is no evidence of positive first order serial correlation and for direct tax, d= 1.3407, d1<d<du, there is inclusive evidence regarding the presence or absence of positive first order serial correlation at 5 percent level of significance.

Table 4

Buoyancy (b_1) Coefficients of Selected Individual Tax 1968/69 to 1992/93

Tax Heads	Independent variable	Buoyancy (b_1)	R^{-2}	F	t	DW
ST	YT	0.8579*	0.8711	163.2	12.7750	0.2569
ED	Y	0.8087*	0.9671	706.5	26.5810`	1.2864
ED	YN	1.4699*	0.9702	782.8	27.9790	0.6126
ED	YMC	0.8087*	0.9671	706.5	26.5801	1.2864
XPD	Y	0.4889*	0.5743	33.4	5.7770	1.1435
XPD	YT	0.3200*	0.5845	34.8	5.8992	1.0906
MPD	Y	1.2457*	0.9655	673.0	25.9430	0.5172
MPD	YT	0.7867*	0.9115	248.0	15.7480	0.4016
LT	YA	-0.0585	0.0479	2.2	-1.4832	1.6906
RGD	Y	1.3420*	0.9789	1115.9	33.4051	0.8898
FR	YA	0.8307	0.7543	74.5	8.6429	0.9553
ET	YS	0.7799*	0.9980	1064.4	32.6251	1.0648
HT	YT	1.2623*	0.8322	120.9	10.9955	0.2249
CT	Y	1.7562*	0.9381	364.7	19.0971	0.3262
AT	YTC	1.5592*	0.9680	727.2	26.9667	1.7408

* Significant at 1 percent level. **Source:** As of Table 1

Table 5
Percentage Contribution of Discretionary Measures
1968/69 to 1992/93

Tax heads	Percentage Contribution	Tax Heads	Percentage Contribution
Total Revenue	47.45	Export Duties	-
Tax Revenue	56.05	Import Duties	46.74
Non Tax Revenue	19.78	Land Revenue Registration duties	- 50.68
Indirect Tax	49.26	Forest Tax	87.49
Customs Duties	59.47	Entertainment Tax	73.41
Sales Tax	33.01	Contract Tax	17.50
Excise Tax	83.33	Air flight Tax	73.09

Source: Computed by the Author from the Master Table at Appendex.

These tables, 1, 2 ,3, 4 and 5, reveal the following fact:

- Except contract tax and non-tax revenue the elasticity coefficients of remaining taxes under consideration are either extremely low, far below unity, or even negative.
- Buoyancy coefficients of selected groups of taxes except customs duties, with respect to YT, are above unity.
- Buoyancy coefficients of selected individual taxes are divergent. It is above unity for air flight tax, contract tax, hotel tax, and registration tax; below unity for other taxes, and even negative for land tax.

This low elasticity and high buoyancy for total revenue as well as individual taxes indicates that the government has concentrated more on introducing various discretionary measures rather than broadening the tax base which is not conducive to support growing development activities. This also suggests that Nepalese tax system is regressive in nature which does not lead to the over all economy towards short run stability as well as long run development. This is because: (a) given the existing tax structure, automatic growth in total revenue is insignificant; and (b) the heavy reliance on indirect taxes like customs, sales and excises which have low or even negative elasticity, had has led for real revenue reduction.

TIME RATE OF GROWTH (TRG) OF SELECTED TAXES VS TIME RATE OF GROWTH OF SELECTED COMPONENTS OF GDP

To measure the responsiveness of tax yields in the existing tax structure , regression coefficients are employed for gross and net revenue series. The results of regression can be counted to give reliable results only when there exists a significant relationship between the variables. The R^{-2} statistic measures the goodness of fit of the functional relationship being measured. Whenever no significant relationship is existed between dependent and independent variables with low R^{-2}, the time of growth technique has been employed to examine the significance of their relationship . Empirically, it is not unusual to obtain a very high R^{-2} but find that some of the regression coefficient are either.

Table 6
Time Rate of Growth of Various Taxes

S.N.	Tax Heads	TRG of Unadjusted Gross Series Percent	TRG of Unadjusted Net Series Percent
1	TR	16.55	8.32
2	TXR	15.88	6.66
3	NTR	19.65	15.32
4	CD	14.47	5.73
5	XPD	6.27	-8.71
6	MPD	17.14	8.97
7	ST	19.34	12.67
8	ED	17.25	2.52
9	IT	20.14	7.62
10	RGD	18.52	8.74
11	LT	-0.69	-5.68
12	ET	14.42	3.51
13	HT	30.26	15.88
14	CT	25.1	20.48
15	AF	30.20	6.88
16	FR	9.57	0.93
17	DT	13.40	1.60
18	IDT	16.60	8.09

Source : As of Table 5

Statistically insignificant or have signs which are contrary to a priori expectations. In this case, theoretical or logical relevance of the explanatory variables to the dependent variable and their significance would be useful.

In this study , although most of the regression coefficients, b and b_1, are statistically significant , the TRG for all individual and group of taxes , and various components of GDP are calculated assuming time as an independent variable.

The TRG of various taxes are calculated for both gross and net series as shown in the Table 6, TRG for total revenue for net series is 8.32 percent against 16.55 percent for gross series. This indicates that total revenue for the study period is increasing at the compound rate of 16.55 percent annually. TRG is more than 20 percent for the gross series of income tax, hotel tax, air flight tax, and contract tax. It is less than 10 percent in the case of land tax.

As in the case of elasticity, TRG for net series are much more lower than that of gross series. It ranges from 20.48 percent for contract tax to 8.71 percent for export duties . The inference can be drown from Table 6 that the increase in the total revenue is more affected by non-tax revenue, income tax , hotel tax, contract tax, air flight tax and in some extent by sales tax. The sluggishness of tax revenue is attributed to the export duties, land tax, excise duties and direct tax as a whole.

Table 7 gives the TRG of GDP and its selected components . As revealed by this table, the TRG of total GDP is slow as against that of total revenue as well as tax revenue for the study period. Agricultural GDP and the GDP from trade, restaurants and hotels , and GDP from manufacturing and construction sector have higher growth rates.

Table 7
Time Rate of Growth (TRG) of GDP and Its Selected Components

S. N.	GDP originating form	TRG percent
1	Y	13.37
2	YA	11.20
3	YN	16.36
4	YT	20.61
5	YMC	21.12
6	YS	18.79
7	YTC	17.79

Source: As of Table 5.

TIME RATE ELASTICITY AND BUOYANCY OF SELECTED GROUPS OF TAXES AND INDIVIDUAL TAXES

In this unit the *time rate of growth* of taxes have been divided by the *time rate of growth of* GDP or its relevant component so as to get an idea of the relative rate of change in tax yields and the relevant component of GDP. This method provides an alternative measure of elasticity and buoyancy to that of regression analysed and discussed earlier.

Table 8 provides time rate elasticity and buoyancy of selected group of taxes and individual taxes. As in the case of elasticity of regression coefficient , almost all taxes including total revenue have time rate elasticity below unity except that of non tax revenue, and except customs duties time rate buoyancy of selected groups of taxes including total unity indicating sufficiently revenue buoyant. But Nepalese tax system does not have automatic responsive character.

Table 8
Time Rate Buoyancy and Elasticity of Various Tax Heads

S N	Tax Heads	Components of GDP	Time Rate Buoyancy	Time Rate Elasticity
1	TR	Y	1.2378	0.6223
2	TXR	Y	1.1877	0.4981
3	NTR	Y	1.4697	1.11458
4	DT	Y	1.0022	0.1197
5	IT	YN	1.2311	0.4658
6	LT	YA	-0.6161	-0.5071
7	RGT	Y	1.3852	0.6537
8	IDT	Y	1.2416	0.6051
9	ST	YT	0.9384	0.6148
10	ED	YMC	0.8168	0.1065
11	CD	YT	0.7021	0.2780
12	MPD	YT	0.8316	0.4352
13	XPD	YT	0.3042	-0.4226
14	ST	YT	1.4682	0.7705
15	AT	YTC	1.6806	0.3829
16	CT	Y	1.8930	1.5318
17	ET	YS	0.7674	0.1868
18	FR	YA	0.8545	0.0830

Source: As of Table 5.

Among the individual taxes as in the case of elasticity and buoyancy, the time rate elasticity of contract tax is the highest, 1.53, and its time rate buoyancy is 1.89. The time rate elasticity of other individual taxes are below unity and time rate elasticity of export duties and land tax are even negative implying the regressive nature of export levies and revenue . The time rate buoyancy of most of the individual taxes are above unity or tend to unity. These results support the earlier results of elasticity and buoyancy coefficient acquired from time series regression analysis and confirms the fact that the major part of responsiveness of the Nepalese tax system to changes in GDP or its relevant components arises , not because of any built-in - elasticity but due to changes in the rates and bases. Thus the time rate of growth of gross taxes under consideration are higher than the time rate of growth of net receipts.

CONCLUSION

When we compare the elasticity coefficients of previous studies to the present study ; we find that over periods tax elasticity has been declining despite the various efforts to increase the tax revenue. The estimate recorded by Reejal was 1.82 for the period 1964/65 to 1970/71 (Reejal 1976), it was recorded 0.92 by Dahal for the period 1964/65 to 1981/82 (Dahal 1983), IDS found it 0.86 for the period 1974/75 to 1984/85 (IDS 1987). In this study it is recorded 0.51 , indicating the deteriorating situation of Nepal's tax system and it even denudes the implication and implementation of government tax policies in the study period.

In buoyancy front, the coefficients recorded by Reejal , Dahal and IDS were 2.18, 1.51 and 1.35 respectively. This is recorded 1.16 in the present study. Thus the share of discretionary measures in the respective studies were; 16.5, 39.1, 36.3 and 56.0 respectively implying ad holism and volatility in government tax policy , imposition of high tax rates on a few taxed commodities, which in turn induces distortions and inefficient resource allocation.

The over all automatic response of Nepal's revenue system is very low, 0.64. It will not help to bridge the resource gap given the present rate structure and it will be difficult to raise the share of revenue in GDP by 2.5 percentage points as predicated by NPC during the Eighth Five Year Plan Period (1992-97). In the study period, the contribution of discretionary changes were significant, without such changes the tax-GDP ratio would have risen only marginally due to the following reasons:

The number of tax incentives and concessions that have been granted, following the supply-side tax policy, for capital formation under the private sector;

The gradual rising of the exemption limit and too many deductible expenses in the case of income taxation.

- The prevalence of self-employment which has kept many people, hard-to-tax group, away from entering the ambit of direct tax net, low voluntary compliance;
- Weak tax administration and ineffective tax laws;
- The existence of general poverty;
- Blanket exemption of taxation in industry sector;
- Exclusion of agricultural sector from the ambit of tax-net; and
- Monitoring problems.

Thus, it appears that more discretionary efforts will have to be taken in the future, as in the past to bridge the expenditure- revenue gap, making the tax system further complex which in turn would further reduce the built-in- flexibility. To increase the tax revenue is not an end itself rather it is a means to meet the fiscal imbalances, reduce inequality of wealth and income, proper allocation of resource, and incentive to work and invest, which would lead to increase in productivity and hence national income.

The central to the success of any taxation policy is the promotion of strong and self-sustaining tax structure, which will be obtained in the elastic tax system. The significance of the elasticity in the tax system is a crucial determinant to syphon off automatically the increasing portion of national income into the public exchequer (Sahota 1961).

The above analysis intensifies the need to reform our tax system. Given amount of revenue can be obtained with higher tax rates if base is narrow, which leads to higher chances of tax evasion, so broadly based taxes are supposed to be useful with smaller rates. Present budget deficits need more revenue from domestic front and inelasticity of total revenue is due to the sluggishness of direct taxes as there is the chance of high tax evasion due to the lack of administrative competency. The best way of combating this difficulty in the short-run might be to concentrate the tax policy on the indirect taxes, such as sales, excise and custom duties, with progressive rates on luxuries, not necessary for health and efficiency, which easier to administer. Non tax fiscal measures should be employed to attain equity and redistributive goals as its responsiveness to GDP is higher than the other tax revenues. The distribution of taxes on agricultural sector and other sectors and that of distribution of GDP clearly shoes that the Nepalese tax system fails badly in terms of horizontal equity. Thus, in the long run, efforts should be made to raise the direct tax revenue by marketing agricultural income taxable with sufficient exemption to subsistence requirements.

SELECTED REFERENCES

Bah, R.W. (1983) *Tax Revenue Forecasting in Developing Countries: A Conceptual Analysis,IMF, DM/72/83.*

Chaudhary, *N.N. (1975) A Study of the Elasticity of the West Malaysian Income Tax System, 1961-70* IMF Staff Paper Vol XXII, No. 2, July.
".....*(1973) Measuring Elasticity of Tax Revenue : A Divisia Index Approach.* IMF Staff Paper, Vol. 26, No-1, July.
Dahal, Madan Kumar (1993) *Taxation in Nepal: A Study of its Structure, Productivity and Burden,* (Unpublished Ph. D.theseis), University of Bombay, India.
Integrated Development System (1987) *Financing Public Sector Expenditure in Nepal,* IDS Kathmandu.
Mansfield, Charles Y.A. (1972) " Elasticity and Buoyancy of a Tax System:: A Method Applied to Paraguay', IMF Staff Paper, vol. II.
Mongar, G. S. (1984) "Sensitivity of Tax Yields and their Forecasting, *Economic Journal of Nepal,* T.U., Vol. 7, No. 1, Jan-March.
Musgravs R.A. and Miller (1968) "Built in Flexibility", *Readings in Fiscal Policy,* AER,
Rao, V.G. (1979) *The Responsiveness of the Indian Tax System, 1960/61 to 1973/74,* Allied Publishers Pvt. Ltd., Bangalore.
Reejal, Puskar Raj (1976) *Revenue Productivity and Equality Aspects of Nepalese Taxation: A Structural Analysis for the Period* 1967/68, 1970/71, CEDA, T.U. Kathmandu.
Sahota,G.S. (1961) *Indian Tax Structure and Economic Development,* Asia Publishing House, Bombay India.
Tanzi, Vito (1978) The *Sensitivity of the Yield of the US Individual Income Tax and The Tax Reforms of The Past Decade,*'IMF Staff Paper, Vol. XXIII, No.2, July.

Thimmaiah (1978) *Studies in Indian Public Finance,* Kalyani Publishers, New Delhi.

Appendex

Master Table

GDP, Total Revenue, from Direct and Indirect Taxes and Individual Taxes (Figures are in Million NRS)

F year	Total GDP	Total Rev.	Tax Re.	Non-tax Rev.	Customs Duties	Export Dutie	Import Duties	Sales Tax	Excise Duties	Income Tax	Reg. Tax	Land Tax	Enter-tainment	Hotel Tax	Contract Tax	Air Tax	Forest Rev	DIrect Tax	Indirect Tax
1968/69	7985.0	413.0	368.3	44.8	183.6	40.4	110.2	48.0	28.0	16.7	6.4	79.4	1.9	0.3	2.3	0.4	21.1	103.6	264.6
1969/70	8768.0	464.0	411.3	52.7	193.5	21.7	125.5	51.1	38.1	19.6	15.6	87.7	2.2	0.5	1.8	0.5	17.7	123.5	286.8
1970/71	8938.0	459.7	395.6	64.1	156.5	17.3	99.3	62.3	56.6	21.2	15.8	76.4	2.5	0.7	2.5	0.6	12.5	113.9	281.7
1971/72	10369.0	553.4	466.7	86.8	198.6	27.3	117.3	69.1	63.6	22.0	18.9	83.3	2.8	0.9	3.2	0.6	22.5	124.7	342.0
1972/73	9969.0	615.8	521.1	94.7	238.2	16.4	131.4	79.8	67.8	23.4	19.9	74.5	3.7	1.5	4.0	1.3	35.2	118.7	402.4
1973/74	12808.0	766.4	642.5	123.9	286.2	21.7	143.8	95.8	77.4	32.6	28.8	96.9	5.0	2.2	4.9	1.3	47.4	159.6	482.9
1974/75	16571.0	1008.4	841.7	164.7	328.5	30.9	182.3	190.5	119.7	47.0	38.0	90.9	5.8	2.8	7.5	2.3	45.0	177.7	665.1
1975/76	17394.0	1115.6	911.2	203.7	358.5	37.7	204.5	161.9	132.0	87.2	40.7	94.8	7.0	3.5	9.5	2.7	24.0	227.3	684.7
1976/77	17280.0	1322.9	1100.1	221.1	386.2	47.6	215.7	222.0	166.1	133.3	44.4	97.9	8.7	4.8	11.8	4.8	43.7	281.8	815.5
1977/78	19732.0	1582.0	1243.9	338.2	458.8	38.7	334.1	273.1	164.4	136.8	54.1	87.0	9.9	10.3	12.9	8.3	63.6	290.5	953.3
1978/79	22215.0	1811.9	1476.8	335.1	626.7	54.4	535.8	356.8	192.6	103.0	55.7	54.6	9.8	14.0	16.7	7.1	82.7	235.9	1240.9
1979/80	23351.0	1880.0	15128.8	351.3	608.0	62.6	504.8	401.2	215.2	101.1	65.0	56.2	9.5	14.0	18.5	8.6	86.5	253.7	1275.0
1980/81	27307.0	2419.2	2035.7	383.4	815.8	69.5	685.1	537.7	242.2	144.0	77.8	100.7	12.0	17.4	36.9	20.6	90.5	353.1	1682.6
1981/82	30988.0	2679.5	2211.3	468.2	825.1	42.2	739.5	597.4	305.7	189.8	88.3	81.7	15.2	23.1	43.0	21.9	113.6	380.0	1831.3
1982/83	33761.0	2841.6	2421.1	420.5	760.9	25.1	714.8	709.3	365.8	240.2	104.8	66.7	16.3	29.0	70.4	22.7	53.9	445.1	1976.0
1983/84	3939.0	3409.3	2737.0	672.3	825.9	30.4	746.2	770.7	432.1	290.9	135.2	77.2	24.0	34.5	78.3	25.4	60.6	541.8	2195.2
1984/85	44441.0	3916.6	3151.32	765.8	1064.4	55.7	907.6	845.8	483.8	307.3	141.7	76.9	24.4	38.8	103.6	26.9	90.5	559.6	2591.3
1985/86	53215.0	4644.5	3659.3	985.1	1231.1	73.3	1081.1	985.9	558.7	364.4	170.1	74.2	22.3	47.8	117.0	24.9	115.6	661.7	2997.7
1986/87	61140.0	597.51	4372.4	1602.7	1505.7	79.9	1285.3	1143.8	678.6	437.6	211.6	72.4	26.9	66.0	126.3	44.7	129.3	768.7	3603.7
1987/88	73170.0	7350.4	5752.8	1596.0	2214.7	107.9	1984.2	1300.5	825.4	579.0	286.2	80.7	32.3	80.6	199.1	65.4	101.1	1010.2	4744.3
1988/89	85830.0	7766.9	6287.2	1489.6	2289.9	62.7	2133.9	1379.7	877.6	861.2	320.6	80.4	32.8	93.2	193.2	67.0	75.6	1330.8	4956.5
1989/90	99702.0	9287.5	7283.9	2003.6	2684.9	32.6	2646.0	1650.1	1097.0	919.0	377.1	74.6	33.5	99.7	170.5	87.7	112.7	1434.8	5849.1
1990/91	116128.0	10729.9	8176.3	2553.6	3044.3	88.5	2752.7	2026.1	1200.3	745.9	456.6	82.1	39.5	115.7	173.3	173.4	136.3	1368.6	6807.7
1991/92	144931.0	13512.7	9875.6	3637.1	3358.9	114.7	2795.2	2840.7	1414.4	855.4	571.2	64.8	38.3	191.2	213.3	177.9	197.8	1595.2	8280.4
1992/93	164634.0	15148.4	11662.5	3485.9	3945.0	140.7	3178.1	3438.2	1452.8	1124.8	685.8	69.3	53.1	223.5	293.1	205.7	178.3	2036.2	9626.3
Avg. Ann. Gwth. In %	12.9	15.5	14.8	19.0	13.1	5.1	14.4	18.6	17.1	18.3	20.6	-0.5	14.2	30.9	21.4	28.4	9.1	12.7	15.5

Source : Annual Budget and Economic Survey of Different Years, MOF, HMG/ Nepal.