CHAPTER V

RESPONSIVENESS OF EXCISE REVENUE TO INCOME AND PRICE CHANGES
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5.1 The growth and composition of excise revenue were examined at length in the preceding chapter both at the aggregate and disaggregate levels in order to identify the growth accelerators in the tax structure. In continuation of this analysis, a more indepth study of the responsiveness of excise revenue is attempted in this chapter by estimating the coefficients of elasticity and buoyancy of the total excise revenue as well as that of certain high revenue yielding commodities. In addition to this, partial elasticities are estimated to separate out the income effect and price effect on revenue. This analysis has been carried out at the disaggregate level encompassing the select commodities with a view to identify commodities having greater responsiveness to price and income changes. The objective of this analytical approach is to utilise the findings of the study for formulating a more responsive tax structure which will automatically mobilise reasonable amounts of additional resources in relation to the changes in income and price.

5.2 Conceptually, elasticity refers to the responsiveness of the tax revenue to national income. Income-elasticity of a given tax indicates its ability to adjust automatically to the changes in the national income. In other words, elasticity is the built-in flexibility of the tax revenue to react to the changes in a commonly accepted growth indicator without entailing any concomitant changes in the rate-structure or base-size.
This definition of elasticity excludes the effects of the changes in the tax-base or rate-schedule from the tax yield. For this purpose, tax efforts are to be carefully quantified and excluded from the annual revenue yield for obtaining the actual tax revenue. This is the most difficult part of the estimation of elasticity as the actual quantum of the revenue accruing from any particular tax-effort would not be separable from the total yield of the tax. As several variables constantly interact to provide the aggregate tax-yield, it is almost impossible to accurately quantify the revenue attributable to any particular tax measure. However, if fairly acceptable estimates of elasticity can be eventually worked out, it will reflect the inherent ability of the particular tax, to mop up, without any additional effort, the incremental income that is generated by the inherent growth and additional investments in the economy. The practical utility of the elasticity estimate lies in choosing an appropriate tax instrument that will yield maximum revenue without altering the tax-base or duty rates too frequently for mobilising additional revenue.

5.3 The concept of buoyancy, on the other hand, is a much simpler measure which indicates the overall responsiveness of the aggregate tax-yield to the national income. The effect of the changes in the tax rates and the base-size are included here and the buoyancy coefficient is computed by dividing the percentage change in gross revenue by the percentage change in national income. This measure, however, does not indicate the built-in ability of the tax system to bring into the tax net the incremental income generated by fresh investments in the
economy without resorting to additional tax efforts.

5.4 However, in the context of a developing economy, buoyancy estimate assumes significance from another point of view. Tax structure in a developing economy normally attains a high degree of income-elasticity only after the tax base reaches certain minimum levels of development. In less developed economies, additional tax efforts of an ad-hoc nature may have to continue as an integral part of the developmental efforts until the economy reaches the optimum levels and tax-compliance patterns get stabilised. Therefore, the buoyancy estimates will provide a reasonably accurate index of tax efforts at the existing developmental levels of the economy.

5.5 Review of Literature

G.S. Sahota's monograph on tax structure and economic development is the pioneering study in the estimation of elasticity and buoyancy of Indian taxes. He chose a comprehensive framework for analysis which incorporated all major taxes prevalent at that time. The objective of the study was to seek answers to the basic questions relating to income elasticity of the tax system as a whole and to suggest solutions for making the tax structure more elastic. Although the analysis covered the period 1949-50 to 1956-57, special attention was paid to the period 1951-52 to 1957-58. The methodology comprised of the computation of regression coefficients and measuring time-rate growth using the exponential type of function. The data for the study was taken from budget documents of the

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Union and State Governments. In the case of elasticity, the budget estimates, revised estimates and final accounts were utilized to exclude the effect of discretionary changes.

5.5.1 In the case of the overall tax revenue, Sahota's study revealed regressiveness in relation to the growth of national income. Central Excise duties, however, showed an elasticity above unity with reference to one variable i.e. national expenditure at market prices. Out of the 12 taxes examined, excise duties had the second highest buoyancy coefficient. Another interesting information brought out in this study was that the actual rate of growth of excise duties was the highest for the gross series which perhaps indicated the intensive tax efforts during the developmental period.

5.5.2 Sahota's study being the first attempt in estimating elasticity and buoyancy of indirect taxes, deserves commendation as a pioneering effort in this area. The main drawback of the work is, that it has taken all the prevailing taxes for an in-depth analysis and, consequently, only cursory attention could be given to any particular tax. Apart from the fact that the role of taxation was generally subdued during this period the total number of excisable commodities were also just 13 in 1948-49. The number of commodities in 1955-57 i.e. at the end of the reference period reached 30 indicating a rapid increase in the coverage of excise taxation. The revenue yield from excise duties also increased from 13.4% of the total tax revenue in 1948-49 to 32.95% in 1955-57. Such rapid transition during the reference period makes it meaningless to estimate the
elasticity of excise revenue which will be obviously low when the tax efforts are excluded. The small number of observations also reduces the reliability of the analysis. The buoyancy estimate, however, provided some idea regarding the intensity of the tax efforts during this period.

5.5.3 The second major attempt to estimate elasticity and buoyancy of excise revenue was by Lakdawala and Nambiar in 1972. The reference period of their study was 1960-61 to 1969-70. Perhaps by mere coincidence, this study started from the point where Sabota concluded his observations. The methodology was to exclude the effects of additional tax efforts and relate the net yield to the national income. The elasticity coefficient of excise duties estimated in this study was 0.61 and the buoyancy coefficient was 1.61. The elasticity coefficient of Indian tax system as a whole was estimated to be 0.63 for the reference period. The low elasticity of excise revenue compared to sales tax was attributed to the predominance of specific rates in the excise tax structure. An important qualitative improvement in this study was the estimates of tax buoyance under different economic situations. Buoyancy coefficients of excise duties and sales taxes during the recessionary period (1968-69 to 1969-70) was found to be somewhat lesser than that of the earlier periods. Although the number of observations in this study was only 10, there was a significant qualitative difference from Sabota's study inasmuch as it covered a more crucial period of economic growth (1960-61 to 1969-70). Total...

1/ D.T. Lakdawala and K.V. Nambiar, Commodity Taxation in India, Ahmedabad, Sardar Patel Institute of Economic and Social Research, 1972.
tax revenue as percentage of national income which was 10.2
in the beginning of this period reached 13.5. by 1969-70.
During this period the number of excisable commodities also
increased from 39 to 60 although the excise revenue registered
only a ten point increase as percentage of the total central
tax revenue. The low figures of elasticity estimates were
attributable to the intensive tax efforts during this period.

5.5.6 Dwivedi attempted another approach using commodity-
wise analysis of the tax yield and tried to explain the yield
in terms of corresponding change in rates/base and the price
fluctuations. In short, the approach was to measure the respon-
siveness of the revenue to the changes in base/rate and
prices of each taxable commodity. This study would have been
relevant if the variations in the rates, base and prices
would be segregated and quantified. In a simpler tax structure
it would have been possible to quantify such subtle variations
but the excise tariff with differential rates is not amenable
to such short-cut analysis. For example, in many cases,
cheaper brands of taxable products manufactured in the pro-
tected sectors enjoy lower rates compared to the costlier
brands of the same goods. In view of such complexities of ex-
cise tariff, Dwivedi's estimates are not at all acceptable.
The very low and negative rate/base elasticity of essential
consumer articles like vegetable products, kerosene and matches
would not be a practical possibility in view of their very
low price elasticity of demand. The explanation for tax
Evaluation and substitution effects are also far from convincing. The conclusion that the rate and base elasticities of non-essential consumer articles like electric bulbs, radios and glass and glassware are significantly higher compared to that of kerosene, tea, soap and matches in totally untenable. The suggestion that the tax incidence on intermediate goods should be increased because of their better rate/base elasticities indicates that the study has not considered other constraints like cascading effects while making such policy recommendations.

5.5.5 Hayek and Atri (1977) attempted estimates of the buoyancy and elasticity of union excise duties and import duties for the period 1965-66 to 1974-75. The authors stated that during this period there had been several major disturbances in the economy such as devaluation of the rupee in 1967, the 1973 oil price-hike and the high rate of inflation that set in from 1973 onwards. In addition to these estimates the study also enquired into the various factors responsible for the inelastic nature of union excise duties by examining the disaggregated commodity-wise revenue yield. A further analysis of the growth of tax revenue with reference to the growth of the tax base and income was also carried out for a brief period from 1971 to 1975-76. Elasticity and buoyancy estimates obtained in this analysis established that excise revenue was inelastic to national income. Certain commodity groups that were responsible for the low elasticity, had also been identified. The results obtained in this analysis were further examined using

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corroborating evidence from the study of commodity-wise revenue yield. The elasticity of the base to income was found to be 1.5 and tax to base was 0.5. This indicated that the rate of growth of the base had been much faster compared to the sluggish growth of the tax.

5.5.6 The buoyancy coefficients of various commodity groups indicated that 8 out of 10 groups had buoyancy of or greater than unity. The group that had the highest buoyancy was non-ferrous metals and the lowest was vegetable oils and fats. In the case of vegetable oils and fats, it was pointed out that the low buoyancy was due to the tax concessions given during the reference period. Group-wise elasticities, however, indicated that only 3 out of the 10 groups had an elasticity of or above unity. High elasticities were found for chemicals, petroleum products, machinery and transport equipments and low elasticities were noticed for food and beverages, tobacco, iron and steel and textile. In the case of tobacco, the authors rejected the estimate as unacceptable due to the almost annual increase in the duty rates. Similarly, the estimate in respect of food and beverages was also rejected as the tax base was too narrow at the beginning of the period to provide any built-in-elasticity.

5.5.7 Apart from the disaggregated estimates, an attempt was also made to compare the rate of growth of a proxy base with elasticity and national income. It was indicated that although the value of the output of all excisable goods increased much faster than national income the elasticity of the tax as a whole remained below unity. This was attributed to the predominance of specific rates of duty and the influence of the commodities like
tobacco, food products etc. having very low elasticity. The authors also acknowledged the contradictory nature of the conclusion which showed high elasticity for petroleum products having specific rates of duty. The analysis of the elasticity of tax to income, tax to base and base to income indicated that the elasticity of the base to income except for vegetable oils and fats was greater than unity. The commodity groups having high base to income elasticity showed lowest tax to base elasticity which was also attributed to the predominance of specific rates.

A somewhat different picture was obtained when income elasticities were estimated for a shorter period using the tax and base data. In this analysis a slight improvement was noticed in the case of the overall income elasticity with the chemical group continuing to have the highest elasticity.

5.5.8 Nayak and Atri's estimates of the buoyancy and elasticity of excise revenue is a more scientific and theoretically acceptable attempt than the earlier studies. The data deficiencies and shortcomings and contradictions in the analysis are fully acknowledged and certain estimates are rejected as unreliable. The attempt to verify the aggregate estimates by using the disaggregated commodity wise estimates is a refinement on the previous studies and the identification of the relative contribution of the various factors to the growth of tax revenue is of considerable informative value. The differential growth pattern of the tax, base and income also reveals the inherent defects in the tax structure that make it low responsive to price and income changes.

1/ For details see Nayak and Atri, op.cit, pp.24-27
5.5.9 An important issue that casts doubts on the reliability of the estimates is the methodology used for excluding the effect of discretionary changes from the revenue yield. The authors admit that they used the ex ante estimates of additional tax effort provided in the explanatory memorandum presented along with the annual budgets to the Parliament. These estimates which are probably based on the preceding years' tax yield or on ad-hoc survey results or estimates can at the best, provide a fairly reasonable indication of the probable revenue that might have accrued from the tax efforts. According to the authors no ex-post figures are available on the actual revenue yield is the basic requirement for calculating elasticity coefficient, the constraints imposed by the ex ante estimates affect the validity of the conclusions.

5.5.10 Apart from these academic studies, the question of the responsiveness of excise revenue has also been examined by two Government Committees. The study conducted by the S.R.F. Review Committee for the period 1963-64 to 1970-71 analysed the additional revenue yield during these years and got the following break up:

1) yield arising from automatic growth of the tax base 41.17%
2) yield from revision of tax rates 47.2%
3) yield from extension of tax coverage 5.7%

The important factor responsible for the additional revenue has been identified as the revision of tax rates rather than the automatic growth of the tax base. This trend is

1/ See report of the Central Excise (Self Removal Procedure) (Review) Committee, op-cit, pp.52-53
further confirmed in another study conducted by the Indirect Taxation Enquiry Committee\(^1\) which found that 52.3% of the additional revenue accrues from rate revision and 45.8% from the automatic growth of the tax base. Although there has been substantial tax efforts during this period which necessitated frequent revision of rates and maximum extension of tax coverage, the fact remains that the tax structure has been consistently showing low responsiveness to the changes in the base and income.

**Methodology**

5.6 The foregoing review of literature brings up certain methodological issues that require careful consideration before proceeding further with the analysis. Since both buoyancy and elasticity are intended to provide a measure of the responsiveness of the tax structure in relation to national income or any other appropriate variable, the assumption is that there is already an adequate tax base and rate structure that can mobilise certain predetermined quantum of revenue by restraining private consumption. It is a debatable point whether this assumption means a stable tax structure that would minimise the cyclical fluctuations of a production-oriented tax system that aims at full employment. Whatever implications the tax structure may have for different economies, the buoyancy and elasticity estimates are made on the assumption that the tax structure is responsive enough to take care of the changes in the growth variable without undergoing any base or rate changes.

\(^1\) See report of the Indirect Taxation Enquiry Committee, om-nit, p.30
5.6.1 This assumption is conceptually valid and empirically acceptable in the case of developed economies having a fairly broad tax base, but in the case of the developing countries, the growth of the tax base would depend on the degree of industrialisation, increase in per capita income, degree of monetisation and such other factors. There are also several extra-fiscal considerations in developing countries such as political constraints, social resistence etc. that may not be conducive to the expansion of the tax-base or revision of the rate structure to optimum levels.

5.6.2 It is, therefore, reasonable to assume that the tax structure in less developed countries is definitely less than optimal although it may be argued that the low levels of taxation may also be due to the lesser revenue requirements and lack of political will. But this argument is apparently untenable as all developing countries are presumably striving to achieve a faster rate of economic growth which requires mobilisation of massive resources for developmental expenditure. If the tax base is not adequate, elasticity estimates may not give any useful indication and buoyancy alone can be considered as an appropriate measure for estimating the tax efforts in the developing countries.

5.6.3 Another methodological issue relates to the exclusion of the continuous impact of the discretionary changes from each year's revenue for calculating the cleaned revenue series. The large scale alterations in the tax-base and rate-structure in developing countries make such exercises meaningless for elasti-
city estimates. Conceptually, it will be more appropriate to use the constant-rate-base method in such cases provided correct and complete information is available regarding the base of each taxable category and sub-category of commodities that attract different rates of duty. Ad valorem taxes require complete information regarding ex-factory prices in disaggregated form which is simply not available for different markets and brands of goods. From this viewpoint also buoyancy is a better index of the efforts than elasticity, particularly for developing countries having a low tax ratio.

5.6.4 Buoyancy and elasticity estimates are made on the assumption that revenue from one tax is independent of that from other taxes. In the case of excise duties, this assumption is not acceptable as on almost all excisable commodities, other commodity taxes, such as sales tax, octroi etc. are leviable. Apart from the impact of other taxes, revenue from a particular commodity may also be affected by the taxation of the inputs and intermediates used in its manufacture. However, it appears that there is no practical way to eliminate the effects of other taxes and estimates of elasticity and buoyancy are bound to suffer the deficiencies arising out of the interaction of various taxes and cascading effects of input taxation. Considering the various methodological issues and data problems outlined above, certain refinements are attempted in this study to overcome at least partly the deficiencies of the earlier estimates. The modifications in the approach are expected to yield more accurate estimates of buoyancy and elasticity of excise revenue. A brief description of the special features of the methodology and the data used are given in the following paragraphs.
5.6.5 Number of observations

Unlike the previous studies, the time series data used in this study cover almost the entire developmental period of the economy since independence. The observations begin from 1951 and extend up to 1981. The definite advantage of this approach is that it follows the expansion of the tax base and rate structure from the take off point of the modern system of excise duties till the completion of its expansion in the eighties. Since the previous estimates confined the observations to a limited period of ten or eleven years, the findings got influenced by the prevailing socio-economic conditions which significantly affect the revenue yield. The estimates derived in this study is not biased by limitations imposed by any particular time frame and the total growth period considered together is likely to neutralise the impact of the fluctuations of a particular period. This analysis utilises almost 3 times more observations than that used in the earlier studies.

5.6.6 Period-wise estimates

If the estimates are confined to a single time-frame the findings will not be comparable to the previous results. Moreover, a longer time series also suffer from the deficiency of having a narrow tax base and low rate structure at the starting point and the phenomenal expansion in the developmental period to mobilise additional resources would have predictably given low elasticities for excise revenue. To obviate these difficulties, separate estimates are also obtained in this study for different periods comprising of smaller observations and relating to the five year plans. Moreover, the short time estimates can also give a better indication of the impact of the dominant changes in the
economic scene on the excise revenue yield and it can also provide useful indication of the variation in the estimates when different time frames are used.

5.6.7 Estimates for select commodities

The previous chapter brought out the fact that a few select commodities account for more than 78% of the excise revenue. In view of the importance of these select commodities from the revenue point of view, they have been chosen for obtaining more accurate estimates of elasticity, buoyancy and partial elasticities. In addition to the aggregate estimates of the selected commodities, separate estimates are also attempted for the specific and ad valorem components of selected commodities. This will probably indicate whether the type of duty has significantly affected the revenue yield or not.

5.6.8 Another modification in this study is the attempt to estimate partial elasticities with national income arising from manufacturing sector at constant prices and whole-sale price index, and implicit price deflator as variables. Partial elasticities are worked out both at the aggregate level and for the type of duties by considering the specific and ad valorem components separately. The purpose of this exercise is to understand the impact of the price and income changes on the revenue. The income variable used for this purpose is the one arising in the manufacturing sector which is the main tax base for excise duties particularly since the abolition of the duty on unmanufactured tobacco in the year 1979. Moreover, there is no agricultural
commodity among the selected ones and the responsiveness of the revenue to the changes in this variable should give the closest and most accurate estimates of the elasticity and buoyancy.

5.6.9 **Commodity-wise estimates**

The aggregate revenue of the selected commodities and their specific and ad valorem components have been used in this study for a thorough analysis of the elasticity and buoyancy of excise revenue. However, the estimates of each individual commodity might have provided a complete picture of the responsiveness of the revenue but such an attempt is impractical due to the differential tariff and the unmanageable number of commodities. Moreover, such a study will have no practical utility in view of the fact that most of these commodities do not yield any significant revenue. Nayak and Atri estimated group-wise elasticity to overcome this problem but the deficiencies of the methodology have been dealt with in the review of literature. In this study the elasticity and buoyancy of individual commodities which are selected on the basis of their revenue yield has been estimated so that there will be complete information regarding revenue potential of each one commodity in the selected group of 26. These commodities can be examined further in terms of the nature of assessment and other relevant factors. These estimates are comparable to the aggregates as the income variable used in both cases are identical. The select commodities are also classified into consumer items, consumer durables, inputs for ascertaining the responsiveness of the different types of commodities to

changes in the income variable. The period chosen for this analysis is the recent one when the tax base and rate structure are fully expanded. The advantage of this approach is that the estimates can pin point the specific commodities which are responsible for the low revenue yield and from the nature of the commodity and the type of duties it would be possible to generalise the reasons for inadequate responsiveness of excise revenue as a whole. The conclusions emerging from this analysis can be used for improving the existing tax structure by maximising the yield without resorting to frequent rate and base changes.

6.6.10 Data base refinements

In this study voluminous tax data have been used to prepare "cleaned revenue series" for estimating elasticity. The data source is mainly Explanatory Memorandums to the budgets and Statistical Abstracts of the Ministry of Finance, Government of India, which give item and sub-item wise revenue yield and the revenue attributable to different notifications. Normally "cleaned revenue series" are constructed using the budget estimates of the probable additional revenue yield accruing from the base and rate changes. However, these estimates sometimes undergo immediate changes at the consideration stage of the Finance Bill when major concessions are announced to accommodate public demand for modifying revenue proposals. The budget estimates do not reflect such interim changes although they might involve major changes in the estimated revenue. Moreover, there are also continuous rate changes through
notifications issued by government which are not reckoned with in the budget estimates but may have serious revenue implications.

To illustrate this point, a brief review of the percentage variations of the budget estimates and actual receipts of excise duties is presented in Table 5.1. The variations support the view that the budget estimates do not fully correspond to the actual revenue although the variations are never more than 5%. There is also no uniform pattern in the variations as there are gains and losses from time to time. However, the overall reliability of the budget estimates is not too low and it can be improved by taking into account the revenue/loss lost by the issue of major notifications that involve large sums of revenue.

### Table 5.1

<table>
<thead>
<tr>
<th>Year</th>
<th>Budget Estimates</th>
<th>Actuals</th>
<th>Variation</th>
<th>% of variation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>1967-68</td>
<td>1236.48</td>
<td>1485.36</td>
<td>(-) 57.23</td>
<td>(-) 4.75</td>
</tr>
<tr>
<td>1968-69</td>
<td>1256.50</td>
<td>1500.37</td>
<td>(+) 22.87</td>
<td>(+) 1.26</td>
</tr>
<tr>
<td>1969-70</td>
<td>1521.27</td>
<td>1524.31</td>
<td>(+) 3.04</td>
<td>(+) 0.20</td>
</tr>
<tr>
<td>1970-71</td>
<td>1513.75</td>
<td>1756.55</td>
<td>(-) 24.20</td>
<td>(-) 1.38</td>
</tr>
<tr>
<td>1971-72</td>
<td>2371.56</td>
<td>2361.19</td>
<td>(+) 34.23</td>
<td>(+) 0.15</td>
</tr>
<tr>
<td>1972-73</td>
<td>2464.75</td>
<td>2324.25</td>
<td>(-) 140.50</td>
<td>(-) 5.70</td>
</tr>
<tr>
<td>1973-74</td>
<td>2741.53</td>
<td>2383.15</td>
<td>(-) 138.38</td>
<td>(-) 5.07</td>
</tr>
<tr>
<td>1974-75</td>
<td>3134.33</td>
<td>3250.22</td>
<td>(+) 62.89</td>
<td>(+) 2.14</td>
</tr>
<tr>
<td>1975-76</td>
<td>3720.69</td>
<td>3664.79</td>
<td>(-) 257.18</td>
<td>(-) 7.33</td>
</tr>
<tr>
<td>1976-77</td>
<td>3965</td>
<td>4211.35</td>
<td>(+) 126.35</td>
<td>(+) 3.13</td>
</tr>
</tbody>
</table>

Note: The above figures include also cess on Coal, Salt, Iron Ore, Rubber and Crude Oil

Source: Explanatory Memorandum to the Budget of the Central Governments for the years 1967-68 to 1976-77
5.6.11 In this study not only the budget estimates but also the major notifications are taken into account for preparation of the 'cleaned series'. Since the time series data used here pertain to almost the entire period since independence the task involved in the preparation has been quite enormous. Cross checking of budget estimates with the revenue gained or lost in the issue of notifications has considerably improved the quality of the cleaned series used for estimating the elasticity. Particular attention has been given to the cleaned series for the disaggregated estimates since the notifications issued in the interregnum can upset the revenue forecast of individual commodities significantly.

In the construction of "cleaned revenue series" the actual revenue receipt pertaining to each year has been proportionately adjusted. The adjustment method employed in this study involve the deduction on account of the budget changes in the base and rate structure and the major tax relief provided at the consideration stage of the budget. The final adjustment is made by excluding the continuing impact of the discretionary changes from the actual revenue realisation for each year. The major drawback of the proportional adjustment method is that it can at best give the revenue on the basis of an average tax structure during the entire reference period and not the actual structure existing at a given time. This method is inadequate if the additional revenue is more than the proportionate revenue yield. This situation is very much in evidence in the case of excise revenue by virtue of
the fact that the entire thrust of resource mobilization during the developmental periods has exclusively been in the area of excise taxation.

5.6.12 However, inspite of the deficiencies indicated above, the proportional adjustment method is preferred in view of the data problems and methodological limitations involved in attempting the alternative known as 'constant-rate-base method' \(^1\)\(^2\). For applying this method, highly disaggregated tax data is required which is rather impossible in view of the differential tariff structure and innumerable items and sub-items involved in the excise tariff.

The cleaned revenue series obtained by the proportional adjustment method are regressed against the income variable using the logarithmic equation:

\[
\log y = \alpha + \beta \log x
\]

The coefficient indicates the percentage rate of change in the tax revenue \(Y\) consequent upon a one percent change in the independent variable \(X\). The same equation is for estimating the buoyancy coefficient but the revenue series consist of actual tax receipts without making any adjustments. The independent variable used for aggregate and commodity-wise analysis is

\(1\)/ In the constant-rate-base method revenue series is obtained on the basis of a constant tax base for the reference period. The tax rates of the base year is applied to the base series to derive the cleaned revenue series. In the case of excise duties having specific rates the clearance data has to be disaggregated rate-wise and for ad valorem goods the value of clearances of excisable goods has to be ascertained tariff rate-wise and the appropriate rate of duty for the base year has to be applied to the value of clearance. In view of the complexities of the excise tariff, it is not all possible to attempt this method which will not only require tax data but also involves disaggregation of the data on the quantity and value of production corresponding to the rates and categories in the excise tariff.
N.N.P. at factor cost (current prices) and for the analysis of the aggregate of selected commodities, national income arising from manufacturing sector has been used. The choice of the more general income variable for aggregate and commodity-wise analysis is for the purpose of facilitating the comparative study of the estimates obtained earlier.

**Findings**

5.7 Consistent with findings of the previous chapters to the effect that the structural complexities undermine the revenue objective, it is seen that the elasticity of excise revenue to national income (N.N.P. at current prices) for the period 1964 to 1981 is only 0.86. This estimate is marginally higher than the ones obtained in the earlier studies using less number of observations. It indicates that the excise revenue is not fully responsive to changes in income and that without discretionary changes, the tax structure cannot mop up additional resources required for the ever increasing public expenditure. The details of the elasticity and buoyancy estimates are presented in Appendix A-10. Table 5.2 gives a comparative view of the elasticity of excise revenue estimated in all the studies.

Table 5.2

Comparative study of elasticity coefficients

<table>
<thead>
<tr>
<th>No.</th>
<th>Authors</th>
<th>Period</th>
<th>Elasticity Income coefficient</th>
<th>Variable used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lakndawala &amp; Nambiar</td>
<td>1960-61 to 1969-70</td>
<td>0.61</td>
<td>N.I.</td>
</tr>
<tr>
<td>2.</td>
<td>Nambiar &amp; Joshi</td>
<td>1960-61 to 1969-70</td>
<td>0.86</td>
<td>N.I.</td>
</tr>
<tr>
<td>No.</td>
<td>Source</td>
<td>Period</td>
<td>Elasticity</td>
<td>Notes</td>
</tr>
<tr>
<td>-----</td>
<td>------------------</td>
<td>-----------------</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>3.</td>
<td>Kayak &amp; Atri</td>
<td>1965-64 to 1974-75</td>
<td>0.76</td>
<td>N.I.</td>
</tr>
<tr>
<td>4.</td>
<td>Present Study</td>
<td>1964-1961</td>
<td>0.66</td>
<td>N.I.</td>
</tr>
<tr>
<td>5.</td>
<td>-do-</td>
<td>1961-1981</td>
<td>0.71</td>
<td>N.I.</td>
</tr>
<tr>
<td>7.</td>
<td>-do-</td>
<td>1975-1981</td>
<td>0.66</td>
<td>N.I.</td>
</tr>
</tbody>
</table>

It is evident from Table 5.2 that the present study gives a higher estimate of the elasticity coefficient compared to previous studies. The explanation for the variation can be the increase in the number of observations since all the independent variable as well as the methodology used are identical in all studies. Another possibility is the difference in the method used for making proportional adjustment in the revenue and the marginal changes in the data.

5.7.1 The elasticity coefficients estimated for different periods indicate that with base year 1954, 1961, 1966 and 1975 the estimates are 0.86, 0.71, 0.66 and 0.66 respectively. It can be seen that there is a progressive decrease in the value of estimates with lesser number of observations. This confirms the view that the number of observations marginally varies the estimates. The exception to this finding is in the case of the base year 1975 but it is probably due to the fact that with the introduction of the residuary item in that year, the scope for further discretionary changes is minimised. Moreover, the rate structure has also been stabilised by that time and there has been a progressive switchover to ad valorem rates that might have improved the responsiveness of the revenue to income and price changes. When the results of the
earlier studies are compared to the estimates of 1961 and 1968, only minimum variation is found. The buoyancy coefficient of excise revenue to income for the period 1954 to 1961 was 1.32. This result is consistent with the finding of Wayek and Attri who got the value of 1.30. The buoyancy coefficient obtained by Nambiar and Joshi for the 10 years period was 1.54 whereas Lakadawala and Nambiar got the estimate for the same period as 1.32. The slight increase in the value obtained in this study is perhaps due to the increase in the number of observations.

5.7.2 The buoyancy coefficient indicates that the tax revenue has been more responsive to the changes in the income variable when discretionary changes are included in the revenue. It is, therefore, evident that the tax structure of excise duties per se is incapable of mobilising adequate revenue in relation to income changes and that base changes and rate revisions are required to make the revenue adequately responsive. This also confirms the findings in the preceding chapters that tax structure complexities arising out of conflicting objectives might be responsible for realizing the revenue potential of excise duties.

Partial Elasticity

5.7.3 Elasticity coefficient indicates the responsiveness of the tax when there is one percent change in the income. This estimate of elasticity is in general terms as it cannot bring out the effect of different components of income on the revenue from a given tax. To separate out the impact of the two major parts of income i.e. the real income and price partial elasticities are to be estimated with reference to these variables. In
this analysis, partial elasticity and buoyancy coefficients have been estimated for the aggregate revenue from the top 26 commodities that yield 76% of the excise revenue. Partial elasticities are also estimated for the aggregate of the commodities having specific rates and ad valorem rates separately. Partial buoyancy coefficients are estimated for the aggregate and ad valorem components. The income variable used in the analysis is H.N.F. from manufacturing sector at constant prices and two price variables i.e. wholesale price index and income using implicit price deflators. Implicit price deflator gives better results than wholesale price index.

The partial elasticity estimates indicate that for the aggregate revenue from the selected commodities one percent increase in income raises the revenue by 0.86% and one percent rise in price (implicit deflator) raises revenue by 0.47%. This clearly points out that excise revenue is not all elastic to price changes although it is fully responsive to changes in income.

5.7.4 This finding is further confirmed by the partial elasticity estimates of the specific and ad valorem components of the aggregate of 26 commodities. In the case of specific rates the change in revenue for a one percent increase in income is 1.06% whereas 1% increase in price generates only 0.2% increase in revenue. On the other hand, in the case of ad valorem rates increase in price raises revenue by 0.84%. The revenue effect of the increasing income is, however, not as pronounced as price effect.
Partial buoyancy estimate reveals that 1% increase in income raises the revenue by 1.68% and 1% increase in price raises the revenue by 0.39%. This finding also confirms that the excise revenue is not buoyant to the changes in price although its income effect is above unity. The net outcome of the partial elasticity and buoyancy estimates is that while the excise revenue is not responsive enough to prices for a proportionate increase, it shows elasticity above unity for real income changes.

Aggregate elasticity and buoyancy coefficients of the selected commodities.

5.7.5 The elasticity and buoyancy coefficients are also estimated for the aggregate revenue from 25 a selected commodities having maximum revenue potential. Since these commodities comprise of only manufactured goods the income variable used is the national income arising from the manufacturing sector. The buoyancy coefficient of the aggregate revenue from these commodities is 0.95 which is less than that of the excise revenue for 1954 to 1961. This perhaps indicates that discretionary changes in the rate and base have been less in the case of selected commodities which has probably been yielding the maximum revenue. Another possibility is the less number of observation in these estimates compared to the aggregate revenue.

For the aggregate revenue from goods having specific rates, the buoyancy coefficient is 0.85, whereas for goods having ad valorem rates it is found to be 1.10. The higher
buoyancy coefficient for the revenue from ad valorem rates is evidently due to the better responsiveness of the revenue to the price changes. It is also clear that the main factor responsible for reducing the overall buoyancy is specific rates of duty applicable to half the number of selected commodities. The conclusion is, therefore, inescapable that if the entire revenue has been derived from ad valorem rates, the buoyancy would have been above unity.

A similar pattern consistent with buoyancy estimate is noticed in the case of elasticity. The aggregate elasticity of the revenue from the selected commodities is 0.59 but the elasticity of the ad valorem component is 0.75. The specific rated goods give an elasticity of 0.49. This result conclusively proves that the low responsiveness of excise revenue to changes in price is largely attributable to the presence of specific rates of duty which can only raise additional resources through higher output levels of the taxed products.

Elasticity and buoyancy of commodity-wise revenue

5.7.6 In addition to the aggregate analysis, commodity-wise estimates are also obtained to ascertain the responsiveness of important individual commodity to income. The individual commodities chosen for this analysis are the ones already identified on the basis of their high revenue yield. They are also classified as consumer goods, consumer durables and inputs. The range of the buoyancy coefficients of the 26 commodities is as follows:
<table>
<thead>
<tr>
<th>Range of buoyancy coefficients</th>
<th>No. of commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) above 2.00</td>
<td>3</td>
</tr>
<tr>
<td>(b) between 1.00 and 2.00</td>
<td>14</td>
</tr>
<tr>
<td>(c) between 0.50 and 1.00</td>
<td>5</td>
</tr>
<tr>
<td>(d) below 0.50</td>
<td>2</td>
</tr>
</tbody>
</table>
| (e) Not ascertainable due to the recent imposition | 2 | **Note:**  

Total : 26

From the above data it is seen that 7 commodities have buoyancy coefficient less than unity whereas 17 commodities show buoyancy above 1. Since buoyancy coefficients per se do not indicate the automatic responsiveness of the commodity, the fact that 7 commodities are having buoyancy equal to unity is highly detrimental to the tax efforts. Similar data compiled for elasticity coefficients is reproduced below:

<table>
<thead>
<tr>
<th>Range of elasticity coefficients</th>
<th>No. of commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) above 1.00</td>
<td>10</td>
</tr>
<tr>
<td>(b) between 0.50 and 1.00</td>
<td>3</td>
</tr>
<tr>
<td>(c) below 0.50</td>
<td>6</td>
</tr>
</tbody>
</table>
| (d) Not ascertainable due to recent imposition | 2 | **Note:**  

Total : 26

It is seen that only 10 commodities are having elasticity above unity and that 14 commodities are inelastic to income changes. The larger number of commodities having
Buoyancy above unity as compared to elasticity indicate the intensity of discretionary changes in the tax structure. The finding that more than half the number of commodities that account for 75% of the total excise revenue are inelastic to income changes, confirms the analysis of aggregate revenue and also points out the necessity for improving the responsiveness of these commodities for the increase in the overall elasticity of excise revenue.

The summary results of the buoyancy and elasticity estimates for different types of commodities are given in Tables 5.3 and 5.4.

**Table 5.3**

Buoyancy coefficients of different types of commodities

<table>
<thead>
<tr>
<th>Commodity classification</th>
<th>Buoyancy coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>above 2</td>
</tr>
<tr>
<td>(a) Consumer goods</td>
<td>1</td>
</tr>
<tr>
<td>(b) Consumer durables</td>
<td>0</td>
</tr>
<tr>
<td>(c) Inputs</td>
<td>2</td>
</tr>
</tbody>
</table>

**Table 5.4**

Elasticity coefficients of different types of commodities

<table>
<thead>
<tr>
<th>Commodity classification</th>
<th>Elasticity coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>above 1.00</td>
</tr>
<tr>
<td>(a) Consumer goods</td>
<td>2</td>
</tr>
<tr>
<td>(b) Consumer durables</td>
<td>2</td>
</tr>
<tr>
<td>(c) Inputs</td>
<td>6</td>
</tr>
</tbody>
</table>
The range of buoyancy and elasticity coefficients of different classes of commodities show that while consumer goods indicate low buoyancy and elasticity, inputs have higher values in both cases. This finding not only points out the intensity of the tax efforts on inputs but also shows that the revenue potential of consumer goods has not been fully tapped in the existing tax structure. The high levels of taxation on inputs give little scope for adequate taxation of consumer goods and contributes substantially to the low responsiveness of excise revenue. The potential revenue from the value added tax on the inputs is not fully taxed when the tax rates on consumer goods are intentionally kept low in view of the heavy tax burden on inputs.

These findings are also consistent with the conclusion of the preceding chapter where the analysis of the compounded growth rates of 25 commodities indicated that 13 of these had growth rates less than that of the total excise revenue. Similarly, buoyancy coefficients show that 10 commodities have low buoyancy and 14 commodities have elasticity less than unity. From these 3 measures, 10 commodities can be easily identified as having consistently low responsiveness to income changes and hence not yielding sufficient revenue. Out of these 10 commodities, 7 are having specific rates of duty. The revenue share of these ten commodities in the total excise revenue is about 50%. The ten commodities are: (1) matches, (2) cotton fabrics, (3) sugar, (4) refined diesel oil, (5) tea (6) cotton yarn (7) motor spirit (8) iron and steel products (9) cement and (10) jute manufactures.
5.7.6 In order to improve the elasticity of excise revenue it will be necessary to re-structure the excise tariff of these commodities by either switching over to ad valorem rates or increasing the duty incidence. Since they are mainly consumer articles, it is advisable to change the duty into ad valorem rates rather than increasing the tax burden. Unless this task is accomplished excise revenue is not likely to show a reasonable degree of responsiveness to income and price changes in the immediate future.

Conclusions

5.8 The main conclusions that emerge from the estimation of elasticity and buoyancy coefficients at the aggregate and disaggregate levels are as follows :-

(1) The overall excise revenue is not income elastic although the buoyancy of the tax revenue is above unity. The low responsiveness of excise revenue is highly detrimental to the intensive tax efforts as it becomes counter productive in the long run. The fact that the tax revenue is buoyant only indicates that there has been massive tax efforts during the reference period.

(2) The partial elasticity coefficients show that the excise revenue is not at all responsive to prices but is fully elastic to income changes. The break up of the elasticity in terms of specific and ad valorem components also indicates that ad valorem rates are more responsive to price changes.
The low responsiveness of excise revenue can, therefore, be attributed to the predominance of specific rates in the tax structure.

(3) The estimates for the aggregate revenue from selected yielding commodities further support this conclusion by higher values for elasticity and buoyancy coefficients for ad valorem component of the group. The coefficients of the buoyancy for commodities having specific rates being very low the conclusion is inescapable that the specific rates are responsible for the low responsiveness of excise revenue.

(4) Commodity-wise estimates show that certain identified commodities are having consistently low elasticity, buoyancy and compounded growth rate. They are (1) matches, (2) cotton fabrics, (3) sugar (4) refined diesel oil, (5) tea, (6) cotton yarn, (7) motor spirit, (8) iron and steel products, (9) cement and (10) jute manufactures. Recasting of the tax structure of these identified commodities is crucial for improving the elasticity of excise revenue.

(5) Analysis of the elasticity and buoyancy of excise revenue in terms of the nature of commodities indicates that inputs show better elasticity and buoyancy. The low responsiveness of consumer articles points out the need for restructuring the excise tariff for these commodities by either switching over to ad valorem rates or reviewing the tax incidence so that the overall elasticity can improve without making frequent changes in the tax base and rates.