Revenue Productivity And Equity Aspects Of Nepalese Taxation : A Structural Analysis For The Period 1964-65 To 1970-71

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I. Introduction

The objective of this paper is to evaluate certain elements of the revenue productivity and the equity aspects of the Nepalese tax structure as it existed during the period 1964/65 to 1970/71. Specifically, it attempts to provide answers to the following questions:

a. To what extent the yield of the Nepalese taxes is responsive to an increase or decrease in its legal base ?

b. To what extent the yield of the Nepalese taxes is responsive to an increase or decrease in the gross domestic product (GDP) ?

c. What are the causes of responsiveness or irresponsiveness as the case may be ? and

d. Has there been unequal distribution of tax burden between the agricultural and the non-agricultural sector of the Nepalese economy ?

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Answers to these questions may provide some useful parameters and information to aid fiscal authorities in their efforts to introduce measures of tax reform.

II. Responsiveness of Different Taxes with Respect to their Legal Base:

Taxes for the purpose of the present study are taken to mean compulsory payments without any direct quid pro guo. Accordingly, revenue sources of His Majesty's Government of Nepal (HMG) as are shown under the heading of customs, excise, land revenue, taxes and registration in the annual budgets are taken to mean revenues derived from taxes, whereas the rest of the sources of revenue are considered as non-tax receipts and are excluded for the purpose of the present study.

The legal base of a tax is the source from which revenue is derived. Accordingly, while calculating the base elasticity (or responsiveness) the indices of different taxes as dependent variables have been related to the following indices as independent variables:

Tax Heads	Tax Base
Import duty	Value of import trade
Export duty	Value of export trade
Excise duty	Quantity index of industrial production[1]
Land Revenue	Index of land area under different crops.[2]

Tax-to-base elasticity is the relationship between relative changes in different tax heads and relative changes in their legal base. The coefficients of elasticity are estimated by least square regression of the type–

(1) $\text{Log } T = \log\ a + b\ \log\ B$

where the regression cofficient (b) gives the percentage change in tax receipts (T) that accompanies a 1 percent change in the base (B). Such a form of the estimating equation implies that the relation between revenue receipt and its base is approximated by the function-

(2) $T = a\ B^b$

1 This index was calculated by the present author on the basis of raw data published annually in Arthik Sarvaychan (Economic Survey) by the Ministry of Finance, HMG/N.

2 This index was calculated by the present author on the basis of raw data published in the Agricultural Statistics by the Ministry of Food and Agriculture, HMG/N.

from which the double log function of equation (1) has been derived. The equation used in this form contains the assumption that the different elasticity coefficients estimated are constant over the range of the base being considered.

Analysis of the base elasticity in the manner as discussed above facilitates the identification of the source of fast revenue growth or, conversely, the causes of lagging revenue growth. In this context, it may be noted that tax to base constituent of elasticity can be raised by an improvement in tax administration that enhances the progressiveness of the tax or the tax structure as a whole. On the other hand, the growth of the tax base is largely determined by the way in which the structure of the economy changes and hence is outside the direct control of the fiscal authorities.

Tax elasticities can be analyzed on the basis of two criterias, "with" and "without" a constant tax formulae. The response of the yield of a tax or a tax system to changes in its base with constant tax formulae is known as the built-in-flexibility of the tax system. The response of the yield of a tax or tax system to changes in base with different tax formulae is known as the buoyancy of the tax system. The tax formulae in the present context means rates, coverage, and imposition of new imposts or any other arbitrary legislative changes. Consequently, while estimating the elasticity coefficients, index of "net" series of different taxes as dependent variable have been related to index of the base as independent variable.

Tho "net" series is computed with the help of the equation formulated on the basis of the theoretical arguments provided by Sahota.[3] The equation is:

$$(3)\quad IT_t = \frac{(AT_t \pm RT_t)}{AT_{t-1}} IT_{t-1}$$

Here, IT = Index of "net" tax receipts

AT=Actual tax receipts

3 G. S. Sahota, Indian Tax Structure and Economic Development, Asia Publishing House, Bombay, 1961.

RT=Receipt due to arbitrary legislative changes[4]

t=Relevant year

t--1=Preceeding year

The logical interpretation of the equation may be given in the words of Sahota himself:

> In order that the alteration in the base and the rate structure in any one year, if capable of enhancing or retarding the built-in-elasticity to the particular tax, have their full play in subsequent years, elimination if tax yields due to legislative changes in tax rates and coverage is done for the current year only of the introduction of such changes. Increases in the yield due to increase in tax rates or extension of the base are substracted from the actual account of that year, and decreases in the yield due to reduction in tax rates or contraction of the base are added to the final account of the year. Hence, forward, however, the changed tax rate structure and the altered base form a part of the overall tax measure, so that for subsequent years the new rates and the new base are allowed to yield their relative influence on the elasticity of the tax.[5]

III. Results of Regression Analysis between Tax Yield and Tax Base:

In table 1 and 2 we have presented the results of regression analysis based upon the postulated relationship of the "net" and the "gross" series of four important taxes whose legal bases were readily available.

The first point that strikes one in both these tables is the stark anomaly in the tax-base relationship of the Nepalese tax structure. As indicated by the level of $\bar{R}^2$, land revenue based on such a theoretically inflexible tax base as land area, shows a better relationship with its tax base rather than import duty or excise duty whose tax bases

4 Tax yield due to arbitrary legislative changes is based on the budget estimate of the Finance Minister. A perusal of the methods adopted by the Finance Minister in different years however indicated that there are many undesirable features of the estimation procedure. Nevertheless this study is based on the assumption that the Finance Minister is in a better position to estimate the yield from an additional tax measure in the year in which it is imposed or in the next year of "full operation" of such measures than any body else.

5 G. S. Sahota, Op. Cit., p. 77.

are usually quite flexible. Besides, not only the absolute size of the elasticity and the buoyancy coefficients of land revenue are high, but also their size as compared to that of import and export duty are several times higher. In fact, the sign of the elasticity coefficients of import duty as presented in table 1 is minus and in table 2 the size of the buoyancy coefficient is less than 1, indicating in both the cases its reqressive character.

Export duty also surprisingly shows a better relationship with its base inspite of the fact that in nearly 40 percent of the cases, the duty is levied on specific rather than on advalorem basis.

The reasons for these anomalous relationship are however, not that difficult to find and are discussed below:

The high elasticity as well as buoyancy of the land tax with respect to its legal base largely reflects the extensive upward revisions in the rates of this tax within the period under consideration. Other contributory factors are additional land brought under cultivation, scientific basis of measurement of land area under the new cadastrial survey act, and virtual impossibility of evading this tax under the Nepalese legal system in which tax receipt can be presented as a proof of the title of ownership of property in lieu of other superior evidence to that effect.

The high elasticity as well as the buoyancy of export duty can be explained in terms of the designing of its rate structure. Although, the weight of export duty around 1966/67 ranged from 1 to 10 percent of the value of the commodities being exported, the overall rate structure of this tax is designed primarily for revenue purposes. Consequently, within the period under consideration, its rate structure has undergone substantial upward revisions. Most of the Nepalese export consists of agricultural commodities and since India provides an unlimited market for these commodities, there is no need to grant export duty exemptions to industries which could have caused an erosion on the yield of this tax. Besides, although in 40 percent of the cases, this duty was levied on specific basis, in actual practice, the year to year variation in the prices of exported items seems to have been taken into consideration on an ad hoc basis while designing the rate structure of this tax.

In contrast to land revenue and export duty, the lack of a systematic relationship

between the yield of import duty and that of its base as well as the low value of elasticity and buoyancy coefficients can be largely explained in terms of the following factors:

The weight of import duties on the value of imports is not that high. Around 1966/67 import duties accounted for only 15 percent of the value of import trade. Besides, the basis of import duty collection has been f. o. b. rather than c. i. f. value. The inability of importers to produce documents regarding tronsport and insurance costs is said to act as a deterrent for collecting this tax on c. i. f. basis. It is also an open secret that import from countries such as Japan, Singapore, Hongkong and Malaysia are grossly underinvoiced. Nepalese custom officials lack necessary expertise as well as information regarding quality standards and current prices of commodities imported from these countries. Finally, there have been several unsuccessful attempts on the part of HMG/N to fight inflation as well as to promote new industries by granting exemptions from import duties.

As regards excise duty, the level of $\bar{R}^2$ with respect to buoyancy (table 2) is considerably higher than with respect to elasticity (table 1). However, in both the cases, the size of the regression coefficient are pretty low. Such a low level of elasticity and buoyancy coefficients can be explained mainly in terms of (I) low rates, (II) laxity in the enforcement of laws, (III) ill designed procedure of assessment under out-moded rules and regulations and (IV) unscientific basis of granting exemptions. For example, excise duty on cigarettes and biri is based on the cost of manufacturing rather than on wholesale and retail price. Even such simple administrative devices as putting bandroll or stamps on commodities subject to excise tax that could have improved its collection, are unknown to excise officials. Another effect in the administration of this tax that can account for its low elasticity and buoyancy is the practice of collecting this tax on rakshi (local liquor) on a contractual basis. Finally, rice-husking-the most important manufacturing industry in Nepal that accounted for 45.5 percent of the total value added by manufacturing in 1965 was altogether exempt from excise duty payments.

TABLE 1

BASE ELASTICITY OF VARIOUS TAXES FOR THE PERIOD 1964/65 to 1970/71

Tax Head (T)	(Log T = log a + b log B + U_t)[1]					
	a	b	R^2	$\bar{R}^2$	F-Statistic	D. W.-[5] Statistic
Import duty[2]	5.12002 (4.77893)	-0.0891702 (-0.367702)	0.0327	-0.2091	-0.135267	1.4416
Export duty[2]	-10.5389 (-1.98605)	3.37867 (2.93971)	0.6836	0.6045	8.64189	2.1143
Excise duty[3]	2.58381 (2.22165)	0.149290 (0.760106)	0.1615	-0.1180	0.577758	1.5861
Land revenue[4]	-8.89492 (-1.75741)	2.93302 (2.70849)	0.5947	0.5136	7.33572	2.1267

Figures written within parenthesis are t - values.

1 U_t stands for disturbance term.

2 For the period 1964/65 to 1969/70.

3 For the period 1966/67 to 1970/71.

4 For the period 1964/65 to 1970/71.

5 D. W. Statistic stands for Durbin - Watson Statistic.

TABLE 2

BASE BUOYANCY OF VARIOUS TAXES FOR THE PERIOD
1964/65 to 1970/71

Tax Head (T')	(log T'=log a+b' log B+U_t)[1] a	b'	R^2	$\bar{R}^2$	F-Statistic	D. W. Statistic
Import duty[2]	4.79106 (1.76050)	0.0520416 (0.844836)	0.0018	-0.2478	0.00712037	0.3880
Export duty[2]	-5.22235 (-1.07040)	2.24096 (2.12069)	0.5293	0.4116	4.49735	1.5964
Excise duty[3]	2.90403 (3.19327)	0.421295 (2.74316)	0 7150	0.6199	7.52489	1.4444
Land Revenue[4]	-18.2682 (-3.12826)	4.98208 (3.98749)	0.7608	0.7129	15.8999	1.2991

Figures written within parenthesis are t – values.

1 T' stands for gross series of tax yields in index form.

2 For the period 1964/65 to 1969/70.

3 For the period 1966/67 to 1970/71.

4 For the period 1964/65 to 1970/71.

IV. Responsiveness of Different Taxes with Respet to GDP

Income elasticity is the relationship between relative changes in different tax heads and relative changes in GDP or its relevant components.

For the purpose of the present study, indices of different tax heads as dependent variables are related to indices of different components of GDP as independent variables as follows:

Tax Heads	Components of GDP
Import duty	GDP originating in wholesale and retail trade
Export duty	GDP originating in wholesale and retail trade.
Excise duty	GDP originating in the manufacturing and the Cottage Industries.
Land revenue	GDP originating in the agric ultural sector.
Income tax	DGP originating in the non-agricultural sector.
Urban house and land tax	GDP originating in ownership of dwellings.
Sales tax	Consumer Price index for Kathmandu[6]
Other taxes[7]	GDP originating in the non-agricultural sector.
Registration	Total GDP
Total tax	Total GDP
Indirect Taxes[8]	Total GDP
Direct taxes	Total GDP
Taxes on the agricultural sector[9]	GDP originating in the agricultural sector
Indirect taxes on the agricultural sector	GDP originating in the agricultural sector
Direct taxes on the agricultural sector	GDP originating in the agricultural sector
Taxes on the non-agricultural sector[9]	GDP originating in the non-agricul tural sector

7 Other taxes consist of entertainment tax, contract tax (on the value of contract received from government), road cess. Vehicla license and various miscellaneous items.

8 The concepts of direct and indirect taxes as well as their empirical referants are discussed in section VII.

9 Detail discussion in this respect is presented in section VII.

Direct taxes on the non agricultural sector	GDP originating in the non-agricultural sector
Indirect taxes on the non-agricultural sector	GDP originating in the non-agricultural sector.

A high responsiveness of tax yield with respect to GDP is a particularly desirable attribute of the tax system. Such an attribute facilitates the financing of the growth in government expenditure without the need for politically difficult decisions to revise the rates and coverage of existing taxes or the imposition of new ones. Besides, such an attribute of the tax system also ensures that tax yield will rise or fall more rapidly than prices in an inflationary or deflationary situation. Therefore an overall stabilization program of the government will be assisted if the income elasticity of the tax system is maximized.

The method and procedures adopted for estimating the elasticity and the buoyancy coefficients of different taxes with respect to GDP are the same as discussed in section II.

V. Results of Regression Analysis between Tax Yield and GDP:

In table 3 and 4, we have presented the results of regression analysis based on the postulated relationship between the "net" and the "gross" series of different taxes in relation to GDP and its relevant components.

The notable aspect in both these tables is once again the level of $\bar{R}^2$ statistic. For taxes analyzed at aggregate level such as total taxes, direct and indirect taxes the level of this particular statistic is quite high. This finding apprently supports one of the underlying assumption of many a aggregate model that tax revenues are functionally related to GDP. In the case of Nepal however, the high level of $\bar{R}^2$ for taxes analyzed at aggretate would tend to bear out such an assumption more on statistical ground rather than on causative grounds. The fact that the level of $\bar{R}^2$ statistic with respect to important individual taxes such as import export duties as well as land revenue are quite low, can be cited as evidences in this regard.

Among the individual taxes that bear statistically significant relationship with relevant components of GDP are income tax, urban house and land tax and registration tax. (See table 3)

TABLE 3

ELASTICITY OF VARIOUS TAXES AND GROUPS OF TAXES FOR THE PERIOD 1964/65 to 1970/71

Tax Head (T)	($T=a\ Y^b$ estimated as $\log T=\log a+b \log Y+U_t$) a	b	R^2	$\bar{R}^2$	F-Statistic	D. W. Statistic
Import	4.49639 (3.06253)	0.0471039 (0.147792)	0 0044	-0.1947	0.0220763	1.8945
Export	-6 93247 (-1.56741)	2.61640 (2.72506)	0.5976	0.5171	7.42595	0.6384
Excise	10.2001 (1.91465)	-1.31345 (-1.20886)	0.2262	0,0714	1.46135	1.0131
Land Tax	1.04478 (0.559035)	0.771110 (2.01738)	0.4487	0.3385	4.06966	2.0418
Income	15.5910 (-6.12816)	4.39010 (8.36859)	0.9334	0.9200	70.0333	2.1946
Urban Honse	84.0595 (4.75183)	-17.5404 (-4.63553)	0.8112	0.7735	21.4865	2.1801
Sales	3.78014 (1.37693)	0 481668 (0.95630)	0.1861	-0.0174	0.914527	0.6816
Other	0.0286977 (0.00522465)	1.03965 (0 917952)	0.1442	-0.0269	0.842656	1 9592
Registration	-7.64985 (-2.53662)	2.59159 (4.19014)	0.7783	0.7340	17.5572	1.6995
Total Tax	-3.80269 (-1.92214)	1.81912 (4.48348)	0.8008	0·7610	20.1016	2.2413
Indirect	-2.46916 (-1.50446)	1.52209 (4.52201)	0.8035	0.7642	20.4484	2.7405
Direct	-5 69992 (-1.77789)	2.24610 (3.41590)	0.7000	0.6400	11.6683	1.8161

Table 3 Contd.....

Tax on Agri.	–0.761501 (–.526144	1.15545 (3.90338)	0.7529	0.7035	15.2361	1.9522
Indirect Tax on Agri.	–0.770500 (–0.493222)	1.15886 (3.62708)	0.7246	0.6695	13.1555	2.7991
Direct Tax on Agri.	–0.240266 (–0.137491)	1.04119 (2.91318)	0.6293	0.5551	8.48650	2.2216
Tax on Non-Agri.	–2.76883 (–1.97961)	1.60655 (5.57055)	0.8612	0.8335	31.0312	2.4145
Indirect Tax on Non,Agri.	–10.6863 (–2.59246)	3.35382 (3.94589)	0.7569	0.7083	15.5701	1.4877
Direct Tax on Non-Agri.	–1.23930 (–1.23839)	1.26978 (6.15360)	0.8834	0.8600	37.8669	2.9918

Figures written within parenthesis are t – values. Degree of freedom for F – Statistic in the case of Sales Tax is 1 5; for the rest of the taxes it is 1 6.

TABLE 4

BUOYANCY OF VARIOUS TAXES AND GROUP OF TAXES FOR THE PERIOD 1964/65 to 1970/71

($T = a\ Y^b$ estimated as $\log T = \log a + b \log Y + U_t$)

Tax Head (T')	a	b	R^2	$\bar{R}^2$	F-Statistic	D. W. Statistic
Import	0.795234 (0.251029	0.92557 (1.34591)	0 2659	0.1191	1.81147	0.7146
Export	1.44193 (0.299751)	0.796368 (0.762616)	0.1042	0.0750	0.581582	0.8419
Excise	-4.85727 (-2.66858)	2.05430 (5.52818)	0.8594	0,8313	30.5607	1.4408
Land Tax	-1.52834 (-0.639384)	1.33928 (2.73949)	0.6002	0.5202	7.50470	1.6056
Income	-9.78639 (10.9333)	3.13541 (16.9881)	0.9830	0.9796	288.597	1.6448
Urban House	8.00406 (2.15474)	-0.763110 (-0.96037)	0.1557	-0.0181	0.922277	1.6405
Sales	3.60135 (1.63896)	0.458305 (1.13686)	2.2442	0.0553	1.29244	0.6786
Other	-9 21349 (-1.71727)	3.12381 (2.82381)	0.6146	0.5375	7.97392	1 3075
Registration	-14.0129 (-3.61543)	3.95384 (4.97407)	0.8319	0.7983	24.7413	2.1123
Total Tax	-5.39420 (-2.92070)	2.17524 (5.73571)	0.8681	0.8417	32.8993	2.0883
Indirect	-5.97769 (-3.44775)	2.30106 (6.47126)	0.8933	0.8720	41.8770	2.3407
Direct	-4.07749 (-1.99392)	1.88620 (4.49738)	0.8018	0.7622	20.2266	1.9055

Table 4 Contd.....

Tax on Agri.	-4.22887 (-2.02269)	1.91482 (4.47805)	0.8004	0.7605	20.0529	2.1013
Indirect Tax on Agri.	-6.01878 (-2.92287)	2.30204 (5.46600)	0.8566	0.8280	29.8772	2 6452
Direct Tax on Agri.	-2.66347 (-1.15049)	1.57684 (3.33027)	0.6893	0.6271	11.0908	1.8990
Tax on Non-Agri.	-6.76966 (-5.26562)	2.48555 (9.3762¹)	0.9462	0.9354	87.9131	2.1854
Indirect Tax on Non-Agri.	-6.40009 (-5.17769)	2.40312 (9.42862)	0.9468	0.9361	88.8989	2.3152
Direct Tax on Non-Agri.	-9.17365 (-5.20069)	3.024'4 (8.31461)	0.9326	0.919i	69.1328	1.5671

Figures written within parenthesis are t – values. Degree of freedom for F – Statistic in the case of Sales Tax is 1 5; for the rest of the taxes it is 1 6.

Another aspect of table 3 is the sing and the elasticity coefficients of those taxes and tax heads that bear significant relationship with different components of GDP. Taxes whose level of $\bar{R}^2$ is high have bigger size of elasticity and taxes whose level of $\bar{R}^2$ is low has also lower size of the elasticity coefficients. The plus sign of the regression coefficient of income tax indicate that the yield of this tax increases as GDP originating in the non-agricultural sector increases. The size of the regression eoefficient of income tax is also the highest among the coefficient of individual taxes and tax heads that bear significant positive relationship with GDP or its relevant compnents. This indicates that income tav is the most Progressive of all the taxes.

The high elasticity of income tax in Nepal is basically due to what is some times known as "exemption effect" and rate "effect". At low levels of income small increases in personal idcome or adjusted gross income is acompanied by very large percentage increase in taxable income especially when it starts from a zero base. Similary, under a progressive rate structure, increases in taxable income per return will cause effective average and marginal tax rates to rise, and tax yield thus rise mere rapidly than taxable income

(or the income aggregate of personal income or adjusted gross income).[10]

The sign of the regression coefficient of urban house and land tax is not only minus but its size is also very big. This indicates that the yield of this tax decreases at a very high rate as the component of GDP originating in tne ownership of dwellings increases. This clearly indicates its regressive character. The reasons for the regressive character of this tax are to be found in extremely low rate schedule, lack of proper assessment of taxable property, and inadequate enforcement of tax laws.

The regression coefficient of total tax is positive and its value is approximately 1.82 This indicates that the Nepalese tax structure as a whole is fairly elastic. However we must hasten to add at the cost of repetition that the elastic structure of the Nepalese tax system is proved more on statistical grounds rather than on causative grounds in so far as important individual taxes bear weak realationship with relevant components of GDP:

As between direct and indirect taxes, the elasticity coefficient of the former is bigger than that of the latter. Tbis indicates that direct tax as a whole is more progressive than indirect tax as a whole, although the difference between the size of the elasticity coefficients of the two type of taxes is not that big.

As between the tax on the agricultural and the non-agricultural sector, the size of the latter is bigger than that of the former.

As between the size of the direct and the indirect taxes on agricultural sector there is not much of a difference. However, as between the direct and the indirect taxes on the non-agricultural sector, the size of the latter is much larger than that of the former.

In table 4 we have presented the results of regression analysis based upon the the postulated relationship between the "gross" series of different taxes in relation to GDP or its relevant components.

Among the individual taxes whose index of "gross" yields show statistically significant relationship with GDP or the relevant components of GDP are: excise duty, income tax, registration and all the taxes analyzed at the aggregate level.

10 Neil M. Singer, "Estimating State Income-Tax Revenues: A New Approach", The Review of Economic and Statistics, Vol. LII, 1970, pp. 427-31.

Taxes whose index of "gross" yields do not show statistically significant relationship with GDP are: import duty, export duty, land revenue, urban house and land tax, sales tax and "other" taxes.

The difference between tax-to-income elasticity and tax-to-income buoyancy shows the importance of discretionary changes in the system of taxes. For example, the tax systestem as a whole had a buoyancy of 2.17 compared to an elasticity of approvimately 1.82 The difference between these two figures indicates the possitive impact of legislative changes on the revenue productivity of the tax system.

VI. Time Rate of Growth of Selected Taxes vz. Time Rate of Growth of Selected Components of GDP:

The method of regression analysis can be counted upon to give reliable results only when there exists a significant relationship between the variables as postulated in the regression equation. In those cases where significant relationship between the dependent and the independent variables do not exist as postulated, regression results cannot be counted upon to derive meaningful policy implications. However, the non-existence of significant relationship between the variables in itself can shed light on the nature of the problem being encountered. For example, the non-existence of a significant relationship between a tax levied on income as a dependent variable and GDP as an independent variable means that the yield of a tax on income has no relationship with the gross income of the country as a whole. This in turn is an indication of the fact that there is something drastically wrong either with the income tax laws or with the administration of the tax.

One indication of whether or not there exist a significant relationship between the dependent and the independent variables as postulated, is the level of $\bar{R}2$ statistic which measures the goodness of fit of the relationship being measured. In other words, the level of $\bar{R}2$ statistic measusures the extent to which changes in tax revenue as a dependent variable is systematically correleted with changes either in its lagal base or in GDP or relevant components of GDP as the independent variables.

Accordingly, whenever the level of $\bar{R}2$ statistic is unacceptable, we have tried an alternative measure of "time rate of growth" using the exponential type of function.

(4) $T=a\,b^t$

which is estimated as –

(5) $\log T=\log a+t \log b.$

and where (t) is time and (b) is the rate of growth of tax (T) per unit of time i. e. $\frac{dT}{T} / d_T$. This "time rate of growth" of taxes following Sahota[11] have been divided by the "time rate of growth" of GDP or its relevant component $\frac{dY}{Y} / d_t$ so as to get an idea of the relative rate of change in tax yields and the relevant components of GDP. This method provides an alternative measure of elasticity to that of the regression coefficient.

A comparision detween the two columns in table 5 shows that the major part of responsiveness of the Napalesc tax system to changes in GDP or its relevant components arises, not because of any built-in-flexivity. but due to changes in the base and the rates. Hence, the relative annual rates of "gross" tax receipts with respect to all the six taxes beiog analyzed in this section are higher than the annual rates of "net" tax receipts.

11 G. S, Sahota. Op. Cit., pp. 21-26.

TABLE 5

TIME RATE OF GROWTH OF VARIOUS TAXES DIVIDED BY TIME RATE OF GROWTH OF GDP OR ITS RELEVANT COMPONENTS FOR THE PERIOD 1964/65

Tax Head (T)	Net Series $(\frac{dT}{\bar{T}} / \frac{dY}{\bar{Y}})$	Gross Series $(\frac{dT}{\bar{T}} / \frac{dY}{\bar{Y}})$
Import duty	0.5295803211	2.913015772
Export duty	4.926393655	2.620420325
Excise duty	-1.573020384	2.205339257
Land Revenue	0.875940651	1.60658136
Sales	1.514385851	1.283062017
Other	1.516287481	3.492766655
Urban House and Land Tax	-	-0.3562046909

Based upon the results of both regression analysis and annual "time rate of growth" analysis the size of elasticity and buoyancy coefficients of different taxes are presented in a summary from in table 6

TABLE 6

SUMMARY OF ELASTICITY AND BUOYANCY COEFFICIENTS BASED UPON THE RESULTS OF REGRESSION AND TIME RATE OF GROWTH ANALYSIS

Elasticity		Buoyancy	
Tax Heads	Value of Coefficient	Tax Heads	Value of Coefficient
Export duty	4.92	Registration	3.95
Income tax	4.39	Other	3.49
Indirect tax non-agricultural sector	3.95	Income	3.13
Registration	2.59	Direct tax an non-agricultural sector	3.02
Direct tax	2.25	Import duty	2.91
Total tax	1.82	Export duty	2.62
Tax on non-agricultural sector	1.61	Tax on non-agricultural sector	2.48
Tax on agricultural sector	1.55	Indirect tax on non-agricultural sector	2.40
Indirect tax	1.52	Indirect tax on agricultural sector	2.30
"Other"	1.52	Indirect tax	2.30
Sales	1.51	Excise	2.20
Direct tax on non-agricultural sector	1.27	Total	2.17
Indirect tax on non-agricultural sector	1.16	Tax on agricultural sector	1.91
Direct tax on agricultural sector	1.04	Direct tax	1.89
Land Revenue	0.87	Land Revenue	1.61
Import duty	0.53	Direct tax on agricultural sector	1.58
Excise duty	−1.57	Sales tax	1.28
Urban House and Land Tax	−17.54	Urban house and Land Tax	−0.76

VII. Distribution of Tax Burden Between the Agricultural and the Non-agricultural Sectors:

In this setion we are concerned with the equity aspect of the Nepalese tax structure. Theoretically, tax equity is analyzed in terms of the concepts of "benefit received" and "ability to pay" principles. The benefit received principle refers to taxes on particular segment of the population in return for particular benefits from public expenditure. The "ability to pay" priciple refers to taxes financing more general expenditure and postulates that tax incidence should be related to the relative tax paying capacity of the tax payers.

Two aspects of the ability to pay principle are: "vertical equity" recognising that a tax payer's ability to pay is related to his "taxable capacity" and "horizontal equity" recognizing that tax payers with "equal capacity" should have equal tax burden

In this study we are concerned ith "vertical equity" only. This particular concept has been analyzed in terms of the distribution of tax burden between the agricultural and the non-agricultural sectors of the Nepalese economy. Following Gandhi,[12] "vertical equity" is measured as well as defined by the following equation:

$$(6)\quad B = \frac{T_A}{(Y_A - S_A)\,e_o} \Big/ \frac{T_N}{(Y_N - S_N)\,e_o} \qquad \left[\, 1 \angle e_o \angle 2 \,\right]$$

Where B = Ratio of tax burden on the agricultural sector to that in the non-agricultural sector

T_A = Per capita tax payment in the agricultural sector

T_N = Per capita tax payment in the non-agricultural sector

12 Ved P. Gandhi, Tax Burden on Indian Agricultural, The Law School of Harvard University, Cambridge, 1966. In this particular work Gandhi provides a very persuasive argument as to why the classical measure of tax burden (taxes as a ratio of income) is inappropriate as a measure of "vertical equity". He also argues for a broader measure of "taxable capacity" consisting of four weighted variables namely per capita income remaining after the deduction of "subsistence requirements", wealth per capita and indices of wealth and income inequality. Besides, he also deducts per capita benefits derived from public expenditure from per capita taxes paid in order to take into account the effects of differences in the incidence of public expenditure on the incidence of taxes.

Y_A = Per capita GDP in the agricultural sector

Y_N = Per capita GDP in the non-agricultural sector

S_A = Subsistencc requirements in the agricultural scctor

S_N = Subsistence requirments in the non-agricultural sector

e_o = Exponent or elasticity of taxes with respect to "taxable capacity".

Equation (6) postulates that relative tax burden between the agricultural and the non-agricultural sectors is measured by the ratio of per capita tax papments (T_A/T_N) divided by their relative "taxable capacity". Relative "taxable capacity" for the purpose of the present study is defined as the ratio of per capita GDP remaining after the deduction of per capita "subsistence requirements" $(Y_A - S_A / Y_N - S_N)$.

Equity considerations in taxation requires that higher "taxable capacity" should be subjected to higher taxes i.e. taxes should be made progressive. But how much progressive ? This is essentially a subjective question and its answer depends on the norm difining equity. The norm of equity in taxation is reflected in the rate of progression or the elasticity of taxes with respect to taxable capacity. An elasticity that is greaer than 1 implies progression, an elasticity that is equal to 1 implies proportion and an elasticity that is less than 1 implies regression. Similarly, an elasticity that is greater than 2 signifies increasing rate of progtession, an elasticity equal to a constant rate of progression and an elasticity less than 2 a decreasing rate of progression.

Higher income has higher "taxable capacity" given subsistence requirements. Subsistence requirements is an absolute concept, it does not very with income. The money equivalent of subsistance requirements howerer, changes due to inflation. "The proper allowance for subsistance is admittedly difficult to determine". [13] It depends on several socioeconomic and biological necessities which vary from society to society and in the same society from one place to another.

Fo the purpose of the present study the annual per capita value of subsistence requirements in the agricultural sector has been taken at Rs. 500 at 1968/69 prices. This figure is based on the Indian Planning Commission's estimate of subsistence

13. Ved P. Gandhi, Ibid., p. 29.

requirements [14] in states like Bihar and U.P. In both these Indian states, the quality of life is almost like that of Nepal. In the case of the non-agricultural sector, the level of subsistence requirements has been arbitrarily fixed at 15 percent greater than that of the agricultural sector in order to recognize higher cost of living in an urban environment.

For the purpose of the present study the agricultural sector is defined as an aggregate of individuals who according to the census of population of Nepal are engaged in agriculture as a means of livelihood Similarly, the non-agricultural sector is taken to mean an aggregate of individuals who are engaged in sectors other than agriculture as a means of livelihood. Consequently, sector-wise incidence of taxes have been analyzed in terms of relative per capita taxes on segments of population both as producers and consumers.

Corresponding to the concept of the agricultural and the non-agricultural sectors, income of the agricultural and the non-agricultural sectors are difined as GDP originating in the agricultural sector and GDP originating in sector other than agriculture respectively.

Following the conventional definition of indirect and direct taxes as taxks whose incidence can and cannot be shifted, import duty, export duty, excise duty and sales tax are considered as indirect taxes, whereas land revenue, income tax, urban house and land tax, taxes grouped under "other taxes" and registration taxes are considered as direct taxes.

The base of land revenue in Nepal is area of land under cultivation classified according to the imputed productivity. Consequently, the incidence of land revenue in Nepal can be shifted only if land can be withheld from its current uses. Such withholding possibilities in the context of the socio-economic conditions prevailing in the agricultural sector of Nepal can be said to be very rare in view of the following facts:

14. See P.K. Pardhan "On Incidence of Poverty in Rural India in the Sixties" The Economic and Political Weekly 8, Feb 1975, special numbers 245-254. In this context it may also be noted that the level of "subsistence requirements" includes required expenditures on items like food, clothes and fuel and does not included expenditures required on items like medical care, education and others.

a. Land revenue comprises a very insignificant proportion of the total cost of agricultural production and the price of the agricultnral produce received by the farmers. Consequently increase or decrease in its rate is not a material consideration in determining the altenative uses of land.

b. Most of the farmers in Nepal are small owner cultivators who produce basically for home consumption. They are rarely concerned with marginal cost and marginal revenue considerations when deciding to put available land under alternative uses.

A tax on personal income income can be shifted only in exceptional circumstances under which the employee has a relatively stronger position vis-a-vis employer. In a country like Nepal where the rate of unemployment is very high and trade unionism does not exist, the probability of the shifting of income tax is virtually zero.

Regarding urban house and land tax, taxes grouped nnder "other" taxes and registraion taxes, no labour need be wasted to determine their shiftability as their combined contribution to the total tax revenue during the period under consideration ranged between 3 to 6 perent only. For our present porpose, all these taxes are considerd as non-shiftable.

In the context of Nepal, the burden of export duties can be regarded as completely shiftable to foreign ers, Most of the commodities subject to export duties are agricultural comn odities. The rate of export duties are designed primarly on revenue considaration. Export promotion considerations are secondary. Moreover, during the period under consideration Nepal had been enjoying almost an unlimited market for its agrieultural exports in India because of scarcity situation prevailing in that country. Consequently, while assessing the burden of taxes, the incidence of export duties have beed excluded altogether.

Most of the burden of import duties are shiftable except duties levied on commadities that are imported by traders and importers who can charge monopoly prices. In the absence of adequate information, the present writer has not been able to allocate the burden of import duties on such commodities as between the trader importer and the eonsumers. Consequently, it is assumed that the whole burden of import duty is passed on to the consumer. In view of the fact that in all probability the value of imports imported by monopolists is limited to a very small proportion of

total import trade, our analysis of the overall tax burden is supposed not to be materially affected by this assumption.

Based on the judgement regarding the shiftability of different taxes as discussed earlier, their burden have been allocated between the agricultural and the non-agricultural sectors as follow:

The whole yield of land revenue have been allocated to the agricultural sector since it was decided earlier that no part of the money burden of this tax is shifted to the consumers of agricultural product in the non-agricultural sector.

The incidence of tax revenue derived from agency, arms and vehicle registrations have been wholly attocated to the non-agricultural sector. The incidence of tax revenue derived from house and land registrations have been allocated to both the sectors on the assumption that the incidence of this tax on each of the sector is equal to the tatio of the agricultural and the non-agricultural pepulation.

During the period under consideration income derived from agriculture was not effectively suject to income tax. Accordingly, the whole of tax revenue derived from income tax has been allocated to the non-agrcultural sector.

The incidence of entertainment tax (on the value of admission tickets mainly to movie houses), urban house and land tax. contract tax (tax on the value of contract received from government), road cess, vehicle licenses and "miscellaneous" tax have been wholly allocated to the non-agricultural sector.

The incidence of import ducties, excise duties and sales tax have been allocated between the agricultural and the non-agricultural sectors on the basis of the fact that the burden of these taxes will be shared by the two sectors according to their respective expenditures on the commodities subject to these taxes, Accordingly the proportion of these taxes paid by each of the sector have been determined by multiplying the ratio of per capita expenditure on the commodities subject to these taxes by the ratio of population in the agricultural and the non-agricultural sectors respectively. [15]

15. The data base of the ratio of per capita expenditure in this respect. is that of Dieter Weiss et. al., Regional Analysis of Kosi Zone/Easter Nepal, Porgamon Press, New York, 1972, p. 237. This ratio is assumed to have remained constant throughout the period under considration.

In table 7, we have presented the relative tax burden between the agricultural and the non-agricultural sectors estimated in terms of equation (6) under two different concepts of taxable cpacity. When difference in the level of subsistence in the two sectors are recognized as one of the factors affecting taxable capacity, the agricultural sector of the Nepalese economy as indicated in table 7 not only appears to have been unfairly treated as campared to the non-agricultural sector, but also shows that the government was taxing that part of its income which for the purpose of the present study was considered as its subsistence requirements. As against this if "taxable capacity" is defined as per caplta GDP without any considerations fo subsistence requirements, the relative taxable capacity of the agricultural sector appears to have been slightly greater than its relative tax payments.

TABLE 7

TAX BURDEN ON THE AGICULTURAL SECTOR TO THAT IN NON AGRICULTURAL SECTOR THE PERIOD 1961/65 to 1970/71

Year	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71
$\frac{TA}{TA}$[1]	0.1620	0.0755	0.0721	0 0820	0.0659	0.0688	0.0635
$\frac{(YA - S A)}{(YN - SN)}$[2]	-0.0319	-0.0243	-0.0193	-0.0007	0.0072	0.0056	-0.0008
e_o[3] / $\frac{YA}{YN}$[4]	0.2419	0.1434	0.1278	0.1335	0.1298	0.1313	0.1274
1.1	0.2099	0.1181	0.1040	0.1091	0.1058	0.1072	0.1037
1.2	0.1821	0.0972	0.0847	0.0892	0.0863	0.0875	0.0844
1.3	0.1580	0.0801	0.0689	0.0730	0.0703	0.0714	0.0687
1.4	0.1371	0.0659	0.0561	0.0596	0.0573	0,0583	0.0559

1 Relative Tax burden.

2 Relative taxable capacity defined as per capita GDP remaining after deducation of subsistence requirements.

3 Exponent or elasticity.

4 Relative taxable capacity defined as per capita GDP.

Throught the period under consideration. In other words, the tax burden in the agricultural sector was less than that in the non-agricultural sector, Consequently, for equity considerations between the two sectors taxes on the agrieultural sector could have been made more progressive. For example, in 1964/65 taxes on the agricultural sector could have been raised by an exponent of 1.3 in 1965/66 by 1.2 and so on provided that the level of subsistance requirements was not a material consideration with the fiscal authorities.

In table 8, we have presented the result of the calculation of the relative tax burden on the non-agricultural sector to that in the agricultural sector under the assumption that "taxable capacity" should be measured by income remaining after the deduction of subsistence requirement. The results indicate that during the period under consideration, the relative "taxable capacity" of the non-agricultural sector was substantially higher then its relative tax payment.

TABLE 8

TAX BURDEN ON THE NON-AGRICULTURAL SECTOR TO THAT IN THE AGRICULTURAL SECTOR FOR THE PERIOD 1964/65 to 1970/71

Year	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71
$\frac{TN}{TA}$	4.1333	6.9732	7.8252	7.4895	7.7042	7.6129	7.8488
$\frac{(YN - SN)}{(YA - SA)}$	6.1708	13.2389	13.8694	12.1883	15.1686	14.5240	15.7378
e_o / $\frac{(YN - SN)}{(YA - SA)}$							
.9	5.1441	10.2251	10.6625	9.4918	11.5572	11.1142	11.9467
.8	4.2882	7.8973	8.1968	7.3919	8.8055	8.5049	9.0689
.7	3.5747	6.0995	6.3014	5.7565	6.7091	6.5082	6.8843
,6	2.9799	4.7200	4.8443	4.4830	5.1117	4.9802	5.2260

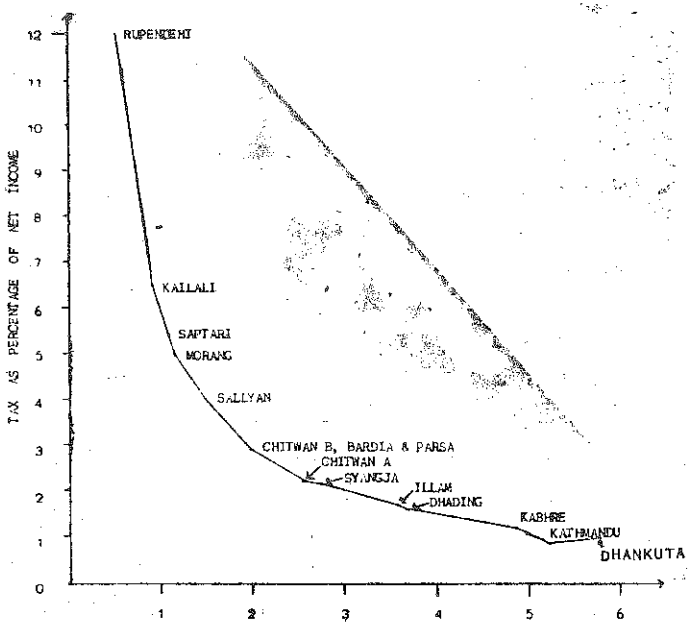
The apparent contradictions in table 7 and 8 can be resolved mainly in terms of the difference in the level of per capita GDP in the agricultural and the non-agricultural sector of the Nepalese economy For example in 1970/71, the per eapita GDP in the agricultural sector was Rs. 569 whereas in the non-agriculturel sector it was Rs. 4,466. Consequently, inspite of the higher level of subsistence allowance allocated to the non-agricultural sector as against the agricultural sector, the "taxable capacity" of the non-agricultural sector, was substantially higher than that of the agricultural sector.

Appendix 1: Regional Inequity in Land Revenue Rate

The relationship between assessed tax per hectare of land and net income per hectare as shown in the accompanying chart is based on the income data provided by the Farm Management Study in the Selected Regions of Nepal 1968/69 and the tax rate provided in the Finance Act 1967/68.

Along the horizontal axis of chart, districts are classified according to net income per hectare, the best measure of ability to pay tax. Along the vertical axis, the districts are classified according to effective tax rate as percentage of net income per hectare. The chart shows that the effective tax rate is sharply higher in the poorer districts than in comparatively prosperous districts.

Inter-district Inequity in Land Tax Rate 1968 - 69



NET INCOME PER HECTARE IN THOUSAND