

Consumption Patterns of Major Food Items in Pakistan: Provincial, Sectoral and Inter-temporal Differences 1979 – 1984-85

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I. INTRODUCTION

Two studies were presented at the Fourth Annual General Meeting of the Pakistan Society of Development Economists that dealt with the regional and inter-temporal differences in consumption behaviour in Pakistan. The first study by Ahmad and Ludlow (1987) presented a sophisticated analysis using the modified LES method and household-level observations, based on the 1979 Household Income and Expenditure Survey. Based on the disaggregated estimates of the demand response for the rural and urban areas of Pakistan's four provinces the study concluded that there were significant differences in consumption patterns between rural and urban areas and across provinces for the 17 commodities studied. However, the analysis did not present any rigorous econometric testing of these differences. The second study by Malik *et al.* (1987) while studying the rural-urban differences and the stability of consumption behaviour for six aggregate commodity groups presented fairly rigorous tests to conclude that for the commodity groups studied, although there were statistically significant differences in consumption behaviour over time, there were no rural-urban differences in the two largest categories considered i.e. food and drinks and clothing and footwear in any of the years from 1963-64 to 1984-85 for which the aggregate Household Income and Expenditure Survey data were available in published form. This obvious difference in the results from the two studies could in fact have resulted from the aggregation of the commodities analysed in the second study. This apparent contradiction in the results needs to be evaluated further.

The present study attempts to econometrically establish the existence or otherwise of rural-urban differences in the consumption patterns of five important

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food items in each province for the year 1979 and 1984-85.¹ Tests are also conducted for the possibility of pooling the sectoral data for each province to present rural and urban estimates for Pakistan as a whole. Tests are also conducted on appropriately deflated data to establish the stability of consumption behaviour over time.

The previous study by Malik *et al.* (1987) is based on a simple single equation estimation of expenditure elasticities.² However, while the previous study focused on six major commodity groups, the present study presents a disaggregated analysis

Table 1

Percentage Distribution of Expenditures on Major Food Items

Years	Wheat	Milk	V. Ghee	Sugar	Gur	All Food*
1984-85						
All Pakistan	16.82	14.96	7.22	5.56	1.13	49.73
Rural Pakistan	18.70	15.10	6.73	5.31	1.56	51.70
Urban Pakistan	14.93	14.83	7.72	5.81	0.71	47.75
Punjab	19.18	20.09	6.49	4.72	0.94	47.81
Sind	12.86	15.71	6.59	4.82	0.31	49.57
NWFP	16.86	15.18	6.91	5.62	3.18	50.77
Baluchistan	18.37	8.88	8.89	7.08	0.11	50.77
1979						
All Pakistan	16.65	14.03	8.04	4.95	2.57	51.42
Rural Pakistan	19.36	14.70	6.98	4.04	3.83	54.21
Urban Pakistan	13.99	13.39	9.08	5.83	1.32	48.68
Punjab	19.61	17.28	6.34	3.45	2.83	49.75
Sind	12.42	15.05	7.16	3.94	0.95	51.52
NWFP	18.03	14.59	9.03	4.92	5.65	54.31
Baluchistan	16.53	9.00	9.70	7.60	0.74	50.04

*Percent of expenditures on all food have been computed from total consumption expenditures.

¹Most studies of consumption behaviour in Pakistan are based on the Household Income and Expenditure Survey data. The years 1979 and 1984-85 are the two most recent ones for which these data are available in published form.

²Studies in Pakistan have ranged from the fairly simple single equation estimation to complex extended linear expenditure system and analysis based on the Almost Ideal Demand System. These include the studies by Kemal (1981), Ali (1986), Siddiqui (1982), Ahmed and Ludow (1987) and Alderman (1988).

of the five major food items, i.e. Wheat, Milk, Vegetable Ghee, Sugar and Gur/Shakkar. These five commodities together accounted for nearly 46 percent of the total food expenditure on an all Pakistan basis in 1984-85. The choice of these particular commodities was dictated by two overriding reasons. Wheat, vegetable ghee and sugar have traditionally been the important commodities for policy intervention in Pakistan. Milk is fast becoming the focus of attention and with the growing emphasis on the development of the livestock sector for future growth in agriculture its importance can be expected to increase. Gur represents an important substitute for sugar especially in the rural areas and can be a possible item for policy intervention. The percentage distribution of expenditure on these food items for the two years is presented in Table 1.

It is interesting to note that the percentage of expenditure on all foods has declined from 51.42 percent in 1979 to 49.73 percent in 1984-85 for all Pakistan. A similar pattern of decline is evident in nearly all the provinces except Baluchistan.

This study is divided into four sections. The second section is devoted to a description of the data and methodology. The results are presented in the third section while the summary of the major conclusions makes up the last section.

II. DATA AND METHODOLOGY

The published Household Income and Expenditure Surveys (HIES) reports present grouped data on the average expenditure on different commodity groups by different income categories for rural and urban households in each of the provinces. The inadequacies of the HIES data have been discussed in detail by Kemal (1981).

In order to avoid the problem of aggregation inherent in dealing with quantities and because expenditure data in these Surveys are readily available, consumption is considered in terms of expenditure rather than quantities. This has generally been done in the earlier studies also. However, most of the earlier studies did not take care of the problem of heteroscedasticity inherent in the use of grouped data such as is available in these published reports.³

Most studies take household income and family size as two important determinants of family consumption behaviour. The family size variable takes care of differences arising out of rural-urban family size differentials and facilitates the computation of estimates of economies of scale in consumption.⁴ However, like the earlier analysis reported in Malik *et al.* (1987) we found the family size variables to be strongly correlated with the household income in both years resulting in severe multicollinearity problems. Analysis on a per capita basis yielded perverse

³ See for example Ali (1981)

⁴ See for example Ali (1981) and Siddiqui (1982).

results. We were therefore constrained to conduct our analysis by dropping the family size variable and risking a certain degree of overestimation in our results.

The analysis is based on a simple logarithmic formulation:

$$\text{Log } C_{ij} = \alpha + \beta \text{ Log } Y_j \quad \dots \quad \dots \quad \dots \quad (1)$$

where

- $i = 1, 2 \dots 5$ commodities;
- $j = 1, 2 \dots n$ income categories;
- $C =$ Consumption expenditure; and
- $Y =$ Income.

As already stated the data are available in grouped form. In order to avoid the problem of heteroscedasticity we use the Generalized Least Squares approach using the robustse option in the TSP computer package that takes into account the non-constant variance.

In studies that test for rural-urban differences, some measure of permanent income is generally used to account for the variability in incomes of rural households on account of agricultural fluctuations. The effects of the transitory components of income are generally removed to get a real measure of the rural-urban differences in tastes and preferences (Shaukat Ali 1981). Houthakker and Taylor (1970) have suggested the use of total expenditure as a proxy for permanent income. However, as pointed out by Ali (1981), this can lead to biased and inconsistent estimates of the Engel curve parameters because the dependent and explanatory variables are jointly determined.

Following Liviatan (1961), Ali (1981) and Malik *et al.* (1987), we adopt a two-stage approach to overcome this problem. In the first stage predicted values of total expenditure are obtained from the following:

$$E_j = \alpha + \beta Y_j + u_j \quad \dots \quad \dots \quad \dots \quad (2)$$

In the second stage the predicted values E_j are then used as a proxy for Y_j in Equation (1) to obtain estimates for the expenditure elasticities for the different commodities.

Three sets of hypotheses are considered. In the first set, tests are conducted for provincial differences across provinces in each sector in each year. In the second set, tests are conducted for inter-temporal differences in each sector in each province across years using appropriately deflated data.⁵ In the third set, tests are

conducted for rural-urban differences in each province in each year. These tests are conducted for each of the five commodities considered in each case. Three hypotheses are considered in each set:

- (i) The respective functions have the same slope only;
- (ii) The respective functions have the same intercept only; and
- (iii) The respective functions are entirely different.

The standard dummy variable approach is used to define the differences in each case. *F*-Statistics are computed for each test. These *F*-values take the form:

$$F = \frac{(RSS_r - RSS_u)/g}{RSS_u/n - k}$$

where g is the number of additional parameters and $(n-k)$ the degrees of freedom in the unrestricted form. In each case the null hypothesis accepts similarity.

III. RESULTS

The test statistics based on the first set of hypotheses considered are presented in Table 2.

Table 2

Test Statistics for Provincial Differences in Expenditure Patterns by Rural and Urban Sectors across Provinces in Each Year

	Rural Sector		Urban Sector	
	1979	1984-85	1979	1984-85
Wheat	14.05	3.84	2.85	8.50
Milk	9.35	19.10	12.59	21.50
V. Ghee	42.10	14.73	0.81*	5.97
Sugar	27.97	11.76	5.36	6.18
Gur	12.95	29.76	6.97	18.69
df (n,g,k)	(43,6,8)	(44,6,8)	(44,6,8)	(44,6,8)

Note: 1. *Indicates insignificant at 5 percent level.

2. Figures reported are computed *F*-statistics under hypothesis (iii) given previously.

⁵ The consumer price index obtained from the Pakistan Economic Survey 1986-87 is used.

These tests reveal considerable provincial differences for each commodity in each sector in each year. Except for the case of vegetable ghee and wheat in the urban sector in 1979, there are statistically significant differences in the expenditure patterns across provinces in each sector. This is an important finding and should be borne in mind by the policy-makers. It also casts serious doubts on the results of studies that have estimated expenditure elasticities for the country as a whole without taking into consideration these provincial differences.

In view of the above, we tested for rural-urban differences in each province in each year. The relevant test statistics are not presented here but it was proved that the rural-urban functions for wheat are similar only in the case of Punjab in 1979. The test statistics also reveal that there were no statistically significant rural-urban differences in case of milk in the three provinces excluding Sind in both the years under consideration. There is also some evidence that the respective functions are similar for vegetable ghee in the three provinces excluding Punjab for both the years. For sugar the functions are different only for Punjab and NWFP for 1979. In all other cases the functions are similar. For gur the functions are different for Baluchistan in both years. In all other cases the functions for gur are similar.

The estimated expenditure elasticities for the five food items considered are presented for each year by rural and urban sectors in each province in Table 3. In cases where it was possible to pool the rural-urban data on the basis of previous evidence only the overall elasticity estimate for both sectors combined is presented. Several interesting results emerge. All the estimated elasticities are significantly different from zero except those for gur in the majority of cases. The case of gur is quite puzzling and our results could be largely due to problems inherent in the collection of data.

The pooled expenditure elasticity for wheat in Punjab in 1979 is 0.52. This is less than the estimated elasticities for this commodity in the rural and urban sectors in the other provinces in that year. In 1984-85 the rural urban elasticities for wheat are different in each case and range from 0.43 for Punjab Urban to 0.74 for Sind Rural. Higher elasticities are estimated for milk and sugar as compared to those for wheat. In the case of vegetable ghee there is evidence of a consistent decline in the value of the estimated elasticities over time. In all other cases no systematic pattern is evident for which changes in consumption patterns according to *a priori* expectations can be inferred. It would thus be of interest to test for differences in consumption behaviour over time within sectors in each province.

The test statistics relating to inter-temporal differences in the expenditure pattern within rural and urban sectors in each province are also computed. A perusal of these results reveals that the rural functions are different in the case of wheat, vegetable ghee, sugar and gur in the Punjab, gur in Sind and wheat, and gur in NWFP.

Table 3
Estimates of the Expenditure Elasticities for Major Food Items

	Punjab		Sind		NWFP		Baluchistan	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
1984-85								
Wheat	0.55 (12.90)	0.43 (6.59)	0.74 (6.05)	0.69 (7.54)	0.63 (8.02)	0.57 (4.66)	0.59 (9.70)	0.51 (5.61)
Milk	0.90 (21.22)		0.84 (10.66)	0.94 (15.96)	0.80 (12.59)		0.90 (9.78)	
Vegetable Ghee	0.37 (18.97)	0.56 (15.44)		0.60 (12.90)	0.71 (9.42)		0.54 (10.46)	
Sugar	0.81 (17.57)		0.80 (12.11)		0.92 (10.24)		0.85 (15.63)	
Gur	0.44 (7.94)	-0.29* (-1.15)	0.15* (1.05)	-1.48* (-1.65)	0.29 (2.89)	-0.11* (-0.87)	-0.93* (-0.70)	
1979								
Wheat	0.52 (5.64)		0.72 (9.50)	0.62 (6.37)	0.70 (15.32)	0.56 (4.92)	0.63 (19.95)	0.93 (6.71)

Continued -

Table 3 - (Continued)

	Punjab		Sind		NWFP		Baluchistan	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Milk	0.95 (11.15)		0.73 (7.71)	0.72 (11.19)	0.75 (14.12)		1.15 (13.49)	
Vegetable Ghee	0.33 (14.84)	0.69 (5.23)	0.65 (11.99)		0.78 (12.33)		0.67 (10.32)	
Sugar	1.12 (19.56)	0.82 (6.60)	0.79 (8.61)		1.10 (12.47)	0.71 (7.47)	0.82 (38.41)	
Gur	0.54 (10.32)	0.15* (1.27)	0.58 (4.78)	0.32* (1.58)	0.76 (7.54)	0.07* (0.76)	-0.67* (-0.64)	

In all other cases there is evidence of inter-temporal similarity. There is evidence that the urban functions are different in case of gur in Punjab and Sind and vegetable ghee and gur in NWFP. In all other cases the functions are similar or the slopes are similar. In these cases pooling of the data over time is possible.

IV. CONCLUSIONS

The major conclusion that emerges from the study is the need for taking explicit cognizance of the differences across provinces within each sector and across sectors within each province. These results highlight the need for careful disaggregated analysis based on carefully collected data from all the provinces of Pakistan. There is a need to improve the quality of the HIES data and for these data to be freely available at the household level to researchers. The level of aggregation at which these data are available masks a lot of the variation that exists in reality.

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Comments on
"Consumption Patterns of Major Food Items
in Pakistan: Provincial, Sectoral and
Inter-temporal Differences 1979 – 1984-85"

This paper focuses on an important, though neglected, area of economic research in our country. However, it is unfortunate that the study suffers from some major structural flaws that cast a shadow of doubt upon the results of the study.

1. Mis-specification of the functional form

The paper utilizes a constant elasticity expenditure (demand) equation (Engel's function) to estimate elasticities for five important food items. It is common knowledge that the constant elasticity Engel's functions are inconsistent with the utility-maximizing behaviour as they do not satisfy the 'adding-up' restriction.¹

More importantly the double-log functional form can be applied only if all households consume all the commodities for which the analysis is being performed. If any commodity is not in the budget of any household, then this type of function cannot be used. Working with the grouped data reduces but does not eliminate the risk of having zero expenditure for some commodities for a given group of consumers. Looking at the HIES of 1979 and 1984-85, one finds that quite a few (income) groups² of consumers do not consume Gur (one of the five food items), one is, therefore, at a loss to understand as how the logs of zero values were computed.

Expressing each food item as a function of total outlay (or total income) assumes that each commodity enters directly into the household's decision process, and decisions on expenditure on all expenditure heads are taken simultaneously. Knowing the Pakistani households, where the decision process is more multi-part budgeting, one tends to disagree with this assumption. In most households, this multi-part budgeting involves different members of households at different levels of the decision process.

¹See Deaton, A., and J. Muellbauer "Economics and Consumer Behaviour". Sections 1-2.

²Rural Baluchistan:

1979 income groups 11 and 12.

1984-85 income groups 7, 10, 11, 12.

Urban Baluchistan:

1979 income groups 1, 4, 11.

1984-85 income groups 2, 9, 10, 11, 12.

2. Estimation Technique

The paper assumes heteroscedasticity and utilizes "Generalized Least Squares approach using the robustse option in the TSP computer package" to correct for the non-constant variances. Intuitively, one agrees with the authors about the heteroscedastic errors. As the authors main concern is heteroscedasticity arising from grouping of observations, a simple transformation of data by multiplying all the expenditure variables by the square-root of group frequencies would have corrected the perceived problem.

Also, one would have also liked more information about the 'robustse' option and the type of GLS used. If the 'robustse' option provides some kind of robust estimator then one has to question the validity of the entire exercise. Robust estimators are usually used when the errors are expected, or known, to have a non-normal distribution. If this is the case then all the test statistics mentioned in the paper are invalid as they assume a normal distribution of regression errors. Otherwise a standard GLS is superior to the robust estimator.

3. Minor Points

- (i) The percentage distribution of expenditures given in Table 1 does not match the figures given in the two HIESs. Whether this is a result of some transformation, e.g., being calculated from deflated data, or a 'cleaning' exercise is not mentioned.
- (ii) The authors considered household size as a relevant variable but decided not to use it because of possible multicollinearity between household size and expenditure (income). This problem could easily had been averted by assuming that households' consumption decisions are made on a per capita basis and, therefore, using per capita expenditure as dependent and independent variables in the regression.

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