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Rural-Urban Differences and the Stability of Consumption Behaviour: An Inter-temporal Analysis of the Household Income and Expenditure Survey Data for the Period 1963-64 to 1984-85

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I. INTRODUCTION

Several studies have been undertaken in the past to analyse consumption behaviour in Pakistan. These studies have ranged from the fairly simple single equation estimations to complex, extended linear expenditure systems and analyses based on the Almost Ideal Demand System. These included the studies by Aziz-ur-Rehman (1963); Bussink (1970); Ranis (1961); Khan (1970); Ali (1981, 1986); Malik (1982); Siddiqui (1982); Mukhtar (1985); Cheema and Malik (1985); Ahmad *et al* (1986); and Alderman (1987). Most of these studies are based on the Household Income and Expenditure Survey data. These Surveys provide the single most important source of data on consumption behaviour in Pakistan. However, the analysis in the studies mentioned above are generally confined to single years only.

The present study is an attempt to econometrically establish the existence, or otherwise, of rural-urban differences in consumption behaviour in each year for the years in which these survey data are available in published form.[1] Tests are also conducted on appropriately deflated data to establish the existence or otherwise of differences in yearly functions. The former hypothesis has obvious implications for the possibility of estimating overall, or Pakistan-level functions, while the latter has obvious implications for estimating marginal propensities or elasticities based on time-series data.

Behaviour based upon the consumer's tastes and preferences define a pattern. This pattern can be empirically ascertained from a set of Engel curve parameters for

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[1] These data are available for the years 1963-64, 1966-67, 1968-69, 1969-70, 1971-72, 1979 and 1984-85.

major commodity groups. We present estimates of Engel curve parameters for six major commodity groups which together accounted for over 88 percent of the average family budget in Pakistan in 1984-85. The relative importance of the different commodity groups in the average rural and urban family budgets can be seen in Table 1.

Table 1

Share of Different Commodity Groups in Total Expenditure – 1984-85

Commodity Groups	Rural	Urban	Overall
Total Food and Drinks	51.35	43.88	48.61
Clothing and Footwear	7.89	6.82	7.50
House Rent and Housing	7.90	16.92	11.21
Fuel and Lighting	6.03	4.95	5.63
Furniture and Fixtures	2.12	1.91	2.04
Miscellaneous	14.66	11.33	13.44
Total	89.95	85.81	88.43

Source: Household Income and Expenditure Survey (Various Issues).

The study extends, with some basic modifications, work by Ali (1981) for Pakistan.[2] The study by Ali (1981) was based on a methodology developed by Lee and Phillips (1971) to test for differences in the consumption patterns of farm and non-farm households in the United States.

The results from this study will, hopefully, enable us to obtain some insights into changes in consumption behaviour as development takes place and incomes rise. Apart from the obvious testing of Engels law, we will be able to establish differences, if any, in urban-rural consumption behaviour for different commodity groups and see how these have changed over time. It may be mentioned that this is the first time to our knowledge that results based on the 1984-85 survey are being presented.

This study is divided into four sections. Following this introduction, the second section is devoted to a description of the data and methodology. The third section contains the results. The major conclusions are described in the last section.

[2]The study by Ali (1981) was confined to a single year. Moreover, although he applied a Two-Stage Least Squares approach, he used the Ordinary Least Squares technique for estimation. We feel that given the grouped nature of the data he should have used weighted least squares to take care of heteroscedasticity. This is the approach we follow.

II. DATA AND METHODOLOGY

The Household Income and Expenditure Survey reports present grouped data on the average expenditure on different commodity groups by different income categories of rural and urban households. The inadequacies of these data have been extensively discussed elsewhere (see, for example, Kemal 1981). We consider six commodity groups, i.e. Total Food and Drinks, Clothing and Footwear, House Rent and Housing, Fuel and Lighting, Furniture and Fixture, and Miscellaneous expenditure. Depending upon the number of income categories, the number of observations varies from year to year. Details of the number of observations in each of the survey years are presented in Table 2.

In order to avoid the problem of aggregation and because budget data in these surveys are readily available in that form, consumption is considered in terms of expenditures rather than quantities.

Most previous studies have taken household income and family size as the two most important determinants of family consumption behaviour. The inclusion of the family size variable helps to isolate differences in consumption patterns arising out of rural-urban family size differentials. Moreover, the inclusion of this variable facilitates computation of estimates of economies of scale in consumption see [Ali, (1981) and Siddiqui (1982)]. However, we found the family size variable to be

Table 2

Number of Observations in Different Years in the Household Income and Expenditure Surveys

Years/Sector	Rural	Urban	Combined
1984-85	12	12	24
1979	12	12	24
1971-72	13	13	26
1970-71	12	13	25
1969-70	12	13	25
1968-69	12	13	25
1966-67	13	13	26
1963-64	11	11	22
Total	97	100	197

Source: Government of Pakistan. Household Income and Expenditure Surveys (Various Issues).

Note: The observations are based on the income group categories in the various Household Income and Expenditure Surveys.

strongly correlated with household income in all years giving rise to severe multi-collinearity problems. In order to avoid this problem we have divided through by family size and conducted our analyses on a per capita basis.

For simplicity and brevity we present here the results based upon a simple linear formulation:

$$C_{ij} = a_{oi} + b_i Y_j \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where

$i = 1, 2$ ..... 6 commodity groups;
$j = 1, 2$ ..... income categories;
C = per capita consumption expenditure; and
Y = per capita income.

In order to test rural-urban differences it is generally assumed that some measure of permanent income (Y_p) would be better than mere reported income. This arises from the fact that the two groups of households would generally differ in the variability of their incomes with rural household income being more variable on account of fluctuations in agricultural incomes. It becomes important, therefore, to remove the effects of the transitory components of income to get a real measure of the rural-urban differences in tastes and preferences (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 Leviatan (1961) and Ali (1981) we use a two-stage approach to overcome this problem. In the first stage, predicted values of total expenditure (E) are obtained from the following:

$$E_j = a + b Y_j + u_j \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

In the second stage, the predicted values $\hat{E}_j$ are then used as a proxy for Y_j in Equation (1) to get estimates of the marginal propensities to spend on different commodity groups.

As already stated the data are available in grouped form. In order to avoid the problem of heteroscedasticity we use the generalised least squares approach with the number of observations in each income cell as the weights.

The standard dummy variable approach is used to test for rural-urban differences in each year for each commodity group. Three hypothesis are considered:

1. The rural-urban functions have the same slope but different intercepts;
2. The rural-urban functions have the same intercept but different slopes; and
3. The rural-urban functions have different intercepts and slopes.

F tests are computed in each case. These F values take the form:

$$F = \frac{(RSS_R - RSS_u)/m}{RSS_u/N-k}$$

where m is the number of additional parameters in the unrestricted form and $(N-k)$ the degrees of freedom in the unrestricted form. In each case, the null hypothesis is that the functions are similar.

In cases where the null hypothesis is accepted the observations for the rural and urban sectors are pooled and estimates for the overall function are estimated. However, in cases where the null hypothesis is rejected, separate estimates are obtained for the rural and urban sectors.

In order to test for differences over time the data are appropriately deflated using the Consumer Price Indices for different groups available in the Pakistan Economic Survey (1986). Dummies are then specified for different years and the same three hypothesis regarding dissimilarity of functions (postulated for the rural-urban tests) are tested for yearly differences.

III. RESULTS

Tests statistics based upon the null hypothesis that rural-urban functions are the same (hypothesis 3) are presented in Table 3. Test statistics relating to the first two hypothesis are not presented here due to space constraints.

A perusal of Table 3 reveals that, except for 1963-64, the rural-urban functions are similar in all years for two of the largest commodity groups considered, i.e., Food and Drinks and Clothing and Footwear. The functions are dissimilar for all years in the case of House Rent and Housing. In the case of Fuel and Lighting the functions were dissimilar for the initial years upto 1971-72. They are however, similar for the years 1979 and 1984-85. Growing electrification and a change away from traditional means of fuel and lighting in the rural areas might explain this phenomenon. In the case of furniture and fixtures the functions are similar in the initial years upto 1971-72. In the case of Miscellaneous expenses the functions are dissimilar in all years except the first two, i.e. 1963-64 and 1966-67.

Based on the results of the tests reported in Table 3, we present estimates of the marginal propensities to spend in each year for each commodity group in Table 4. Engel's law is confirmed through the decline in the marginal spending on Food and Drinks from nearly 0.35 in 1966-67 to 0.28 in 1984-85. Moreover, it has remained more or less constant for Clothing and Footwear and Fuel and Lighting.

Table 3

Test Statistics Given that the Rural-urban Functions are the Same, i.e. have the Same Intercept and Slope Parameters

Commodity Group / Years	Total Food and Drinks	Clothing and Footwear	House Rent and Housing	Fuel and Lighting	Furniture & Fixtures	Miscellaneous	Degrees of Freedom
1984-85	0.02	0.56	188.23*	2.24	17.14*	200.97*	(2,20)
1979	1.76	0.89	302.58*	0.23	5.17**	10.14*	(2.20)
1971-72	1.87	0.02	9.20*	40.78*	2.53	7.42*	(2.22)
1970-71	1.93	1.46	12.53*	39.94*	0.13	3.81**	(2.21)
1969-70	2.47	2.46	4.12*	30.07*	2.79	6.82*	(2.21)
1968-69	2.88	0.09	33.53*	31.64*	1.08	11.24*	(2.21)
1966-67	0.01	0.14	10.22*	9.52*	0.97	0.46	(2.22)
1963-64	8.22*	29.44*	72.05*	50.08*	2.01	0.03	(2.18)

Notes: *Denotes significant at the 1 percent level.

**Denotes significant at the 5 percent level.

The Statistics in this table are values of approximately F random variables, with degrees of freedom shown in the last columns for each year, given that the respective rural/urban functions are the same.

Table 4

Estimates of the Marginal Propensity to Spend by Commodity Groups in each Year

Years	Commodity Groups	Total Food and Drinks	Clothing and Footwear	House Rent and Housing	Fuel and Lighting	Furniture and Fixture	Miscellaneous
1984-85	Overall	0.282	0.065	–	0.025	–	–
	Urban	–	–	0.217	–	0.030	0.364
	Rural	–	–	0.073	–	0.028	0.293
1979	Overall	0.284	0.064	–	0.024	–	–
	Urban	–	–	0.226	–	0.029	0.376
	Rural	–	–	0.056	–	0.027	0.433
1971-72	Overall	0.287	0.066	–	–	0.018	
	Urban	–	–	0.174	0.022	–	0.440
	Rural	–	–	0.105	0.018	–	0.312
1970-71	Overall	0.274	0.085	–	–	0.011	–
	Urban	–	–	0.202	0.024	–	0.413
	Rural	–	–	0.083	0.009	–	0.344
1969-70	Overall	0.258	0.068	–	–	0.010	–
	Urban	–	–	0.193	0.022	–	0.420
	Rural	–	–	0.074	0.009	–	0.351
1968-69	Overall	0.315	0.072	–	–	0.014	–
	Urban	–	–	0.189	0.023	–	0.395
	Rural	–	–	0.019	0.010	–	0.283
1966-67	Overall	0.347	0.067	–	–	0.016	0.340
	Urban	–	–	0.198	0.022	–	–
	Rural	–	–	0.013	0.013	–	–
1963-64	Overall	–	–	–	–	0.013	0.360
	Urban	0.378	0.114	0.167	0.032	–	–
	Rural	0.366	0.071	0.080	0.014	–	–

Note: All estimates are significant at the 1 percent level.

Table 4 presents overall estimates where it was possible to pool the rural-urban data on the basis of the test results in Table 3.

As is well-known, the R^2 ceases to be an effective measure of the goodness of fit when Generalized Least Squares are used. Therefore, in choosing between alternative forms, theBox-Cox test (1964) is generally used. An alternative goodness of fit statistic involves estimating the squared correlation coefficients between the observed values of the variables and their predicted values obtained by using the weighted least squares estimates of the parameters. These goodness of fit statistics were computed. A perusal of these statistics reveals that the linear formulation used explains quite adequately the variation in the dependent variables.

The test statistics for the similarity of the yearly functions are presented in Table 5. A perusal of this table reveals that the null hypothesis of similarity is convincingly rejected in each case. The functions are dissimilar and hence any attempts to get time-series estimates of the marginal propensities from this data set are likely to yield spurious results.

Table 5

Test Statistics for the Similarity of Yearly Functions

Commodity Groups	F_1	F_2	F_3
Total Food and Drinks	4.94*	8.89*	6.17*
Clothing and Footwear	48.96*	105.00*	59.95*
House Rent and Housing	2.69*	3.19*	2.86*
Fuel and Lighting	88.86*	40.51*	64.67*
Furniture and Fixture	24.84*	45.13*	27.20*
Miscellaneous	6.74*	14.30*	9.20*

Notes: *Denotes significant at the 1 percent level.

The statistics in the column under F_1 and values of approximately F random variable with degrees of freedom 7,188 given that the eight yearly functions have different intercept but same slopes.

The statistics in the column under F_2 are values of approximately F random variable with degrees of freedom 7,188 given that the eight yearly functions have same intercept but different slopes.

The statistics in the column under F_3 are values of approximately F random variable with degrees of freedom 14,181 given that the eight year of functions are the same.

IV. CONCLUSIONS

This study presents for the first time, and in one place, an analysis of the entire data generated by the Household Income and Expenditure Surveys from 1963-64 to 1984-85. Using appropriate econometric techniques tests are conducted to determine the possibility of pooling rural and urban data to get overall estimates for different commodity groups in different years.

The results verify Engel's law of a decline in marginal food expenditures as income rises, and a constancy in marginal expenditures on clothing, footwear and fuel and lighting.

Tests for the similarity of yearly functions reveal that it would not be possible to pool the data for different years. All three hypothesis for the similarity of the yearly functions are rejected in each case. Any attempts to obtain time-series estimates are, therefore, likely to yield spurious results.

REFERENCES

Ahmad, Ehtisham, H. M. Leung and Nicholas Stern (1986). "The Demand for Wheat under Non-Linear Pricing in Pakistan". London: London School of Economics.

Alderman, Harold (1987). "Estimates of Consumer Price Response in Pakistan: using Market Prices as Data". Washington: International Food Policy Research Institute. (Unpublished)

Ali, M. Shaukat (1981). "Rural-Urban Consumption Patterns in Pakistan". *Pakistan Economic and Social Review,* Vol. XX, No. 2.

Ali, M. Shaukat (1986). "Household Consumption and Saving Behaviour in Pakistan: An Application of the Extended Linear Expenditure System". *Pakistan Development Review.* Vol. XXIV, No. 1.

Aziz-ur-Rehman, A. N. M. (1963). "Expenditure Elasticities in Rural West Pakistan". *Pakistan Development Review.* Vol. III, No. 2.

Box, G.E. P. and D. R. Cox. (1964). "An Analysis of Transformation". *Journal of the Royal Statistical Society.* Series B.

Bussink, W. C. E. (1970). "A Complete Set of Consumption Coefficients for West Pakistan". *Pakistan Development Review.* Vol. X, No. 2.

Cheema, Aftab Ahmad, and Muhammad Hussain Malik (1985). "Changes in Consumption Patterns and Employment under Alternative Income Distribution in Pakistan". *Pakistan Development Review.* Vol. XXIV, No. 1.

Houthakkar, H. S., and L. D. Taylor (1970). *Consumer Demand in the United States, 1920–1970.* (2nd Ed.). Cambridge, Mass.: Harvard University Press.

Kemal, A.R. (1981). "Income Distribution in Pakistan: A Review". Islamabad: Pakistan Institute of Development Economics. (Research Report Series, No. 123)

Khan, M. I. (1970). "Demand for Food in Pakistan in 1975". *Pakistan Development Review.* Vol. X, No. 3.

Lee, Feng-Yao, and Keith E. Phillips (1971). "Differences in Consumption Patterns of Farm and Non-farm Households in the United States". *American Journal of Agricultural Economics.* Vol. 53.

Liviatan, Nissan (1961). "Errors in Variables and Engel Curve Analysis". *Econometrica.* Vol. 29.

Malik, Shahnawaz (1982) "Analysis of Consumption Patterns in Pakistan". *Pakistan Economic and Social Review.* Vol. XX, No. 2.

Mukhtar, Hamid (1985). "Essays in Consumer Behaviour: Evidence from Pakistan Data". Ph.D. Thesis, Boston University. (Unpublished)

Pakistan, Government of (Various Issues). *Household Income and Expenditure Survey.* Islamabad: Federal Bureau of Statistics.

Pakistan, Government of (1986). *Pakistan Economic Survey 1986-87.* Islamabad: Ministry of Finance. Economic Adviser's Wing.

Ranis, G. (1961). "Consumer Expenditure and Consumption Function". Karachi: Pakistan Institute of Development Economics. (Monograph No. 6)

Siddiqui, Rehana (1982). "An Analysis of Consumption Pattern in Pakistan". *Pakistan Development Review.* Vol. XXI, No. 4.

Comments on "Rural-Urban Differences and the Stability of Consumption Behaviour: An Inter-temporal Analysis of the Household Income and Expenditure Survey Data for the Period 1963-64 to 1984-85"

I appreciate the authors' efforts to improve upon the earlier work in this subject. They have effectively estimated marginal propensities to spend on six broad consumption categories by using superior econometric techniques. They have identified rural-urban differences and pointed to differences over time. The Engel's curves are estimated on Household Income and Expenditure Survey data from per capita consumption expenditures.The paper makes a significant contribution to the literature. However, I have reservations on two points.

1. Defining Y_p:
   Since the authors were working with grouped data (averages) further smoothing of the expenditure variable to arrive at the permanent income surrogate was something that was overdone; they may have lost some information to achieve better regression results.
2. For determining yearly differences in one equation, the number of dummy variables needed would be several times the original two variables i.e. intercept dummy and the Y_p.

I make the following minor suggestions for further improvements:

1. To help the reader it would have been better if the full regression results rather than just F- Statistics and marginal propensities are given in the article.
2. The model can be improved by constraining it with the budget constraint. The left-out expenditure will need to be accounted in another consumption category or saving.
3. Yearly differences based on Table 4 show a somewhat haphazard variation especially for some of the less important commodity groups. This needs rationalization. Most probable situation is that data (HIES and Deflators)

is too weak to show clearly the trends which are more useful for policy-making. This may require further elaboration/manipulation of data.

On the whole, the effort is commendable, and there is little room for improvement. It would be very interesting to see the results of the larger version of the paper.

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