DEMAND FR HOUSING IN
PROVINCE OF SINDH (PAKISTAN)

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Abstract. The paper is an analysis of demand for housing in the Province of Sindh, Pakistan. The study compares rent to income ratios across various sub-groups, stratified by income and urban size. Demand elasticities are also calculated. Data used in the analysis comes from a survey of households in the Province of Sindh. The survey was conducted by the Sindh Regional Plan Organization in 1987. The sample for the survey was stratified by urban size (large, medium and small centers) and the size of the plot. Results of the analysis show that majority of households (60-70%) spend around 10-20 percent of their incomes on housing. Very few households (less than 10%) spend more than 40 percent of their income on housing across all urban sizes. Renter households spend relatively less of their income on housing than owners.

Estimates of income elasticities are low. The permanent income elasticity is lowest for the largest urban areas. There is much variation found in the household size elasticity across different urban size areas. A comparison of elasticities across renters and owners shows that investment motives on part of owners are not strong and that financial constraints in Sindh are more operative than in other developing countries.

I. INTRODUCTION

This paper deals with different aspects of the housing market particularly the demand for housing in the province of Sindh, Pakistan. The main objective of this paper is to provide a better understanding of the working of the housing market in a developing country like Pakistan. The aim is to help in the formulation of better housing policies and aid in providing decent and adequate housing, especially for the low-income groups. Most of the research on housing in developing countries deals with affordability, replicability and cost recovery. Expenditure on housing is determined by household income and size as well as other socioeconomic and demographic

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characteristics as well as preferences. It is important to know how income, household size and other variables affect household expenditure on housing services. The results of such an investigation would be valuable for formulation of housing programmes and design of specific housing projects.

This study focuses on the housing market in the province of Sindh, Pakistan, and aims to contribute to the above goal. The pattern of housing expenditure is studied in various cities and across subgroups within the cities. Housing demand equations are estimated for each of the subgroup to provide a better understanding of household behaviour and expenditure patterns with respect to housing services. Comparisons are then made between the parameters estimated for different groups. The estimated elasticities are then compared to those reported in studies for other developing countries.

The paper is organized in the following way. The next section gives a brief review of the literature while methodology and data are discussed in Section III. The results of analysis are discussed in Section IV while the conclusions are presented in Section V.

II. REVIEW OF LITERATURE

Theoretical and empirical work on demand for housing in developed countries is extensive. The literature has been primarily concerned with estimates of determinants of demand for housing characteristics. Attention has focused on (*i*) estimating price and income elasticities of demand, (*ii*) investigating the major sources of biases in estimates of the demand equation, (*iii*) appropriate functional form of the demand equation, (*iv*) use of micro or macro data sets and (*v*) simultaneity between tenure choice and housing demand. Studies, however, have focused on more than one issue at a time. Scope of investigations has varied between cities, parts of cities to countries, from homogeneous tenure groups to all consumers, and from cross sectional data to time series of varying lengths.

ESTIMATING INCOME AND PRICE ELASTICITIES

Many authors have estimated the housing demand and price elasticities both for the developed as well as developing countries. They demonstrate that estimates of elasticities of demand for housing vary according to the definition of services included in housing, the characteristics of the user and the extent of housing market. The elasticity estimates differ according to tenure type, socio-demographic characteristics of the user, quality of housing and measurement of housing. General conclusions regarding these elasticities

are that permanent income elasticities exceed current income elasticities, these eleasticities are well below 1 and that housing demand is demand inelastic.

Relatively less work has been done in developing countries on estimates of income and price elasticities of demand but studies that exist show that both income and price elasticity estimates are similar to those for developed countries. Follain *et al.* (1982) estimated a permanent income elasticity for Korea of 0.6 for owners and 0.4 for renters. Their estimates for current income elasticity of demand were much lower at 0.2 and 0.12 respectively for owners and renters. Ingram (1981) estimated current income elasticity of 0.47 for Cali and 0.67 for Bagota in Columbia. Jimenez and Keare (1984) estimated a permanent income elasticity of between 0.3 and 0.6 for renters and between 0.6 and 1.0 for owners in El-Salvador.

Malpezzi *et al.* (1985) in his review of cities of seven developing countries found values from 0.31 to 0.88 for income elasticities of demand. Grootaert and Dubious (1988) found income elasticity of demand of 0.5 in Abidjan and around 0.4 in other cities of the Ivory Coast.

III. METHODOLOGY AND DATA COLLECTION

METHODOLOGY

The methodology for analyzing demand for housing in the study consists of two parts. The first relates to variability in variables like income and urban size of housing. Rent to income ratios are calculated and compared across various subgroups which are stratified by income and urban size. The ratios are compared across groups and with those for total population.

The second part of the analysis deals with the estimation of housing demand elasticities. The following demand equation is estimated:

$$R_i = f(Y_i, Z_i)$$

where:

Y = measure of permanent income

Z_i = vector of household characteristic and includes size of household and its square term (HHSIZE^2)

R = actual market rent for renters and imputed rent for owners[1]

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[1]Imputed rent for owners is estimated through a rent hedonics equation. See Appendix A for details.

DATA

Data used in the analysis was collected through a survey of households in the province of Sindh, conducted by the Sindh Regional Plan Organization in 1987. It was stratified by urban size (large, medium and small) and size of the plot on which the house was constructed. Population and sample size figures by city are presented in Appendix B.

IV. RESULTS

EXPENDITURE ON HOUSING

The households in the Sindh province of Pakistan are stratified into several groups by income class and urban class. The hypothesis tested here is whether the scope of the housing market affects housing expenditure and whether agglomeration economies associated with urban size affect housing expenditure by certain groups. Literature suggests that variations may exist in the cost of housing construction and urban infrastructure across different sizes. Differentiation by urban size may provide important insight into the pattern of households expenditure on housing.

Three types of areas are identified, large, medium and small. The large cities included in the analysis have a population of over 1.5 million, medium areas consist of population between 1.0 million and 1.5 million and the small urban areas have a population of less than a million. See Appendix B for distribution of sample size by city.

Table 1 presents a distribution of households by the percentage of expenditure on housing[2] by income class and urban size. Results show that a majority of the households in the sample (over 60 to 70 percent) spend around 10-20 percent of their income on housing, 22 percent spend less than 10 percent and very few households spend more than 40 percent of their income on housing.

The percentage of income or total expenditure spent on housing seems first to increase with income and then declines. This result is different from that reported for some developing countries (Shefer, 1990) where it is reported to increase systematically with income and urban size. A closer look at the distribution in Table 1 indicates that more of the richer households spend 10 percent or less on housing. This is true for all sizes of cities. In the second category of households, that spend between 10 to 20 percent of their

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[2]Total household expenditure is used as a proxy for permanent income throughout the analysis.

incomes on housing, the percentage first rises and then declines (see column 2).

TABLE 1

Distribution of Households by Rent to Income Ratio, Income
and Urban Size (Percentages)

Income (Rs.)	Rent to Income Ratios			
	< 10 percent	10-20 Percent	20-40 percent	> 40 percent
Overall	22	68	9	1
< 1000	5	63	29	3
1000 – 2000	10	88	1	0
2000 – 3000	52	48	–	–
3000 – 4000	83	17	–	–
4000 – 5000	95	5	–	–
5000 – 6000	96	4	–	–
6000 and above	99	1	–	–
Small	21	68	10	1
< 1000	7	62	28	3
1000 – 2000	11	86	3	0
2000 – 3000	54	46	–	0
3000 – 4000	84	16	–	–
4000 – 5000	94	6	–	–
5000 – 6000	97	3	–	–
6000 and above	99	1	–	–
Medium	22	72	6	–
< 1000	3	68	25	2
1000 – 2000	8	90	2	–
2000 – 3000	52	47	1	–
3000 – 4000	82	18	–	–
4000 – 5000	96	4	–	–
5000 – 6000	94	6	–	–
6000 and above	100	–	–	–
Large	22	68	9	1
< 1000	3	59	34	4
1000 – 2000	10	88	2	–
2000 – 3000	50	50	–	–
3000 – 4000	85	15	–	–
4000 – 5000	94	6	–	–
5000 – 6000	98	2	–	–
6000 and above	100	–	–	–

The results also show that less than 10 percent of the households in the sample spend 20 percent or more of their income on housing and that most of

these consist of low-income households. Households earning an income between 1000 and 2000 rupees are spending the largest proportion of their incomes on housing. Results show that the above observed patterns are the same across all urban size categories.

TABLE 2

Distribution of Owner Households by Rent to Income Ratio, Income and Urban Size (Percentages)

Income (Rs.)	Rent to Income Ratios			
	< 10 percent	10-20 Percent	20-40 percent	> 40 percent
Overall	**19**	**58**	**22**	**1**
< 1000	–	27	69	4
1000 – 2000	4	86	10	–
2000 – 3000	52	48	–	–
3000 – 4000	85	15	–	–
4000 – 5000	96	4	–	–
5000 – 6000	98	2	–	–
6000 and above	99	1	–	–
Small	**17**	**58**	**24**	**1**
< 1000	–	30	66	4
1000 – 2000	4	86	10	–
2000 – 3000	54	46	–	–
3000 – 4000	86	14	–	–
4000 – 5000	96	4	–	–
5000 – 6000	07	3	–	–
6000 and above	99	1	–	–
Medium	**20**	**62**	**17**	**1**
< 1000	–	29	78	3
1000 – 2000	4	88	8	–
2000 – 3000	52	48	–	–
3000 – 4000	84	16	–	–
4000 – 5000	97	3	–	–
5000 – 6000	99	1	–	–
6000 and above	100	–	–	–
Large	**18**	**55**	**26**	**1**
< 1000	–	21	74	5
1000 – 2000	3	86	11	–
2000 – 3000	48	52	–	–
3000 – 4000	88	12	–	–
4000 – 5000	95	5	–	–
5000 – 6000	98	2	–	–
6000 and above	99	1	–	–

TABLE 3

Distribution of Renter Households by Rent to Income Ratio, Income
and Urban Size (Percentages)

Income (Rs.)	Rent to Income Ratios			
	< 10 percent	10-20 Percent	20-40 percent	> 40 percent
Overall	**42**	**46**	**12**	–
< 1000	34	45	21	–
1000 – 2000	41	49	10	–
2000 – 3000	56	38	6	–
3000 – 4000	60	37	3	–
4000 – 5000	82	9	9	–
5000 – 6000	69	31	–	–
6000 and above	100	–	–	–
Small	**50**	**40**	**10**	–
< 1000	45	42	13	–
1000 – 2000	50	41	9	–
2000 – 3000	58	35	6	1
3000 – 4000	63	30	7	–
4000 – 5000	90	–	10	–
5000 – 6000	100	–	–	–
6000 and above	–	–	–	–
Medium	**35**	**50**	**15**	–
< 1000	27	40	33	–
1000 – 2000	33	56	11	–
2000 – 3000	49	43	8	–
3000 – 4000	61	39	–	–
4000 – 5000	75	–	25	–
5000 – 6000	50	50	–	–
6000 and above	–	–	–	–
Large	**38**	**49**	**13**	–
< 1000	24	52	24	–
1000 – 2000	37	51	12	–
2000 – 3000	60	36	4	–
3000 – 4000	56	44	–	–
4000 – 5000	75	25	–	–
5000 – 6000	100	–	–	–
6000 and above	100	–	–	–

Distribution of households by percentage of expenditure on housing is
separately presented for owners and renters in Tables 2 and 3, respectively.
The patterns differ significantly between the two groups. A substantially
higher proportion of rented households (35 percent or more) spends 10

percent or less on housing (Table 2, column 1) as compared to around 20 percent or less of the owners (Table 3, column 1). Renter households spend less on housing than do owners across all urban sizes.

TABLE 4

Estimation of Demand Equation
(t statistics in parenthesis)

Variables	Overall	Large Cities	Medium Cities	Small Cities
y	0.027 (68.993)***	0.022 (34.942)***	0.030 (45.538)***	0.029 (38.999)***
HHSIZE	1.539 (9.656)***	0.980 (3.200)***	0.768 (3.123)***	2.339 (8.123)***
HHSIZE^2	−0.027 (−6.415)***	0.010 (1.174)	−0.025 (−4.415)***	−0.048 (−6.017)***
Constant	159.093	169.769	163.506	146.961
R^2	0.255	0.251	0.288	0.236
# of cases	23712	6830	8085	8797
F Stat	2703.398	764.183	1092.223	906.172

***Significant at 99 percent.

TABLE 5

Elasticities of Demand for Housing
(Calculated at Mean Values)

Variables	Overall	Large Cities	Medium Cities	Small Cities
y	0.214	0.173	0.244	0.224
HHSIZE	0.068	0.042	0.033	0.108
HHSIZE^2	−0.015	0.005	−0.014	−0.028

TABLE 6

Estimation of Demand Equation (Owners)
(t statistics in parenthesis)

Variables	Overall	Large Cities	Medium Cities	Small Cities
y	0.023 (73.906)***	0.019 (37.258)***	0.027 (49.918)***	0.024 (41.037)***
HHSIZE	1.192 (8.941)***	0.541 (2.068)***	0.423 (2.018)**	1.988 (8.490)***
HHSIZE^2	−0.014 (−4.045)***	0.024 (3.399)***	−0.015 (−3.048)***	−0.033 (−5.193)***
Constant	172.164	183.003	172.561	163.844
R^2	0.320	0.320	0.357	0.299
# of cases	20436	5781	7121	7534
F Stat	3212.012	908.505	1317.730	1070.831

**Significant at 95 percent.
***Significant at 99 percent.

TABLE 7

Elasticities of Demand for Housing (Owners)
(Calculated at Mean Values)

Variables	Overall	Large Cities	Medium Cities	Small Cities
y	0.180	0.148	0.221	0.182
HHSIZE	0.053	0.023	0.002	0.090
HHSIZE^2	−0.008	0.013	−0.009	−0.020

TABLE 8

Estimation of Demand Equation (Renters)
(t statistics in parenthesis)

Variables	Overall	Large Cities	Medium Cities	Small Cities
y	0.085 (31.812)***	0.080 (17.847)***	0.078 (15.447)***	0.093 (20.908)***
HHSIZE	−2.119 (−2.15)**	−3.043 (−1.304)	−0.156 (−0.095)	2.491 (1.250)
HHSIZE^2	−0.079 (−2.132)**	−0.081 (−0.719)	−0.075 (−1.542)	−0.332 (−3.741)***
Constant	72.302	89.581	82.626	31.832
R^2	0.250	0.247	0.230	0.267
# of cases	3276	1049	960	1263
F Stat	364.543	114.199	95.462	153.185

**Significant at 95 percent.
***Significant at 99 percent.

TABLE 9

Elasticities of Demand for Housing (Renter Households)
(Calculated at Mean Values)

Variables	Overall	Large Cities	Medium Cities	Small Cities
y	0.666	0.668	0.628	0.837
HHSIZE	−0.096	−0.135	−0.006	0.127
HHSIZE^2	−0.035	−0.034	−0.030	−0.166

ESTIMATION OF ELASTICITIES OF DEMAND

Results for the estimation of the linear demand equation are presented in Table 4.[3] The corresponding elasticities are presented in Table 5. Three variables are used in the estimation, total expenditure (Y), household size (HHSIZE) and square of household size (HHSIZE^2). All the variables are significant at 99 percent level except the HHSIZE^2 variable for large cities (column 2).

Table 5 shows that estimates of elasticities for income are low. The elasticities with respect to household size are also small, while those for HHSIZE^2 are even smaller but negative (except for large cities). This indicates that a percentage change in housing expenditure resulting from a percentage change in permanent income or total household expenditure is likely to be proportionately small.

The permanent income elasticity is lowest at 0.17 for large urban areas. The household size elasticity is smallest for medium cities and largest for small urban areas. However, there is not much variation in elasticities across different urban sizes.

Separate demand equation for renters and owners are presented in Tables 6 and 8, respectively. The corresponding elasticity estimates are reported in Table 7 for owners and in Table 9 for renters. A comparison of these elasticities shows that the permanent income elasticity for renters is substantially higher than that for owners. This result shows that the investment motives on the part of owners are not that strong and that the financial constraints on housing are more operative for the Province of Sindh in Pakistan than for other developing countries where owner demand elasticity for income is generally reported to be higher than that for renters. The household size elasticity is negative for renters except for the small cities, it is positive for all urban size categories. Most of our elasticity estimates are comparable to those reported elsewhere for other developing countries.

V. CONCLUSIONS

The paper has analyzed expenditure patterns on housing and estimated elasticities of demand for housing across different urban sizes in the province of Sindh, Pakistan. The findings of this paper are mostly consistent with

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[3]Other functional forms were tried but the linear equations worked the best.

those of previous studies in other developing countries. The elasticity estimates are low as compared to other estimates for same city size but are generally significant and fall within the estimated range. Majority of households spend 10-20 percent of their income on housing. The percentage of income spent on housing by owners is significantly greater than that by renters. The percentage expenditure out of a households total expenditure increases with income class but not systematically.

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Rent Hedonic Equation
(t statistics in parentheses)

Variables	
RSIZE	0.017 (3.390)***
WAT	12.671 (3.053)***
INMIGI	−17.382 (−3.710)***
LATNO	52.289 (2.365)**
DIST	−14.013 (−3.367)***
ELEC	21.636 (3.950)***
KITCHEN	7.375 (1.813)*
TOTAL	24.375 (9.306)***
PUCCAWAL	26.523 (3.609)***
CONROOF	9.707 (1.345)
CONSTANT	56.781
R^2	0.116
# OF CASES	2954
F STAT	38.707

*Significant at 90 percent level.

**Significant at 95 percent level.

***Significant at 99 percent level.

APPENDIX B

Population and Sample Size by City

City	Population (1981 Census)	Sample Size
Tharparker	1502	2914
Hyderabad	2054	2110
Nawabshah	1647	3200
Sukkur	1089	1637
Jacobabad	1012	2352
Larkana	1139	2978
Dadu	1077	2840
Thatta	761	1965
Badin	777	1827
Sangher	923	2107
Shikarpur	620	2268
Khairpur	981	3485

Mean and Standard Deviation of Variables

Variables	Mean	Standard Deviation
HHSIZE1	117.93	192.56
TOTEXP	1648.77	1171.89
HHSIZE	9.46	5.34
IMPRENT	216.30	68.07
SIZE	1117.13	620.31
RSIZE	827.12	401.60
WAT	0.34	0.48
LATNO	1.03	0.25
ELEC	0.73	0.45
KITCHEN	0.40	0.49
TOTAL	2.14	1.24
PUCCAWAL	0.17	0.37
CONROOF	0.19	0.39