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No. 25

Sources of Change in Revenue from Import Taxes  
1954-63.

By

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1954 to 1963

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INTRODUCTION

When import substitution in industrial goods is taking place at a rapid rate due largely to indirect tax policy, there are certain implications for government revenue, both in terms of the sources of revenue and the rate of revenue growth. If import substitution results in the replacement of a flow of highly taxed imported goods by an equal flow of lightly taxed domestic goods, there would be a loss of revenue from indirect taxes. This loss can be ~~offset in part by~~ taxing profits in the import substituting industries. Alternatively, the same total revenue can be collected if the flow of domestically produced goods is sufficiently larger than the flow of imported goods it replaced. Both of these alternatives may be, in some degree, in conflict with the aim of promoting saving, or of restricting consumption.<sup>1/</sup> A broader view of "import substitution", measured by the changes in the percentage of total supply of a commodity group that was supplied by domestic production, would lead to less obvious conflicts between policy goals, but would presumably have similar effects. If the flows of goods (not

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\*/ The author is Research Adviser at the Pakistan Institute of Development Economics. Abdur Rab and Ronald Soligo of the Institute gave useful comments on an earlier draft, which have improved the presentation and argument considerably. Ghulam Mohammad Radhu supplied additional information on statutory rates of tax on various commodity groups which was essential to the study, and Leonard DeSouza provided computational assistance. The author is grateful to them all, but absolves them of responsibility for errors in fact or judgement that no doubt remain.

<sup>1/</sup> See [2][11] and [1] for discussion of these arguments.

flows of income) are to be taken as the tax base, the larger the share of more lightly taxed domestic production in total the lower will be the effective tax rate on the total flow of goods. Thus, while it is encouraging to see indirect tax revenue from domestic production rising very rapidly and its share increasing in total revenue from indirect taxes [3], one must be aware of the fact that, per unit flow of goods in the economy there is a decrease in effective tax rates.

Problems of the above variety were noted in the Report of the Taxation Enquiry Committee, and presumably will be some concern to the Commission on Taxation and Tariff. The present paper is a very modest beginning in the direction of more empirical insight into the nature and the magnitude of this problem. A brief paper on domestic indirect tax revenue is also under preparation, and hopefully within a short time it will be possible to complete, update, and integrate the two to see the extent to which import substitution and compositional changes in domestic demand have affected the revenue from the principal indirect taxes.

Two previous studies from the Institute, [3] and [12], provide the basic data on tax revenue from and tax rates on domestic and imported goods. The other variable on which observations were needed were the flows of imported goods. At present the Institute is engaged in a study of structural change and import substitution in manufacturing industries in Pakistan since 1954 [4] and the data on imports used here have been taken from the working papers of that study, and the exact methods of allocating imports will not be detailed here. For 1961/3 the data are taken directly from the Central Statistical Office (CSO) Statistical Yearbook 1963 [6]. For 1954 the private account imports are from the CSO Statistical Bulletin [8] and for 1955 the private account imports are taken from the CSO Foreign Trade Statistics of Pakistan [7]. The allocation of Government Account imports to various originating section in 1954 follows that given by Ghulam Rasul

[13]. However, several adjustments have been made, and Rasul's distribution of most manufacturing imports is applied to 1955 after government imports that could be allocated directly (such as food grains, coal, and fertilizers) had been deducted. Sugar was a special case, since the value of imports given by Rasul was much too low when compared to the revenue collected from taxes on imported sugar. For sugar imports the figures used here for 1954 and 1955 were derived on the basis of the relationship between tax revenue and imports in 1957 and 1958, for which the CSO did have records and the relationships were sensible and stable. The adjustment made is roughly consistent with the difference in quantity figures for imports as reported by the Food Ministry [10] and the quantity figures used by Rasul.

The choice of commodity groups used here is based on that used in our study of structural change and import substitution in manufacturing industry [4] where we have chosen thirty-two industrial groups, mostly two-digit industries, but also some four-digit industries where it seemed meaningful to divide up an industry more finely for analytical purposes.<sup>2/</sup> In studying import taxes it was necessary to aggregate to twenty-one manufacturing industries due to limitations of the tax collection data. The reclassification of the Central Board of Revenue (CBR) data into the industry groups is similar to that in [3] but some minor misallocations and mistakes in that paper have been corrected here.

The choice of the period for the study may seem strange. It is dictated solely by pragmatic considerations, and questions of principle have not entered. 1954 was the first year for which reliable data on imports at a detailed level were available both for government and private accounts, and 1962/63 is the last year for which final figures on taxes on imports were available. It would have been useful to break the period

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<sup>2/</sup> These are the same industry groups/used by Redhu [12] as

at 1959/60, but the data on import duty collections in that year are extremely misleading. A comparison of the flows of imports by commodity group with the collections of import duty on the same group, shows that from 1954/55 to 1959/60 a larger and larger share of taxes on almost every industrial group was classified under "miscellaneous" articles, and by 1959/60 the miscellaneous and Government account items comprised over one-third of total collections. Thus, it is impossible to rely on data for that year. For the analysis of the changing revenue structure, two year's data have been added for each period to minimize the effect of short-run fluctuations. Period one refers to 1954 and 1955; period two refers to 1961/62 and 1962/63.

## II - THE IMPORTANCE OF TAXES ON IMPORTS.

Before beginning the analysis it is well to be aware of the orders magnitude of the variables considered were. From fiscal years 1954/5 and 1955/6 to fiscal year 1961/2 and 1962/3 total tax revenue of the Central and Provincial Governments increased eighty-eight per cent, for a total increase of Rs. 1,281 million. From calendar year 1954 and 1955 to fiscal years 1961/2 and 1962/3 tax revenue from imports (customs duties and sales taxes) increased ninety-eight per cent, for an increase of Rs. 484 million, comprising nearly forty per cent of the total increase in tax revenue. Revenue from import taxes that can be allocated to the specific type of goods taxes (here called "allocated" taxes) increased one hundred twenty-five per cent, or Rs. 467 million. One reason for the faster rate of increase in the "allocated" taxes was the change in the classification system in 1960/61 that led to a proportionally smaller "miscellaneous" group in period two than in period one. In period two, import taxes comprised thirty-six per cent of total tax

revenue, and "allocated" import taxes on imports were thirty-one per cent. Thus, this analysis

TABLE. 1. Summary Table of Imports and Tax Revenue 1954-1955 and 1961/2 - 1962/3 (Rs. million)

Item	Period 1	Period 2	Absolute increase	Percentage increase
1. Total Government Revenue	1,455.9	2,737.0	1,281.1	88%
2. Total Revenue from Import Taxes	492.3	976.4	484.1	98%
3. Revenue, from "Allocated" Import Taxes	374.3	841.7	467.4	125%
4. Total Imports	1,138.0	3,463.9	2,325.9	204%
5. "Allocated" Imports	973.4	2,842.8	1,869.4	192%

Source: Economic Survey [9] and Appendix Table A-1.

is concerned with tax revenue comprising about one-third of the total revenue from all taxes. The "allocated" import tax revenue was quantitatively more important in both periods than the combined revenue from income, corporation and land taxes. Thus, it would seem worth while to study the determinants of import taxes in some detail.

The importance of structural changes in import flows from a revenue point of view is illustrated in Table 2. The ratio of tax revenue to import flows can be called the average effective rate of tax on imports. A change in the effective rate of tax on an aggregate flow can arise from changes in the rates, changes in composition away from or toward more heavily taxed items, or changes of definition of those parts of the flow of imports that are taxable. The average effective rate fell considerably over the period, as the marginal tax-revenue to import ratio was below the average ratio. Since, as Radhu has pointed out [12], there were increases in the statutory rates of duty over the period in almost every industrial group,



TABLE 2. Marginal and Average Effective Rates of Tax.

	Average Rate Period 1	Rate Period 2	Marginal Rate
Effective Rate of Tax on Total Imports	43.3%	28.2%	20.8%
Effective Rate of Tax on "Allocated" Imports	38.4%	29.6%	25.0%

this change must have come about through changes in the structure of imports away from high duty, towards low duty items or changes in the definition of the imports which were taxable. The latter question has been ignored in this paper, since it is likely to be small. The question examined below in some detail is: what part of the total changes in revenue are due to rate changes, <sup>to</sup> base changes, to changes in inter - industry composition of imports, and to changes in intra-industry composition of imports? In answering this question one would hope to learn not only about the determinants of the revenue structure, but also about the nature and direction of import substitution, or the changed structure of demand for imports.

### III. AGGREGATE REVENUE IMPACT OF RATE AND COMPOSITIONAL CHANGES

The method used to measure the revenue impact of changes in total import flows and the composition of imports, as well as the statutory rates of tax, is quite straight forward. It consists of making an estimate of the revenue that would have resulted if composition or rates of one period had in fact held in the other period, and comparing the projection under one type of assumption with the projection under another type (e.g. same composition but rates changed) to ascertain quantitatively the separate effect of each variable. The principal simplifying assumption necessary to make such a comparison meaningful is that the particular assumption about one variable is consistent with a particular



assumption about another variable (e.g. that imports could have the same composition with two different structures of taxation). While the violation of the assumption in question would make a difference in the precise quantitative estimate of revenue involved, the results will show that the orders of magnitude will not be upset.<sup>3/</sup>

The simplest projection of import revenue for period two that can be made is to apply to the same ratio of total tax revenue to total imports as had existed in period one.

This would be given by  $\sum_{i=1}^n T_{1i} \frac{\sum_{i=1}^n M_{2i}}{\sum_{i=1}^n M_{1i}}$  where  $T_{1i}$  is the revenue from commodity  $i$  in period one,  $M_{2i}$  is the value of imports

of commodity  $i$  in period two, and  $\sum_{i=1}^n M_{1i}$  is the sum of all the

commodities from 1 to n. It would imply a proportional growth of all imports and taxes at the same rates. The scope of the detailed analysis, however, is limited "allocated" import tax revenue, and to imports of those commodities to which import tax revenue can be accurately assigned. The "allocated" commodities are primarily manufactures, semi-manufactures, and unmanufactured tobacco. "Allocated" tax revenue was eighty-six per cent of total revenue from import taxes in period two and seventy-seven per cent in period one, so that the conclusions should be of general use. Unallocated and government account items are combined in the tables here and the identification of each of the n-1 "allocated" commodities is given in the left-hand column of Table A-1. The simple proportional growth projection of import taxes for "allocated" imports is written

$\sum_{i=1}^{n-1} T_{1i} \frac{\sum_{i=1}^{n-1} M_{2i}}{\sum_{i=1}^{n-1} M_{1i}}$ . The analysis from this point onward will be

<sup>3/</sup> It is also likely that in the period under study here, there would probably be relatively little effect of changes in duties on quantities imported. There has been excess demand for almost every type of imported goods, so that quantity imported would be relatively inelastic with respect to changes in tax rates. This argument is developed and tested empirically in [ 5 ].

concerned solely with "allocated" imports and import taxes, and the use of the terms imports and import taxes will refer henceforth to "allocated" imports alone.

A second estimate of revenue from import taxes could be made by assuming that, in each commodity group, revenue grows proportionally to imports, but that the relative growth of imports among commodity groups is equal to the actual rather than to proportional growth. Such an estimate could

be written  $\sum_{i=1}^{n-1} \frac{T_{1i}}{M_{1i}} M_{2i}$ . There is another meaning

that one could attach to this expression however, that can be more easily understood by re-writing it as  $\sum_{i=1}^{n-1} \frac{T_{1i}}{M_{1i}} M_{2i}$ .

The expression states that the same effective rates of tax would apply to each commodity group in period two as applied in period one. To calculate revenue for any commodity group, one would multiply imports of the commodity group in period two by the effective rate in period one.

The actual revenue in period two would be

written  $\sum_{i=1}^{n-1} T_{2i}$ . In order to compare this with the previous estimate, conceptually, the revenue estimate could be thought of as the effective rate of tax in period two times the imports of the commodity group in period two,

$\sum_{i=1}^{n-1} \frac{T_{2i}}{M_{2i}} M_{2i}$ . Differences between the actual revenue from commodity group  $i$  in period two, and the revenue for the commodity group based on period one effective rates (as in the estimate in the last paragraph) are due to differences between period one and period two effective rates.

The "effective rates" in each period are, essentially, an average of statutory rates weighted by the share of the imports at each separate statutory rate within the commodity group. Differences in the effective rates of tax on any commodity group between the two periods can be due to (i) differences in the statutory rate on each individual product

within the commodity group, or (ii) differences in the share of imports of individual products in the commodity group. Since here we work with aggregates of several products in each commodity group, the estimated movements in the statutory rates for the commodity group (i.e.  $r_{1i}$  and  $r_{2i}$ ) may not accurately represent the effects of the rate changes from a revenue point of view. However, it is assumed throughout the rest of this exercise that differences between period one and period two effective rates of taxation for each commodity group can be divided into rate changes and compositional changes alone.

A fourth revenue estimate could be made by adjusting period two revenue from each commodity group downward by the ratio of period one to period two statutory rates. This is written

$\sum_{i=1}^{n-1} T_{2i} \frac{r_{1i}}{r_{2i}}$ , where  $r_{1i}$  and  $r_{2i}$  are the average statutory rates applying to commodity group  $i$  in periods one and two respectively.

Since this last method adjusts effective rates of period two downward by statutory rate changes between the two periods, a fifth estimate might be made by adjusting effective rates from period one upward by rate changes between the two periods.

This could be written  $\sum_{i=1}^{n-1} \frac{T_{1i}}{r_{1i}} \frac{r_{2i}}{r_{1i}}$ .

Before discussing the changes in revenue due to changes in rates of tax and structure of imports, the expressions used here should be more clearly defined. "Inter-industry" composition means the relative flows of imports (or of revenue) among the  $n-1$  commodity groups used in the paper. Thus, "period two inter-industry composition of imports" means the proportional distribution of imports among commodity groups that applied in period two. "Intra-industry" composition is a bit more difficult to define, but it means, broadly, the distribution of imports within a commodity group among the products subject to different rates of import tax. Intra-industry composition is directly

related to the "effective rate of tax" on a commodity group, and in the absence of ~~rate~~ changes, changes in effective rates could come about only due to shifts in the composition of imports within a commodity group from high to low or from low to high tax rate items. Thus, "period two intra-industry composition" would be identified with the effective rate of import tax on a commodity group in period two. Adjustments of the effective rate by the statutory rates are used here to separate the effects of rate changes from the effects of compositional changes. Because of the problem already noted (that the average rates used here are not accurate measures for discussions of revenue) projection of revenue at old and new "intra-industry" composition are not "pure" or unambiguous and will result in some distortion. It will be seen in the detailed examination of revenue by commodity groups, however, that the method produces results consistent with other information about the changes in import composition, so that the use of these crude tools is probably justified.

The results of the different method of estimating revenue, for the average of 1961/2 and 1962/3, are given in Table 3, in order of declining magnitude of the revenue yield. It is quite clear that there is a substantial range (about Rs 400 million) in the revenue that would occur if different rates and compositions of imports were chosen.

TABLE 3. Average Import Tax Revenue  
1961/2-1962/3 under Various  
Assumption (Rs million)

		Rs. million
1. Tax revenue if taxes grow proportionally to all imports, period one intra- and inter-industry composition and rates.	$\sum_{i=1}^{n-1} T_{1i} \frac{\sum_{i=1}^{n-1} M_{2i}}{\sum_{i=1}^{n-1} M_{1i}}$	= 1,093.0
2. Tax revenue at period two inter-industry composition, period two rates, period one intra-industry composition.	$\sum_{i=1}^{n-1} \frac{T_{1i}}{M_{1i}} M_{2i} \frac{r_{1i}}{r_{2i}}$	= 963.6
3. Actual revenue from imports, period two.	$\sum_{i=1}^{n-1} T_{2i}$	= 841.7
4. Tax revenues at period two inter-industry composition, and period one intra-industry composition and rates.	$\sum_{i=1}^{n-1} \frac{T_{1i}}{M_{1i}} M_{2i}$	= 759.5
5. Tax revenue/period two inter-industry and intra-industry composition, and period one rates.	$\sum_{i=1}^{n-1} T_{2i} \frac{r_{1i}}{r_{2i}}$	= 693.7

Note: imports and tax revenue refer to "allocated" imports and "allocated" taxes only, not to totals. Source: Appendix Table A-1.

The estimates in Table 3 provide raw material for determining the quantitative importance of rate and compositional changes in period two revenue. These changes in revenue are shown in Table 4. In each estimate of change in potential revenue an attempt was made to separate the effects of intra-industry shifts in composition, inter-industry shifts in composition, and changes in rates, by holding two of the other three factors constant.

TABLE 4. Summary of Effects of Rate and Compositional Changes on Revenue From Import Taxes.

	Rs. Million
1. Loss in potential period two revenue due to changes in <u>inter</u> -industry composition, measured at old rates (line 1 minus line 4 of Table 3).	333.5
2. Loss in potential period two revenue due to changes in <u>intra</u> -industry composition measured at old rates and new <u>inter</u> -industry composition (Line 4 minus line 5 of Table 3).	65.8
3. Loss in potential period two revenue due to changes in <u>intra</u> -industry composition measures at new rates and <u>inter</u> -industry composition (line 2 minus line 3 of Table 3).	121.9
4. Gain in potential period two revenue due to changes in rates measures at old <u>intra</u> -industry and new <u>inter</u> -industry composition (line 2 minus line 4 of Table 3).	204.1
5. Gain in potential period two revenue due to changes in rates measures at new <u>intra</u> -industry and <u>inter</u> -industry composition (line 3 minus 5 of Table 3).	147.9
6. Net gain in period two revenue from changes in rates and <u>intra</u> -industry composition measures at new <u>inter</u> -industry composition. (line 3 minus line 4 of Table 3).	82.2

Source: Computed from Table 3.

Adding lines one and two from Table 4, one can estimate the total hypothetical loss in revenue from import taxes due to the combined effects of inter- and intra-industry changes in composition (when both are estimated at period one rates). Nearly Rs. 400 million are involved. This (hypothetical) loss is greater than the combined increase in revenue from income, corporation and land taxes in period two over period one. It is clear from Table 4, however, that the principal loss in potential revenue came from shifts in inter-industry composition of imports. The important revenue-yielding commodities were the first industries in which import substitution took place, and it is quite clear that liberalization of imports took place primarily in low-duty raw materials, and capital goods most of which are identifiable by industry of origin. Thus, one would expect substantial

switching of the composition of imports among commodity groups and, therefore, in the average effective rate of duty on total imports.

Intra-industry changes in composition, however, have also been important from the revenue point of view. These are measured in rows two and three of Table 4 at period one and period two rates respectively. The aggregate loss in revenue, as will be seen below, conceals some rather interesting movements in opposite directions in various industries. The loss in potential revenue from intra-industry changes in composition amounts to as much as Rs 120 million when measured at period two rates.

Off-setting the losses in revenue from changing composition of imports toward low duty items are the increases in revenue that have taken place due to changed rates of import duty and sales tax. These changes are shown in lines four and five of Table 4, for period one and period two intra-industry composition, respectively. The hypothetical increases in tax revenue due to changed tax rates are quite substantial, representing at least Rs 150 million and as much as Rs 200 million potential revenue in a year.

The difference between actual collections in period two and the projected revenue based on old rates and intra-industry composition give the net gain in revenues due to rate changes and intra-industry shifts in composition or, alternatively due to changes in "effective rates of tax" on each industry. The amount is just over Rs. 80 million, as shown in line 6 of Table 4. Even though the increased statutory rates would have yielded from Rs 150 to 200 million if intra-industry composition had remained unchanged, there was such a substantial loss due to shifts from high to low duty items within commodity groups that the net increase was only about one half the potential increase.



Some of the changes in the composition of imports and import tax revenue were due to increased domestic supplies of the goods previously imported or their close substitutes. No doubt some of the changes were due simply to a shift away from consumption and import of goods with higher imports tax rates. One of the questions raised is the extent to which high duties (yielding substantial revenues, originally) were levied in order to encourage import substitution in particular industries, or whether high duties encouraged import substitution that was not anticipated. If the latter is the case, and if one can assume that the government levied high duties on luxury items whose consumption as well as import they intended to discourage, then one can say that the government's aim of restricting consumption of high duty (luxury) items has been successfully circumvented by the process of import substitution. This is clearly a matter that bears further investigation.

#### IV COMPOSITIONAL CHANGES IN REVENUE BY COMMODITY GROUP

Several points of interest arise when one examines the changes in import tax revenue at a disaggregated level. These include: the offsetting nature of rate and compositional changes within industries; the importance of various industrial groups in determining the changes in total revenue from import taxes; and the relationships between changes in composition and the rates of tax that were in force in period one.

Table 5 shows the changes in revenue. These changes, that come from changes in rates, inter-industry composition, and intra-industry composition. Some of the changes may not be particularly meaningful at this disaggregated level, due to non-comparability of the revenue flows and import flows in particular industries.<sup>4/</sup> Changes in revenue due to intra-industry changes in composition are shown in columns (2) and (3) at period two and period one rates respectively. Positive changes indicate shifts in composition from more lightly to more heavily taxed imports. Negative changes indicate shifts away from more heavily taxed imports. Negative shifts can be due to (i) import substitution in high duty items, (ii) reduction in relative quantities of high-duty items demanded because of their higher prices, or (iii) relatively tighter licensing of imports having higher duties (indicating that they are less "essential"). The latter point has recently been emphasized in Pal's study of import prices [ 5:7].

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<sup>4/</sup> For example, miscellaneous manufacturing imports in 1954 are much too large due to incomplete classification by C.S.O. Revenue attributed to "machinery" and to "electrical machinery and equipment" are not completely distinguishable in the revenue statistics and the classification changes in 1960/61, making the two periods non-comparable. Other problems in comparability at the disaggregated level arise due to changes in the classification system used both for imports and for import duties. Thus, the aggregate figures are probably more meaningful than the disaggregated computations.

Table 5. Changes in Period Two Revenue, by Commodity Group,  
Due to Changed Composition and Changed Rates, Ms. 1000

(1)	(2)	(3)	(4)	(5)	(6)
Industry of Origin	Change due to intra-industry composition period two rates	Change due to Intra-industry composition period one rates	Change due to rates, period two composition	Change due to rate period one composition	Change due to inter-industry composition
2070 Sugar	27,910	28,454	-1,250	-706	-123,821
2091 Edible Oils	-12,323	-12,790	- 280	-747	17,207
2092 Tea	- 2,200	- 2,200	0	0	- 3,097
2099 Food mfg. n.e.c.	500	270	5,966	5,736	- 2,428
2100 Beverages	-15,958	-11,333	3,198	7,823	- 1,457
2600 Tobacco manufactures	- 579	- 285	540	834	- 1,647
2311 )					
2390 ) Textiles except silk					
2340 ) and art silk	-45,454	-21,113	12,680	37,022	-188,272
2314 ) Silk and art silk	- 6,009	- 3,492	19,513	22,030	- 39,332
2420 ) Footwear plus					
2900 ) leather goods	6,768	4,739	2,544	515	846
2500 ) Furniture and					
2600 ) wood mfg.	- 8,085	- 6,500	636	2,221	3,630
2700 Paper & paper prod.	-12,775	- 8,015	6,790	11,549	- 10,330
3000 Rubber goods	-18,580	-24,685	-4,517	-10,622	14,497
3140 ) Chemicals and					
3191 ) Pharmaceuticals	24,803	26,668	-3,193	- 1,329	- 671
3199 )					
3150 Soaps, cosmetics, etc.	2,838	1,897	2,135	1,195	- 169
3200 Petroleum and coal mfg.	-75089	-72991	3,042	5,140	- 51,702
3399 Non-metallic mineral mfg.	19,161	27406	-10,140	-1,895	2,081
3400 ) Basic metals and					
3500 ) their manufactures	6,185	4,659	23,320	21,795	38,463
3600 Mach. except electrical	-40126	-16050	50,020	74,096	219
3700 Electrical machinery and equipment	37,282	29,004	18,863	10,586	12,603
3800 Transport equipment	- 10,666	-9,218	17,135	18,584	32,309
3900 Misc. mfg.	14,312	13,583	990	262	- 2,840
Total Allocated Mfg.	-108,085	-51989	147,992	204,089	-303,970
Unmanufactured Tobacco.	- 13,859	-13,859	- 0 -	- 0 -	- 29,535
Total Allocated Imports	-121,944	-65,851	147,992	204,089	-333,505

Source: Computed From Table A-1. For definition of each variable see Tables 3 and 4.

In several industries where there is general knowledge of the import substitution process, one can "see" the results from columns (2) and (3). Both of the textile groups, paper and paper products, rubber and rubber products, and products of petroleum and coal are examples that ~~quickly~~ come to mind. Import substitution has taken the form of continued import of the semi-processed raw-materials and completion of final processing in Pakistan. Such a pattern leads to a reduction in imports of the highest-duty items first, since, as brought out by Radhu, finished goods have higher rate of duty than do semi-processed goods [ 12 ]. As was true of the aggregate changes in revenue, a final determination of the revenue effects of import substitution after accounting for the revenue from the new domestic flows of output, must wait until final ~~figures~~ on domestic flows of product are available.

Effects of rate changes in individual industries are shown in columns (4) and (5) of Table 5. Most of the increase in revenue from increased rates came from the metals and machinery groups (3400 to 3800) regardless of whether period one or two composition is used. Unfortunately, as noted above the use of average statutory rates in the computation for each industry prevents one from examining the possibility of offsetting rate changes within an industry (e.g. increased duties on final products and decreased duties on raw materials).

Column (6) of Table 5 shows the difference between revenue from proportional growth of all imports and actual growth of imports by commodity groups, thus giving the change in revenue due to inter-industry changes

in composition of import flows. Positive changes reflect growth in imports of the commodity group that is greater than the average growth, and negative changes indicate less than proportional growth. Since net change in revenue is negative, imports that increased less than proportionally. The large negative contributors were the items of heavy weight in period one revenue: sugar, non-silk textiles, and products of petroleum and coal. The positive contributors were, once again, the metal and machinery sectors, 3400-3800, but they are outweighed considerably by the negative changes.

In Table 6 the changes in potential period two revenue are given as percentages of revenue from the commodity group in period two. "net change in revenue" is the difference between actual revenue and revenue projected on the basis of new inter-industry composition but also rates and intra-industry composition. The percentage changes in inter-industry composition are computed at the old intra-industry composition and rates. Comparison of columns (2), (3) and (4) of Table 6 point out the offsetting nature of rate and compositional changes within many commodity groups.

TABLE 6. Percentage of Period Two Revenue Attributed to Changes in Intra-industry Composition, Changes in Rates, and Changes in Weights.

(1)	(2)	(3)	(4)	(5)
Industry of origin	Change due to intra-industry composition	Change due to rates	Net change in revenue	Change due to Inter-industry composition
	(2) + (3)			
2070 Sugar	45%	- 1%	44%	- 351%
2091 Edible Oils	- 224	- 9	- 233	92
2092 Tea	- 236	0	- 236	- 99
2099 Food mfg. n.e.c.	3	50	53	- 44
2100 Beverages	- 119	48	- 71	- 7
2200 Tobacco	- 40	64	24	- 200
2311) Textiles except				
2390) Silk and Art silk.	- 142	106	- 36	- 590
2490)				
2314 Silk & Art Silk Text.	- 9	39	30	- 107
2420) Footwear plus				
2900) Leather goods	68	18	86	71
2500) Furniture and				
2600) Wood manufacturing	- 252	49	- 203	41
2700 Paper & Paper prod.	- 57	50	- 7	- 53
3000 Rubber goods	- 163	- 57	- 220	34
3140) Chemicals and				
3191) pharmaceuticals	56	- 4	52	- 3
3199)				
3150 Soaps and cosmetics	37	25	62	- 7
3200 Petroleum & coal mfg.	- 73	4	- 69	- 30
3399 Non-Metallic Minerals.	98	- 25	73	33
3400) Basic Metals and				
3500) their manufacture.	4	19	23	41
3600 Machinery	- 34	75	41	4
3700 Elec. Mach. & equip.	40	18	58	37
3800 Transport equipment	- 7	13	6	26
3900 Misc. Manufacturing	- 10	22	12	- 41
Total Allocated Mfg.	- 70	- 4	- 74	- 55
Unmanufactured Tobacco	- 111	00	- 111	- 112
Total Allocated Imports	- 11	21	10	- 44

Notes: Change due to Intraindustry composition =

$$\left\{ \left[ T_{2i} - \frac{T_{1i}(M_{2i})}{M_{1i}} \right] \frac{r_{2i}}{r_{1i}} + \left[ T_{2i} \frac{r_{1i}}{r_{2i}} - \frac{T_{1i}(M_{2i})}{M_{1i}} \right] \right\} \div 2T_{2i}$$

Change due to rates = Col (4) minus Col (2)

Net Change due to rates and Intra-industry Composition =

$$\left[ T_{2i} - \frac{T_{1i} M_{2i}}{M_{1i}} \right] \div T_{2i}$$

Changed due to interindustry composition =

$$\left[ \frac{T_{1i}}{M_{1i}} M_{2i} - T_{1i} \frac{M_{2i}}{M_{1i}} \right] \div \frac{T_{1i}}{M_{1i}} M_{2i}$$

Source: Computed from Table 5 and Table A-1.



V- RELATIONSHIPS BETWEEN RATES OF TAX AND CHANGES IN  
IMPORT AND REVENUE STRUCTURE

The relationships between tax rates in period one and changes in the structure of imports (and import tax revenue) between periods one and two were examined by means of rank correlation analysis. In general one would expect movements away from goods with the highest rates of duty toward goods with lower rates of duty, due to import substitution, substitution effects of higher prices, or lighter licensing of imports with higher duties. One would expect this kind of movement to occur both between commodity groups and within commodity groups (as a larger percentage of total supply is finished domestically but semi-finished goods continue to be imported). One would expect negative correlation between the rates of tax and the changes in revenue or in imports (since both measures of changes in tax structure given in Table 6 are really measures of changing import structure). The results of the correlation analysis are given in Table 7.

The rank correlation analysis yields several tentative conclusions about the interrelation among inter- and intra-industry changes in the composition of imports, statutory rates of tax, and effective rates of tax on commodity groups.

- i. The average statutory rate of tax on a commodity group was not significantly related to the change in the composition of imports.
- ii. The average effective rate of tax was significantly related to changes in imports; the higher the effective period one tax rate, the greater the shifts in composition both away from the commodity group heavily taxed and away from the more highly taxed items within any commodity group.



iii. Rankings of the statutory rate and the average effective rate on a commodity group in period one were just barely related to one

TABLE 7. Rank Correlation Coefficients for Analysis of Changes in Revenue Structure.

(1)	(2)	(3)	(4)
	Percent change due to intra-industry shifts	Percent change due to inter-industry shifts	$r_{1i}$
$T_{1i}/M_{1i}$	- .569 (99%)	- .536 (97.5%)	± .402 (90%)
Percent change due to intra-industry shifts	--	+ .54 (N.S.)	+ .311 (N.S.)
Percent change due to inter-industry shifts	--	--	- .253 (N.S.)

NOTES: N = 22 for correlations in columns (2)&(3)  
 N = 19 for correlations in column (4)  
 figures in parentheses are confidence levels for correlation coefficients.  
 N.S. means coefficient is not significant.

SOURCE: Computed from Tables 6 and A-1.

another (coefficient significant at only the ninety percent level).

iv. The changes in inter-industry composition were not significantly related to the changes in intra-industry composition. (That is, commodity groups away from which the greatest substitution took place were different from the commodity groups within which the greatest substitution took place).

Having done these exercises, one can rightly inquire about their contribution to our understanding of

the processes that have been at work over the past decade, or of the incentive structure of import taxes. Several comments are in order. First, if we can identify commodities by the rate of tax on them, the above analysis suggests that the tax revenue data and their relationship to import flows give a reasonable measure (at a fairly aggregate level) of the kinds of commodities being imported under any given commodity group. Second, it would seem from the above analysis that in looking at the incentives for import substitution at any point in time it is more meaningful to look at the average effective rates of tax than at the statutory rates of tax. In his study of tax rate structure [ 12 ] Radhu argued that the rate structure would give some indication of the differential incentives for import substitution. It appears that the effective rates would be a more useful explanatory variable for changes in import structure over a period of time. Third, in a preliminary analysis of changes in import structure using data from this Study, it seems that one's expectations about the relationships between height of duty and substitution effect are borne out. Either the licensing authority followed a course similar to what one would have expected from the private market, or the private sector exerted influence on the structure of import demand away from highly taxed toward lightly taxed imports.

#### VI AN EXERCISE WITH ELASTICITIES

It is most common when analysing revenue from various taxes to calculate elasticities of revenue from the tax under consideration with respect to some relevant determining variable. Since the data are readily available for such an exercise from Appendix Table A-1, elasticities have been computed here, under two sets of assumptions. First, the elasticity has been found without adjusting for changes in

statutory tax rates between the two periods. Such a coefficient was been called the "buoyancy" of a tax by Sahota, in his empirical study of the Indian tax structure [ 14 ].

Second, after adjusting period two revenue to take account of rate changes between the two periods, a "true" elasticity has been calculated. Elasticity is the more useful and meaningful concept analytically, while "buoyancy" must be relied upon if one does not have tax rate data. Both the elasticity and the buoyancy coefficients were computed by taking an average of period one and period two revenue or imports as the base, so that an "arc" not a "point" elasticity coefficient has been calculated, representing the percentage change in revenue divided by the percentage change in imports. The coefficients are given in Table 8. Because these coefficients are "arc" estimates, they will not be strictly comparable to the calculations made in the earlier sections of this paper.

If one is going to use elasticities for revenue projections, it is important to keep in mind certain principles. Even a casual glance at the elasticities assumed for purposes of revenue projections during the Third Plan Period as given in the Outline paper [ 10a ] raises questions about the validity of the assumptions used. Reporting that "elasticity" (what is here called buoyancy) of customs duties with respect to total imports from 1959 to 1963 was unity, the Planning Commission adopted an elasticity assumption of 0.3 for the Third Plan Period. Their reasoning is that changes in "...the composition of imports in favour of low-duty capital goods..." [ 10a, p.53 ] will lead to slower growth in duties with respect to total imports. Several problems arise, however. First, customs duties include export duties, which should be treated separately. Second, the proportional growth in revenue from 1959 to 1963 was due largely to increases in the rates of duty in 1960/61, so that the base period elasticity includes

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the new rates, while the projection assumes that there will be no further rate changes. Third, and most important, a great deal of structural change had already taken place within imports, from high to low duty items, by 1964. Thus, starting from the composition of imports and the resulting revenue of 1964/65, it would require an almost unbelievable further shift in the composition of imports to bring the elasticity of revenue with respect to imports down to 0.3.

Is it possible that such a rapid structural change in import composition could take place in the Third Plan Period? Apparently, not even the Planning Commission felt so, since it did not project any drastic changes in the Third Plan composition of imports over those of the Second Plan, nor did it project drastic changes in 1969/70 over the structure in 1964/65. Table shows projections of import composition for the Third Plan and for 1969/70 as given in the Outline, and as projected assuming the same composition by type of good as existed in the Second Plan and in 1964/65, respectively. Virtually the only major difference from proportional growth is in debt servicing, not in the commodity imports. In fact, the imports of "low-duty capital goods" would have been greater if they had just grown proportionally to total imports than in the Outline's own estimate.

Proportional growth of all imports would imply proportional growth of import tax revenue, or an elasticity of unity. The Outline projects greater than proportional growth in raw materials for both consumer and capital goods, which are higher-duty items, and less than proportional growth of capital goods, which are lower-duty items<sup>5/</sup>. The only change that would bring about a smaller growth of revenue is the . .

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<sup>5/</sup> by The duties, Planning Commission definitions of consumer goods, capital goods, and raw materials for each are given by Radhu [12].

less than proportional growth of higher-duty consumer goods. However, if one takes 1964/65 as a base, which was done in the Outline revenue projections, the Outline's projected imports of consumer goods in 1969/70 are only nine per cent smaller than under a proportional growth assumption, the difference being less than one per cent of total imports.

TABLE 9. Projections of Import Composition for The Third Plan Period. (Rs. million)

	Imports, 1969/70		Imports, Third Plan	
	by distri- bution in 1964/65	from Outline	by distri- bution in Second Plan	from Outline
Capital goods	3,163	3,900	13,765	13,400
Raw material for Capital goods.	1,117	1,270	4,710	5,200
Freight charges	498	420	1,998	2,000
Technical assistance	108	120	570	500
Sub-total	4,886	4,710	21,043	21,100
Consumer goods	660	600	3,537	2,800
Raw material for consumer goods	966	980	4,218	4,310
Freight charges	148	135	761	630
Debt service	404	700	1,443	2,635
Other invisible	606	545	2,998	2,525
Sub-total	2,784	2,960	12,957	12,900
Total imports	7,670	7,670	34,000	34,000

Source: Outline of the Third Five Year Plan  
/ 10 a / pp 74-75.

On the basis of the above argument it is difficult to see why the Outline should have projected revenue from customs duties an elasticity with respect to imports of only 0.3. An elasticity closer to unity would have been more consistent with the Outline's own projections of import composition. It is well to remember that the difference in assumptions of 0.1 in the elasticity of import taxes or customs duties is likely to involve a very substantial amount of revenue, and under-estimating

the amount of revenue forthcoming from existing tax rates will lead to over-estimates of the additional revenue needed to offset Plan expenditures.

Working with the Planning Commission's estimates of imports during the Third Plan period, one finds that a difference of 0.1 in the elasticity assumption for customs duties involves about Rs. 100 Million over the five years. Thus, if one raised the estimate of the elasticity to 0.8 (0.2 above the estimate for 1954 to 1963 found for allocated imports in the present paper), which is reasonable based on the assumed changes in composition of imports over the five years, the estimate of revenue from current taxes for the Third Plan would increase by Rs. 500 million, and the estimate of additional tax revenue needed from new taxes or changed tax rates would fall to Rs. 2,500 million.

#### VII SUMMARY AND CONCLUSIONS

The purpose of this paper was to shed some empirical light on the effects of changing composition of imports on revenue from import taxes. Though it is not a complete study of the relationship between imports and import taxes, some interesting and useful information does emerge. The principal findings can be summarized as follows.

- i) The increase in revenue from import duties and sales taxes on imports was greater over the decade studied than the combined increase in revenue from income, corporation, and land taxes in the same period.
  - ii) The ratio of import tax revenue to imports fell over the period, despite substantial rises in the statutory rates of duty. The principal reason for the loss in potential revenue was the change in the composition of imports among the major commodity groups, due primarily to import substitution and tight licensing of higher duty items. However, there was also a substantial loss in potential revenue due to a shift within many commodity groups from high to low duty items
-



This loss in potential revenue due to changes in imports composition amounts to some Rs. 400 million per year, while the gain due to increased rates of duty comes to Rs. 150 million to Rs. 200 million per year.

iii) The effective rates of tax in the early years of the period under study were significantly related to changes in the structure of imports over the period. High effective rates of tax in period one led to shifts away from the commodity group and to shifts toward lower duty items within the commodity group.

iv) The effective rates of tax on a commodity group appeared to be a better measure of the incentives for substitution away from the commodity group than the average statutory rate of tax.

v) Since there has been a substantial shift in the structure of imports over the past decade, there is less "potential" left now for further shifts in the composition of imports (when classified by rates of duty). There is little scope left for further import substitution in the industries that compete with high-duty imports. Therefore, fore, one should expect to find a higher elasticity of import taxes with respect to imports during the Third Plan than prevailed over the past decade. The elasticity assumed in the Outline paper is much too low, and results in a projected level of revenue well below what one could reasonably expect from import duties during the Plan period.

Much work still needs to be done to refine the estimating procedures and to include the effects of import substitution on revenue from domestic sources. It is my hope, however, that the above exercises will suggest some useful hypotheses and directions for further work in the area and will lead to more careful and accurate work in the analysis of tax revenue and its sources.

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Table 8 - Elasticity and Buoyancy of Tax Revenue from Imports by Commodity Groups, 1954 to 1963

	Industry of origin	Buoyancy	Elasticity
2070	Sugar	- .320	- .366
2091	Edible oils	.883	.894
2092	Tea	-2.068	-2.068
2099	Food manufacturing n.e.c.	1.846	1.065
2100	Beverages	.492	.144
2200	Tobacco	-13.676	24.973
2311 )	Textiles n.e.c.	1.295	1.850
2390 )			
2490 )			
2314	Silk & art silk	1.992	.713
2420 )	Footwear & leather	1.189	1.174
2900 )			
2500 )	Furniture & wood	.366	.185
2600 )			
2700	Paper products	.906	.192
3000	Rubber goods	.251	.462
3140 )	Chemicals & pharm.	.544	.609
3191 )			
3199 )			
3150	Soaps & cosmetics	1.633	1.419
3200	Petroleum & coal	.367	.327
3399	Non-metallic products.	1.412	1.464
3400 )	Basic metal products	1.102	1.018
3500 )			
3600	Machinery n.e.c.	1.354	.676
3700	Electrical machinery	1.294	1.233
3800	Transport machinery	1.033	.957
3900	Misc.mfg. n.e.c.	2.466	2.429
	TOTAL MFG.	.815	.642
	UNMFG TOBACCO	- 1.342	- 1.342
	TOTAL ALLOCATED IMPORTS	.652	.590

Notes: Buoyancy =  $\frac{T_{2i} - T_{1i}}{T_{1i} T_{2i}} \div \frac{M_{2i} - M_{1i}}{M_{1i} + M_{2i}}$

Elasticity =  $\frac{T_{2i} \frac{r_{1i}}{r_{2i}} - T_{1i}}{T_{1i} + T_{2i} \frac{r_{1i}}{r_{2i}}} \div \frac{M_{2i} - M_{1i}}{M_{1i} + M_{2i}}$

Computed from Table A-1.

8	9	10	11	12	13	14
$r_{11}/r_{21}$		$\frac{T_{11}^{11}(M_{21}^{21})}{M_{11}^{11}}$	$\frac{T_{11}^{11}(M_{21}^{21})}{r_{11}^{21}}$	$\frac{T_{21}^{21}(r_{11}^{11})}{r_{21}^{21}}$	$\frac{T_{11}^{11}}{M_{11}^{11}}$	$\frac{T_{21}^{21}}{M_{21}^{21}}$
1.02	318,186	70,545	69,134	127,453	97	172
1.05	2,929	37,342	35,848	11,763	12	4
1.00	12,453	6,260	6,260	1,861	184	55
.49	15,782	10,926	22,398	11,465	19	40
.72	42,026	39,112	54,757	16,446	510	298
.50	4,944	1,650	3,317	1,080	129	169
.46	440,374	63,830	137,873	21,604	74	54
.63	152,097	73,434	117,494	66,451	106	152
.70	701	2,392	3,421	11,870	32	228
.78	10,251	17,510	21,952	4,511	34	11
.63	59,809	39,150	62,249	23,121	48	43
1.34	55,980	84,974	63,731	35,605	78	24
1.07	45,627	44,285	41,628	97,620	9	19
.67	5,213	4,876	7,265	8,670	23	61
.97	446,089	342,686	352,967	196,705	71	42
1.43	8,469	12,631	8,842	67,443	17	65
.81	112,594	189,519	233,108	198,837	17	22
.40	98,357	98,794	246,985	66,694	17	12
.77	43,086	68,252	89,463	126,300	16	38
.87	183,165	247,783	284,950	229,348	38	40
.95	16,258	10,461	10,984	37,627	8	30
4.00	111,634	52,565	52,565	24,847	263	73
	2,186,026	1,519,017	1,927,191	1,387,321	38	30

TABLE A-1

Basic data and calculations for analysis of changes in revenue from taxes on imports.

6		3		5		6	
1	2	3	4	5	6	7	
Industry of origin	Tax Revenue 1954 + 1955	Tax Revenue 1961/62 + 1962/63	Imports 1954 + 1955	Imports 1961/62 + 1962/63	Average rate of tax, 1954 & 1955	Average rate of tax 1961/62 & 1962/63	
	T <sub>1i</sub>	T <sub>2i</sub>	M <sub>1i</sub>	M <sub>2i</sub>	r <sub>1i</sub>	r <sub>2i</sub>	
2070 Sugar	108,942	124,954	112,414	72,788	63	62	
2091 Edible oils	1,033	11,203	8,315	309,556	46	44	
2092 Tea	4,264	1,861	2,314	3,397	- a/	- a/	
2099 Food Mfg. n.e.c.	5,404	23,397	28,710	58,048	57	76	
2100 Beverages	14,390	22,842	2,819	7,662	- a/	- a/	
2200 Tobacco	1,693	2,159	1,311	1,278	76	153	
2311 ) 2390 ) 2400 ) 2314 ) 2420 ) 2700 )	150,787	46,965	205,173	86,852	67	145	
Textiles							
Silk and <del>art silk</del>	52,079	105,477	49,081	69,207	125	200	
Footwear & leather	240	16,957	748	7,456	82.7	118.2	
2500 ) 2600 )	3,510	5,788	10,322	51,493	43	55	
Furniture and wood							
2700 Paper products	20,479	36,700	44,955	85,941	46	73	
3000 Rubber goods	17,153	26,571	23,224	108,622	51	38	
3140 ) 3191 ) 3199 )	15,623	91,234	172,845	489,935	32	30	
Chemicals & Pharm.							
3150 Soaps & cosmetics	1,785	12,941	7,808	21,329	49	73	
3200 Petroleum & coal	152,744	202,789	216,364	485,418	30.07	31.01	
3399 Nonmetallic minerals	2,900	47,163	16,708	72,773	93	65	
3400 ) 3500 )	38,553	245,478	232,077	1,140,855	32	39.3	
Basic metal products							
3600 Machinery	33,678	166,734	465,996	1,367,016	5	12.5	
3700 Electrical machinery	14,753	164,026	94,463	437,263	49	64	
3800 Transport "	62,717	263,618	166,118	656,308	47	54	
3900 Misc. mfg.	5,567	39,607	70,485	132,450	69.6	72.9	
Total mfg.	710,286	1,658,459	1,932,250	5,665,647			
Unmfg. Tobacco	38,224	24,847	14,563	20,027	- a/	- a/	
Allocated imports	748,510	1,683,306	1,946,813	5,685,674			
Unallocated "	236,009	269,527	329,215	1,242,195			
Total imports	984,519	1,952,833	2,276,028	6,927,869			

a/ ad valorem rate not calculated due to inadequate price information.

Source: Tax Revenue from Lewis and Qureshi [3] and CBR unpublished data. Imports from working papers of Lewis and Soligo [4], based on [6], [7], [8], and [13]. Tax rates from Radhu [12].

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