Shifting of Indirect Taxes: A Further Study

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Indirect taxes—customs duties, sales tax, excise duty and export duty—are an important source of revenue to the Government of Pakistan. These taxes may be changed to bring about changes in production structure and consumption patterns. However, in the case of Pakistan, changes in sales tax and excise duty in particular seem to have been brought about mainly for revenue purposes. Indirect taxes accounted for 64 percent of the total revenue receipts of the federal Government of Pakistan in the year 1972-73 [4]. The contribution of indirect taxes to the revenue receipts of the federal government shows some fluctuations, but over all, the share of indirect taxes does not show any definite trend. Whereas the share of indirect taxes in total revenue receipts is almost constant, there have been important changes in the revenue receipts from different indirect taxes, e.g. sales tax, excise tax and import duties. In the early fifties, excise and sales taxes accounted for 15 percent of the revenue receipts, but they contributed as much as 27 percent of the revenue in the seventies. This shows that sales and excise taxes are emerging as important sources of revenue to the federal Government of Pakistan. In view of the growing importance of indirect taxes in Pakistan it will be instructive to determine who will bear the burden of taxes. Shifting or non-shifting of a tax has an important bearing on the economy.

Radhu [12], Pal [10,11], Alamgir [1] and Irfan [3] have studied the problem of tax-shifting for Pakistan. Relating the changes in taxes (excise and sales) to changes in prices, Radhu [12] found no evidence of tax shifting on to the consumers. Pal [10,11] and Alamgir [1] compared the c.i.f. prices of imports with their corresponding whole sale prices, and concluded that as the difference between the c.i.f. prices and the wholesale prices was much greater than the combined total of the customs duty and the sales tax, an increase in tariff rates would not be shifted onto the consumers.

Irfan [3] has studied the shifting problem for cigarettes and petroleum only, and has concluded, on the basis of time series data, that the taxes were shifted forward on to the consumer. Irfan's conclusions are contrary to those of Radhu. The difference in the results of the two studies may well be due to the different samples of data used. It may also be that the supply constraint, the reason suggested by Radhu for non-shifting of taxes was not operative in the case of Irfan's sample. Like Radhu's study, the present study is an attempt to analyse the shifting problem on a larger sample. This study also analyses the shifting problem for specific products. However, the scope of the paper is limited to an analysis of excise and sales taxes only, and does not incorporate import duties which are being studied in a separate study now under way at the Pakistan Institute of Development Economics.

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The paper is divided into four sections. In the first section the problem of tax shifting is discussed. The second section is devoted to a discussion of methodology and data. The results are presented in the third section, while the conclusions drawn from this study are described in the fourth section.

Shifting of Taxes

Indirect taxes may be shifted on to the consumers fully or partly. Or they may not be shifted at all, and may be wholly absorbed in the profits of producers. The shifting of a tax is determined by the slopes of the demand and supply curves. The more inelastic the demand curve, the greater is the shifting of the tax. Similarly, the more inelastic the supply curve, the less is the shifting of the tax. In particular, if the demand curve is completely inelastic, the producers will be able to shift the full amount of the tax on to the consumer. On the other hand if supply is completely inelastic, producers cannot shift the tax on to the consumers. This may be seen in Fig. 1 in which CSW is the marginal cost curve prior to the imposition of tax. The marginal cost curve is drawn on the assumption that OM is the maximum output beyond which the producer is incapable of extending his production. The marginal revenue (MR) curve intersects CSW at T, and the price is equal to O P. An imposition of an *ad valorem* tax shifts CSW to C'S'W but leaves the price and output unchanged. However, a major increase in the tax would shift the curve to C''S''W and would bring about a change in the price. Radhu [12] supported his empirical evidence with the argument that supply is inelastic because of the bottlenecks in production due to limited availability of imported inputs. On the other hand, Irfan's results differed from Radhu's possibly because of the former's particular choice of a sample consisting of commodities for which demand is inelastic.

Excise duties, which have been both specific and *ad valorem*, have been subject to frequent changes. On the other hand, sales taxes, which have been *ad valorem* only, have been subject to less fluctuations. Indeed, rates of sales taxes have changed only thrice : in 1960-61 from 10 to 12.5 percent ; in 1963-64 from 12.5 percent to 15 percent; and in 1970-71, from 15 to 20 percent. However, prior to 1970-71, the effective rate of the sales tax was 19.75 percent due to the imposition of a defence surcharge and a rehabilitation tax on products subject to the sales tax. The latter two taxes were withdrawn in 1970-71.

Data and Methodology

To study the effect of tax changes on prices, i.e. whether taxes have been shifted or not, a simple regression model is used similar to the one used by Radhu [12] and Irfan [3]. Price changes have been regressed on tax changes, i.e.

$$\Delta P = \alpha + \beta \Delta t$$

where ΔP = change in the prices

Δt = change in the taxes

Such a relationship leads to a specification problem since prices are affected not only by the changes in taxes, but also by many other factors. However, as in Radhu's and Irfan's studies, it is assumed in this study that in a short period the influence of other factors on prices may not be significant.

The analysis has been carried out both on the basis of absolute tax change and in terms of percentages.

$$\frac{\Delta P}{P} = \alpha + \beta \left(\frac{\Delta t}{t} \right)$$

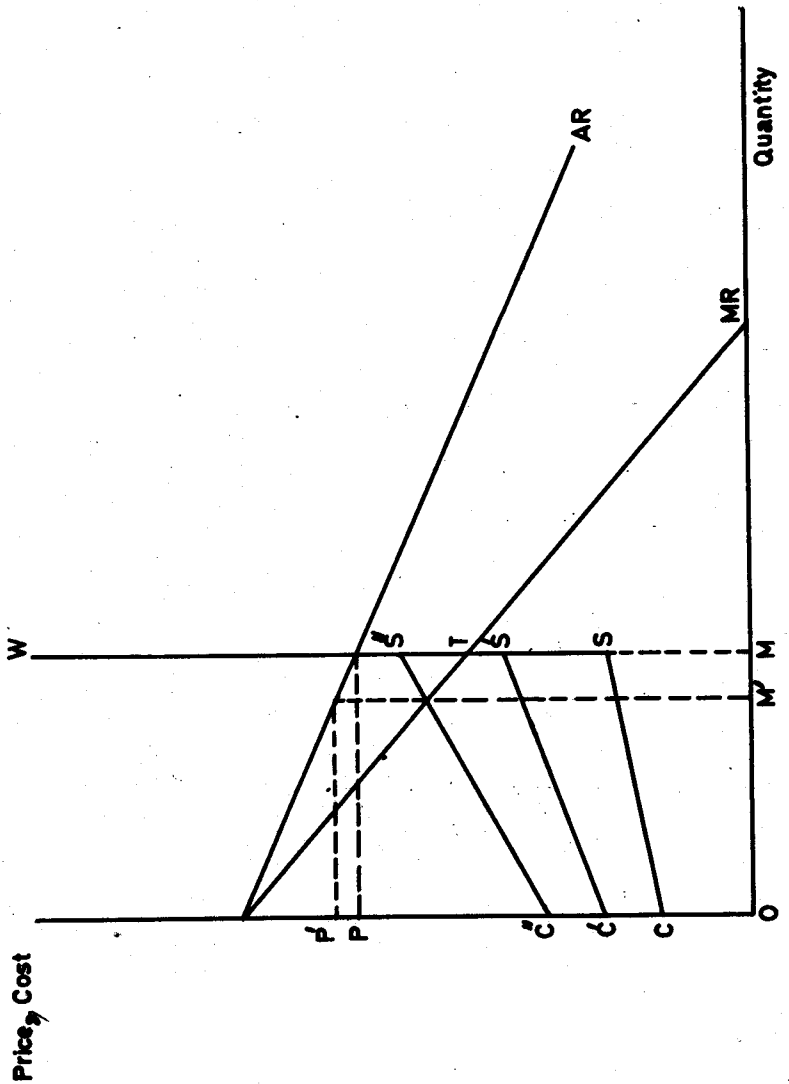

Fig. 1
Indirect Tax Incidence with Limited Supply
Source [12]

The analysis in terms of absolute changes will help determine that part of an increase in tax which is shifted to the consumer. The analysis in percentage terms will help establish if producers, following a mark-up procedure in pricing the goods, applied the same mark-up to an increased cost (i.e. the one including tax) as before the imposition of increased tax.

The inclusion of an intercept in the equation may cause some to wonder why there should be a positive or negative change in prices when there is no change in the tax. However, an exclusion of the intercept will be an unnecessary constraint, since there are other factors affecting prices, and an intercept may take out the effect of those factors. That is why an intercept in the equation was retained.

The commodities included in the sample of this study are : tea, matches, vegetable ghee, hides and skins, general chemicals, footwear, paper, cement, jute manufactures, paints, coal and coke, cotton fabrics, cotton yarn, diesel oil, kerosene oil, motor spirits furnance oil, cigarettes, soda ash, polish and creams, washing soap, electric bulbs, mustard oil, woollen cloth, silk cloth, and sugar. Certain other products, subjects to sales and excise duties, had to be excluded from the sample because their prices were not available.

To compare out results with those of Radhu, a study of shifting for the overall indirect tax structure has been carried out. However, it is more meaningful to study the shifting of taxes at a disaggregated level. Moreover, the results obtained through such study can be used in studies on the incidence and progressivity of taxes. Thus we have divided the sample into 12 groups, viz. chemicals, cement, hides and skins, petroleum products, cigarettes, cotton fabrics, jute manufactures, silk cloth, cotton yarn, woollen cloth, food products, and miscellaneous.

Price changes have been calculated on the basis of prices both in the month before and the month after a change in tax. For example, if the tax changed in June, then the price differential between May and July was taken. The selection of these two months was necessitated because the prices reported for June necessarily represented the average of pre-tax change and post-tax change prices. Change in tax is readily available in some cases, and where it is not, it is easy to calculate. If there is a change in more than one tax, then the tax changes are added. For example, if both sales and excise taxes change, then the change in tax will be the sum total of the change in sales tax and the change in the excise tax. There are some commodities, which are subject to an import duty as well. For some of the products which are subject to an *ad valorem* tax, the non-availability of c.i.f. prices poses a problem. Fortunately, except for tyres and tubes, the products included in the sample are subject to specific import duties only. Thus we have recalculated the regressions reported by Irfan [3].

The main sources of the data for the sales tax, excise tax and import duty are the unpublished reports of the National Central Board of Revenues (C.B.R.) [6], and the *Fiscal Policy of Pakistan* [9]. Data on price changes have been taken from several issues of the Monthly Statistical Bulletin [7].

Results

In absolute terms, the regression equation for overall indirect tax structure is :

$$\Delta P = 0.39 + \underset{(7.02)}{0.48}\ \Delta t$$

$$R^2 = 0.20 \quad F = 49.26,$$

and in percentage terms, it is

$$\frac{\Delta P}{P} = 0.97 + \underset{(5.28)}{0.08}\ \frac{\Delta t}{t}$$

$$R^2 = 0.13, \qquad F = 27.86$$

The above regressions suggest that taxes were shifted on to the consumers. The regression coefficient is significant at the one percent level of significance. On an average, 48 percent of the tax is transferred onto the consumers. This result is contrary to Radhu's findings and shows that, in general, taxes do shift onto the consumers.

Table 1

Results of Regression Analysis of Absolute Changes in Taxes and Prices

Commodity	Intercept	Regression coefficient	t-statistic	F. value	R^2	D.W.
Cigarettes	0.69	0.76	4.82	23.19	0.45	1.63
Petroleum products	—0.02	0.91	3.71	13.80	0.56	1.94
Chemicals	—5.44	5.70	9.80	96.11	0.84	1.29
Cement	2.68	—0.05	0.16	0.03	0.01	2.25
Cotton fabrics	—0.09	0.49	2.68	7.16	0.25	2.14
Jute manufactures	1.72	—5.57	0.77	0.59	0.13	1.47
Hides & Skins	—0.88	0.40	0.31	0.09	0.01	1.01
Silk cloth	0.02	0.52	0.94	0.88	0.11	2.43
Cotton yarn	0.34	0.25	1.53	2.34	0.15	1.11
Woollen cloth	0.03	0.52	1.19	1.41	0.17	1.64
Food products	0.59	0.43	7.65	58.53	0.78	1.14
Miscellaneous	2.15	0.34	5.24	27.45	0.51	2.05

Table 1 reports regressions for different groups of commodities[1]. It may be observed that for six groups of commodities out of 12, taxes do shift onto the consumers. Regression coefficients are significant at $\alpha = .05$ for all the six groups. D.W. suggests that the residuals are not systematically related, and as such the misspecification bias may not be large. The commodities for which the tax has shifted are : cigarettes, petroleum products, chemicals, cotton fabrics, food products and miscellaneous. One possible reason for the shifting of taxes for these products could be that their demand was inelastic. This has, however, to be verified with empirical evidence.

If one looks at the regression of each of the products, it is surprising to note that the regression coefficient of chemicals is 5.70, which means that if the tax on chemicals changes by one rupee, the producers raise the price by Rs. 5.70. However, the tendency of chemical producers to reap huge profits is well known, and may well account for the high regression coefficient for chemicals.

For cigarettes, the regression coefficient is 0.76, and is highly significant. Even more significant is the result for petroleum which shows that almost the whole amount of the tax is passed on to the consumers. In three other cases, i.e. textiles, miscellaneous and food products, a larger part of the tax is absorbed by the producers. For the rest of the sample, the taxes do not appear to have shifted forward. To determine whether the taxes have been absorbed in the producers' profits or were shifted backward to the producers of raw materials further research will need to be carried out.

[1]Except for cigarettes, petroleum products and silk cloth, the regression coefficients for percentage changes in taxes and prices are insignificant and have not been reported.

Conclusions

This study has shown that indirect taxes are being shifted on to the consumers, and Radhu's contention, that taxes do not shift though possibly true for earl years, does not appear to be valid for later years. The results of this study different from Radhu's for the reason that the products on which the ta had very small weight in the sample. This study also supports the Irfan that the taxes are shifted on to the consumers. It is obse consumer goods in general do shift onto the consumer, while th do not. For six products, viz. cigarettes, petroleum pr chemicals, food products and miscellaneous products, th for cement, jute manufactures, silk cloth, woollen c and skins, we did not find any evidence of the shif Thus, the taxes do shift in some cases, and don all tax structure is such that excise duties to the consumers.

Appendix

Changes in Indirect Taxes and Prices

Commodity	Tax	Years	Change in tax	Change in price
Cigarettes[b]				
Scissors	E	58-59	—1.88	—2.12
,,	,,	58-59	—1.88	—2.16
,,	,,	59-60	1.88	0
,,	,,	62-63	0.65	0.71
,,	,,	63-64	3.85	5.55
,,	,,	65-66	2.40	3.00
,,	,,	66-67	—2.15	—0.95
,,	,,	70-71	5.25	5.00
,,	,,	70-71	5.25	3.00
Red Lamp	E	62-63	0.18	0.41
,,	,,	62-63	0.18	0.48
,,	,,	63-64	—1.05	0.10
,,	,,	66-67	0.50	1.20
Passing Show	E	59-60	—1.88	0
,,	,,	61-62	0.10	0.08
,,	,,	62-63	0.21	0.15
,,	,,	63-64	—0.05	0.05
,,	,,	66-67	2.50	3.20
Capstan	E	58-59	5.77	0
,,	,,	58-59	5.77	5.00
,,	,,	62-63	2.26	3.00
,,	,,	62-63	2.26	0
,,	,,	63-64	11.50	8.00
,,	,,	63-64	11.50	0
,,	,,	64-65	8.50	10.00
,,	,,	64-65	8.50	12.00
,,	,,	65-66	5.10	6.00
,,	,,	66-67	0.40	0
,,	,,	66-67	0.40	4.00
,,	,,	70-71	8.50	10.00
Furnace Oil	E + M	63-64	0.14	0.07
	E	65-66[a]	0.03	0.03
	,,	66-67	0.17	0.13
Diesel Oil	E + S + M	63-64	0.77	0.37
,,	E	65-66[a]	0.13	0.13
,,	,,	66-67	—0.06	—0.02
Motor Spirit	E	65-66[a]	0.39	0.39
,,	,,	66-67	0.56	0.79
,,	,,	71-72	1.00	0.25
,,	,,	72-73	0.50	1.00
Kerosene Oil	E + M	65-66[a]	2.24	0.32
,,	E	66-67	2.56	4.17
,,	,,	66-67	2.56	2.06

[a]Beginning with 1965-66, petroleum products were subject to defence surcharge which was, however, merged with the excise duties in 1968-69.

[b]Cigarettes were liable to 20% surcharge of excise duty, which was merged with the excise duty in 62-63.

Commodity	Tax	Years	Change in tax	Change in Price
Soda Ash	S	60-61	1.44	0.41
,,	,,	63-64	0.44	0
,,	S+E[c]	66-67	4.51	1.14
General Chemicals	S	60-61	—0.02	—13·38
,,	,,	63-64	—0.82	—20.25
,,	,,	70-71	0.27	1.33
Imported Chemicals	S	60-61	0.90	0
,,	,,	60-61	0.02	—0.06
,,	,,	60-61	0.04	0.06
,,	,,	63-64	1.91	0
,,	,,	63-64	1.55	5.62
,,	,,	63-64	1.14	—2.62
,,	,,	63-64	—0.54	—17.75
,,	,,	63-64	5.12	20.00
,,	,,	63-64	0.03	—0.06
,,	,,	63-64	0.02	—0.05
,,	,,	70-71	0.18	0.75
,,	,,	70-71	0.59	3.33
,,	,,	70-71	11.76	70.00
,,	,,	70-71	—0.09	—0.56
,,	,,	70-71	—0.01	—0.03
Cotton Yarn 20 counts	S	63-64	1.57	1.82
,,	,,	63-64	1.50	1.44
,,	,,	63-64	1.83	0.26
,,	,,	63-64	1.54	1.90
Cotton Yarn more than 20 counts	S	59-60	0.78	1.25
,,	,,	59-60	0.82	1.94
,,	,,	59-60	1.02	2.00
,,	,,	59-60	0.98	0.69
Cotton yarn more than 20 counts	S	60-61	0.59	0.56
,,	,,	60-61	0.46	—1.84
Cotton yarn more than 20 counts	S	63-64	0.52	0.06
,,	,,	63-64	1.65	0.62
Cotton yarn 20 counts	S+E	67-68[c]	2.50	—0.06
,,	,,	67-68[c]	1.43	—0.50
Cotton Yarn	E	71-72	—5.00	—1.00
Cotton Fine	E	58-59	0.06	0.06
,,	,,	59-60	0.06	0
,,	S	60-61	0.27	—3.25
,,	,,	63-64	—0.13	0
,,	E	64-65	0.11	0
,,	,,	71-72	—3.00	—0.72
,,	,,	71-72	—3.00	—2.72
Cotton Medium	E	59-60	0.06	0.01
,,	S	60-61	0.02	—0.19
,,	E+S	63-64	—0.05	0
,,	E	64-65	—0.12	—0.01

[c]Sales tax was merged in excise duty.

Commodity	Tax	Year	Change in tax	Change in price
Cotton Medium	E	66-67	—0.02	0.09
,,	S + E	67-68[d]	0.17	0
,,	E	71-72	—0.20	+ 0.03
Cotton Coarse	E	59-60	1.25	1.69
,,	,,	59-60	0.03	0.02
,,	,,	63-64	0.11	—0.03
,,	,,	63-64	0.02	0
,,	,,	64-65	—0.01	0
,,	,,	64-65	—0.12	+ 0.02
,,	,,	71-72	—2.00	—0.30
,,	,,	71-72	—0.05	0.02
,,	S + E	67-68[d]	—0.11	0
Woollen Cloth	E	28-2-58	0.50	—1.01
,,	,,	28-2-58	0.50	1.85
Woollen Cloth	S + E	60-61	1.45	0
,,	,,	60-61	0.46	0
,,	E + S	63-64	0.29	0
,,	,,	63-64	0.89	0.32
Woollen Fabrics	E + S	69-70[d]	—2.03	—0.67
,,	E	71-72	—0.94	0.06
,,	,,	71-72	—1.10	—1.07
Silk Cloth	E	58-59	0.16	0.34
,,	,,	59-60	0.06	0
,,	S + E	60-61	0.48	0.31
,,	,,	60-61	0.40	0
,,	,,	62-63	—0.31	—0.44
,,	E + S	63-64	—0.06	—0.41
,,	E	70-71	—0.26	—0.05
,,	S	67-68[e]	—0.88	+ 0.02
,,	E	69-70	0.50	—0.17
,,	,,	71-72	—0.27	—0.38
Cement	S + E	60-61	16.89	0
,,	S	63-64	2.58	2.57
,,	,,	63-64	3.72	10.72
,,	,,	63-64	1.70	0
,,	S + E	66-67[f]	0.43	0.65
,,	,,	66-67[f]	—1.10	—0.92
,,	,,	66-67[f]	1.14	4.52
Jute manufactures	S	60-61	1.35	1.62
,,	,,	60-61	2.04	—22.56
,,	,,	60-61	1.39	—27.31
,,	,,	63-64	2.02	—11.12
,,	,,	63-64	2.54	—6.33
,,	,,	70-71	0.29	1.71

[d] Sales tax was merged in excise duty.

[e] Sales tax was abolished.

[f] Sales Tax was abolished and merged in excise duty.

Commodity	Tax	Year	Change in tax	Change in price
Hides	S	63-64	0.19	–1.25
,,	,,	63-64	0.16	–3.75
,,	,,	63-64	–0.42	–7.25
,,	,,	70-71	–0.21	–1.33
,,	,,	70-71	0.01	0
,,	,,	70-71	–0.04	–0.33
Skins	S	60-61	–0.03	–1.12
,,	,,	60-61	0.03	–0.12
,,	,,	60-61	–0.03	–1.25
,,	,,	63-64	0.03	0
,,	,,	63-64	0.08	–0.06
,,	,,	63-64	0.11	0.28
,,	,,	63-64	0.09	0.14
,,	,,	63-64	0.02	–0.04
,,	,,	70-71	0.46	0
,,	,,	70-71	–0.86	0
,,	,,	70-71	–1.09	–0.75
,,	,,	70-71	0.31	0
Sugar Desi	E	61-62	1.09	–2.00
,,	,,	62-63	–1.46	0.25
Sugar Refined	E	63-64	5.12	5.31
,,	,,	63-64	5.12	–0.50
Tea	E	69-70	0.05	–0.05
,,	,,	69-70	0.04	0.20
,,	,,	4/59	0.25	0
,,	,,	4/60	0.25	–0.50
,,	,,	4/60	0.25	–0.25
Mustard Oil	S	64-65	8.64	14.00
,,	,,	64-65	10.72	26.97
Vegetable Product	E	59–60	0.09	–0.09
,,	S	60-61	0.17	0
,,	,,	63-64	0.17	0.20
,,	,,	66-67	–0.24	–0.13
,,	,,	66-67	–0.20	0.11
,,	S+E	67-68[g]	–0.24	–0.50
,,	E	70-71	0.30	0.35
,,	,,	71-72	–0.53	0.10
Polish and Creams	S+E	63-64	0.15	0.12
,,	,,	70-71	–0.09	0.02
Electric Bulbs	S+E	63-64	0.16	0.12
,,	,,	63-64	0.13	–0.10
,,	,,	69-70	0.04	–0.10
,,	,,	69-70	0.03	–0.25
Footwear	S	59-60	0.88	2.31
,,	,,	59-60	0.40	1.00
,,	,,	59-60	6.14	20.50
,,	,,	59-60	1.98	5.44
,,	,,	60-61	0.16	0
,,	,,	60-61	0.16	0

[g] Sales Tax was merged in excise duty.

Commodity	Tax	Year	Change in tax	Change in price
Paper	S	60-61	0.05	-0.06
"	"	63-64	0.03	0.02
"	S + E	70-71	0.11	0
Paints	S	60-61	0.50	0
Coal	S	60-61	2.64	0
"	"	63-64	7.31	4.31
Coke	S	60-61	1.82	0
"	"	63-64	1.73	0
"	"	70-71	0.13	0
Mild Steel Products	E	63-64	-25.00	0
Matches	E	59-60	0.75	0.56
Soap Washing	E	59-60	6.00	6.52
"	S	65-66	-0.12	0.05
Tyres	E	64-65	89.92	32.31
Tubes	E	64-65	7.22	2.59
Leather goods	S	59-60	1.28	0

Source : [2,4,5,6,7 and 9]

References

1. Alamgir, M. "The Domestic Prices of Imported Commodities in Pakistan : A Further Study." *Pakistan Development Review.* Vol. VIII, No. 1. Spring 1968.
2. Butt, Mohammad Amin and Saeed Mohammad. *The Law of Sales Tax.* Lahore : Qaumi Kutab Khana. 1969.
3. Irfan, Mohammad. "Shifting and Incidence of Indirect taxes on Tobacco and Petroleum Products in Pakistan." *Pakistan Development Review.* Vol. XIII, No. 1. Spring 1974.
4. Pakistan. Central Board of Revenue. *Central Excise Tariff.* (First Edition ; corrected up to 31st December, 1972). Karachi. 1973.
5. ————. *Pakistan Customs Tariff.* (a) Fourth Edition; 1st July 1968—30th June 1969. Karachi 1969. (b) Seventh Edition, corrected up to 15th September 1973 Karachi. 1973.
6. ————. Unpublished reports on prevailing rates of central excise duties on various commodities during the period, 1948 to 1972.
7. Pakistan. Central Statistical Office. *Monthly Statistical Bulletin.* (For all years, 1953 to 1972)
8. Pakistan. Finance Division. *Pakistan Economic Survey,* 1973-74. Islamabad. 1974.
9. Pakistan. Ministry of Finance. *Fiscal Policy of Pakistan : A Historical Perspective.* 2 vols. Islamabad. 1972.
10. Pal, Mati Lal. "The Determinants of the Domestic Prices of Imports." *Pakistan Development Review.* Vol. IV, No. 4. Winter 1964.
11. ————. "Domestic Prices of Imports in Pakistan : Extension of Empirical Findings." *Pakistan Development Review.* Vol. V, No. 4. Winter 1965.
12. Radhu, Ghulam Mohammad. "The Relation of Indirect Tax Changes to Price Changes in Pakistan." *Pakistan Development Review.* Vol. V, No. 1. Spring 1965.