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DIFFERENCES IN HOUSING EXPENDITURE/INCOME AND UTILITY EXPENDITURE/INCOME RATIOS BY SELECTED CHARACTERISTICS OF RURAL HOME OWNERS

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Abstract

Differences in housing expenditure-to-income and utility expenditure-to-income ratios are compared among groups of rural home owners by selected socioeconomic, household, and housing characteristics. Personal interviews were conducted with 506 rural households in communities of less than 20,000 in six midwestern states. Of the 506 households interviewed, 399 were home owners. The responses of the 399 rural home owners were examined using analysis of variance with the least significant difference test. The authors found that young home owners and low-income home owners pay a higher proportion of their income for housing than other groups. Lower-income households also pay a higher percentage of income for utility costs as do one-person households. This is true for those with less than a high-school degree and those living in older, less expensive housing. The findings suggest that housing and utility expenditure, in relation to income, should be analyzed separately since different segments of the population are impacted differently. The findings also provide important information for decision-makers in the design of government and educational programs and for the lending policies of financial institutions.

Introduction

Housing and utility expenditure are often a major component of the family budget. Hefferan (1987) reported that the typical American family of four spends between 22 and 27 percent of its income for housing. However, different segments of the population spend different proportions of their income on housing. Lindamood and Hanna (1979) calculated that 22 percent of home owners spend less than 10 percent of their income for housing expenses; 42.7 percent spend from 10 to 19 percent; 13.5 percent spend from 20 to 24 percent; 12.4 percent spend 25 to 34 percent; and 9.4 percent spend over 35 percent for basic housing expenses.

In order to facilitate family well-being, it is important to understand variations in the amount of income paid for housing and utility expenditures. This study examines the percentage of income spent by specific, rural home owners for: 1) housing expenditures; 2) utility expenditures; and, 3) combined housing and utility expenditures.

There are several reasons it is important to obtain information from rural home owners about the percentage of income they spend for housing and utility expenditures. First, there is an absence of information. Much of the analyses of housing and utility expenditures in relation to income has been calculated using national or urban samples. Relatively few analyses of housing and utility expenditures of rural home owners exist. Second, a better understanding of the ratio between housing expenditures-to-income and utility expenditures-to-income among rural home owners is needed to discover the extent of variability that exists. In addition, the factors related to that variability need to be identified and examined. These data are needed by housing professionals to equip rural home owners with comparative information about housing and utility expenditures. The data will also show how housing expenditure-to-income and utility expenditure-to-income changes over time. Third, the information would be useful in guiding the decisions of loan officers. And finally, information on these variations is needed by policymakers to develop or continue relief programs among rural home owners with burdensome housing or utility expenditure.

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Literature Review

Owners and renters are generally separated when analyzing the relationship between income and housing expenditures. This procedure is common since it is difficult to equate the expenditures of these two tenure types (Roistacher, 1974). Fein and Lane (1981) note that little information on home owner expenditures for shelter is available before 1977.

Previous research has shown that, in general, income level has the greatest impact on the ratio of housing expenditures to income (Fein and Lane, 1981; Meeks, 1984; Morris and Winter, 1978; Roistacher, 1974). As income increases the amount of money spent on housing increases. Among higher-income households, however, spending occurs at a declining rate. Hence, these households spend a lower proportion of their income on housing (U.S. Dept. of Labor, 1986). Crull (1976), found that lower-income owners with mortgage payments were spending over 30 percent of their income for housing; those in the upper-income groups were paying less than 30 percent. She found that all families had similar housing norms but differed in achieved housing.

The education level of the household head has been found to be a predictor of housing expenditures (Morgan, 1965; Roistacher, 1974). When differences in family income and education of the household head are controlled, family size is an important determinant of housing expenses (Limmer, 1980; Roistacher, 1974). Findings indicate that for a given level of income, housing expenditures increase with household size up to about five. Beyond that they tend to decline as expenditures for other household items increase. However, Fein and Lane (1981) in their analysis of 1976 Annual Housing Survey data, did not find family size related to the proportion of income spent for housing.

Age is hypothesized to have a significant effect on the percentage of income spent for housing. This is due to different preferences for housing in relation to other goods and services and because of differences in expectations concerning future income (Fein and Lane, 1981). As the family moves through the stages of the life-cycle, higher quality and more expensive housing is the norm. Higher expenditures are supported by peak earnings between the ages of 50 and 60. At retirement, expenditure norms may be lowered as the household experiences a decrease in income (Morris and Winter, 1978). Older home owners have often paid off the mortgages on their homes. Thus, their expenditures and their income may be small in relation to the value of the home (Fein and Lane, 1981; Roistacher, 1974; Winter, 1980). Previous research has found the relationship between age and housing expenditures to be nonlinear (Reid, 1962). Household heads under 25 (Fein and Lane, 1981) and over 65 pay a larger percentage of their income for housing costs (Roistacher, 1974; Fein and Lane, 1981).

The sex and the race of the household's head has been found to account for some of the variation among households of similar income (Maisel and Winnick, 1966). Fein and Lane, (1981) found that minorities paid a lower proportion and female-headed households paid a larger proportion. Roistacher (1974) found that female-headed households spent more than a fourth on housing.

Meeks (1984), in her analyses of 1980 Census data, found that the proportion of income spent for housing did not differ between urban and rural communities. Although housing costs were higher in urban communities, so were incomes. She found that about three fourths of all owners spent a fourth or less of their income on housing. This was true in all locations. In addition, one in eight spent over a third. Fein and Lane (1981) found that owners living in the Northeast and West paid a higher percentage of their income for housing, while those in the South paid a lower percentage.

Generally, utility expenditures as percent of income are not isolated for analysis. Many of the measures of housing expenditures include utility costs as a component. Through analysis of the Consumer Expenditure Survey data for the Midwest, Williams (1988) calculated the proportion of housing expenditures that went for the mortgage payment and the proportion that went for other expenses. She found that about 60 percent (depending on the value of the home) of the housing expenditure was the

mortgage (principal plus interest). About a quarter was spent on utilities, household operations, and insurance. The remainder was used for upkeep, repair, improvements, and taxes .

Duncan and Morgan (1980), through analysis of data from the Panel Study of Income Dynamics, found that on an annual basis the average ratio of utility payments to house prices was 3.6 percent. Families in the top income decile had utility-to-house-value ratios of two percent; families in the bottom decile had ratios averaging nearly eight percent. Findings from the U.S. Department of Labor (1986) show that as income increases, the proportion of income spent for utility costs decreases.

The framework developed to guide the analyses is shown in Figure 1. The hypotheses for this study are that the ratio of housing expenditure-to-income and utility expenditure-to-income are higher for the following six groups. 1) lower-income groups; 2) younger households and older households; 3) households whose head has a lower educational level; 4) households with four or five members; 5) households living in older houses; and 6) households living in less expensive houses.

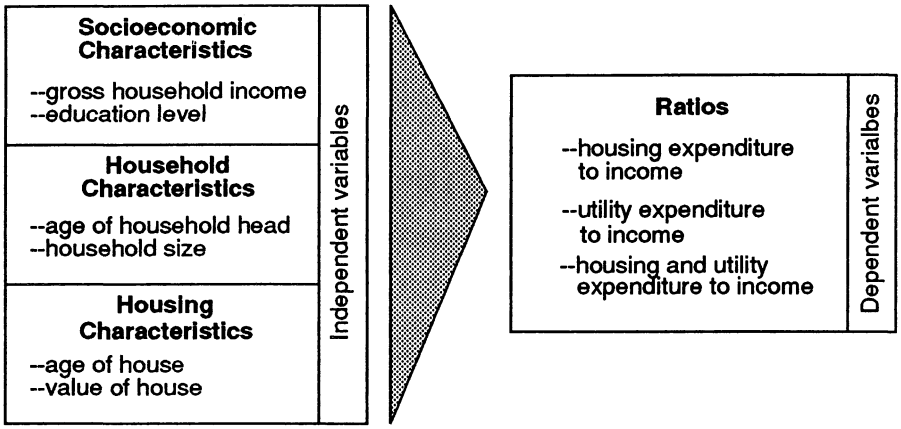

Figure 1. Theoretical framework.

Methodology

Data were collected in Illinois, Iowa, Minnesota, Missouri, Nebraska, and Wisconsin for the North Central Regional Research Project NC178 in 1985 and 1986. The project focused on the "Economic, Social, Psychological, and Health Consequences of the Housing Decisions of Rural Families." The sampling frame was drawn by the Iowa Statistical Laboratory, Iowa State University. The procedures used to select the sample are described in detail in Cook, Morris, and Winter (1988). In summary, the population of interest was rural. It consisted of all households outside Standard Metropolitan Statistical Areas and outside incorporated cities with populations of 20,000 or more.

A multi-stage, area sample of households was selected within each state. The probabilities were proportional to the sizes of areas in terms of number of occupied housing units and conformed to the 1980 Census of Housing. The overall probability of being selected was the same for all households in the sampled population within a state.

A total of 702 households were originally identified. About 16 percent of the identified dwelling units were not eligible. This included 59 vacant units and another 44 that were second homes. Ten of the dwellings on the maps used to delineate the sampling areas no longer existed. Hence, there were 589 eligible households. This represented almost 84 percent of the original 702 dwellings. Of the 589 eligible households, 506 interviews were completed for a response rate of over 85 percent. There were 61 households that refused to be interviewed and 22 households were unable because of health or other disabling conditions.

An interview schedule was developed by researchers from each of the states. These researchers conducted a small-scale pretest to refine the instrument. It was then used in a full-scale pretest by the Survey Section of the Iowa Statistical Laboratory and adjusted once more. Trained interviewers administered the instrument to respondents during the fall of 1985 and spring of 1986.

Of the 506 completed interviews, 399 were home owners; 107 were renters. Only data obtained from the 399 rural home owners within the sample were analyzed using the Statistical Program for the Social Sciences (SPSSX). One-way analysis of variance was used to discover if significant differences existed between incomes and housing and utility expenditures among household categories. If significant differences were indicated, the least significant difference test (LSD) was used to identify where the differences lay.

For the analyses, housing expenditures were defined as the sum of mortgage payments, real estate taxes, insurance, and maintenance per year. This was divided by 12 to obtain monthly expenditures. Lot rental was added in the case of mobile homes.

Utility expenditures were defined as the sum expenditures for electricity, water, sewer, garbage, liquid propane gas, natural gas, wood, coal, fuel oil, and kerosene per year. Again, these were translated into monthly expenditures.

Combined housing and utility expenditures were defined as the sum of the preceding housing and utility expenditures. These were parlayed into monthly expenditures.

Income was defined as the sum of the following: wages and salaries (gross), farming or market gardening (net), farm land rental, other rental property (net); business, professional practice, or trade income (net); roomers or boarders (net); dividends, interest, trusts, royalties on stock, bonds, or other investments (gross); other retirement annuities (gross); other disability payments (gross); unemployment or workman's compensation (gross); any welfare income (gross); alimony or child support; gifts from friends or relatives; or other sources per year. These were also expressed in monthly figures.

Missing data on housing expenditures, utility expenditures, and income were estimated through a regression estimation procedure. This process was based on those cases which reported no missing data for either housing, utility expenditures, or income. The R-square from the analysis used to estimate missing housing expenditures was .43. The R-square from the analysis to estimate missing utility expenditures was .32. The R-square from the analysis to estimate missing income was .45.

The ratio of housing expenditure-to-income was determined by summing the monthly housing expenditures and then dividing by monthly income. The ratio of utility expenditure-to-income was determined by summing the monthly utility expenditures and dividing by monthly income. The ratio of combined housing and utility expenditures-to-income was determined by summing housing and utility expenditures and dividing by monthly income.

To establish categories for reporting frequency distributions for these ratios, the data were divided into quintiles as nearly as possible. Because some ratios at the dividing point had a large number of cases, it was not always possible to arrive at precise divisions at the quintile points.

For the analyses, selected socio-economic, household, and housing characteristics were categorized. These are shown in Table 1 along with associated descriptive statistics.

Table 1. Frequency distributions of the sample.

Characteristics	Number	Percent
Socioeconomic		
Gross annual Household income		
Less than $5,000	11	2.8
$5,000 through $9,999	50	12.5
$10,000 through $14,999	62	15.5
$15,000 through $19,999	64	16.0
$20,000 through $29,999	93	23.3
$30,000 through $39,999	63	15.8
Over $39,000	56	14.1
Total	399	100.0
Education		
Less than high-school degree	96	24.1
High-school graduate	186	46.6
Post-secondary education	117	29.3
Total	399	100.0
Household		
Age of household head		
21 through 34	77	19.3
35 through 44	67	16.8
45 through 54	48	12.0
55 through 64	75	18.8
65 through 74	82	20.6
Over 74	50	12.5
Total	399	100.0
Size of household		
One person	61	15.3
Two persons	162	40.6
Three persons	57	14.3
Four persons	72	18.0
Five or more persons	47	11.8
Total	399	100.0
Housing		
Year house was built		
Before 1900	61	15.3
1900 through 1919	64	16.0
1920 through 1945	72	18.0
1946 through 1965	74	18.5
1966 through 1977	86	21.6
1978 through 1984	42	10.6
Total	399	100.0
Value of House		
$400 through $21,500	76	19.0
$21,501 through $32,500	82	20.6
$32,501 through $43,846	72	18.0
$43,847 through $59,630	75	18.8
$59,631 through $200,000	94	23.6
Total	399	100.0

Results

The frequency distribution of ratios comparing housing expenditures-to-income; utility expenditures-to-income; and housing plus utility expenditures-to-income are shown in Table 2.

As shown, rural home owners spend almost a fourth of their income for housing and utility expenditures. The median expenditure was 20.2 percent.

Differences in ratios Significant differences ($p < .05$) were found in percentage of income used to pay housing costs when rural home owners were categorized by their gross monthly income. This is shown Table 3.

Table 2. Frequency distribution of ratios of housing and utility expenditures-to-income.

Ratios	Number	Percent
Housing expenditure-to-income		
.00 through .05	97	24.3
.06 through .09	68	17.0
.10 through .15	78	19.5
.16 through .23	77	19.3
.24 through .69	79	19.9
Total	399	100.0
Mean = .151	Median = .128	
Utility expenditures-to-income		
.01 through .03	57	14.3
.04 through .05	102	25.5
.06 through .08	90	22.6
.09 through .12	73	18.3
.13 through .41	77	19.3
Total	399	100.0
Mean = .089	Median = .068	
Combined housing and utility expenditures-to-income		
.02 through .11	82	20.6
.12 through .17	81	20.3
.18 through .23	76	19.0
.24 through .33	81	20.3
.34 through .89	79	19.8
Total	399	100.0
Mean = .240	Median = .202	

As anticipated, the percentage of income spent for housing expenditures was higher for lower-income groups. Home owners with monthly incomes below $1,250 spend a significantly higher percent of their income for housing than home owners with monthly incomes of $2,499 or more.

A similar pattern emerged in relation to the percentage of income paid for utility expenditures. The higher-income groups pay a lower percent of monthly income for utilities.

When housing and utility expenditures are combined, one sees a pattern of higher percentages of income for housing and utility expenditures with lower amounts of household income.

Significant differences ($p>.05$) in the percentage of income paid for housing expenditures were not found among the categories of educational level among rural home owners. Those with post-secondary educations spend comparably with those who have less than a high-school degree.

The pattern changed with regard to utility expenditures. Rural home owners with less than a high-school degree spend over 12 percent of their income on utilities. This compares to about eight percent for high-school graduates and about seven percent for home owners with a post-secondary education. When housing and utility expenditures are combined, no significant differences are found among rural home owners by educational level.

The ratio of housing expenditures-to-income was highest for young families 21 through 34 years of age. The group with heads of household over 74 had the lowest ratio.

A different pattern appears with regard to utility expenditures. Home owners over 74 years of age spent over 13 percent of their income on utilities. Home owners in the 55 through 64 bracket spent less than 10 percent. When housing and utility expenditures are combined, however, there are no significant differences in percentages spent by age.

Table 3. Differences in ratio means by socioeconomic household and housing characteristics for p.< .05 (N=399).

Characteristics	N	Expenditure-to-income ratios: Housing expend.	Utility expend.	Housing & Utility
Gross monthly income				
Less than $833.25	61	.195	.193	.388
$833.26 through $1,250.00	63	.185	.122	.306
$1,250.01 through $1,666.58	63	.164	.086	.250
$1,666.59 through $2,499.92	93	.145	.062	.207
$2,499.93 through $3,333.25	63	.115	.050	.165
Over $3,333.25	56	.098	.035	.133
Education of respondent				
Less than high-school degree	96		.123	
High-school graduate	186		.082	
Post-secondary	117		.072	
Age of head of household				
21 through 34	77	.204	.069	
35 through 44	67	.155	.064	
45 through 54	48	.155	.068	
55 through 64	75	.141	.096	
65 through 74	82	.125	.110	
Over 74	50	.116	.131	
Household size				
1 person	61		.147	.301
2 persons	162		.084	.217
3 persons	57		.085	.245
4 persons	72		.068	.236
5 or more persons	47		.069	.238
Year house was built				
Before 1900	61		.112	
1900 through 1919	64		.105	
1920 through 1945	72		.092	
1946 through 1965	74		.088	
1966 through 1977	86		.073	
1978 through 1984	42		.064	
Value of house				
$400 to $21,500	76		.122	.258
$21,501 to $32,500	82		.109	.278
$32,501 to $43,846	72		.090	.241
$43,847 to $59,630	75		.067	.217
$59,631 to $200,000	94		.063	.210

Boxes in a single column indicate no significant differences between groups.

It was hypothesized that larger households spend a larger percentage of their inlt housing expenditures. This was not supported among rural home owners. No significant differences were found when rural home owners were categorized by family size.

A significant difference was found in the percentage of income spent on utilities by size of household. One-person households spent almost 15 percent on utilities. Households with two or more persons spent less than 10 percent. When housing and utility expenditures were combined, significant differences similar to the pattern found for utility data emerged.

No significant differences in percentage of income paid for housing expenditures were found by the age of the house. Home owners with older houses spend comparably to home owners with newer houses. However, significant differences were found in the percentage paid for utilities by age of house. Home owners living in houses built before 1945 spent about 10 percent. This compared to just over 6 percent among home own-

ers with houses built since 1977. There were no significant differences for combined housing and utility expenditures when home owners were categorized by the age of the house.

No significant differences were found for housing expenditures when home owners were categorized by the value of their home. Significant differences were found in the percentage of income paid for utilities by value of the house. Rural home owners in houses with lower values spent over 10 percent on utilities. Home owners in more highly valued houses spent less than seven percent.

Discussion

Rural home owners with higher housing and utility expenditures in relation to income are not unlike home owners in urban and national samples. Lower income and younger families spend disproportionately for housing. Rural home owners that spend disproportionately for utilities fall into the following five groups. They are 1) lower income, 2) older, 3) have less than a high-school degree, 4) are in one-person households, and 5) live in older and less valuable houses. Those who spend disproportionately for combined housing and utility expenditures are: lower-income households; one-person households; and those in houses with lower values.

Conclusions

Most lower-income, rural home owners spend a greater proportion of their income for housing-related costs than higher-income home owners. Similarly, this is compounded by greater proportions spent on utilities. Those in the lowest category spend almost 40 percent of their income for housing and utility expenditures. Those in the highest income category spend less than 15 percent. For poorer households this means less money for other necessities. These findings support policies that supplement housing and utility expenditures for lower-income, rural families or that provide affordable housing stock.

The findings reveal that housing programs should focus on the needs of young families. The ratio of housing expenditures-to-income often preclude this group from home ownership. The findings also offer empirical support for programs that help first-time home buyers.

If programs are not available to help young rural home buyers, they need to understand that, if they purchase a home, they may be spending a higher proportion of their income for housing than other age home owners. They would need to decide if they want to make sacrifices in the consumption of other goods and services, relative to older home owners, in order to become a home owner. However, for long-term planning, the ratio of housing expenditures-to-income is likely to decrease over time, so that by the time they retire, housing expenditures-to-income may not be as burdensome since most will have paid off their mortgage.

Utility expenditures, in relation to income, are higher for older households. The findings lend support for short-run programs that assist older home owners pay their utility bills. Programs that encourage younger, elderly persons to invest in the energy-saving features in their homes will save money in the long run. These kinds of energy-saving measures reduce housing expenditures over the years so expenditures are lower by the time these home owners live on their retirement income.

The ratio of housing expenditure-to-income and utility expenditure-to-income are higher for one-person, rural households. Most one-person households are elderly. The same is true for combined housing expenditures. To heat, cool, and maintain the home for this group may entail sacrifices not experienced by other groups. Shared housing among individuals has been promoted as a way to help one-person households meet their housing-related expenditures. These programs have enjoyed limited success in the midwest. Shared housing may be the best alternative for individuals with a strong need to acquire or maintain a home. Alternative approaches to shared housing need to be explored.

Lending institutions recognize the ratio between percent of income and housing expenditures as a key guide in lending practices. Tellingly, no significant differences were found between housing expenditures and income ratios and the value of houses. Utility expenditures did vary with the age of homes; homes of less value required a higher proportion of income for utilities. Lending institutions need to monitor the ratio of utility expenditures to income more carefully among vulnerable groups. This could reduce foreclosure rates. Conversely, if the ratio between utility expenditures and income are low, it may be possible to make a larger loan on the house.

Many previous studies on housing expenditures include utility expenditures as a component of housing expenditures. This study suggests that the impact of utility expenditures are not always parallel. Hence, utility expenditures should be considered independently. A better understanding of the potential appropriateness of programs is possible by looking at the ratios of housing expenditure-to-income and utility expenditure-to-income in this way. People need to be especially aware of the significance of utility expenditures as a component of housing-related expenses. Utility expenditures are a major component of the expenses incurred in owning a home. At present they are not fully recognized as such by housing professionals, potential home owners, nor lending institutions.

References

Cook, C.C., Morris, E.R., & Winter, M. (Eds.) (1988). *Economic, Social, Psychological and Health Consequences of the Housing Decisions of Rural Families.* Ames: Iowa State University.

Crull, S.R. (1976). Cultural aspects of housing consumption. *Illinois Teacher.* Nov/Dec., 73-76.

Duncan, G.J., & Morgan, J.N. (1980). The effect of inflation and taxes on the costs of homeownership. *The Journal of Consumer Affairs,* 14, 383-404.

Fein, J.D., & Lane, T.S. (1981). *How Much for Housing?* Cambridge, MA: Abt Books.

Hefferan, C. (1987). Family budget guidelines. *Family Economics Review,* 4, I-9.

Limmer, R. (1980). *How Well Are We Housed, Volume 6: Larger Households.* Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Lindamood, S., & Hanna, S.D. (1979). *Housing, Society, and Consumers.* New York: West Publishing Company.

Maisel, S.J., & Winnick, L. (1966). *Family housing expenditures: Elusive laws and intrusive variances.* In W.L.C. Wheaton, G. Milgram, & E. Myerson (Eds.), Urban Housing. New York: The Free Press.

Meeks, C.B. (1984). Housing quality and affordability. *Family Economics Review,* 26-28.

Morris, E.W., & Winter, M. (1978). *Housing, Family and Society.* New York: John Wiley and Sons.

Morgan, J.W. (1965). Housing and the ability to pay. *Econometrica,* 33, 289-306.

Reid, M. (1962). *Housing and Income.* Chicago: University of Chicago Press.

Roistacher, E. (1974). *Housing and homeownership.* In J.N. Morgan (Ed.), Five Thousand American Families-Patterns of Economic Progress: Volume 2 (pp.1-40). University of Michigan: Institute for Social Research.

U.S. Department of Labor, Bureau of Labor Statistics (1986). *Consumer Expenditure Survey: Interview Survey, 1984* (Bulletin 2267). Washington, DC: U.S. Government Printing Office.

Williams, F. (1988). Research on hypothesized 60-40 distributions in housing expenditures and in housing to income. *Housing and Society,* 15(2),195-200.

Winter, M. (1980). Managerial behavior of young families in pursuit of single-family homeownership. *The Journal of Consumer Affairs*, 14, 82-95.