

# INFLATION AND HOUSEHOLD SAVINGS: A CASE STUDY OF PAKISTAN, 1984-85

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## 1. Introduction

While inflation is believed to increase business savings as the cost of production adjusts rather slowly to the rising commodity prices, it adversely affects household savings. When inflation takes place, consumers are expected to make adjustments either in their consumption level or in saving or in both. Usually in developing countries like Pakistan, most of the consumer items are relatively price inelastic implying a rise in expenditures whenever prices of these items go up. With income held constant, this involves reduction in savings. Actually the adverse effect of inflation on savings can be thought of a combined outcome of two separate effects. Firstly, there is a direct own-price effect in which an increase in the price of a commodity raises its expenditure by virtue of being price inelastic. Secondly, expenditures on other commodities may fall through cross-price elasticities. If the sum of the cross-price effect is not sufficient to compensate for the enhanced expenditure due to own price effect, savings would necessarily decline.

The objective of the present study is to estimate the extent of loss in household savings that is likely to be caused by price increases of various consumption items. The study will relate to the Pakistan's economy and pertain to the fiscal year of 1984-85 for which the latest Household Income & Expenditure Survey (HIES) (Pakistan, 1987) is available.

The need for estimating saving impact of inflation through a disaggregated analysis of different consumption items arises because the extent by which household savings are affected by inflation depends not as much on the overall rate of inflation as on the differential rates of price increases being experienced by different commodities involving different magnitudes of price elasticities and budget shares. Of course, a same overall inflation rate will have differential consequences on savings if it were brought about by increases in prices of those commodities for which price elasticities of demand are relatively large and whose weights in consumption basket are relatively large, as against if the same inflation resulted from price increases of those commodities whose price elasticities are relatively large and the weights are relatively small. Thus to have a meaningful study, one has to analyze the households' consumption behaviour in terms of individual commodities and therefrom to move towards deriving price elasticities of saving. The level of disaggregation, of course, would depend on the availability of data and the interest of the researcher.

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Such a disaggregated analysis also has a significant utility from the policy formulation point of view particularly in a country where some or most of the essential prices are regulated by the government either directly or indirectly through tax-subsidy package. For example, this may help in predicting the likely impact on household savings of a policy-induced increase in the prices of public utilities such as natural gas or electricity or any other essential consumer item having bearing on the government budget.

## 2. Methodology

To estimate the consumption and saving elasticities needed for the proposed study, the Extended Linear Expenditure System (ELES) has been applied to the cross-section data on income and expenditure available in the Pakistan HIES 1984-85. While brief description of the methodology involved in the ELES is given below, for details, the readers are referred to the authors' earlier article (Ali, 1985) in which ELES was applied to Pakistan's data for 1979, or to the original contributions by Stone (1954) and Lluch et al (1977).

As suggested by Lluch et al (1977), the demand function for  $i$ th commodity under the extended version of the Stone's Linear Expenditure System (LES) [i.e., with total expenditure treated as endogenous rather than exogenous as implicit in the Stone's LES], can be expressed as:

$$V_i = p_i \cdot r_i + b_i^* \cdot (Y - \sum p_i \cdot r_i) \quad (1)$$

where

$V_i$  = expenditure on  $i$ th good.

$p_i$  = Price of  $i$ th good.

$r_i$  = Subsistence quantity or basic requirement of  $i$ th good.

$b_i^*$  = MPC out of income for  $i$ th good, so that  $\sum b_i^* = u$ , the aggregate MPC.

$Y$  = Total income.

$(Y - \sum p_i \cdot r_i)$  = supernumerary income.

For cross section data where  $p_i$  is the same across all income classes, the term  $p_i \cdot r_i$  may be replaced  $r_i^*$  which indicates subsistence expenditure in prices prevailing at the time of household survey. Thus, the expenditure system can now be described as follows:

$$V_{ih} = a_i + b_i^* \cdot Y_h + e_{ih} \quad (2)$$

( $h = 1, 2, \dots, H$  income classes;

$i = 1, 2, \dots, N$  commodity group;

$$a_i = r_i^* - b_i^* \cdot \sum r_i^*.)$$

Since the system in equation (2) is one of the identical regressors, the estimation of each of its equations separately through OLS would be equivalent to the system's Maximum Likelihood (ML) estimation.

Once the parameters of the equation (3) for all commodity groups are estimated, the relevant elasticities can be computed through the following relationships:

*Elasticity of Demand for Good i with respect to:*

$$a) \text{ Income} \quad E_{iy} = b_i^* \cdot (Y/V_i) \quad (3)$$

$$b) \text{ Own Price} \quad E_{ii} = (1 - b_i^*) \cdot (r_i^*/V_i) - 1 \quad (4)$$

$$c) \text{ Price of } j\text{th good} \quad E_{ij} = b_i^* \cdot (r_j^*/V_i) \quad (5)$$

*Elasticity of Saving with respect to:*

$$a) \text{ Income} \quad E_{SY} = Y/(Y - \sum r_i^*) \quad (6)$$

$$b) \text{ Price of } i\text{th good} \quad E_{Si} = -r_i^* \cdot (1-u)/(Y-V) \quad (7)$$

where  $V$  stands for total consumption expenditure,  $u$  ( $\sum b_i^*$ ) the aggregate marginal propensity to consume out of income, and

$$r_i^* = a_i + b_i^* \cdot \sum r_i^* \quad (8)$$

$$\sum r_i^* = \sum a_i / (1-u) \quad (9)$$

### 3. Estimation and Results

For the purpose of the analysis, total expenditure has been desegregated into 16 commodity groups. Description of these commodity groups along with their average budget shares is given in Table 1.

In the author's earlier study (Ali, 1984) there were 12 commodity groups with x1 represen-

**Table 1**  
CLASSIFICATION OF CONSUMPTION EXPENDITURE 1984-85

Commodity Groups	Description	Monthly Household Expenditure (Rs)*	Share (%)
x1	Wheat/Wheat Flour	143.2	8.7
x2	Rice	34.6	2.1
x3	Pulses	30.8	1.9
x4	Edible Oils	54.2	3.3
x5	Other Food & Drinks	541.0	32.9
	(Total Food)	(803.8)	(49.0)
x6	Clothing	93.0	5.7
x7	Footwear	31.0	1.9
x8	Rent on Housing	185.3	11.3
x9	Gas	15.0	0.9
x10	Electricity	72.5	4.4
x11	Furniture & Fixture	33.7	2.1
x12	Personal Care	83.3	5.1
x13	Medical Care	38.3	2.3
x14	Education & Recreation	34.4	2.1
x15	Transport & Communication	73.6	4.5
x16	Miscellaneous	178.1	10.8
	Total Expenditure	1642.0	100.0

\* Weighted average of consumption expenditure of 12 income classes reported in the HIES 1984-85 (Pakistan, 1987)

ting Food & Drinks which in the present study has been bifurcated into 5 smaller groups (x1...x5) in order to highlight the role of individual prices of essential items like wheat, rice, pulses and edible oils. Similarly, as against the consolidated group of Fuel & Lighting used in the previous study, public utilities like gas and electricity have presently been identified as separate items of consumption (x9 and x10) while all other items of fuel and lighting have been merged into miscellaneous expenditure under x16.

In the estimation of the system of equation (2) for the 16 commodity groups mentioned above, both income and consumption expenditures were taken net of income tax payments (i.e. income as well as miscellaneous expenditure exclude income tax paid). Moreover, both were used in per capita terms since the size of households across different income classes differed significantly.

The regression results are reported in Table 2.

The results on the whole indicate a good fit in terms of high coefficient of determina-

**Table 2**  
REGRESSION RESULTS  
( $V_{ih} = a_i + b_i \cdot Y_{ih} + e_{ih}$ )

xi	Description	a	b*	t-Ratios		R <sup>2</sup>
				a	b*	
x1	Wheat	22.022	.00287	40.3	2.0	.29
x2	Rice	3.385	.00758	6.6	5.6	.76
x3	Pulses	4.157	.00259	26.8	6.3	.80
x4	Edible Oils	7.190	.00601	36.9	11.7	.93
x5	Other Food	34.297	.18438	5.7	11.6	.93
x6	Clothing	7.530	.02614	12.7	16.7	.97
x7	Footwear	2.631	.00828	8.3	9.9	.91
x8	Rent	-4.253	.12369	-1.3	14.0	.95
x9	Gas	-.8340	.00637	-5.0	14.3	.95
x10	Electricity	-.4544	.01019	-1.4	11.8	.93
x11	Furniture	-.2669	.01992	-.80	22.5	.98
x12	Personal Care	4.3366	.03192	6.6	18.3	.97
x13	Medical Care	2.0882	.01443	8.7	22.7	.98
x14	Education	-5.4217	.03964	-7.2	20.0	.98
x15	Travel/Transp.	-14.3016	.09017	-6.6	15.8	.96
x16	Misc. Exp.	3.0092	.12733	1.5	23.9	.98

tion, correct signs, and statistical significance of coefficients. Three main implications of these results are worth noting.

First, the aggregate MPC estimated for 1984-85 is 0.69 implying, at the mean, an income elasticity of total expenditure of 0.75. The MPC estimated from 1979 data was 0.63. Thus, during the period between the two household surveys, the allocation of additional income between consumption and savings has moved more towards consumption and away from savings.

Second, the combined MPC for the first 5 items which taken together constitute Food group with almost 50% weight in total consumption, works out to be 0.20 compared with the similar estimate of 0.18 for 1979. This shows that the proportion of additional income spent on the consumption under Food group has slightly increased from 18% in 1979 to 20% in 1984-85. This is possibly due to the fact that food prices during this period have increased relatively more (52.4%) than those of non-food consumption items (48.4).

Third, for six out of 16 items of consumption, the intercept (constant term) of the equation is negative implying an existence of a positive correlation between the average propensity to consume (APC) and the increase in income level. These include rent, gas,



electricity, furniture & fixture, education, and transport. This is a reflection of a very low consumption base of these items and indicates a greater than unity income elasticity of demand. However, though these items also had negative intercept for 1979, the negative sign in the case of 2 items, namely, rent and furniture & fixture, is presently not statistically significant, suggesting a definite improvement in the consumption/availability of these commodities. Over time, as the consumption level increases, superior goods turn into normal goods. Why did this improvement occur in the case of rent and furniture rather earlier than in other items such as education and transport which also had negative intercept in 1979, can, perhaps, be explained by the fact that much larger economies of scale exist in the case of rent and furniture, as compared to the other two items.

Based on the regression results, income and price elasticities (own as well as cross) which facilitate derivation of impact of price changes on household savings, have been computed. For x8 (rent) and x11 (furniture & fixture), where intercept was statistically insignificant even at 90% confidence level, regression equations were reestimated with zero intercept in order to have more precise estimates of the slope<sup>1</sup>. The configuration of various consumption items in terms of ordering according to dire necessities, necessities, comforts, and luxuries, as yielded by the computed elasticities, is given in Table 3.

In order to assess the impact of increase in prices of various commodities on household savings, attempt has been made to compute price elasticities of saving not directly through the expression in equation (7) but by distinguishing the two separate effects which form this elasticity, as mentioned in the beginning of the paper. The results are shown in Table 4.

The calculations show that, in 1984-85 prices, a 10% increase in commodity prices across the board (i.e. a 10% inflation brought about by a uniform 10% increase in prices of all commodities), reduces the annual household savings by Rs 519 which at the prevailing annual level of household savings of Rs 1534 as reported in the HIES 1984-85, represents a decline of 33.8% implying an elasticity of 3.38. The mechanism involved in the said reduction in savings can be spelled out as follows:

	Rs per annum 1984-85
a) Increase in expenditure on the commodities whose prices have increased, i.e., own-price effect.	1511
b) Reduction in expenditure on other commodities due to adjustments	

1. This is in line with the argument given by Theil (1978, p. 76).

made in response to (a) above, i.e., cross-price effect, computed on the basis of Table 5.	992
c) Net increase in total expenditure or equivalently reduction in savings.	519
d) Prevailing level of total expenditure.	19704
e) Prevailing level of households' savings.	1534
f) Implied elasticity of total expenditure with respect to inflation.	0.263
g) Implied elasticity of household savings with respect to inflation.	3.384

**Table 3**  
ORDERING OF CONSUMPTION ITEMS\*

	Income Elasticity	Own price Elasticity
<i>A. Dire Necessities</i>		
1. Wheat (x1)	0.035	-0.020
2. Pulses (x3)	0.149	-0.047
3. Edible oils (x4)	0.196	-0.027
<i>B. Necessities</i>		
4. Rice (x2)	0.388	-0.092
5. Clothing (x6)	0.497	-0.127
6. Footwear (x7)	0.473	-1.106
7. Personal Care (x12)	0.678	-0.167
8. Medical Care (x13)	0.666	-0.147
<i>C. Comforts</i>		
9. Other food & drinks (x5)	0.603	-0.290
10. Rent (x8)	1.089	-0.237
11. Electricity (x10)	1.211	-0.239
12. Furniture & Fixture (x11)	1.014	-0.213
13. Misc. Expenditure (x16)	0.920	-0.298
<i>D. Luxuries</i>		
14. Gas (x9)	1.972	-0.350
15. Education & Recr. (x14)	2.039	-0.390
16. Travel/Transport (x15)	2.169	-0.537

\* Elasticities were computed at the mean using weighted averages of income and consumption expenditures of the 12 income classes reported in the HIES.

Such an elasticity of saving with respect to overall inflation is, however, only a theoretical illustration. In real life, inflation does not take place through a uniform increase in prices of all commodities, rather it involves differential rates of increase in various prices. In

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housing (with a weight of 11.3%) where savings are reduced to the extent of 3.4 percent and 3.9 percent respectively by a 10 percent increase in their prices. In the case of clothing and personal care, the impact is also significant. The price elasticity of saving for food group as a whole is as high as 1.75. Medical care and transport & communication are two other classified commodity groups where substantial increase in prices may cause a considerable reduction in savings. These findings combined with the empirical facts that in Pakistan the expenditure on food items currently constitutes almost one-half of the consumer budget and that in the near past the prices of food items have grown relatively faster than those of non-food items, help one to understand why the saving ratios in Pakistan have been relatively low despite a steady growth of around 3.5 percent per annum in the national per capita income.



**Table 5**  
PRICE ELASTICITIES (all entries have minus sign)

	M.S. ALI - INFLATION AND SAVINGS IN PAKISTAN															
Price	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15	x16
Expend.																
x1	0.020	0.001	0.001	0.001	0.009	0.002	0.001	0.003	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.004
x2	0.031	0.092	0.006	0.012	0.103	0.018	0.006	0.035	0.001	0.003	0.006	0.016	0.007	0.005	0.008	0.043
x3	0.012	0.003	0.047	0.004	0.040	0.007	0.002	0.013	0.000	0.001	0.002	0.006	0.003	0.002	0.003	0.017
x4	0.016	0.004	0.003	0.027	0.052	0.009	0.003	0.018	0.000	0.001	0.003	0.008	0.004	0.002	0.004	0.022
x5	0.048	0.011	0.010	0.018	0.290	0.028	0.010	0.054	0.001	0.004	0.009	0.024	0.011	0.007	0.013	0.067
x6	0.040	0.009	0.008	0.015	0.132	0.127	0.008	0.045	0.001	0.003	0.008	0.020	0.009	0.006	0.011	0.055
x7	0.038	0.006	0.008	0.014	0.126	0.022	0.106	0.043	0.001	0.003	0.007	0.019	0.009	0.006	0.010	0.053
x8	0.087	0.019	0.018	0.033	0.290	0.051	0.017	0.237	0.002	0.007	0.017	0.044	0.020	0.013	0.023	0.121
x9	0.157	0.035	0.033	0.059	0.525	0.093	0.031	0.178	0.350	0.013	0.030	0.080	0.037	0.024	0.042	0.220
x10	0.096	0.022	0.020	0.036	0.322	0.057	0.019	0.109	0.003	0.239	0.019	0.049	0.023	0.015	0.026	0.135
x11	0.081	0.018	0.017	0.030	0.270	0.048	0.016	0.091	0.002	0.007	0.213	0.041	0.019	0.013	0.021	0.113
x12	0.054	0.012	0.011	0.020	0.181	0.032	0.011	0.061	0.001	0.004	0.010	0.167	0.013	0.008	0.014	0.076
x13	0.053	0.012	0.011	0.020	0.177	0.031	0.011	0.060	0.001	0.004	0.010	0.027	0.147	0.008	0.014	0.074
x14	0.162	0.036	0.034	0.061	0.543	0.096	0.032	0.184	0.004	0.013	0.031	0.083	0.038	0.390	0.043	0.227
x15	0.172	0.039	0.036	0.065	0.577	0.102	0.034	0.196	0.005	0.014	0.033	0.088	0.041	0.027	0.537	0.241
x16	0.073	0.016	0.015	0.028	0.245	0.043	0.015	0.083	0.002	0.006	0.014	0.037	0.017	0.011	0.019	0.0296

NOTES: 1. Figures along the diagonal represent own-price elasticities and those off diagonal are cross-price elasticities

2. Cross-price elasticities should be read as follows:

Column head indicates the commodity the price of which changes exogenously

Row head indicates the commodity the expenditure on which changes in response to the price change of the column head commodity.

3. Description of commodities may be seen in Table 1.

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**Abstract**

*In this paper an attempt was made to apply the Extended Linear Expenditure System (ELES) to the Pakistan's household income and expenditure data for 1984-85 in order to assess the implications of inflation on households' savings. The study involved estimation/computation of own and cross price elasticities of demand for different consumption items. Total consumption expenditure was classified into 16 commodity groups with essential items like wheat, rice, pulses, edible oil, gas, and electricity included as individual items. The analysis showed that a 10 percent increase in the prices of all the commodities across the board would reduce the households' savings by 33.84 percent implying an inflation elasticity of saving of 3.384. In the case of differential rates of price increases for different commodities, as is true in real life, the elasticity coefficient is likely to range between 3.0 to 3.6 depending on the actual increase in prices of different commodities and their weights in total consumption. The commodity groups whose price increases led to relatively large reductions in savings included wheat, other food (excluding rice, pulses, and edible oil), rent on-housing, and miscellaneous expenditure. In the case of edible oil, clothing, and personal care, the impact was moderate while the remaining items of expenditure turned out to be those having relatively small impact on savings.*

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## L'INFLATION ET L'EPARGNE DES MENAGES: UN EXEMPLE TIRE DE L'EXPERIENCE DU PAKISTAN (1984-85)

### RESUME

*Dans cet article on essaie d'appliquer la méthode E.L.E.S. (Extended Linear Expenditure System) au revenu et à la dépense globale des ménages au Pakistan dans les années 1984-85 pour évaluer les effets de l'inflation sur l'épargne des ménages.*

*La méthode consiste à estimer les élasticités directes et croisées de la demande par rapport aux prix des différentes catégories de consommation. L'ensemble des dépenses pour la consommation a été classifié en 16 catégories tandis que des biens fondamentaux tels que le blé, le riz, l'huile alimentaire, les légumes, le gas et l'électricité ont été considérés séparément.*

*L'analyse a montré qu'une augmentation de 10% des prix de l'ensemble des biens considérés réduit l'épargne des ménages de 33,84% ce qui signifie une élasticité de l'épargne par rapport à l'inflation de 3,384.*

*Au lieu d'avoir une augmentation généralisée des prix on peut introduire l'hypothèse, comme on le vérifie dans l'expérience courante, que les différentes catégories de biens enregistrent une dynamique des prix différenciée. Dans ce cas les coefficients d'élasticité probablement varieront entre 3,0 et 3,6. Dans cette fourchette les résultats varient selon le taux d'augmentation des différentes catégories de biens et leur importance dans la consommation totale.*

*Les catégories de produits dont l'augmentation des prix réduit de façon plus marquée l'épargne sont le blé, les autres produits alimentaires (si l'on exclut le riz, les légumes et l'huile alimentaire), le loyer des habitations et les autres biens non classifiés. L'influence de l'augmentation des prix du l'huile alimentaire, du vêtement et des soins médicaux est modérée. On a pu enfin démontrer que les catégories de dépense non mentionnées ont un effet assez modeste sur l'épargne.*

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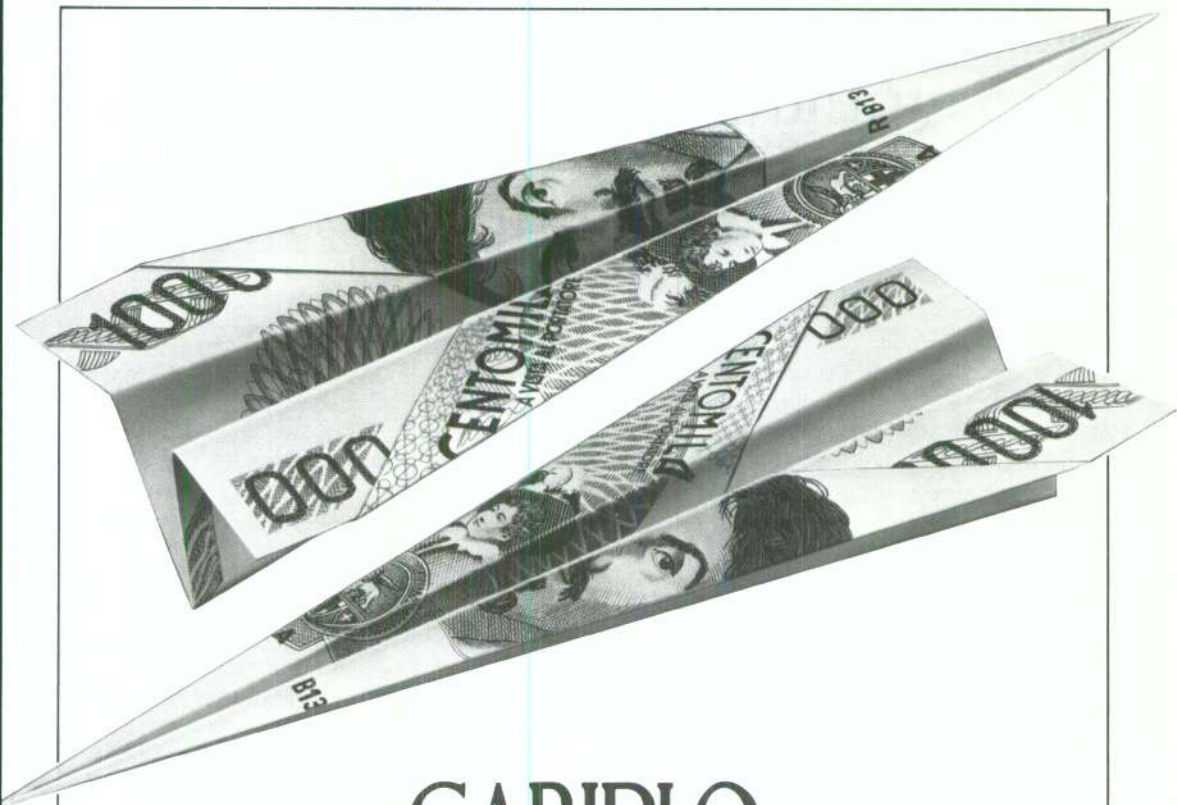
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