

RURAL-URBAN AND PROVINCIAL DIFFERENCES IN HOUSEHOLD EXPENDITURE PATTERN IN PAKISTAN

Eatzaz AHMAD and Naurin MALIK*

A linear expenditure system over eighteen commodity groups is estimated for each of the rural and urban areas of the four provinces of Pakistan using the 1984-85 Household Income and Expenditure Survey. Various commodity groups are classified into necessities and luxuries for small, medium and large households separately for each of the eight regions of Pakistan. Using appropriate F-tests, we found considerable difference in household consumption patterns across rural and urban areas and across the four provinces of Pakistan. The assumption of provincial similarity in consumption patterns is rejected more forcefully than the assumption of rural urban similarity.

I. Introduction

Estimation of linear expenditure systems has been a popular exercise in Pakistan. Most of the studies conducted in the past distinguish between rural and urban households while estimating a linear demand system [see Ahmad, Ludlow and Stern (1988), Ahmad and Ludlow (1987), Ali (1985), Siddiqui (1982) and Malik (1982)]. Only two recent studies by Malik, Abbas and Ghani (1987) and Malik, Mushtaq and Ghani (1988) explore the possibility of provincial differences in the household expenditure pattern. The first of these is based upon six commodity groups only, whereas the second considers five food items only. Further, the statistical tests for provincial differences are based on single equation estimates for each of the consumption items of commodity groups, rather than on the whole expenditure system taken together.

The objective of the present study is to extend research on these lines. We

*The authors are Lecturer, School of Economics, University of New South Wales, Australia, and former M.Sc. Student, Department of Economics, Quaid-i-Azam University, Islamabad.

will explore the possibility of similarity or dissimilarity, in households consumption patterns across the rural and urban areas of the four provinces of Pakistan, in the context of the linear expenditure system. The analysis is for eighteen commodity groups taken together, as well as for each commodity group separately. We first test the assumption of a uniform household consumption pattern across the eight regions simultaneously. Then the assumption of a uniform consumption pattern across the four provinces for the rural and urban regions combined, and for each of the two regions is tested. Finally, we test the assumption of uniform consumption patterns across rural and urban areas for all the provinces taken together, and for each of the provinces separately. In the end we discuss our estimates of the linear expenditure system for rural and urban areas of the four provinces of Pakistan.

The method of analysis and the data are explained in Section II, while the results are discussed in section III. Section IV concludes the study.

II. The Methodology and The Data

We base our analysis on the expenditure system linear in total expenditure and household size:

$$E_i = a_i + b_i E + c_i H + U_i, \quad i = 1, 2, \dots, m \quad (1)$$

where, E_i , E , H and U_i denote respectively¹ expenditure on commodity group i , total expenditure, household size and a random error term. The intercepts and the household size effects in the above equations are supposed to be characterized by the minimum (or subsistence) consumption requirements for various commodity groups by the households. The adding-up property requires the restrictions:

$$\sum_i a_i = 0, \quad \sum_i b_i = 1, \quad \sum_i c_i = 0, \quad \sum_i U_i = 0$$

Thus in a system of m equations only $m-1$ equations have to be independently estimated. The estimate for the residual equation can be inferred from the parameters of the estimated part of the system.

¹The household size variable is a crude approximation of various demographic factors affecting consumption pattern. More appropriate techniques, such as incorporation of household equivalence scale family composition variables also have certain limitations. For more details see [Brown and Deaton (1972), Grunau (1988), Deaton, Ruiz-Castillo, and Thomas (1989), and Pollak and Wales (1980)]. The grouped data in the Household Income and Expenditure Survey used in our study does not contain enough information to construct such detailed demographic variables.

The above specification of the linear expenditure system is usually attributed to what is known as the Stone-Geary utility function [see, for example, Ahmad, Ludlow and Stern (1988) and Ali (1982)]. Deaton and Muellbauer (1980), have pointed out, however, that any quasi-concave utility function would generate expenditure systems linear in total expenditure. This means that in a cross section study in which prices are assumed to be constant across households, the exact form of the utility function is not identified. It is precisely for this reason that we do not intend to calculate price elasticities in this paper.²

The Household Income and Expenditure survey 1984-85 is chosen as the data base in our study. The data in this survey are given in terms of sample means for 12 income classes for each of the rural and urban areas of each of the four provinces of Pakistan. There are several implications of grouping. An obvious one, common in all forms of aggregation, is the loss of information contained in variation within an income class. A fundamental issue is the suppression of zero observations due to grouping. In many cases zeros indicate a rigid taste for not consuming a good like tobacco or non-availability of a good like electricity in some rural areas. Expenditure on such goods is motivated by changes in tastes or exogenous factors. These zero observations have to be treated in a special manner due to there being a fundamental distinction among inability to consume, the decision not to consume and the decision to consume less.³

Finally, with all the observations given in terms of sample means, the random error terms in a regression equation are the sample means of the original error terms in equation (1), with variance being inversely proportional to the number of households, which is not equal across income classes. The variance of the random error terms varies across the data points. This built-in heteroscedasticity can be removed by multiplying the data by the square root of the number of households in various income classes.

We have classified total household expenditure into 18 groups: wheat, rice, pulses, dairy, edible oils, meat (all types), fruit and vegetables, sugar (including gur and shakkar), tea and coffee, tobacco (including chewing products), other foods, clothing, footwear, fuel and lighting, housing, durables (furniture, fixture, crockery, etc.), personal care (including medical care, recreation and education) and miscellaneous (remittances, gifts, charity, taxes, social/religious functions etc.).

²In a separate paper we are studying the sensitivity of price elasticities to alternative specifications of the utility function compatible with expenditure system linear in total expenditure and household size estimated from cross section data.

³The hierarchic demand function approach by Jackson (1984) provides an interesting treatment of zero observations.

To explore the possibilities of similarity or dissimilarity in household consumption patterns across various regions of Pakistan we formulate the following hypotheses.

Hypothesis 1

The consumption pattern is identical across the eight regions of Pakistan (rural and urban areas of each of the four provinces).

Hypothesis 2

The consumption pattern is identical across the four provinces of Pakistan in rural and/or urban areas.

Hypothesis 3

The consumption pattern is identical across the rural areas of the four provinces.

Hypothesis 4

The consumption pattern is identical across the urban areas of the four provinces.

Hypothesis 5

The consumption pattern is identical across the rural and urban areas of the four provinces.

Hypothesis 6

The consumption pattern is identical across the rural and urban areas of the Punjab.

Hypothesis 7

The consumption pattern is identical across the rural and urban areas of Sindh.

Hypothesis 8

The consumption pattern is identical across the rural and urban areas of the NWFP.

Hypothesis 9

The consumption pattern is identical across the rural and urban areas of Baluchistan.

These hypotheses will be tested for the whole expenditure system as well as for each of the 18 commodity groups separately using F statistics (see the Appendix for details).

III. The Results

Equation (1) is estimated by the use of OLS for various regions after removing the built-in heteroscedasticity. The F values to test the *j*th hypotheses, labelled F_j , for the whole system and for each commodity group are arranged in Table 1. The results show that Hypothesis 1 is rejected for the whole system as well as for each of the commodity groups. Thus, there exists considerable difference in household consumption pattern across rural and urban areas and/or across the four provinces of Pakistan. For more details, we now move to the subsidiary hypotheses (2 through 9).

Hypothesis 2 is rejected for the whole system and for each commodity group, meaning that the consumption pattern is not uniform across provinces in rural and/or urban areas. Hypotheses 3 and 4 are also rejected for the system, with only one exception. Thus dissimilarity across the provinces is prominent within rural as well as urban households.

Hypothesis 5, testing the assumption of a similar consumption pattern across rural and urban areas in one or more provinces, is rejected in all the cases. The remaining four hypotheses explore the possibility of uniform consumption patterns across rural and urban areas within a province taken in isolation. The results indicate that for the estimation of the system as a whole, rural and urban areas cannot be pooled in any province. In the case of Baluchistan, however, the dissimilarity is prominent for five commodity groups only: wheat, footwear, fuel and lighting, housing and durables. In the other provinces only for a few commodity groups can a single Engel curve be estimated for the rural and urban areas with little loss of generality. These commodity groups are rice and personal care in Punjab, pulses and sugar in Sindh, edible oils, housing, durables, personal care and miscellaneous in the NWFP.

The results suggest that the provision of pooling provincial households in estimating household expenditure systems is rejected more forcefully than the provision of pooling rural and urban households. Many studies in household expenditure systems in Pakistan, however, tend to ignore the possibility of dissimilar expenditure patterns across the four provinces of Pakistan and only

TABLE 1
F Value for the Hypotheses 1 through 9

Commodity Group	F1	F2	F3	F4	F5	F6	F7	F8	F9
Overall	21.6	10.8	9.0	16.3	23.2	126.0	53.8	2.8	4.9
Wheat	27.7	15.3	11.9	26.5	24.1	53.0	7.4	42.0	3.1*
Rice	47.7	51.2	55.7	33.4	27.0	0.8**	58.5	27.5	2.3**
Pulses	6.1	5.0	4.1	6.8	5.3	8.7	2.4**	37.0	0.4**
Dairy	37.4	25.4	26.1	24.1	26.3	31.0	36.4	14.7	1.3**
Edible Oils	62.6	41.4	44.8	36.7	48.9	199.3	69.0	2.0**	1.5**
Meat	45.7	37.8	29.5	50.0	24.3	86.3	39.2	10.4	0.9**
Fruit and Vegetables	24.4	6.9	16.2	2.0*	38.6	114.9	72.9	23.4	2.0**
Sugar	14.9	14.2	9.4	60.5	4.4	49.0	0.7**	3.1*	1.5**
Tea and Coffee	96.5	109.5	87.8	172.0	11.7	40.3	70.3	2.5*	1.1**
Tobacco	19.7	22.4	22.3	22.4	2.1	2.5*	2.6*	5.1	0.8**
Other Food	42.0	32.0	26.6	34.7	22.0	81.8	21.9	18.8	0.1**
Clothing	22.0	24.5	28.4	21.4	10.0	22.8	52.8	6.8	1.5**
Footwear	16.2	17.1	19.6	11.6	9.1	6.5	33.8	10.1	6.6
Fuel and Lighting	40.2	46.3	96.8	16.9	12.3	9.7	14.8	13.4	2.7*
Housing	14.1	2.0	1.1**	6.7	22.8	406.6	219.2	2.4**	15.4
Durables	10.0	10.3	17.9	6.3	4.6	2.9*	15.2	0.2**	4.3
Personal Care	7.4	8.3	7.5	9.9	2.9	2.3**	11.7	1.1**	2.3**
Miscellaneous	52.4	22.3	19.7	34.3	60.5	298.9	98.1	2.3**	0.5**

Notes *insignificant at 5 per cent level but significant at 10 per cent level.
**insignificant at 10 per cent level.

emphasize separate estimation for the rural and the urban areas.

We now discuss consumption patterns in various regions of Pakistan. The Engel curve estimates are presented in Table 2. Notice first that the intercept in equation (1), a_i measures fixed expenditure on commodity group i when the income level and the household size are zero. Its value may be non-zero due to linear approximation of the Engel curve. Since household size is positive in any case, we have reported our results for the estimated value of a composite intercept term $a_i + c_i H$ for alternative household sizes 2 (small), 4 (medium) and 6 (large).

The value of b_i , a pure income effect, indicates the share of an increase in total expenditure allocated to commodity group i . It appears from the results that a high value of this coefficient is generally associated with luxury goods such as meat, housing, durables, personal care and miscellaneous. At the other extreme, a negative value on b_i identifies an inferior good, such as wheat in urban Punjab. One can also observe a substantial variation in the marginal expenditure shares of various commodity groups across the eight regions. In case of wheat, for example, the marginal share varies from 0.3 per cent only in urban Punjab, rural and urban Sindh and urban NWFP to 3.8 per cent in rural Baluchistan.

The household size effect c_i 's indicate the allocation of total expenditure among various commodity groups when family size increases. This decision is made in the light of two competing forces. An increase in family size requires additional expenditure on various goods on account of increased liability of absolute necessity, which depends on the nature of economies of scale. This effect may be referred to as the necessity effect. The resulting decrease in the discretionary expenditure, on the other hand, would lead to a fall in expenditure on all normal goods on account of the income effect. The results suggest that the income effect dominates the necessity effect for the luxury items, with high marginal expenditure shares such as housing, durables, personal care and miscellaneous in some regions. An increased household size is generally accommodated by increasing food consumption at the expense of non-food consumption except clothing, footwear and fuel and lighting. The household size effects for various commodity groups also vary across regions. For example, with the addition of one person in the household the monthly expenditure on meat increases by Rs.13.65 in rural Baluchistan and decreases by Rs.8.55 in urban Punjab.

Finally, a positive value of the intercept $a_i + c_i H$ implies that for a household with family size H , commodity i is a necessity in the sense that its income elasticity of demand is less than one. Likewise a negative value identifies a luxury item, with income elasticity greater than one. The results show that most of the food items are necessities having income elasticity greater than one. This

TABLE 2
Estimates of the Linear Engel Curves

Commodity Group	Rural Punjab	Urban Punjab	Rural Sindh	Urban Sindh	Rural NWFP	Urban NWFP	Rural Baluchistan	Urban Baluchistan
Wheat								
b	0.010	-0.003	0.003**	0.003	0.013**	0.003**	0.038	0.007**
c	25.35	24.53	23.56	15.93	31.29	18.72	6.00**	17.85
a + 2c	30.7	35.8	16.0	27.2	23.2	39.4	63.3	54.2
a + 4c	81.4	84.9	63.1	59.0	85.8	76.9	75.3	89.9
a + 6c	132.1	134.0	110.2	90.9	148.4	114.3	87.3	125.6
Rice								
b	0.008	0.011	0.012*	0.005	0.016	0.005	-0.003**	0.016
c	4.79	3.38	9.28	4.86	-0.33**	1.92	9.90*	-1.64**
a + 2c	-6.9	-7.1	23.1	11.5	1.2	-2.6	2.2	8.2
a + 4c	2.7	-0.4	41.6	21.3	0.6	1.3	22.0	4.9
a + 6c	12.3	6.4	60.2	31.0	-0.1	5.1	41.8	1.6
Pulses								
b	0.004	0.002	0.003	0.003	0.005	0.005	0.006**	0.005**
c	4.51	4.41	3.23	3.34	3.52	2.64	2.41**	0.93**
a + 2c	5.4	6.7	7.5	9.5	8.2	3.4	14.1	23.8
a + 4c	14.4	15.6	14.0	16.2	15.3	8.7	18.9	25.7
a + 6c	23.5	24.4	20.5	22.9	22.3	14.0	23.7	27.6

TABLE 2
(continued)

Commodity Group	Rural Punjab	Urban Punjab	Rural Sindh	Urban Sindh	Rural NWFP	Urban NWFP	Rural Baluchistan	Urban Baluchistan
Dairy								
b	0.069	0.065	0.025*	0.057	0.057	0.038	0.013**	0.030
c	45.85	24.27	38.86	6.14	22.38	19.47	11.65**	14.45**
a + 2c	-73.1	-38.7	-15.2	9.6	-17.5	-6.2	19.9	-17.2
a + 4c	18.6	9.8	62.5	21.9	27.3	32.7	43.2	11.7
a + 6c	110.3	58.4	140.2	34.1	72.1	71.7	66.5	40.6
Edible Oils								
b	0.004	0.008	0.005	0.009	0.006	0.011	0.011**	0.005**
c	2.36	7.08	4.84	10.04	10.10	9.93	5.26**	12.09
a + 2c	22.2	14.1	25.5	17.4	8.4	0.2	30.7	21.5
a + 4c	27.0	28.3	35.2	37.5	28.6	20.1	41.3	45.7
a + 6c	31.7	42.4	44.9	57.6	48.8	40.0	51.8	69.9
Meat								
b	0.039	0.071	0.040	0.070	0.043	0.053	0.084	0.082
c	-0.11**	-8.55	4.74	7.16	3.86**	1.99**	13.65**	4.97**
a + 2c	-8.8	-6.8	-13.4	-34.4	-13.2	-9.4	-37.9	-15.4
a + 4c	-9.0	-23.9	-3.8	-20.1	-5.5	-5.4	10.5	-5.5
a + 6c	-9.3	-41.1	5.7	-5.8	2.2	-1.4	16.8	4.5

TABLE 2

(continued)

Commodity Group	Rural Punjab	Urban Punjab	Rural Sindh	Urban Sindh	Rural NWFP	Urban NWFP	Rural Baluchistan	Urban Baluchistan
Fruit and Vegetables								
b	0.021	0.035	0.021	0.033	0.026	0.031	0.045	0.029
c	7.76	7.01	3.50	9.84	7.10	11.82	4.93**	7.75**
a + 2c	8.9	3.9	20.1	-2.2	8.7	-2.8	1.6	18.2
a + 4c	24.5	17.9	27.1	17.5	23.0	20.9	11.4	33.7
a + 6c	40.0	31.9	34.2	37.2	38.0	44.5	21.3	49.2
Sugar								
b	0.021	0.009	0.012	0.008	0.040	0.012	0.023	0.016
c	3.79	7.26	4.75	6.45	2.79**	10.46	3.16**	8.34
a + 2c	1.1	0.8	7.6	8.3	13.2	16.4	14.7	-1.1
a + 4c	8.7	15.4	17.1	21.2	18.8	37.3	21.0	15.6
a + 6c	16.3	29.9	26.6	34.2	24.4	58.2	27.4	32.3
Tea/Coffee								
b	0.007	0.010	0.010	0.012	0.009	0.005	0.015	0.011
c	1.25	0.45**	1.26**	3.48	6.74	8.50	3.78**	1.64**
a + 2c	1.4	1.4	0.9	-0.9	7.3	5.6	-2.9	8.9
a + 4c	3.9	2.3	3.5	6.1	20.8	22.6	4.7	12.2
a + 6c	6.5	3.2	6.0	13.0	34.3	39.7	12.3	15.5

TABLE 2
(continued)

Commodity Group	Rural Punjab	Urban Punjab	Rural Sindh	Urban Sindh	Rural NWFP	Urban NWFP	Rural Baluchistan	Urban Baluchistan
Tobacco								
b	0.012	0.004*	0.015	0.005	0.014	0.004	0.036	0.032
c	3.05	6.89	8.05	10.69	-1.41**	4.26*	1.43**	-2.48**
a + 2c	0.3	-2.5	-3.2	-2.1	4.0	-4.0	-24.7	-10.1
a + 4c	6.4	11.3	12.9	19.3	-2.4	4.6	-21.9	-15.0
a + 6c	12.6	25.1	29.0	40.7	-5.3	13.1	-19.0	-20.0
Other Food								
b	0.022	0.043	0.025	0.057	0.024	0.043	0.068	0.067
c	0.96**	-4.18*	3.35**	-6.96**	10.97	7.46**	-14.36*	-16.14*
a + 2c	3.8	11.5	19.4	48.3	-8.7	16.2	3.9	15.5
a + 4c	5.7	3.2	26.1	34.4	13.3	31.1	-24.8	-16.8
a + 6c	7.7	-5.3	32.8	20.5	35.3	46.0	-53.5	-49.0
Clothing								
b	0.042	0.029	0.009	0.033	0.027	0.037	0.084	0.073
c	4.99	9.90	13.53	7.64	9.33	7.89	-11.18**	2.55**
a + 2c	4.3	-0.5	11.3	1.1	7.2	-2.5	23.6	-22.6
a + 4c	14.3	19.3	38.4	16.4	25.8	13.3	1.2	-17.5
a + 6c	24.2	39.1	65.5	31.7	44.5	29.7	-21.1	-12.4

TABLE 2
(continued)

Commodity Group	Rural Punjab	Urban Punjab	Rural Sindh	Urban Sindh	Rural NWFP	Urban NWFP	Rural Baluchistan	Urban Baluchistan
Footwear								
b	0.010	0.010	0.004	0.008	0.007	0.010	0.032	0.014
c	3.24	4.55	3.27	3.89	3.92	3.26	-6.57**	1.91**
a + 2c	-0.2	-5.1	3.5	-0.2	-0.9	0.1	16.7	2.3
a + 4c	6.3	4.1	10.0	7.6	6.9	6.6	3.6	6.1
a + 6c	12.7	13.2	16.6	15.4	14.8	13.1	-9.6	10.0
Fuel and Lighting								
b	0.017	0.021	0.008	0.015	0.038	0.028	0.022	0.020
c	8.89	6.58	9.52	10.94	14.29	9.64	3.29**	13.57
a + 2c	16.8	25.1	19.9	31.2	20.4	37.3	44.6	10.1
a + 4c	34.6	38.3	38.9	53.1	49.0	56.6	51.2	37.3
a + 6c	52.4	51.5	58.0	75.0	77.6	75.9	57.8	64.4
Housing								
b	0.111	0.228	0.058	0.237	0.204	0.201	0.060	0.133
c	-21.17	-20.84	1.52**	-40.87	-59.27**	-3.30**	-4.84**	-10.09**
a + 2c	44.2	-15.2	34.6	13.3	50.4	-93.5	15.3	74.3
a + 4c	0.2	-56.9	37.6	-68.5	-68.2	-100.1	5.6	54.1
a + 6c	-43.7	-98.6	40.7	-150.2	-186.7	-106.7	-4.0	33.9

TABLE 2
(continued)

Commodity Group	Rural Punjab	Urban Punjab	Rural Sindh	Urban Sindh	Rural NWFP	Urban NWFP	Rural Baluchistan	Urban Baluchistan
Durable								
b	0.027	0.032	0.010	0.028	0.028	0.024	0.085	0.067
c	-1.57**	-3.62	4.26	-4.31	-1.79**	0.32**	-17.62	-19.08**
a + 2c	-5.0	-6.3	-4.2	-9.4	-5.7	-9.8	-5.7	1.9
a + 4c	-8.1	-13.6	4.4	-18.1	-9.3	-9.1	-41.0	-36.2
a + 6c	-11.3	-20.8	12.9	-26.7	-12.9	-8.5	-76.2	-74.4
Personal Care								
b	0.205	0.224	0.378	0.274	0.207	0.284	0.246	0.277**
c	-39.65	-41.77	-78.01	-38.54	38.96**	-80.70	10.90**	-39.29
a + 2c	8.4	-3.3	-58.3	-87.4	117.6	21.6	-173.3	-103.8
a + 4c	-70.9	-86.9	-214.4	-164.5	194.9	-139.8	-151.5	-182.4
a + 6c	-150.2	-170.4	-370.4	-241.6	272.9	-301.2	-129.6	-261.0
Miscellaneous								
b	0.361	0.193	0.351	0.135	0.227	0.197	0.126	0.106
c	-53.41	-27.39	-59.58	-9.76	-24.57**	-34.32	-21.83*	2.63**
a + 2c	-54.5	-13.7	-95.1	-40.7	-63.9	-9.6	-6.2	-68.8
a + 4c	-161.4	-68.4	-214.3	-60.3	-113.1	-78.2	-49.9	-63.5
a + 6c	-268.2	-123.2	-333.4	-79.9	-162.2	-116.9	-93.6	-58.2

Notes: The parameters b, c, a+2c, a+4c and a+6c represent respectively the marginal expenditure shares, the household size effects and the composite intercepts for the household size 2, 4 and 6.

*insignificant at 5 per cent level but significant at 10 per cent level.

**insignificant at 10 per cent level.

is particularly true among large families due to high minimum consumption requirement (positive b_j 's). Some food items in certain regions become luxuries as the household size increases, such as meat in Punjab and 'other foods' in Baluchistan. This is perhaps due to increase in the consumption of more essential food items due to increased family size. Among the non-food items clothing, footwear and fuel and lighting are necessities for small as well as large families. With a few exceptions, housing, durables, personal care and miscellaneous are regarded as luxury items, by large families in particular.

IV. Conclusion and Policy Implications

This study had two main objectives: to explore the similarity or otherwise of household expenditure patterns across rural and urban areas, and across the four provinces of Pakistan. The second objective was to study the household expenditure pattern for the rural as well as the urban areas of each of the four provinces. For this purpose data on household expenditures on various items for the year 1984-85 have been classified into eleven food and seven non-food commodity groups. The main findings of the study are highlighted below.

There exist considerable differences in expenditure patterns across rural and urban areas of the four provinces of Pakistan. While studying expenditure systems except for one commodity group, pooling of households across provinces is not permissible in rural or urban Pakistan. The hypothesis of similar consumption patterns across rural and urban areas is by and large rejected. The data do not, however, reject the possibility of similarity in consumption patterns for a few commodity groups, particularly in the NWFP and Baluchistan. In the case of Baluchistan the dissimilarity in consumption patterns is prominent only for a few commodity groups: wheat, footwear, fuel and lighting, housing and durables. It seems, therefore, that while studying household expenditure systems, the risk of suppressing information is higher when provincial dissimilarities are ignored, than the one that results from ignoring rural-urban differences.

In urban Punjab, a relatively rich area, wheat is considered to be an 'inferior' food. In all the other locations, various commodity groups are 'normal' and sensitive to changes in total expenditure with the exception of some items (mostly food). The food items are found to be necessities, with a few exceptions like meat among large households. Among the non-food items clothing, footwear and fuel and lighting can be classified as necessities for small as well as large families. Housing, durables, personal care and miscellaneous are generally regarded as luxury items, in particular, among large families. Large families generally spend more on essential food items, clothing, footwear and fuel and lighting as compared with small families.

The result that expenditure pattern is not uniform across provinces is significant for national tax policy purposes. It has been recognized in the public finance literature that commodities having a low income elasticity of demand should be taxed more heavily on efficiency grounds, than commodities with high income elasticities. On equity grounds the opposite would hold. A desirable tax structure would depend on the relative importance of efficiency and equity aspects in the social welfare function.⁴ In any case, if the desirable commodity tax rates have some relationship with the pattern of income elasticities, our results point to the need for different commodity tax rules for each province. This would be practically possible if provinces have the authority over commodity taxation to a reasonable degree. The federal government may collect, for example, only taxes of a uniform nature and the provinces formulate their own commodity specific tax structures. This may also be desirable on account of different social norms and budgetary requirements of the various provinces.

*University of New South Wales
Australia*

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⁴ Deaton (1979) has shown that the optimal tax structure can be uniform under very restrictive assumptions. For more details on the optimal taxation policy also see Atkinson and Stiglitz (1987), chapter 12 and Atkinson and Stiglitz (1972).

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Appendix

While specifying F statistics to test the nine hypotheses we identify the various region of Pakistan as: RP: Rural Punjab, UP: Urban Punjab, RS: Rural Sindh, US: Urban Sindh, RN: Rural NWFP, UN: Urban NWFP, RB: Rural Baluchistan, UB: Urban Baluchistan, P: Punjab, S: Sindh, N: NWFP, B: Baluchistan, U: Urban Pakistan, R: Rural Pakistan, AP: All Pakistan. The number of observations and the number of parameters to be estimated for each regions are 12 and 3 respectively. If data are pooled over K regions the number of observations and the number of parameters would be 12k and 3k respectively. Various F statistics to test our nine hypotheses applied on one commodity group at a time are outlined as follows.

$$F_1 = \frac{[\sum e^2_{AP} - Z] / 21}{Z / (96 - 24)}$$

where,

$$Z = \sum e^2_{RP} + \sum e^2_{UP} + \sum e^2_{RS} + \sum e^2_{US} + \sum e^2_{RN} + \sum e^2_{UN} + \sum e^2_{RB} + \sum e^2_{UB}$$

$$F_2 = \frac{[\sum e^2_R + \sum e^2_U - Z] / 18}{Z / (96 - 24)}$$

$$F_3 = \frac{[\sum e^2_R - \sum e^2_{RP} - \sum e^2_{RS} - \sum e^2_{RN} - \sum e^2_{RB}] / 9}{[\sum e^2_{RP} + \sum e^2_{RS} + \sum e^2_{RN} + \sum e^2_{RB}] / (48 - 12)}$$

F_4 is the same as F_3 with subscript R (rural) replaced by the subscript U (urban).

$$F_5 = \frac{[\sum e^2_P + \sum e^2_S + \sum e^2_N + \sum e^2_B - Z] / 12}{Z / (96 - 24)}$$

$$F_6 = \frac{[\sum e^2_P - \sum e^2_{RP} - \sum e^2_{UP}] / 3}{[\sum e^2_{RP} + \sum e^2_{UP}] / (24 - 6)}$$

F_7 , F_8 and F_9 are the same as F_6 with the subscript P (Punjab) replaced by the subscripts S (Sindh), N (NWFP) and B (Baluchistan) respectively.

Next, in a system of 18 equations only 17 are independently estimated. Thus, if data are pooled over k regions, the number of observations and the number of parameters would be $(12 \times 17)k = 204k$ and $(3 \times 17)k = 51k$ respectively. The F statistics to test the j th hypothesis ($j = 1, \dots, 9$) applied on the whole system thus easily follows:

$$F_1 = \frac{\text{sum } [\Sigma e_{AP}^2 - Z] / 357}{\text{sum } Z / (1632 - 408)}$$

Where, sum denotes summation over 17 commodity groups.

$$F_2 = \frac{\text{sum } [\Sigma e_R^2 + \Sigma e_U^2 - Z] / 306}{\text{sum } Z / (1632 - 408)}$$

$$F_3 = \frac{\text{sum } [\Sigma e_R^2 - \Sigma e_{RP}^2 - \Sigma e_{RS}^2 - \Sigma e_{RN}^2 - \Sigma e_{RB}^2] / 153}{\text{sum } [\Sigma e_{RP}^2 + \Sigma e_{RS}^2 + \Sigma e_{RN}^2 + \Sigma e_{RB}^2] / (816 - 204)}$$

F_4 is the same as F_3 with the subscript R (rural) replaced by the subscript U (urban).

$$F_5 = \frac{\text{sum } [\Sigma e_P^2 + \Sigma e_S^2 + \Sigma e_N^2 + \Sigma e_B^2 - Z] / 204}{\text{sum } Z / (1632 - 406)}$$

$$F_6 = \frac{\text{sum } [\Sigma e_P^2 - \Sigma e_{RP}^2 - \Sigma e_{UP}^2] / 51}{\text{sum } [\Sigma e_{RP}^2 + \Sigma e_{UP}^2] / (408 - 102)}$$

F_7 , F_8 and F_9 are the same as F_6 with the subscript P (Punjab) replaced by the subscripts S (Sindh), N (NWFP) and B (Baluchistan) respectively.