RAND/WN-10073-HUD

RENT INFLATION IN BROWN COUNTY, WISCONSIN: 1973-78

James P. Stucker

August 1978

This Note was prepared for the DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, under Contract No. H-1789. It is intended to facilitate communication of preliminary research results. Views or conclusions expressed herein may be tentative and do not represent the official opinion of the sponsoring agency.

Rand
SANTA MONICA, CA. 90406

PREFACE

This working note was prepared for the Office of Policy Development and Research, U.S. Department of Housing and Urban Development (HUD). It analyzes the inflation in housing costs that has occurred in Brown County, Wisconsin, since September 1973 to determine whether payments should be increased for participants in the experimental housing allowance program there.

Many persons contributed to this note. Daniel A. Relles planned and executed the statistical analysis of the survey data; he also constructed the population weights. Paul Ernst collected and organized the information on fuel and utility rates. Daniel Alesch and Paul Ernst analyzed the rents paid by successive cohorts of allowance program enrollees, discussed in Sec. IV. Therman Britt analyzed the contribution of inflation in fuel oil prices to rent change (Appendix C). Joseph Berry, Wade Harrel, and Helen Wagner did most of the programming. Ann W. Wang and Robert Young helped analyze allowance program data. Ira S. Lowry supervised the entire operation. The analyses and descriptions in this note are patterned after those in Lowry's *Inflation in the Standard Cost of Adequate Housing: Site I, 1973-1976*, The Rand Corporation, WN-9430-HUD, March 1976.

Jodi Gordon prepared most of the first-draft typescript and tables. Christine D'Arc edited the text and supervised production of final copy, which was typed by Jean Houston and Marlene Giffen.

This note was prepared pursuant to HUD Contract H-1789, Task 4.8.1.

SUMMARY

The experimental housing allowance program operated by the Brown County Housing Allowance Office (HAO) is designed to enable participants with low incomes to afford the full cost of decent, safe, and sanitary housing in that community. The schedule of the standard cost of adequate housing (R^*) that was adopted when enrollment began in June 1974 reflected housing costs in Brown County as they were reported in a market survey conducted in August, September, and October of 1973.*

In April 1976, the R^* schedule was increased by about 16 percent to compensate for rent increases occurring in the 30 months since it was first set. At that time the schedule was also realigned to slightly increase payments to the smallest households and to slightly decrease payments to the largest households. In April 1977, the schedule was increased across the board by about 6 percent to compensate for fuel and utility cost increases. The study reported here was prompted by evidence that inflation in the cost of housing had made even the latest schedule obsolete, and that allowance payments were no longer adequate to serve program purposes. The study is based primarily on surveys of housing costs throughout Brown County that were not available for the 1976 and 1977 revisions.

INFLATION IN RENTAL HOUSING COSTS, 1973-78

Our analysis of inflation in housing costs addresses two questions, both important in deciding on appropriate revisions of R^*:

- o By how much have housing costs risen since the original schedule was designed?
- o To what extent is the allowance program itself responsible for inflation in housing costs?

---

*R^* refers to the standard cost of adequate housing in the county, to which allowance entitlements are keyed. The amount varies with household size.

Although the housing allowance program serves both renters and homeowners, the original schedule and the analysis reported here rely on data only for renters, whose housing costs are most easily measured. Those costs consist of contract rent (the amount paid to the landlord) plus payments for any fuel and utility services not included in contract rent. We think the findings are equally applicable to homeowners, whose housing costs are not entirely explicit payments to others.

The analysis draws on four sources of data: field surveys of renter households in Brown County, conducted periodically as part of the Supply Experiment; fuel and utility rate schedules obtained from local suppliers; administrative records of the allowance program reporting the rent paid by program participants; and more general indexes of rent and fuel costs compiled by the U.S. Bureau of Labor Statistics. Those sources address different aspects of the inflation issue and cover different portions of the 54-month interval between September 1973 and March 1978. Their evidence is mutually consistent, however, and leads to the following conclusions:

- Between 1974 and 1977, contract rent in Brown County increased at an average annual rate of about 4.4 percent. Gross rent, including fuel and utility services billed to tenants, increased at an average annual rate of about 6.6 percent.
- The inflation rate varied markedly in different sectors of the rental market. It was higher for single-family homes than for apartments and higher for low-rent units than for high-rent units. For example, gross rent for low-rent single-family homes increased by over 9 percent annually, while gross rent for high-rent apartments in large buildings increased by less than 4 percent annually.
- The inflation rate also differed over time. Contract-rent inflation increased slowly between 1974 and the early months of 1977. The rate of increase in gross rent, however, seems to have peaked in 1975, when most households experienced the full effects of increased fuel prices. The data also show that from 1975 to 1977 rent increased the most (in both

absolute and percentage terms) for the larger units, most of which are single-family houses.

- There was apparently some competition between fuel cost and shelter-rent increases, as though landlords were unwilling or unable to increase shelter rent substantially during a time of large fuel cost increases. In 1974 shelter rent increased by less than 2 percent. As fuel cost increases have moderated in more recent years, contract-rent and shelter-rent inflation have increased.
- Our data adequately cover events from late 1973 through early 1977. We have some information subsequent to early 1977, but it is both indirect and conflicting. The rate of increase in fuel and utility costs appears to have moderated even further. However, tentative estimates of rent inflation in 1977 indicate that gross rent, and thus by implication shelter rent, increased even faster in 1977 than in 1976. Under those circumstances we conclude that the best estimate of inflation for April 1977 to April 1978 is provided by a simple extrapolation of the estimate for January 1976 through March 1977.
- We have no evidence that the allowance program has added to the rate of inflation in housing costs in Brown County. The overall rate of gross-rent inflation, the increased rate for single-family dwellings, and the shift in emphasis from fuel cost increases to shelter-rent increases are all consistent with national and regional trends. Participants' rent increases have been consistently below marketwide averages.

COMPENSATING FOR INFLATION

The allowance entitlement of a program participant is equal to the standard cost of adequate housing (R^*) minus one-fourth of the participant's adjusted gross income. The income limit for participation in the program is equal to $4R^*$, the level at which allowance entitlement drops to zero.

We are convinced that housing costs in Brown County have risen enough to require another compensating increase in the HAO's schedule

of R^*. Otherwise, program participants will find it increasingly difficult to afford housing that meets program standards, and some households that need assistance will be denied it because the now-obsolete schedule also defines the income limits for participation.

ADJUSTMENTS TO THE R^* SCHEDULE

The original schedule of standard costs, adopted in September 1973, was adjusted in April 1976 and April 1977 to cover prior inflation. Because the original schedule seemed deficient in its treatment of both small and large households, it was also realigned in April 1976 to increase payments to the former and decrease them to the latter. The changes are summarized below:

HAO Occupancy Standard		Standard Cost of Adequate Housing ($ per month)			
Number of Persons	Number of Rooms	Original Schedule	April 1976 Realignment	April 1976 Increase for Inflation	April 1977 Increase for Inflation
1	1-2	100	+10	15	5
2	1-3	125	+ 5	15	10
3-4	4	155	--	20	10
5-6	5	170	--	25	10
7-8	6	190	-10	30	10
9+	6	220	-15	25	15

Our current estimates of gross-rent inflation cover the entire period September 1973 through March 1978--calculated for the period September 1973 to March 1977 and extrapolated thereafter through March 1978. Based on those inflation rates, we have estimated the amount by which the 1973 R^* schedule (as realigned in 1976) needs to be increased to compensate for inflation over the 54-month period. Note that the procedure ignores the 1976 and 1977 adjustments for inflation. The estimates are as follows:

HAO Occupancy Standard		Standard Cost of Adequate Housing ($ per month)	
Number of Persons	Number of Rooms	Original Schedule Realigned April 1976	Required Increase
1	1-2	110	30
2	1-3	130	40
3-4	4	155	45
5-6	5	170	65
8	6	180	85
9+	6	205	95

The net adjustments we now propose in the current schedule consist of the 54-month inflation estimates minus the inflation adjustments adopted in 1976 and 1977. The resulting schedule would therefore be the following:

HAO Occupancy Standard		Standard Cost of Adequate Housing ($ per month)		
Number of Persons	Number of Rooms	April 1977 Schedule	Proposed 1978 Inflation Adjustment	Proposed 1978 Schedule
1	1-2	130	10	140
2	1-3	155	15	170
3-4	4	185	15	200
5-6	5	205	30	235
7-8	6	220	45	265
9+	6	245	55	300

EFFECTS OF PROPOSED SCHEDULE CHANGES

The proposed changes would have three effects on program size and cost. First, payments to current recipients would increase by the amount of the change in R^* for households of their size. Second, some who are now eligible but who consider their current entitlements too small to warrant participation might decide to enroll as their entitlements are increased. Third, some who are not now eligible would become eligible because an increase in R^* raises the income limit for participation.

In December 1977, the HAO paid out $228,000 in allowances to 3,247 renters and homeowners living in certified housing. The proposed adjustments would immediately increase the monthly disbursements to those households by nearly $48,000.

Increased enrollment due to schedule changes is harder to estimate and would in any case be spread over time. We judge that the proposed adjustments would induce 500 to 1,000 additional households to enroll over the course of a year, eventually adding $10,000 to $15,000 to monthly disbursements.

CONTENTS

TABLES

I. INTRODUCTION

The experimental housing allowance program operated by the Brown County Housing Allowance Office (HAO) as part of the Housing Assistance Supply Experiment is designed to enable participants to afford the full cost of decent, safe, and sanitary housing in that community. Enrollment and payment of allowances began in June 1974. The initial schedule of payments reflected housing costs in Brown County in September 1973, based on data collected locally at that time.

Since then, even though the allowance levels have been increased twice, in 1976* and 1977,** consumer prices have continued to rise sharply, and there are indications that the cost of housing in Brown County has increased enough that the allowances available to program participants are again no longer adequate to meet the program objectives. This report analyzes the evidence concerning the amount of inflation in housing costs from September 1973 through March 1978 to determine whether further compensating revisions are needed in the allowance schedule.

The remainder of this section explains the programmatic and empirical bases for the initial payment schedule used by the Brown County HAO. The discussion focuses on the estimation of R^*, the standard cost of adequate housing for households of different sizes.

FORMULA FOR DETERMINING ALLOWANCE PAYMENTS

Households entitled to assistance under the experimental program include those whose incomes are inadequate to support a specified standard of housing consumption, so long as they actually occupy housing

---

*In April 1976, the R^* schedule was increased by about 16 percent to compensate for rent increases during the 30 months since R^* had been set. See Ira S. Lowry, *Inflation in the Standard Cost of Adequate Housing: Site I, 1973-1976*, The Rand Corporation, WN-9430-HUD, March 1976.

**In April 1977, the schedule was again increased by about 6 percent to compensate for fuel and utility cost increases identified by the HAO. The changes were recommended in a letter to HUD from Charles E. Nelson, 15 February 1977.

that meets the standard. They may be renters or homeowners, and the adequacy of their housing is periodically tested by the HAO.

The assistance formula postulates that any household, whatever its size or composition, can afford to pay 25 percent of its adjusted gross income for housing. The difference between that amount and the standard cost of adequate housing in Brown County is paid monthly by the HAO to all enrolled households whose housing meets program standards. The formula for a household of n persons is

$$A_n = R^*_n - .25Y \ ,$$

where A = the amount of the monthly allowance payment,

R^* = the standard monthly cost of adequate housing, including fuel and utilities, and

Y = adjusted gross income per month, the adjustments reflecting exemptions and deductions specified by statute or program regulations.

As can be seen from the formula, an increase or decrease in R^* has a dollar-for-dollar effect on the amount of the allowance payment for all participants, regardless of their income. It also affects the income limit for participation in the program; raising or lowering R^* by one dollar raises or lowers that limit by four dollars. A change in the income limit may in turn increase or decrease the number of households in the county that are eligible for the program.

Note also that the amount of the allowance payment does not depend on the participant's actual housing expenditures, except that program regulations prohibit payments exceeding those expenditures. A family that finds certifiable housing costing less than R^* normally receives exactly the same payment as another family of the same size and with the same income that spends more than R^*, either by choice or because of a lack of alternatives on the market. That arrangement is intended both to allow each household to adapt its housing consumption to its particular needs and preferences and to encourage careful shopping for housing bargains.

The "standard cost of adequate housing" is thus a critical program

parameter, affecting both the amount of payments to participants and the potential size of the program. In concept, it is "the price at which specified packages of housing services can be supplied by the private market on a continuing basis, in quantities that meet the program's objectives of enabling all assisted households to secure adequate housing."*

The specifications for the "packages of housing services" are of course those adopted by the HAO for certification of participants' housing. They entail space requirements that vary with household size, requirements for structural soundness, light and ventilation, safety and sanitation, and the availability of equipment and utility services commonly regarded as necessary for health, comfort, and decency.**

ESTIMATING THE STANDARD COST OF ADEQUATE HOUSING

Before enrollment began in the Brown County housing allowance program, Rand estimated the standard cost of adequate housing units of different sizes and recommended to HUD a schedule of such costs to govern payments to participating households. The estimates were based jointly on evidence collected in a field survey conducted as part of the Supply Experiment and on the opinions of a panel of local citizens chosen for their knowledge of the housing market.***

The field survey, conducted in August, September, and October of 1973, was addressed to the occupants of some 10,000 housing units in

---

*The concept is explained in David B. Lewis and Ira S. Lowry, *Estimating the Standard Cost of Adequate Housing*, The Rand Corporation, WN-8105-HUD, March 1973. That document also proposes a method for estimating such standard costs, which was followed in both experimental sites. The quotation is from Ira S. Lowry, Barbara M. Woodfill, and Tiina Repnau, *Program Standards for Site I*, The Rand Corporation, WN-8574-HUD, January 1974, pp. 4-5.

**The standards are similar to those of national model housing codes. They are detailed in Chapter 12 of the *HAO Handbook* of the Brown County Housing Allowance Office.

***See Lowry, Woodfill, and Repnau, *Program Standards for Site I*, for details.

Brown County. The households were interviewed briefly to obtain information on household size, composition, and income; size and quality of housing unit; tenure of occupants; and housing costs.

The questions on housing quality were chosen to test whether the unit would meet program standards. The question on housing cost for renters elicited their contract rent, their use of specified fuels and utility services, and whether the fuels and utility services were included in contract rent. Because of the brevity of the interview and the complexity of the accounting, we did not ask the respondents to estimate their fuel and utility costs. Instead, we estimated them from the information respondents gave about usage and responsibility for payment.*

About 5,300 renters provided enough information for us to measure the size and quality of each unit and estimate its gross rent (contract rent plus tenant-paid utilities). Taking each size of unit (number of bedrooms) separately, we analyzed the relationship between gross rent and housing quality and selected the lowest level of gross rent at which 50 and 75 percent, respectively, of all units met our simplified standards of quality. Since the market was manifestly able to supply housing of adequate quality within that range of gross rent, we accepted it as the first approximation of the standard cost of adequate housing, applicable to renters and homeowners alike.**

Apart from the survey, twenty-five local residents selected for

---

*The procedure for making those estimates is documented in David M. de Ferranti, Ira S. Lowry, and others, *Screening Survey Audit Report for Site I*, The Rand Corporation, WN-8684-HUD, November 1974, Appendix C. From information provided by fuel and utility suppliers, consumption norms were established for households and housing units of various sizes. The normal consumption was then multiplied by the applicable rates to estimate utility costs for each household. To estimate gross rent for a given household, the estimated cost of utilities paid directly by the tenant was added to the contract rent reported in the survey.

**Although we obtained from homeowners estimates of the market value of their homes and an account of the utilities they used, we could not directly estimate their monthly housing costs. Almost by definition, the true cost of a specified bundle of housing services is the same for homeowners and renters, even though the explicit payments to others may differ.

their knowledge of the Brown County housing market were asked to estimate the current gross rent for standard housing units of various size in each of fourteen neighborhoods in the county. A distinction was drawn between rents for new tenants and those for all occupied units.

Each panelist prepared his estimates independently, only for neighborhoods with which he was personally familiar. The results were compiled and discussed by the panelists; then each was given the opportunity to modify his original estimates. The procedure followed was an adaptation of the so-called Delphi method for securing a consensus among experts.

Finally the panelists' estimates were retabulated and averaged. First, median values for each neighborhood were calculated, and the medians were weighted by neighborhood shares of the countywide inventory of rental housing. A weighted average was then calculated across neighborhoods for each size of unit; that average was the panel's consensus estimate of R^*.

Table 1.1 summarizes the results of the two investigations. We believed that the standard cost for each size of unit fell within the

Table 1.1

SURVEY AND PANEL ESTIMATES OF R^* BY NUMBER OF BEDROOMS PER UNIT: BROWN COUNTY, SEPTEMBER 1973

Number of Bedrooms	Monthly Gross Rent ($)				
	Survey Data for Units Meeting Minimum Standards		Panel Average for Standard Units in Modest Neighborhoods		
	At Least 50 Percent Meet Standards	At Least 75 Percent Meet Standards	New Tenants	All Tenants	Proposed Range of Values for R^*
0	70	95	101	96	95-101
1	75	130	131	122	122-131
2	90	130	160	147	130-160
3	95	180	187	168	168-187
4	165	180	219	195	180-219
5	110	200	251	230	200-251

SOURCE: Lowry, Woodfill, and Repnau, *Program Standards for Site I*, Table 12.

range shown in the last column but that the selection of specific values for specific household sizes entailed programmatic considerations that could not be deduced from the data. In fact, the program's criteria for "adequate housing" were still being formulated when the investigations were under way. The main issue outstanding was the occupancy standard, i.e., how the number and type of rooms in a unit should relate to the size and composition of the household. We recommended to HUD a complex but flexible standard that took account of the age and sex as well as number of household members and that included requirements for both number of bedrooms and number of other rooms. Our proposed R^* schedule began at $125 for a single person and increased in $10 increments to $215 for ten persons.

HUD preferred a scheme less complex than our recommendation. Table 1.2 shows the occupancy standard and the R^* schedule that it approved for initial use in Brown County. The schedule was understood to be experimental in the sense that program experience with the occupancy standard and the corresponding payment schedule might lead to improvements. Similarly, research on housing costs in Brown County might alter the premises underlying the concept of the standard cost of adequate housing or the methods for estimating it.

STRUCTURAL CHANGES TO R^*

When the current schedule was designed, there was concern about its appropriateness for very small and very large households.

Occupancy Standard for Small Households

Under the original HAO occupancy standards, adequate housing for a single person enrolled in the program consisted of a single room, access to a shared bathroom in the same building, and reasonable access to a shared kitchen, public dining room, or restaurant. The same arrangements fulfilled HAO standards for a two-person household. In the marketplace, such arrangements are to be found in rooming houses and lodgings in private homes.

If a household of one or two persons occupied a separate housing unit, a private bath and a kitchen were required. The layouts

Table 1.2

OCCUPANCY AND *R** STANDARDS ADOPTED FOR THE BROWN COUNTY PROGRAM, MARCH 1974

Occupancy Standard			
Number of Persons	Number of Bedrooms[a]	Number of Rooms[b]	*R** ($ per month)
1	0	1-2	100
2	1	1-3	125
3-4	2	4	155
5-6	3	5	170
7-8	4	6	190
9+	5[c]	7[c]	220

SOURCE: *HAO Handbook* for Brown County, Secs. 10.06 and 12.03.

NOTE: Program participants may live either in housing units or rooming units. A housing unit must have a bathroom (not counted as a habitable room) and kitchen facilities for the exclusive use of its occupants. A rooming unit need not have a private bathroom or kitchen if those facilities are reasonably available to its occupants.

[a]A unit must have one bedroom for every two members of the household occupying the unit.

[b]A housing unit occupied by more than two persons must have one habitable room in addition to the kitchen and bedrooms to serve as a general living area. The minimum number of rooms is not strictly defined because kitchen facilities may or may not be located in a separate room. Here, we count the kitchen as a separate room.

[c]Revised in December 1974 to 4 bedrooms and 6 rooms altogether.

of small housing units varied, but two or three habitable rooms were usually needed to meet the requirements: a combined bedroom and living room plus a kitchen; a bedroom plus a combined living room and kitchen; or three separate rooms (the bathroom does not count as a habitable room).

The HUD-approved standard cost of adequate housing for one person adopted in March 1974 was $100. Our analysis of the local housing market indicated that that amount was then more than enough to pay for

a rented room, and enough to pay for a two-room efficiency apartment that met program standards. Adopting that figure signified that the allowance program did not intend to support occupancy of a larger housing unit by a single client. Although such a person could draw benefits while occupying a larger unit, his housing expenditures would ordinarily exceed a fourth of his nonallowance income plus the allowance.

The standard cost for two persons was set at $125, then enough to support occupancy of a one-bedroom (three-room) apartment. Again, adopting that figure signified that the program did not intend to support occupancy of larger housing units by two-person households--which might consist of an adult or elderly married couple, a parent and child, or even adult siblings or other related persons.

Those decisions reflected a judgment about the housing needs of the elderly single persons and two-person families who compose about half the households in Brown County that are eligible for assistance and about 60 percent of those that have so far enrolled. The problem was that few such households found the proposed arrangements desirable or even tolerable except under severe budgetary stress. Even before receiving assistance, nearly all of them lived in separate housing units that were usually larger than the minimum sizes acceptable to the HAO or the sizes on which standard costs were based, even though their housing expenses usually exceeded a fourth of their income.

Table 1.3 demonstrates that phenomenon as of the end of the first year of program operations. It compares HAO occupancy standards for households of different sizes with the sizes of the housing units that were actually occupied by program participants.

Note that 82 percent of the single renters in the program occupied units larger than two rooms and 38 percent occupied units larger than three rooms. Among single owners, the discrepancy between standards and reality is even more striking. Ninety-seven percent occupied units of more than two rooms and 85 percent occupied units of more than three rooms. The housing expenses of record for nearly three-fourths of the single renters exceeded the scheduled $100, and we know that the records underestimate their fuel and utility bills. The housing

Table 1.3

COMPARISON OF HAO OCCUPANCY STANDARDS WITH HOUSING UNITS OCCUPIED BY PROGRAM PARTICIPANTS: BROWN COUNTY, JUNE 1975

HAO Occupancy Standard		Percentage of Households by Size of Unit[b]				
			Larger Than HAO Standard by:			
Number of Persons	Number of Habitable Rooms[a]	Same as HAO Standard	1 Room	2 Rooms	3+ Rooms	Total
Renters						
1	1-2	17.8	43.6	22.1	16.6	100.0
2	1-3	32.6	43.9	17.5	6.0	100.0
3-4	4	61.0	28.3	9.0	1.7	100.0
5-6	5	69.3	25.3	5.3	--	100.0
7-8	6	59.1	18.2	18.2	4.5	100.0
9+	6	44.4	11.1	22.2	22.2	100.0
All cases	(c)	41.9	36.0	14.9	7.1	100.0
Homeowners						
1	1-2	2.7	14.8	40.7	41.7	100.0
2	1-3	16.0	40.7	32.0	11.3	100.0
3-4	4	32.2	41.7	18.2	7.9	100.0
5-6	5	48.8	22.0	23.6	5.7	100.0
7-8	6	45.3	34.0	15.1	5.7	100.0
9+	6	40.7	33.3	14.8	11.1	100.0
All cases	(c)	22.8	29.8	28.5	18.8	100.0

SOURCE: Tabulated by HASE staff from HAO administrative records.

NOTE: This comparison is based on records for 1,138 renters and 929 homeowners who were enrolled on 20 June 1975 and had received at least one allowance payment. Records for 87 renters and 56 homeowners were excluded because size of housing unit was not reported. Percentages may not add exactly to 100.0 because of rounding.

[a]HAO occupancy standards require one bedroom for every two persons, with a maximum of four bedrooms; a separate living room for households of three or more persons; and a private kitchen and bathroom, except for rooming houses in which such facilities may be shared with others. All rooms counted against these requirements must meet certain standards for space, light and ventilation, heating, electrical outlets, and privacy. Bathrooms do not count as habitable rooms. Although kitchens are not always habitable rooms, we assume here that households of three or more persons live in separate housing units that include a habitable kitchen and living room in addition to the required number of bedrooms.

[b]Based on the count of habitable rooms in the participant's last certified housing unit.

[c]Not applicable.

expenses of record for single homeowners were nearly always below $100, but again the records far underestimate the true amount.

There were similar but less striking discrepancies between the occupancy standards and occupancy patterns for two-person households. Two-thirds of the renters and 84 percent of the owners occupied units larger than three rooms, and three-fourths of the renters paid more than the scheduled $125.

The evidence was clear that households of one and two persons, whether or not they participated in the allowance program, would continue to occupy larger units than are supported by program standards;

and that they would continue to spend over a fourth of their nonallowance incomes for housing unless standard cost were increased to support occupancy of larger units.

In April 1976, in response to those strong signals, the standard cost of adequate housing for households of one and two persons was increased relative to the standard cost for larger households. The increments were $10 and $5, respectively.

Standard Costs for Large Housing Units

Designing a schedule of standard costs for large housing units based on evidence from the rental market was particularly difficult because the market is thin. Our survey data for September 1973 indicated that four-bedroom units renting for $180 and five-bedroom units renting for $200 usually met program standards of quality. Local experts, however, thought that $195 and $230 were the respective rents needed to achieve that quality. The schedule of standard costs that was adopted by the HAO in March 1974 compromised on $190 and $220.

The occupancy standards adopted at the same time required four bedrooms (six rooms) for seven or eight persons and five bedrooms (seven rooms) for nine or more persons. The latter standard was later reduced to four bedrooms (six rooms) without a commensurate reduction in R^*. The logic behind the decision was that very large families would have difficulty finding accommodations of any kind and needed more flexibility in living arrangements than the original occupancy standard provided. At the same time, they needed an allowance based on a standard cost of $220 to give them financial access to a wider market, including units that exceeded the size specified in the revised occupancy standard.

Subsequent events seemed to support the need for flexibility in living arrangements for very large families, but we think that the survey data were closer to the mark on standard costs than were the panel's estimates. At the end of the program's first year, 9 renter and 27 homeowner households with nine or more members were participating in the program. Fifteen of those households lived in certified units with only six habitable rooms, the HAO minimum; the others were in

larger units, up to ten rooms. Among the nine renter households, only two had housing expenses of record that exceeded $220; the median amount was $185.

The inflation adjustments proposed in March 1976 would have increased R^* to $220 for seven or eight persons and to $245 for nine or more persons. Thinking that those amounts would be inappropriate windfalls for such households because their housing expenses were typically less, we recommended that the schedule of the standard cost of adequate housing be realigned to lower R^* by $10 for seven or eight persons and by $15 for nine or more persons.

The realigned schedule approved by HUD and effected in April 1976 is shown in Table 1.4. It serves as the base for all inflation adjustments described in this report.

Table 1.4

REALIGNMENT OF THE STANDARD COST OF ADEQUATE HOUSING, APRIL 1976

HAO Occupancy Standard		Standard Cost of Adequate Housing ($ per month)		
Number of Persons	Number of Rooms	September 1973 Schedule	Amount of April 1976 Realignment	Realigned Schedule
1	1-2	100	+10	110
2	1-3	125	+ 5	130
3-4	4	155	--	155
5-6	5	170	--	170
7-8	6	190	-10	180
9+	6	220	-15	205

SOURCE: Ira S. Lowry, *Inflation in the Standard Cost of Adequate Housing, Site I, 1973-1976*, The Rand Corporation, WN-9430-HUD, March 1976, Tables 1.2 and 5.5.

ORGANIZATION OF THE REPORT

Section II measures the inflation in Brown County housing costs between 1974 and 1977, based on comparisons of contract rent and fuel and utility expenditures reported by occupants of a marketwide sample

of housing units that were surveyed each year from 1974 through 1977. An important finding is that the inflation rate differed markedly in different sectors of the market and in different years.

Section III analyzes the effects of changes in fuel and utility prices between September 1973 and January 1978. We use household consumption norms to estimate the typical effects of those changes on the housing costs of program participants. Our estimates do not distinguish utility bills paid by landlords from those paid by tenants or homeowners. The estimates of gross-rent inflation and utility cost inflation are then used to produce estimates of shelter-rent changes from 1974 through 1977.

Section IV uses the accumulated evidence to project gross-rent inflation rates for the full 54-month period, September 1973 through March 1978.

Section V presents the conclusions and recommendations. The conclusions pertain to the extent of housing cost inflation between September 1973 and March 1978, its causes, and the effects of the allowance program on housing costs. Briefly, we judge that the standard cost of adequate housing, as defined and measured in 1973, has since increased by 29 to 47 percent, the rate varying with the size and type of dwelling. In 1974 and 1975 nearly all the increases could be attributable to higher fuel and utility costs, whether paid directly by the tenant or borne by the landlord. Since then, fuel cost inflation has moderated somewhat, and shelter-rent increases may now account for over half of the annual increase in gross rent. We find no evidence that increased housing demand by program participants has significantly influenced the level of rents in Brown County.

To offset the inflation in housing costs, monthly payments to program participants should be increased by $10 to $55, the larger amounts pertaining to the larger households. From 1975 through 1977 rent increased most (in both absolute and percentage terms) for the larger units, which are usually single-family houses. That fact was not reflected in the 1976 and 1977 R^* adjustments. Consequently, our recommended 1978 adjustments are substantially greater for the larger units.

II. MEASURING RENT INFLATION, 1974-77

In this section we estimate the rate of increase in both contract and gross rent for conventional rental housing units in Brown County between 1974 and 1977. The estimates are based on case-by-case comparisons of rent actually paid for 1,796 specific housing units at various times during the period. Therefore they are unaffected by changes in the composition of the rental inventory--a frequent source of ambiguity in rent-inflation estimates.

The housing units used in this analysis are a subset of those included in the Supply Experiment's permanent panel of residential properties, whose owners and occupants are interviewed annually. Because their sampling histories are known, it is possible to weight individual records in proportion to the population of units they represent. Thus, we are able to generalize our findings not only to the rental market as a whole but also to specific sectors of that market.

Briefly, we conclude that between 1974 and 1977, contract rent in Brown County increased at an average annual rate of 4.4 percent, and gross rent (contract rent plus tenant payments for fuel and utilities) increased at an average annual rate of 6.6 percent. However, the rates varied greatly between market sectors. The gross rent for low-rent single-family houses increased at an average annual rate of over 9 percent, while that for high-rent apartments in large buildings increased at a rate of less than 4 percent. The rates also differed significantly over time. Contract-rent inflation increased steadily from 3.7 percent in 1974 to 4.8 percent in 1976-77. Gross-rent inflation rose from 4.9 percent in 1974 to 8.2 percent in 1975, then dropped to 6.9 percent for 1976-77.

CONSTRUCTING THE DATA BASE

The annual surveys of rental properties conducted as part of the Supply Experiment are the best available source of data for measuring changes over time in the cost of housing services in Brown County. The surveys are addressed to a scientific sample representing nearly the

entire population of rental properties and housing units in the county; the sample is large enough for detailed analysis; and units selected for the permanent panel are resurveyed year after year. Moreover, the survey instrument probes carefully for details of the financial arrangements between landlords and their tenants and for expenses other than contract rent that are borne directly by the tenant.

For the present purpose, the main drawback of this data source is its lack of timeliness. The annual survey of tenants and homeowners was designed to feed a long-term research agenda rather than the short-term needs of program administration. Fieldwork is spread over a period of six months, and roughly another six months is required to reduce field reports to "clean" machine-readable records. Only then can the data file be audited to determine the number of usable records and the likelihood of nonresponse bias; and only then can scientific sampling weights be computed for individual records to be used for a given analysis.

Building a Longitudinal File of Housing-Unit Records

Our analysis of rent inflation is based on records from the four surveys of rental housing units* that have been completed in Brown County to date:

Survey	Dates Conducted	Number of Interviews Completed with Renter Households
Wave 1 (baseline)	January through May 1974	>2,800
Wave 2	January to July 1975	>2,800
Wave 3	January to August 1976	>2,900
Wave 4	January to July 1977	>2,700

*The surveys were addressed to homeowners as well as to renters, but we deal here only with records for the latter. We also exclude renters of mobile homes and lodgers in rooming houses or private homes from the data base. The survey samples exclude federally subsidized housing units, so the data refer strictly to privately owned, unsubsidized rental housing units of conventional construction.

In order to include records from the wave 4 survey, it was necessary to extract them before they had been cleaned of errors and inconsistencies. We rejected some records with obviously erroneous or suspicious entries in preparing the analysis file, but doubtless accepted some with less conspicuous errors. However, the data items used in this analysis have not presented major cleaning problems in previous surveys.

For the rent-inflation analysis, we selected only housing units that were occupied by renters and whose occupants had been interviewed at least twice, linking the machine-readable records for each case. The steps in building the file were complex and are not detailed here; Tables 2.1 and 2.2 summarize the results.

Table 2.1 shows that 2,835 interviews were completed for renter households in the baseline survey. Those records formed the basis of our linked data file. Records from waves 2, 3, and 4 were added if their housing-unit identifiers matched those on the baseline file. In that manner 1,799 records from wave 2, 1,515 records from wave 3, and 1,381 records from wave 4 were selected for the linked data file.

Table 2.1

LONGITUDINAL LINKAGE OF HOUSING-UNIT RECORDS FOR RENT-INFLATION ANALYSIS, 1974-77

Item	Wave 1	Wave 2	Wave 3	Wave 4
Records with completed interviews	2,835	2,852	2,929	2,744
Records linked with wave 1 records	2,835	1,799	1,515	1,381
Linked records rejected because:				
Tenant paid less than full rent	327	150	92	73
Contract rent not reported	43	18	16	7
Gross rent not computable	43	21	16	7
Interview date not reported	1	0	2	0
Linked records accepted	2,486	1,633	1,409	1,304

SOURCE: Tabulated by HASE staff from records of the annual surveys of renter households in Site I.

NOTE: Records from successive surveys were linked on housing-unit identifier; the respondents may differ. Records tabulated here pertain to privately owned, unsubsidized rental housing units, excluding rented rooms and mobile homes. Links were attempted for all units classified as rental in baseline survey.

They were not necessarily the same *households* that responded in wave 1; records were linked on housing-unit, not household, identifiers. Excluding the records for which item nonresponse prevented computation of gross rent, we found 2,486 records from wave 1, 1,633 records from wave 2, 1,409 records from wave 3, and 1,304 records from wave 4 with all the necessary data for further analysis.

Table 2.2 summarizes all of the linkages available in the data and the portion we selected for analysis. When we had, say, three

Table 2.2

SELECTION OF RENT-INFLATION ANALYSIS FILE FROM ALL LINKED RECORDS

Linkages between Surveys				Number of Linked Observations	Number of Selected Observations
Wave 1	Wave 2	Wave 3	Wave 4		
X	X			1,502	1,502
X		X		1,289	199[a]
X			X	1,192	57[a]
	X	X		1,173	1,173
	X		X	1,059	165[a]
		X	X	1,066	1,066
X	X	X		1,090	0[a]
X	X		X	986	0[a]
X		X	X	981	0[a]
	X	X	X	894	0[a]
X	X	X	X	832	0[a]
Total selected observations					4,162
Extreme rent changes rejected[b]					184
Rent-inflation analysis sample					3,978

SOURCE: Case-by-case analysis by HASE staff of linked observations in the tenant surveys for Site I.

[a]See accompanying text for the reason for excluding multilinked records.

[b]Outliers were defined as records with a residual greater than three times the standard error of the equation when annual inflation rates for gross and contract rent were entered in multiple regressions with panel stratum, number of rooms, date of first rent observation, and the period of time spanned by the observations.

records for a particular housing unit, three possible linkages could be made (1 with 2, 2 with 3, and 1 with 3), but only the first two would be truly independent. In all cases, we selected only those shorter-term linkages.

Weighting the Linked Records

The next step was to weight the records in the analysis file. Each record had been assigned to one of 18 sampling strata, according to location (urban or rural), use (residential or nonresidential), tenure (ownership or rental), number of residential units on property, and market value or gross rent. Following established weighting procedures, we subdivided the rental strata (1 through 11) so that the weighted sample of renter units accurately reproduced various baseline control totals in sample selection records. Table 2.3 shows the subdivisions: Strata 3, 6, 9, and 10 are subdivided by number of housing units, and strata containing 2-4 units are subdivided according to the presence of a resident landlord. In all cases, the unit-level weights are constant within the subdivisions;* they equal the estimated countywide number of renter units divided by sample counts of such units.**

Table 2.4 summarizes the distribution of housing units and rent-change observations in the analysis sample by sampling stratum and indicates the populations represented by the units in each stratum. The largest samples were available for strata 2, 5, and 6, each with at least 275 records and over 600 linked rent observations. Those three strata contain over 50 percent of all rental housing units in the county. Strata 4, 5, and 6 together compose units on properties whose average gross rent per unit falls in the middle tercile of the countywide rent distribution, the range most pertinent to inflation analysis.

---

*Not all properties in a given stratum have the same sampling history weights because some were misstratified in the early stages of sample selection.

**Care was taken to minimize nonresponse bias. We tried out a given stratification scheme (such as the above) to obtain weights, and then saw how well it reproduced various countywide totals that we knew were accurate (e.g., properties, total units, resident landlord units, residential buildings--all by stratum and location). In our judgment, the weights leave no glaring biases that would impair the analysis.

Table 2.3

SUBSTRATIFICATION SCHEME FOR CONSTRUCTING WEIGHTS TO MONITOR INFLATION

Panel Stratum[b]	Substratum Property Characteristic[a]		Total Number of Renter Units		Weight[c]
	Number of Residential Units	Number of Owner Units	Countywide Estimate	Baseline Sample	
1	All	All	269	87	3.092
2	All	0	1,911	201	9.507
2	All	1+	673	86	7.826
3	5-9	All	291	81	3.593
3	10-19	All	77	12	6.417
3	20+	All	80	11	7.272
4	All	All	657	174	3.776
5	All	0	1,862	263	7.080
5	All	1+	561	79	7.101
6	5-9	All	594	226	2.628
6	10-19	All	499	128	3.898
6	20+	All	478	39	12.256
7	All	All	737	72	10.236
8	All	0	1,622	91	17.824
8	All	1+	369	15	24.600
9	5-9	All	128	40	3.200
9	10-19	All	217	42	5.167
9	20+	All	745	25	29.800
10	1	All	306	29	10.552
10	2+	All	335	86	3.895
11	All	All	222	27	8.222
All strata			12,633	1,814	6.964

SOURCE: Sample selection records, Site I, baseline, and computations by HASE staff.

[a] "All" means that the substratum includes all values of the indicated variable. Owner units on rental properties are those occupied by resident landlords.

[b] See Table 2.4 for the meaning of panel stratum numbers.

[c] Weights are defined as the ratios of countywide estimates to baseline sample totals.

For those three strata, we have a total of over 900 property records and 2,000 rent-change observations, a large enough sample to yield reliable estimates. The weakest parts of the data base are for low-rent urban single-family houses, high-rent urban single-family houses, and high-rent rural properties.

Table 2.4

RECORDS AND HOUSING UNITS BY TYPE OF PROPERTY; RENT-INFLATION ANALYSIS FILE

Sampling Stratum[a]		Properties in Analysis File		Rent Observations in Analysis File		Estimated Population of Housing Units at Wave 1	
Number	Type of Property	Number	Percent	Number	Percent	Number	Percent
	Low-Rent Urban						
1	Single-family	88	4.9	173	4.3	269	2.1
2	2-4 units	275	15.3	614	15.4	2,583	20.4
3	5+ units	103	5.7	216	5.4	448	3.5
	Medium-Rent Urban						
4	Single-family	177	9.9	355	8.9	657	5.2
5	2-4 units	339	18.9	786	19.8	2,423	19.2
6	5+ units	387	21.5	892	22.4	1,571	12.4
	High-Rent Urban						
7	Single-family	70	3.9	155	3.9	738	5.8
8	2-4 units	107	6.0	235	5.9	1,991	15.8
9	5+ units	107	6.0	252	6.3	1,090	8.6
	Rural						
10	Low or medium rent	115	6.4	245	6.2	641	5.1
11	High rent	28	1.6	55	1.4	222	1.8
All types		1,796	100.0	3,978	100.0	12,633	100.0

SOURCE: Tabulated by HASE staff from records in the rent-inflation analysis file for Site I.

NOTE: Percentages may not add exactly to 100.0 because of rounding.

[a]Records in the analysis file are assigned to sampling strata on the basis of property characteristics reported in the baseline survey. Properties are stratified by average gross rent per unit, roughly into terciles of the overall distribution of gross rent in Brown County.

Once sampling weights were on the file, it was possible to group records by characteristics other than sampling stratum while still appropriately weighting those that came from different strata. Thus, records could be grouped by number of rooms per unit, and a weighted tabulation of gross rents for, say, four-room units would still reflect the appropriate proportions of urban and rural homes, single-family dwellings and apartments, and low-, medium-, and high-rent properties. Table 2.5 shows how the sample and population are distributed by number of rooms per unit.

Table 2.5

RECORDS AND HOUSING UNITS BY NUMBER OF ROOMS: RENT-INFLATION ANALYSIS FILE

Number of Rooms[a]	Properties in Analysis File		Rent Observations in Analysis File		Estimated Population of Housing Units at Wave 1	
	Number	Percent	Number	Percent	Number	Percent
1 or 2	132	7.3	308	7.7	676	5.4
3	435	24.2	971	24.4	2,640	20.9
4	667	37.1	1,490	37.5	5,121	40.5
5	366	20.4	807	20.3	2,771	21.9
6+	196	10.9	402	10.1	1,425	11.3
Total	1,796	100.0	3,978	100.0	12,633	100.0

SOURCE: Tabulated by HASE staff from records in the rent-inflation analysis file for Site I.

NOTE: Percentages may not add exactly to 100.0 because of rounding.

[a]Records in the analysis file are assigned the number of rooms reported in the baseline survey.

THE RENT-INFLATION ANALYSIS

With four years of survey data covering nearly 4,000 observations on rent change, we were able to perform a more detailed analysis of rent inflation than had been possible before. We adopted a statistical procedure that took account of the date of each observation so that separate estimates of inflation could be computed, by sampling stratum and size of unit, for 1974, 1975, and 1976-77. We initially hoped to

obtain separate estimates for 1976 and 1977. However, as the wave 4 observations pertained mostly to the first three months of 1977, the initial estimates of inflation computed for that year were quite unreliable and statistically indistinguishable from the 1976 estimates.* Consequently, we pooled the 1976 and 1977 data to produce one set of estimates. Only the combined estimates are discussed here.

Calculating Annual Inflation Rates

The annual inflation rates for 1974, 1975, and 1976-77 were calculated by assuming that within each year the rate of inflation remained constant but that it could vary from one year to the next. If rent increased steadily for m months at an average annual rate r, the level of rent at the end of the period, R_m, can be expressed in terms of the initial rent level, R_o, as

$$R_m = (1 + r)^{m/12} R_o. \tag{1}$$

Similarly, if rent increases at an annual rate of r_1 for m_1 months and then increases at a different rate, r_2, for m_2 more months, the resulting level of rent can be represented as

$$R_m = (1 + r_1)^{m_1/12} (1 + r_2)^{m_2/12} R_o, \tag{2}$$

where $m = m_1 + m_2$. Our general model is thus

$$R_m = (1 + r_{74})^{m_{74}/12} (1 + r_{75})^{m_{75}/12} (1 + r_{76\text{-}77})^{m_{76\text{-}77}/12} R_o. \tag{3}$$

To estimate the annual inflation rates, the r_t's, we transform Eq. (3) into a linear multiple regression equation. Define

*Rent-inflation estimates based on the model that separated the 1977 data from the 1976 data are presented in Appendix A.

$$y = \ln R_m - \ln R_o$$

and

$$a_t = \ln(1 + r_t),$$

where $\ln$ denotes the natural logarithm. Then, for the i^{th} observation on housing of class c, the relationship in Eq. (3) can be expressed as

$$y_{i,c} = m_{i,c,74}\, a_{c,74} + m_{i,c,75}\, a_{c,75} + m_{i,c,76\text{-}77}\, a_{c,76\text{-}77} + e_{i,c}, \quad (4)$$

where $e_{i,c}$ represents the error term. We wish to estimate the a's, given information for y and the m's.

We assume that the error terms are independent and that they are identically distributed with mean zero and variances proportional to m (where $m = m_{74} + m_{75} + m_{76\text{-}77}$). That is, the expected error for each rent-change observation is zero, but if there is an error we expect it to be larger the longer the time span of the observation. Under those conditions, ordinary least-squares will yield the best linear unbiased estimates of the a_t's (and maximum likelihood estimates if the errors are normally distributed) if each observation is weighted by $(m)^{-\frac{1}{2}}$.*

We assume that the parameters to be estimated depend only on the year, sampling stratum, and number of rooms in the unit. The basic assumption is

$$a_{c,t} = \alpha_{s,t} + \beta_{r,t}, \quad (5)$$

where t indexes year--1974, 1975, 1976-77,

s indexes sampling stratum--1 through 11,

r indexes number of rooms--1-2, 3, 4, 5, 6+.

---

*J. Johnston, *Econometric Methods*, McGraw-Hill, New York, 1963, pp. 207-211.

That additivity assumption yields 45 parameters to be estimated; without additivity the number would have been about 132--prohibitively large.

The inflation rates we wish to estimate are fairly complex functions of the foregoing regression estimates. Using the least-squares fit, the change in log gross or contract rent for a housing unit of type rs can be predicted by:

$$\hat{y}_{s,r} = m_{74}\left(\hat{\alpha}_{s,74} + \hat{\beta}_{r,74}\right) + m_{75}\left(\hat{\alpha}_{s,75} + \hat{\beta}_{r,75}\right) + m_{76\text{-}77}\left(\hat{\alpha}_{s,76\text{-}77} + \hat{\beta}_{r,76\text{-}77}\right). \tag{6}$$

From the weights we have computed, we can obtain

$$W_{s,r} = \text{number of renter units of type } r,s.$$

Then, the average of predicted changes in log rent is

$$\hat{y}_{s} = \frac{\sum_{r} W_{s,r}\,\hat{y}_{s,r}}{\sum_{r} W_{s,r}}, \tag{7}$$

$$\hat{y}_{r} = \frac{\sum_{s} W_{s,r}\,\hat{y}_{s,r}}{\sum_{r} W_{s,r}}, \tag{8}$$

$$\hat{y} = \frac{\sum_{s,r} W_{s,r}\,\hat{y}_{s,r}}{\sum_{s,r} W_{s,r}}. \tag{9}$$

These quantities and their standard errors are easily computed. The final step is to transform the estimates back to inflation rates using the transformation

$$T(y) = exp\left[y/\left(m_{74} + m_{75} + m_{76-77}\right)\right] - 1. \qquad (10)$$

Standard errors of the transformed parameters are then computed as

$$T\ (y + \sigma_y/2) - T\ (y - \sigma_y/2). \qquad (11)$$

Inflation Rate by Type of Property

Our estimates of the yearly inflation rates are shown in Table 2.6 for contract rent and in Table 2.7 for gross rent. The first column under each year gives the estimated average annual percentage change in rent, and the second column gives the standard error of that estimate. Thus, in Table 2.6, the average annual percentage change for stratum 1 in 1975 is 5.34 ± 1.29. That result is interpreted to mean that there is a 64 percent probability that the true mean for all stratum 1 housing units in Brown County in 1975 lies between 4.05 and 6.63 and a 90 percent probability that the true mean lies between 2.76 and 7.92.*

Inflation in Contract Rent. Table 2.6 shows that the annual rate of inflation in contract rent for all rental housing in Brown County rose slowly but steadily, from 3.7 percent in 1974 to 4.4 percent in 1975, and then to 4.8 percent in 1976-77. The rate for each year, and the change in the rate between years, however, vary greatly by type of property. The highest rate, 7.1 percent, is for low- and medium-rent rural properties in 1974. The lowest, 1.3 percent, is for high-rent urban properties of 2-4 units in the same year. Three of the property types (medium-rent, single-family urban dwellings, medium-rent urban properties of 5 and more units, and low- or medium-rent rural properties) actually experienced less inflation in 1976-77 than in 1974.

We were surprised to find so much difference in the inflation rate for different sectors of the housing market. Contract rent not being

*The levels of confidence indicated (64 and 90 percent) are equivalent to one and two standard errors of a normal distribution, adjusted downward for the minimum degrees of freedom of any component of the estimate.

Table 2.6

INFLATION IN CONTRACT RENT FOR DIFFERENT PROPERTY TYPES, 1974-77

Sampling Stratum		Annual Inflation Rate (%)					
		1974		1975		1976-77	
Number	Type of Property	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
	Low-Rent Urban						
1	Single-family	5.01	1.33	5.34	1.29	5.02	1.21
2	2-4 units	5.22	0.66	6.55	0.70	6.52	0.66
3	5+ units	5.78	1.09	4.09	1.17	6.54	1.14
	Medium-Rent Urban						
4	Single-family	4.26	0.87	4.24	0.93	3.36	0.84
5	2-4 units	3.39	0.60	5.00	0.65	4.95	0.58
6	5+ units	3.49	0.59	4.21	0.62	3.19	0.54
	High-Rent Urban						
7	Single-family	4.43	1.35	2.91	1.36	4.57	1.26
8	2-4 units	1.33	1.04	2.53	1.10	5.12	1.07
9	5+ units	2.16	1.02	3.62	1.04	3.10	0.96
	Rural						
10	Low or medium rent	7.11	1.21	4.29	1.20	4.81	0.96
11	High rent	2.79	2.36	3.20	2.73	4.21	2.26
All types		3.74	0.29	4.43	0.31	4.80	0.28

SOURCE: Calculated by HASE staff from records in the rent-inflation analysis file for Site I.

Table 2.7

INFLATION IN GROSS RENT FOR DIFFERENT PROPERTY TYPES, 1974-77

Sampling Stratum		Annual Inflation Rate (%)					
		1974		1975		1976-77	
Number	Type of Property	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
	Low-Rent Urban						
1	Single-family	9.67	1.68	12.83	1.68	8.20	1.52
2	2-4 units	5.95	0.81	9.64	0.88	9.12	0.82
3	5+ units	5.41	1.32	6.39	1.45	7.03	1.39
	Medium-Rent Urban						
4	Single-family	4.03	1.05	13.95	1.24	6.48	1.06
5	2-4 units	4.82	0.74	8.35	0.81	7.25	0.72
6	5+ units	5.08	0.72	6.37	0.76	3.38	0.66
	High-Rent Urban						
7	Single-family	5.46	1.65	8.93	1.75	9.27	1.61
8	2-4 units	2.94	1.28	7.76	1.41	7.76	1.33
9	5+ units	3.17	1.25	5.11	1.28	3.29	1.17
	Rural						
10	Low or medium rent	6.33	1.46	6.92	1.49	7.98	1.20
11	High rent	7.73	3.00	6.02	3.40	9.47	2.89
All types		4.89	0.36	8.18	0.39	6.94	0.35

SOURCE: Calculated by HASE staff from records in the rent-inflation analysis file for Site I.

easily analyzed, however, it is better to move on to gross rent, and later to shelter rent, than to attempt to read special significance into these differences.

Inflation in Gross Rent. By adding tenant payments for fuel and utilities to contract rent, Table 2.7 obtains estimates of the total cost of housing to the tenant, which are comparable across units even though the responsibility for paying the bills may be different.

Gross rent rose 4.9 percent in 1974, 8.2 percent in 1975, and 6.9 percent in 1976-77. Those rates are significantly larger than the corresponding rates for contract rent, which implies that tenants' fuel and utility bills increased much more than their contract rents.* Again, the rate varies by type of property as well as by year.

The entries in Table 2.7 do show some regularity. Most (9 of 11) of the individual stratum inflation rates estimated for 1975 are greater than the corresponding rates for 1974. Most (9 of 11) of the rates estimated with the combined 1976-77 data are also greater than the corresponding 1974 rates, although the 1976-77 estimates are usually (7 of 11) lower than the corresponding 1975 estimates. Within the estimates for each year there is also some regularity. In each case, the greatest inflation rate is for some grouping of single-family dwellings, and the lowest rate is associated with high-rent urban apartments.

The pattern of increases in gross rent shown in Table 2.7 is not, however, nearly as regular as the patterns we have estimated in previous studies. That is partly because of the greater detail we have been able to establish here. In our other studies, we were able to calculate only a single inflation rate for each sampling stratum; here we have estimated three for each stratum. Disaggregation increases the detail, but decreases the precision, of any set of estimates.

The pattern of inflation reported here for 1974 and 1975 is consistent with our previous causal hypothesis that most rent increases could be attributed to higher fuel costs. Our 1976 report on rent inflation in St. Joseph County, Indiana, contends as follows:

---

*See Sec. III for estimates of how housing costs are affected by changes in fuel and utility rates.

> The hypothesis that best explains the pattern is that most of the rent increases--whether in contract rent or in the cost of fuel and utilities billed to the tenant--are attributable to higher utility costs, particularly for heating fuel. We know from other data that single-family houses tend to be larger than units on large apartment properties. Single-family houses tend also to cost more to heat than apartments in multiunit structures, both because houses have more rooms and because they lose more heat through their exposed walls and roofs. A similar argument can be made, though with less force, for electricity consumption, the other large component of utility costs.
>
> When the price of heating fuel rises, the added dollar-cost per unit is thus greatest for single-family houses and least for apartments on large properties. On the other hand, the added dollar-cost will be about the same for a low-rent as for a high-rent unit (controlling for unit size); but it will be a smaller percentage increase for the high-rent unit.*

The data in Table 2.7 indicate that that explanation may no longer hold true after 1975. The pattern of inflation displayed by the 1976-77 estimates is decidedly less regular. Rent increases for single-family dwellings were no longer consistently larger than rent increases for apartments on small properties, and the rate of inflation for high-rent properties seems to have caught up with the rate for lower-priced properties. The meaning of those changes will be discussed further in the next section when we factor gross-rent inflation into its two major components: changes in shelter rent and changes in expenditures on fuels and utilities.

Inflation Rates by Size of Unit

Table 2.8 shows the rate of inflation in contract and gross rent according to number of rooms per unit. The samples for units with one and two rooms were small so they are combined. For a similar reason, units with six or more rooms were combined into one category.

The rate of contract-rent inflation varies less by size of unit than by type of property. The range of annual rates for contract rent is 3.4 to 5.7 percent. The rate of inflation in contract rent for all

---

*Lowry, *Inflation in the Standard Cost of Adequate Housing: Site I, 1973-1976*, p. 22.

Table 2.8

INFLATION IN CONTRACT AND GROSS RENT FOR DIFFERENT-SIZED UNITS, 1974-77

Number of Rooms	Annual Inflation Rate (%)					
	1974		1975		1976-77	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Contract Rent						
1 or 2	3.68	0.94	4.89	1.01	5.17	0.87
3	3.47	0.57	4.42	0.60	5.74	0.57
4	3.41	0.47	4.38	0.49	4.56	0.45
5	3.83	0.60	4.08	0.64	4.51	0.57
6+	5.32	0.85	5.08	0.92	4.32	0.81
All sizes	3.74	0.29	4.43	0.31	4.80	0.28
Gross Rent						
1 or 2	5.07	1.15	5.35	1.23	6.46	1.07
3	3.84	0.69	6.19	0.74	7.10	0.70
4	4.81	0.57	8.10	0.61	5.51	0.55
5	6.31	0.74	8.70	0.81	7.98	0.72
6+	4.30	1.02	12.63	1.20	10.11	1.04
All sizes	4.89	0.36	8.18	0.39	6.94	0.35

SOURCE: Calculated by HASE staff from records in the rent-inflation analysis file for Site I.

but the largest units slowly but steadily increased over the observation period. The rate of inflation for units with 6 or more rooms, on the other hand, shows a steady, gradual decline.

The estimated inflation rate for gross rent is much more volatile. Generally, it peaked in 1975 but was higher in 1976-77 than in 1974; however, there is much variability within that general pattern. Gross rent increased most for units with 6 or more rooms. We estimate that the inflation rate for those units almost tripled between 1974 and 1975, jumping from 4.3 to 12.6 percent, and that although it moderated somewhat in 1976-77 it remained above 10 percent. In Brown County most such larger units are medium- to high-rent single-family dwellings and duplexes, which casts further doubt on the hypothesis that the observed gross-rent inflation is mainly a result of increased fuel costs.

III. ESTIMATING INFLATION IN SHELTER RENT AND IN FUEL AND UTILITY EXPENDITURES, 1973-78

Changes in contract and gross rent indicate how much inflation has occurred in housing costs, but to explain the causes of that inflation we must separate changes in shelter rent from changes in fuel and utility expenditures. In Sec. II, we demonstrated that gross rent in Brown County rose more rapidly than contract rent from 1974 to 1977. Because the difference between gross and contract rent consists entirely of outlays for fuel and utility services billed directly to the tenant, that finding implies that increases in such outlays were responsible for much of the gross-rent inflation during the period. Indeed, since some of those items are usually billed to the landlord rather than to the tenant, the reported increase in contract rent must also reflect the higher cost of fuels and utility services.

In this section we first review the recent history of rate changes for each of the fuels and services whose costs are conventionally included in gross rent. They are fuels (energy sources) for lighting, operating household appliances, cooking, water heating, and space heating; piped water for bathing, washing, and garden use; and disposal of sewage and solid waste. Then we estimate how the rate changes have affected the monthly cost of operating a typical home in Brown County.* Finally we factor the increase in fuel and utility expenditures from

---

*The data used in this section were assembled by Paul F. Ernst for the Brown County HAO, and were used by him to estimate adjustments to standard allowances for fuel and utility expenses incurred by program participants. His computations and findings are reported in *Residential Utility Rate Changes in Brown County, Wisconsin, from September 1973 to January 1978*, Housing Allowance Office of Brown County, Inc., BC/HAO-2, January 1978. Generally, Ernst followed methods devised by Barbara M. Woodfill of Rand for the same purpose. His report provides convenient documentation of procedural details only generally described here. We use Ernst's and Woodfill's data and many of their computations for somewhat different purposes here--to estimate the amount of inflation in gross rent that is attributable to higher costs for fuels and utility services.

the gross-rent inflation estimate presented in Sec. II and derive estimates of yearly inflation rates for shelter rent in Brown County.

The analysis is complicated by both the intricacy of rate schedules and the coexistence of alternative domestic equipment using different fuels for such things as heating and cooking. However, we conclude that the total cost of fuel and utility services consumed by a typical renter household in Brown County increased by about 21 percent in 1974, 23 percent in 1975, and 16 percent in 1976. If fully reflected in gross rent, those added costs would account for about three quarters of the observed gross-rent inflation in 1974 and 1975 and about three-fifths of the gross-rent inflation observed in 1976. Shelter-rent increases were quite modest in 1974 and 1975; by 1977, however, they accounted for over half the total inflation in gross rent.

ESTIMATING CHANGES IN FUEL COST

Electricity, gas, and fuel oil are all used by households in Brown County but in different proportions and for varying purposes (see Table 3.1). Electricity is nearly always used for lighting and to operate household appliances. It competes primarily with piped or bottled gas for cooking and water heating. For space heating, piped gas and fuel oil are the principal competitors, though some households use bottled gas, kerosene, coal, or wood. Because the last four fuels account for only small fractions of all fuel consumed in residences, we excluded them entirely and dealt only with electricity, piped gas, and fuel oil in the analysis.

To obtain general estimates of household fuel expenditures at different times, we first estimated the amount of each fuel that a typical household would consume for a specified use, such as space heating. Then we applied the current rate schedule for each fuel that was usable for that function to estimate its cost--for example, the cost of heating a typical home alternatively by electricity, piped gas, and fuel oil. Next, we weighted each alternative cost estimate by the relative frequency with which Brown County households used that fuel for that function. The result was a weighted average fuel cost for each function. Summing over the functions yielded an estimate of the typical monthly fuel bill.

Table 3.1

DISTRIBUTION OF HOUSEHOLDS BY TYPE OF FUEL USED FOR SELECTED DOMESTIC FUNCTIONS: BROWN COUNTY, 1970

Fuel	Percentage of Households by Fuel Used for Function Indicated			
	Lighting, Appliances	Cooking	Water Heating	Space Heating
Electricity	100.0[a]	41.2	14.7	0.5
Piped gas	(b)	50.8	77.4	70.1
Bottled, tank, or LP gas	(a)	7.0	5.2	4.0
Fuel oil or kerosene	(a)	0.4	0.9	21.7
Coal or coke	--	(c)	0.4	3.2
Wood	--	0.4	--	0.3
Other	--	--	--	0.1
None	--	0.2	1.4	0.1
Total	100.0	100.0	100.0	100.0

SOURCE: Tabulated by National Planning Data Corporation from records of the 1970 Census of Housing, Fourth Count.

NOTE: Percentages may not add exactly to 100.0 because of rounding.

[a]Virtually all housing units in Brown County are lighted by electricity. A small number of farmhouses and seasonal homes may use bottled gas or kerosene.

[b]About 20 percent of all housing units have gas-powered clothes dryers.

[c]Less than 0.1 percent.

Fuel Consumption Norms by Function

The domestic fuel-consuming functions distinguished here are lighting and appliance operation, cooking, water heating, and space heating. The consumption norms for each (see Table 3.2) are based on average household consumption data from a variety of sources applying to the census region composed of Illinois, Indiana, Michigan, Ohio, and Wisconsin. The regional norms for space heating were adjusted to reflect specific meteorological conditions in Brown County.

Table 3.2

AVERAGE MONTHLY FUEL CONSUMPTION IN TYPICAL BROWN COUNTY HOUSEHOLD BY FUNCTION, 1970-75

Function	Fuel Consumption When Indicated Fuel Is Used		
	Electricity (kWh)	Gas (therms)	Fuel Oil (gal)
Lighting and appliances[a]	377	3[b]	(c)
Cooking	100	8	(c)
Water heating	380	24	(c)
Space heating	1,915	126	108

SOURCE: Kent Anderson, *Residential Energy Use: An Econometric Analysis,* The Rand Corporation, R-1297-NSF, October 1973; American Gas Association, *Info Data Sheet,* Nos. 74/1 and 74/2; Public Service Commission of Wisconsin, Accounts and Finance Division Bulletin No. 9, *Comparison of Net Monthly Bills for Electrical Utility Service in Wisconsin,* March 1973, and No. 10, *Comparison of Net Monthly Bills for Gas Service in Incorporated Wisconsin Communities with Over 500 Population,* January 1973; *U.S. Bureau of the Census, Detailed Housing Characteristics, Wisconsin,* 1970 statistics; and calculations by HASE staff.

NOTE: In the eastern North Central census region, consumption norms are generally based on an "average" housing unit of 5.2 rooms occupied by 3.7 persons.

[a]Fuel used for appliances is based on the average number of each appliance per household in 1970, as follows: refrigerator (1.00), television (1.16), clothes washer (0.53), clothes dryer (0.55), freezer (0.36), dishwasher (0.14), other small appliance (1.00).

[b]Gas-powered clothes dryer, used by about 20 percent of all households.

[c]Fuel oil is rarely used for this purpose.

Applying Rate Schedules to Fuel Consumption Norms

Applying electricity and gas rate schedules* to functional consumption norms is complicated because there is a fixed charge for each

*Rate schedules for each of the three fuels are reported in Appendix B for various dates from September 1973 through January 1978.

service; moreover, the variable charge per kilowatt-hour or therm drops as the amount consumed increases. Therefore, someone using electricity for lighting, cooking, and water heating pays less per kilowatt-hour than someone using electricity only for lighting. Also, rates differ slightly for urban and rural customers.

The first problem was handled by ordering the functions, applying the fixed charge to the first function, and assuming that use of a fuel for a higher-order function implied use of the same fuel for all lower-order functions. For electricity, the order was lighting and appliances, cooking, water heating, and space heating. The fixed charge was allocated to lighting and appliances, and anyone who used electricity for water heating was assumed to use it also for the two preceding functions. The cost of heating water with electricity was then calculated at the lower marginal rate applicable to a heavy user.

Separate fuel cost estimates were prepared for urban and rural users to reflect the different rates applicable to them; the Brown County HAO uses the separate schedules to estimate "actual" housing costs for individual clients. Here, however, the estimates of fuel costs are based only on the urban rate schedules, which apply to about 80 percent of all Brown County households.

Table 3.3 shows the estimated monthly cost of each fuel, by function, when consumed in the amounts shown in Table 3.2. Estimates are given for various months in 1973-78. The last column of the table shows a weighted average, constructed by weighting the cost for each fuel according to the proportion of all households using it for the purpose indicated. Under the rates applicable in September 1973, the composite monthly fuel bill for a typical household would have been $34.77; in January 1978, the bill for the same amounts of fuel would have been $64.25, an increase of 85 percent.*

ESTIMATING CHANGES IN THE COST OF OTHER UTILITIES

Other utilities whose costs are conventionally included in gross rent are water and sewer service and garbage collection. In Brown

*See note to Table 3.3 for qualifications.

Table 3.3

AVERAGE MONTHLY FUEL COST FOR TYPICAL BROWN COUNTY HOUSEHOLD BY FUNCTION, 1973-78

Function	Cost ($) of Fuel If Used for Function Indicated			Weighted Average Cost ($), All Fuels
	Electricity	Gas	Fuel Oil	
September 1973				
Lighting and appliances	11.65	(a)	(b)	11.65
Cooking	2.56	2.09	(b)	2.30
Water heating	9.01	3.40	(b)	4.30
Space heating	40.88	13.53	25.97	16.52
Total	64.10	19.02	25.97	34.77
February 1975				
Lighting and appliances	16.20	(a)	(b)	16.20
Cooking	2.81	3.10	(b)	2.97
Water heating	10.67	4.06	(b)	5.12
Space heating	50.80	16.88	37.07	21.73
Total	80.48	24.04	37.07	46.02
February 1976				
Lighting and appliances	19.02	(a)	(b)	19.02
Cooking	3.41	3.29	(b)	3.35
Water heating	12.94	4.55	(b)	5.89
Space heating	61.89	19.39	42.12	24.85
Total	97.26	27.23	42.12	53.11
January 1977				
Lighting and appliances	18.46	(a)	(b)	18.46
Cooking	3.56	3.94	(b)	3.77
Water heating	13.54	5.58	(b)	6.85
Space heating	66.47	26.42	47.02	31.36
Total	102.03	35.94	47.02	60.44
January 1978				
Lighting and appliances	18.82	(a)	(b)	18.82
Cooking	3.66	4.08	(b)	3.89
Water heating	13.90	6.01	(b)	7.27
Space heating	68.28	28.69	51.95	34.27
Total	104.66	38.78	51.95	64.25

SOURCE: Calculated by HASE staff from data in Tables 3.1, 3.2, B.1, B.2, and B.3.

NOTE: Average monthly cost for each fuel is based on consumption norms for that fuel in an average month of any calendar year, and on rate schedules in effect for the months indicated. The weighted average for all fuels weights each fuel according to the proportion of all households consuming it for the use indicated.

[a]To simplify calculations, fuel costs for gas-powered clothes dryers are excluded. See Table 3.2.

[b]Fuel oil is rarely used for this purpose.

County those services are with minor exceptions provided by local governments, each of which sets rates within its jurisdiction. In 1973, the two largest jurisdictions funded sewer service and garbage collection from general property tax revenues; beginning in 1975, both shifted to user charges for sewer service.

To estimate typical household expenditures for those services at different times, we applied the effective rate schedules to consumption norms, just as we did for fuel expenditures. It was necessary, however, to construct separate expenditure estimates for each jurisdiction that had a different rate schedule and then to compile a countywide average expenditure, weighting the amounts calculated for each jurisdiction by the share of the county's population in that jurisdiction.

We treated utility services funded from general property tax revenues as though they were free to the user, since the taxes on his home were unaffected by his consumption of the service. As a matter of interest, we do report estimates of the costs to local governments of providing those services.

Water Service

Water is supplied to residential customers by nine local governments, the seven largest of which serve about 84 percent of the county's population.* All seven bill their customers quarterly according to gallons consumed; after a minimum charge, the rate drops as consumption rises.**

According to local authorities, the typical household in Brown County consumes 20,000 gal of water per quarter, or 6,667 gal monthly. Table 3.4 shows the charge for that amount of water by jurisdiction for various months in 1973-78. The weighted average across jurisdictions rose from $3.82 in September 1973 to $4.44 in January 1978.

---

*The other two public systems are in small rural villages. The remaining rural homes are supplied mostly by private wells.

**For each of the seven jurisdictions the rate schedules in effect from September 1973 through January 1978 are shown in Appendix Table B.4.

Table 3.4

AVERAGE MONTHLY COST OF WATER SERVICE FOR TYPICAL BROWN COUNTY HOUSEHOLD BY JURISDICTION, 1973-78

Jurisdiction	Percent of Population Covered	Cost ($)[a]				
		September 1973	February 1975	February 1976	January 1977	January 1978
City of Green Bay	63.3	4.11	4.11	4.61	4.61	4.61
City of DePere	10.4	4.00	4.00	4.00	4.00	4.00
Town of Allouez	10.6	3.00	4.09	4.09	4.39	4.39
Village of Howard	4.2	3.17	4.36	4.36	4.36	4.36
Village of Ashwaubenon	8.7	2.67	2.67	2.67	2.67	3.78
Village of Pulaski	1.2	3.33	3.33	3.33	3.33	3.33
Town of Bellevue	1.5	5.42	5.42	5.42	5.42	5.42
All	100.0	3.82[b]	3.99[b]	4.31[b]	4.34[b]	4.44[b]

SOURCE: Appendix Table B.4, and calculations by HASE staff. Population estimates by jurisdiction are from U.S. Bureau of the Census, *1973 Population and 1972 Per Capita Income Estimates for Counties, Incorporated Places, and Selected Minor Civil Divisions in Wisconsin,* Current Population Reports, Series P-25, No. 594, June 1975.

NOTE: Percentages do not add exactly to 100.0 because of rounding. The seven jurisdictions for which rate schedules were available contain 84 percent of the county's population and 97 percent of those served by a public water supply.

[a]Based on average monthly consumption of 6,667 gallons and rate schedules for September 1973, January 1975, February 1976, January 1977, and January 1978.

[b]Average of monthly costs by jurisdiction, each jurisdiction weighted by its share of total population.

Sewer Service

The seven local governments that supply water to their constituents also provide sewer service, either directly or by contracting with a newly formed metropolitan sewer district. In 1973 Green Bay and Allouez covered the cost of that service by a general property tax levy, while all other jurisdictions levied quarterly user charges based on the amount of water metered to the customer. In 1975, Green Bay and Allouez shifted to user charges.* We calculated monthly costs based on water consumption of 6,667 gal per month. The results are shown in Table 3.5.

*Rate schedules for sewer service in each jurisdiction are given in Appendix Table B.5 for September 1973 through January 1978.

Table 3.5

AVERAGE MONTHLY COST OF SEWER SERVICE FOR TYPICAL BROWN COUNTY HOUSEHOLD BY JURISDICTION, 1973-78

Jurisdiction	Percent of Population Covered	Cost ($)[a]				
		September 1973	February 1975	February 1976	January 1977	January 1978
City of Green Bay	63.3	(b)	(b)	5.07	6.22	7.11
City of DePere	10.4	2.00	2.00	2.00	7.33	7.33
Town of Allouez	10.6	(b)	(b)	4.67	4.67	7.33
Village of Howard	4.2	3.96	3.96	9.16	6.73	8.87
Village of Ashwaubenon	8.7	2.40	2.40	3.75	3.75	3.75
Village of Pulaski	1.2	3.33	3.33	3.33	3.33	3.33
Town of Bellevue	1.5	2.00	2.00	5.56	4.40	6.67
All	100.0	(c)	(c)	4.75[d]	5.91[d]	6.88[d]

SOURCE: Appendix Table B.5, and calculations by HASE staff. See Table 3.4 for source and notes on percentages.

[a]Based on monthly water consumption of 6,667 gallons, except as noted. Costs are calculated from rate schedules for September 1973, January 1975, February 1976, January 1977, and January 1978.

[b]Sewage charge included in general property tax levy, at $3.20 per $1,000 of assessed valuation for Green Bay and $2.775 per $1,000 of assessed valuation for Allouez.

[c]Not computed because nearly 75 percent of the population covered did not pay user charges.

[d]Average of monthly costs by jurisdiction, each jurisdiction weighted by its share of total population.

In comparing the cost of sewer service for 1973 and later years, we decided to treat the 1973 cost as zero, since user charges were then imposed on only a fourth of all households in the seven jurisdictions and only a fifth of all households in the county. Although specific tax levies in Green Bay and Allouez were earmarked for sewer service, the amounts paid varied with property value, not use of the service; and when those jurisdictions shifted to user charges their property tax rates were not reduced.

Garbage Collection

Solid waste collection costs are included in the general property tax in most jurisdictions in Brown County. The user is charged directly only in Howard Village and a few rural areas. Because of the general

absence of user charges, we excluded the costs of garbage collection from our analysis of inflation.

As a matter of information, however, we asked local officials for estimates of the cost of providing that service in 1973 and 1975. In Howard, user charges were $3.00 per month in both 1973 and 1975. In Green Bay, the largest jurisdiction, the solid waste collection budget averaged $2.87 per month per household served in 1973 and $3.53 in 1975, an increase of about 11 percent annually. Estimates of cost in other jurisdictions were similar except for Allouez, where an unusually efficient collection system brought costs down to $2.00 per month for residential customers. Generally, garbage collection costs more in rural than in urban areas because the low density of customers necessitates more travel between pickups.

SUMMARY OF COST CHANGES, 1973-1978

Table 3.6 compares fuel and utility service costs for a typical urban household in Brown County in September 1973, February 1975,

Table 3.6

SUMMARY OF MONTHLY FUEL AND UTILITY COSTS FOR TYPICAL BROWN COUNTY URBAN HOUSEHOLD, 1973-78

Item	Cost ($)				
	September 1973	February 1975	February 1976	January 1977	January 1978
Fuel, by Use					
Lighting and appliances[a]	11.65	16.20	19.02	18.46	18.82
Cooking	2.30	2.97	3.35	3.77	3.89
Water heating	4.30	5.12	5.89	6.85	7.27
Space heating	16.52	21.73	24.85	31.36	34.27
Total	34.77	46.02	53.11	60.44	64.25
Other Utilities					
Water service	3.82	3.99	4.31	4.34	4.44
Sewer service	(b)	(b)	4.75	5.91	6.88
Garbage collection	(c)	(c)	(c)	(c)	(c)
Total	3.82	3.99	9.06	10.25	11.32
Total	38.59	50.01	62.17	70.69	75.57

SOURCE: Tables 3.3, 3.4, and 3.5.

NOTE: Estimates are generally based on a "typical" housing unit of 5.2 rooms occupied by a household of 3.7 persons. All costs are calculated by applying effective rates for the fuel or utility in question to consumption norms for the typical housing unit.

[a] Includes monthly fixed charge for electricity.

[b] Included in general property tax for households in Green Bay and Allouez in 1973 and early 1975. Later in 1975, both shifted to direct user charges.

[c] Included in general property tax for nearly all urban households. The estimated cost per household in Green Bay was $2.87 in 1973, $3.53 in 1975, $3.84 in 1976, and $3.92 in 1977.

February 1976, January 1977, and January 1978, summarizing the estimates presented earlier in this section. For rental units, some of these costs are usually included in contract rent; others are billed directly to the tenant.

Over the full period, we estimate that fuel costs increased by 85 percent and that user charges for other utilities increased by 196 percent, mainly because two large jurisdictions began charging users directly for sewer service in 1975. Combining fuel and utilities, the overall cost increase was nearly 96 percent. Table 3.7 estimates the annual inflation rates for fuel and utility costs in segments of the period. The highest rate is in the 1975 period, when costs rose by more than 24 percent. The lowest estimate is in the most recent period, 1977, when fuel and utility costs rose by less than 7 percent.

Table 3.7

ESTIMATED ANNUAL INFLATION IN FUEL AND UTILITY COSTS FOR TYPICAL BROWN COUNTY URBAN HOUSEHOLD, 1973-78

Period	Inflation Rate (%)
September 1973 to February 1975	20.9
February 1975 to February 1976	24.3
February 1976 to January 1977	15.0
January 1977 to January 1978	6.9
September 1973 to January 1978	16.8

SOURCE: Calculated by HASE staff from data in Table 3.6.

ESTIMATING CHANGES IN SHELTER RENT

Shelter rent, the amount paid for direct housing services, may conveniently be calculated by subtracting fuel and utility expenditures from gross rent. Table 3.8 estimates gross rent and its components--fuel and utility expenditures and shelter rent--for a typical urban rental dwelling in Brown County from 1974 to 1978. The annual inflation rates implied by those estimates are shown in Table 3.9.

Table 3.8

AVERAGE MONTHLY EXPENDITURE FOR GROSS RENT AND ITS COMPONENTS: TYPICAL BROWN COUNTY URBAN HOUSEHOLD, 1974-78

Item	Expenditure ($)				
	January 1974	January 1975	January 1976	January 1977	January 1978
Shelter rent	128.89	131.03	135.40	141.44	153.48
Fuel and utilities	41.11	49.70	61.05	70.69	75.57
Total (gross rent)	170.00	180.73	196.45	212.13	229.05

SOURCE: Calculated by HASE staff from data in Tables 2.8, 3.6, and 3.7.

NOTE: Estimates are for a 5-room dwelling meeting HAO standards and renting for $170 (including fuel and utilities) in January 1974. Gross-rent inflation was estimated from survey data for the years indicated; inflation in fuel and utility expenses was estimated from consumption norms and local rate schedules. Shelter-rent inflation was derived as a residual.

Table 3.9

COMPONENTS OF GROSS-RENT CHANGE FOR TYPICAL BROWN COUNTY HOUSEHOLD, 1974-77

Item	1974	1975	1976	1977
Annual Change (%)				
Shelter rent	1.7	3.3	4.5	8.5
Fuel and utilities	20.9	22.8	15.8	6.9
Gross rent	6.3	8.7	8.0	8.0
Contribution to Change in Gross Rent (%)				
Shelter rent	1.3	2.4	3.1	5.7
Fuel and utilities	5.0	6.3	4.9	2.3

SOURCE: Computed by HASE staff from data in Tables 2.8 and 3.8.

The estimates of annual changes in fuel and utility expenditures for the calendar years indicated are nearly the same as the estimates in Table 3.7 for slightly different periods. The estimates of yearly percentage changes in shelter rent and fuel and utility expenditures are computed from the data in Table 3.8; they show that through 1976 shelter rent increased at a much lower rate than either fuel and utility expenditures or gross rent.

The lower portion of Table 3.9 shows the contribution made by the changes in shelter rent and in fuel and utility expenditures to the gross-rent inflation rate. For example, in 1976 we estimate that the shelter-rent increase is responsible for a 3.1 percent increase in gross rent, and that the increase in expenditures for fuels and utilities is responsible for the other 4.9 percent of the total 8.0 percent gross-rent inflation rate. Those estimates illustrate the pattern of inflation in Brown County from 1974 through 1977.

The cost of fuel and utilities rose quite rapidly in 1974 and 1975. Since then the rate of increase has moderated substantially. The portion of those costs paid by tenants is an immediate increase in their gross rent. Increases in fuel and utility costs paid by landlords, however, are not reflected in gross rent until they are passed along to tenants in the form of increased contract rent. Thus large changes in the costs of fuels and utilities both immediately affect the gross-rent inflation rate and signal future changes in gross rent.*

The data show some competition between fuel and utility inflation and shelter-rent inflation, as if landlords were unwilling or unable to increase shelter rent substantially during a time of large fuel cost increases. That seems especially true in 1974. As fuel cost rises have moderated in the more recent years, inflation in contract rent and shelter rent has increased. In 1977 the contribution of shelter-rent increases to gross-rent inflation was larger than the contribution made by fuel and utility expenditures.

---

*Appendix C analyzes the relationship between price increases for fuel oil and rent changes in Brown County. We conclude that landlords had passed about two-thirds of their 1973-74 fuel cost increases to their tenants during the same year.

IV. ESTIMATING INFLATION IN GROSS RENT, 1973-78

This section estimates the increase in gross rent in Brown County from September 1973 through March 1978. The survey data discussed in Secs. I and II on the housing expenditures of county residents adequately describe inflation from 1973 through early 1977. Is it valid simply to extrapolate those estimated inflation rates over the entire period, or should they be adjusted upward or downward?

EVIDENCE FROM SURVEYS AND THE UTILITIES

The inflation rates estimated in Table 2.7 accurately reflect the pattern of inflation in Brown County from 1974 through early 1977. We judge that the 1974 estimates are also applicable to the period September to December 1973. The validity of extrapolating the 1976-77 estimates to cover the last nine months of 1977 and the first quarter of 1978 is less obvious.

As mentioned above (pp. 21-22), we originally estimated separate inflation rates for 1977; but the survey data only covered the first three months of the year, and the estimates were so imprecise that they were statistically indistinguishable from the 1976 estimates. However, they suggest that the rate of gross-rent inflation was higher in the first quarter of 1977 than in 1976. In contrast, the evidence in Sec. III--that the rate of inflation in fuel and utility costs was quite high in 1974 and 1975, moderated somewhat in 1976, and was substantially lower in 1977--indicates less inflationary pressure on gross rent in 1977, suggesting that our 1976-77 estimates are too high to extrapolate over the period April 1977 through March 1978.

EVIDENCE FROM GOVERNMENT INDEXES OF INFLATION

Price indexes from the U.S. Bureau of Labor Statistics are shown in Table 4.1. The consumer price index of residential rent (equivalent to our measure of contract rent), computed over all cities sampled in the United States, increased faster in 1976 and 1977 than in 1974 or 1975. Residential rent for the sample composed of Green Bay, Wisconsin,

Table 4.1

ANNUAL RENT INFLATION IN THE NATION,
NORTH CENTRAL CENSUS REGION,
AND "C" CITIES, 1974-77

Item	Inflation Rate (%)			
	1974	1975	1976	1977
Nation[a]				
All items	12.2	6.8	9.8	6.8
Housing	13.7	7.4	5.7	7.5
Housing components:				
Residential rent	5.4	5.4	5.9	6.2
Fuel oil and coal	32.4	8.7	9.2	8.6
Gas and electricity	19.6	12.0	13.8	7.6
North Central Region				
All items	11.9	6.8	5.0	7.2
Housing	13.5	7.9	6.0	8.2
"C" Cities in North Central Region[b]				
Housing components:				
Residential rent	4.6	5.0	7.1	5.7
Fuel oil	32.8	12.4	5.5	9.1
Gas	20.9	14.7	30.7	5.0
Electricity	21.7	15.5	2.1	8.3

SOURCE: Tabulated by HASE staff from data in the *Monthly Labor Review* and special information supplied by the U.S. Bureau of the Census.

[a]U.S. city average for the consumer price index.

[b]Cities of "C" size had a population of 50,000-249,999 in 1960. This sample consists of Champaign-Urbana, Illinois, and Green Bay, Wisconsin.

and Champaign-Urbana, Illinois, behaved similarly, although the rate of increase in that index was less in 1977 than in 1976.

The national index of housing, which is roughly equivalent to our measure of gross rent, displays a different pattern. It rose rapidly in 1974 and 1976, more slowly in 1975 and 1977. There is no housing index for the Green Bay sample, but we can tell from the local fuel

and utility schedules that any composite index of gross rent constructed from those elements would probably show less of an increase in 1977 than in 1976.

Therefore, the evidence is still inconclusive. The national and regional indexes indicate that gross-rent inflation increased in 1977, but the more specific index for Green Bay and Champaign-Urbana indicates that the rate may have fallen.

RENT INFLATION EXPERIENCED BY PROGRAM PARTICIPANTS

The final source of data to investigate is HAO records of the housing expenses of families who have received housing allowances. We examined those records--some as recent as December 1977--to appraise the inflationary pressures in Brown County through 1977. The contract rent of a household is recorded when the household first enrolls in the program, after the household and its dwelling have been certified and allowance payments have been approved, and semiannually thereafter, or whenever the client reports a change in income, family status, tenure, or place of residence. Since the information pertains to program participants only, it does not reflect the entire housing market and should not be used directly to measure changes in R^*. It does, however, indicate conditions in the local market.

We use the HAO data for two investigations of rent change. First, we compare the contract rents paid for the first certified dwellings occupied by successive monthly cohorts of program participants. We find that the average first contract rent has increased since the program began and that the rate of increase was perhaps greater in 1977 than earlier. Whereas the contract rent throughout Brown County rose about 4.5 percent per year from 1974 through 1976 (Sec. II), the first contract rent for program participants rose about 2 percent per year between June 1974 and December 1976 and about 5 percent in 1977.

The second analysis considers contract-rent changes for program participants after they obtain certified housing. We find that the average annual rate of change in contract rent for all program

participants is 3.2 percent. For participants who have received payments for more than one year and who have not moved, the inflation rate is 1.4 percent.

First Recorded Rent for Participant Cohorts, 1974-77

The Rand office in Brown County periodically analyzes the influence of moving, size of household, and passage of time on the rents of monthly cohorts of enrollees as they qualify for allowance payments. Here we extend that analysis by testing whether first rents increased faster after the beginning of 1977. We find that the 1977 rate of increase is more than twice the rate experienced in 1974-1976 and that the difference between the rates is statistically significant.

Key statistics from the three regressions of interest are shown in Table 4.2. Separate estimates were calculated for 1974-76 and for 1977; then the data were pooled and estimates were calculated for the entire period. The intercept and the household size and mover coefficients were constrained to a single value for the entire period but the month coefficient was allowed to differentiate between 1974-76 and 1977.

We estimate that the average rate of increase in first contract rent was 2.1 percent per year in the earlier period and about 5 percent in 1977. Virtually the same estimates are obtained from the divided and the pooled observations, and statistical tests indicate that the large difference in rates is not due to random sampling error.

The 1974-76 rate of 2.1 percent is substantially lower than the contract-rent inflation rates estimated in Table 2.7: 3.7 percent in 1974, 4.4 percent in 1975, and 4.8 percent in 1976-77. If we assume that program participants are concentrated in low-rent housing, the difference is even more pronounced. Table 2.5 showed that the contract-rent inflation rate for low-rent, single-family housing was greater than 5 percent in all three periods.

However, intercohort rent changes are equivalent to rent inflation only if we assume that successive cohorts occupied dwellings of the same average size and quality. The more rapid intercohort increase after 1976 could reflect either rent inflation or a change in cohort housing

Table 4.2

REGRESSION ESTIMATES OF INFLUENCES ON FIRST CONTRACT RENT PAID BY MONTHLY COHORTS OF ENROLLEES, JUNE 1974 THROUGH DECEMBER 1977

Period	Coefficient Estimates				Equation Statistics		Inflation Statistics	
	Constant	Household Size	Mover	Month	$\bar{R}^2$	F	Average Rent	Inflation Rate[a]
June 1974 through December 1976	95.18	12.80[b]	17.51[b]	0.25[b]	0.44	66.6	142.40	2.1
January through December 1977	97.58	13.10[b]	5.87[b]	0.66[b]	0.32	17.0	161.44	5.0
June 1974 through December 1977	96.28	12.87[b]	14.20[b]	0.26/0.61[b,c]	0.45	72.3	147.79	2.1/5.1[c]

SOURCE: Analysis by HASE staff of HAO records of program participants in Site I.

[a]Average annual inflation rate of contract rent with respect to time. It is computed using the month coefficient and the average value of the contract-rent variable. The coefficients are statistically different at the 0.05 level of significance.

[b]This estimate is statistically different from zero at the 0.05 level of significance.

[c]The first estimate refers to June 1974 through December 1976 and the second to 1977.

consumption, perhaps because the characteristics of enrollees, and thus their housing choices, shifted. At present, we cannot rule out the latter possibility.

Rent Changes for Program Participants, 1974-77

We calculated annual inflation rates for the contract rent of those receiving allowance payments in June 1977, using their rent when the housing unit was first certified, that for June 1977, and the elapsed time between. Such rates are meaningful only if they reflect actual changes in the price of rental housing. To control for the two factors that could bias the rates--whether a client moved and whether he lived in a dwelling less than a year--we performed additional calculations.

Reported contract rent may change either because the rent changes or because the client moves to another unit. When a household moves, the rent of the new home does not usually equal that of the old; and rent changes are more likely to reflect changes in the size or quality of the dwelling than actual price changes. Consequently, we computed separate rates of change for movers and nonmovers.

We also allowed for the length of time households had participated in the allowance program. Rents usually change once a year. Thus, records for households that have received allowance payments for less than a year may not show any rent changes even though their units may be scheduled for substantial increases. We therefore estimated separate inflation rates for various lengths of time, as shown in Table 4.3. Of the 1,889 households that were receiving allowance payments in June 1977, 1,378 (73 percent) had resided in the same housing unit all the time they had been in the program; 1,147 (61 percent) had received payments for over 12 months; 734 (almost 40 percent) satisfied both criteria. We think the annual rate calculated using the records of nonmovers who had been receiving payments for over a year should closely approximate the true inflation rate for all participant renters in Brown County.

Table 4.3

RENT CHANGE AMONG PARTICIPANT HOUSEHOLDS

Household Status	Rent Decreased	No Rent Change	Rent Increased	Total
Received allowance 6 months or less:				
Stayed in initial unit	0	339	1	340
Moved to another unit	9	0	11	20
Total	9	339	12	360
Received allowance 7 to 12 months:				
Stayed in initial unit	0	301	3	304
Moved to another unit	31	6	41	78
Total	31	307	44	382
Received allowance longer than 1 year:				
Stayed in initial unit	5	555	174	734
Moved to another unit	92	24	297	413
Total	97	579	471	1,147
All households	137	1,225	527	1,889

SOURCE: Tabulated by HASE staff from HAO records for Site I through June 1977.

NOTE: Data base consists of 1,889 renter households living in certified units and receiving allowance payments at the end of the program's third year.

Table 4.4 shows the annual percentage rates of change in contract rent for program participants. The rates vary markedly between groups. Several relationships stand out:

- The rent of short-timers who did not move rarely increased.
- Households that moved after receiving allowances generally moved to more expensive housing. The rate of change for that group comprises some unknown mixture of price, size, and quality changes.
- Nonmover households receiving payments for over a year had scattered, moderate rent increases.

Table 4.4

ANNUAL INCREASES IN CONTRACT RENT FOR PROGRAM PARTICIPANTS

Household Status	Rate of Increase (%)		
	Nonmovers	Movers	All
Received allowance 6 months or less	0.1	17.1	1.0
Received allowance 7 to 12 months	0.1	7.6	1.6
Received allowance longer than 1 year	1.4	9.7	4.4
All households	0.8	9.7	3.2

SOURCE: Calculated by HASE staff from HAO records for Brown County through June 1977.

NOTE: Data base consists of 1,889 renter households living in certified units and receiving allowance payments at the end of the program's third year.

Our best estimate of the inflation rate in contract rent for program participants--the rate for nonmovers who had received payments for over a year--is 1.4 percent. It is again substantially below the 4.5 percent calculated with data from the surveys of all county residents. Perhaps the inflation rate for program participants is indeed lower than for nonparticipants. However, our chosen estimate excludes dwellings that had a change of tenants. If landlords withhold major rent increases until their tenants move, the combined mover and nonmover estimate of 4.4 percent may be closer to the mark. Although that rate undoubtedly reflects movers' increased housing consumption, it is quite close to the survey estimate for all rental units.

ESTIMATING INFLATION IN GROSS RENT, 1973-78

The evidence of gross-rent inflation after early 1977 is both indirect and conflicting. The rate of increase in fuel and utility prices seems to have dropped substantially. However, some tentative estimates of rent inflation in 1977 indicate that gross rent, and by implication shelter rent, increased even faster in 1977 than in 1976. In 1977 national and regional rent indicators turned up, but a disaggregated index based partially on Green Bay data turned down. Rent for those just joining the allowance program appears to have increased

faster in 1977 than in earlier years, but for households already in the program, subsequent rent increases appear to be below the national, regional, and even the county average.

In view of the conflicting evidence, we conclude that the best estimate of inflation for April 1977 through March 1978 is provided by a simple extrapolation of the estimate for January 1976 to March 1977. Such an extrapolation yields the inflation estimates in Table 4.5. The last two columns show averages of the three individual annual rates, weighted as described in the footnote. Those averages will be used to compute the recommended increase in R^*.

Table 4.5

RENT INFLATION BY SIZE OF UNIT, 1973-78

Number of Rooms	Annual Inflation Rate (%)			Average Annual Rate (%), 1973-78		54-Month Equivalent Rate (%)	
	1974	1975	1976-77	Mean	Standard Error	Mean	Standard Error
Contract Rent							
1 or 2	3.68	4.89	5.17	4.69	0.49	22.90	2.58
3	3.47	4.42	5.74	4.81	0.31	23.57	1.64
4	3.41	4.38	4.56	4.20	0.25	20.33	1.30
5	3.83	4.08	4.51	4.23	0.32	20.47	1.65
6+	5.32	5.08	4.32	4.77	0.45	23.32	2.37
All sizes	3.74	4.43	4.80	4.42	0.16	21.50	0.82
Gross Rent							
1 or 2	5.07	5.35	6.46	5.82	0.60	29.01	3.29
3	3.84	6.19	7.10	5.98	0.38	29.88	2.09
4	4.81	8.10	5.51	5.88	0.31	29.33	1.69
5	6.31	8.70	7.98	7.67	0.40	39.47	2.33
6+	4.30	12.63	10.11	9.01	0.57	47.44	3.44
All sizes	4.89	8.18	6.94	6.64	0.19	33.55	1.10

SOURCE: Calculated by HASE staff from records of the rent-inflation analysis file for Site I.

[a]The 1973-78 average annual rate is weighted in the following manner: 15 months of the 1974 estimated rate (to include the last 3 months of 1973 after approval of the initial R^* schedule); 12 months of the 1975 rate; and 27 months of the combined 1976-77 rate (to include the first 3 months of 1978).

V. CONCLUSIONS

This analysis of inflation in housing costs has addressed two questions, both important in deciding whether and by how much the schedule of the standard cost of adequate housing R^* needs to be revised.

- By how much have housing costs risen since the original schedule was designed?
- To what extent is the allowance program itself responsible for inflation in housing costs?

Although the housing allowance program serves both renters and homeowners, it is easier to measure housing costs for renters because nearly all a renter's costs are reflected in explicit payments to others. Furthermore, if the allowance program had disturbed prices in the local housing market, the effects would probably be greater in the rental than in the ownership market. For both reasons, we focused on rental housing to answer the questions posed above, drawing on four sources of data.

First, we analyzed data from the field surveys of renter households in Brown County, which are conducted periodically as part of the Supply Experiment. We compared contract rents and tenant payments for fuel and utility services reported for specific housing units in successive surveys. Because the housing units surveyed were a probability sample of all rental units in the county, we are able to generalize from them to the market as a whole and to specific sectors of it. However, the data only cover September 1973 through March 1977.

Second, we obtained rate schedules from public utilities, local governments, and retailers of fuel oil and calculated the changes in fuel prices and utility service charges between September 1973 and January 1977. Those data were used to estimate changes in the costs of fuel and utility services consumed by typical renter households in Brown County, whether they were billed to the landlord or to the

tenant. We next compared the local data with national and regional indexes of rent and fuel costs from September 1973 to December 1977 compiled by the U.S. Bureau of Labor Statistics.

Finally, we reviewed the administrative records of the Brown County allowance program, comparing the rent participants paid before enrolling in the program with the rent they paid in June 1977, at the end of the program's third year; and comparing the first program rent of all enrollees from June 1974 through December 1977.

Although the four sources of data deal with different aspects of the inflation issue and cover different spans of time, they tell a consistent story, summarized below:

- Between 1974 and 1977, contract rent in Brown County increased at an average annual rate of about 4.4 percent. Gross rent, which includes fuel and utility services billed to tenants, increased at an average annual rate of about 6.6 percent.
- The inflation rate varied markedly in different sectors of the rental market. It was higher for single-family homes than for apartments and higher for low-rent units than for high-rent units. For example, the gross rent for low-rent single-family homes increased by over 9 percent annually, while gross rent for high-rent apartments in large buildings increased by less than 4 percent annually.
- The inflation rate also differed over time. Contract-rent inflation increased slowly between 1974 and the early months of 1977. The rate of increase in gross rent, however, seems to have peaked in 1975, when most households experienced the full effects of increased fuel prices. The data also show that over 1975-77, rent increased most (in both absolute and percentage terms) for the larger units, most of which are single-family houses.
- There was apparently some competition between fuel cost and shelter-rent increases, as though landlords were unwilling or unable to increase shelter rent substantially during a

time of large fuel cost increases. That was especially true in 1974. As fuel cost increases have moderated in more recent years, contract-rent and shelter-rent inflation have increased.

- Our data adequately cover the events from late 1973 through early 1977. We have some information subsequent to early 1977, but it is both indirect and conflicting. The rate of increase in fuel and utility costs appears to have moderated even further. However, tentative estimates of rent inflation for 1977 indicate that gross rent, and by implication shelter rent, increased even faster in 1977 than in 1976. Under those circumstances we conclude that the best estimate of inflation for April 1977 to April 1978 is provided by a simple extrapolation of the estimate for January 1976 through March 1977.
- We have no evidence that the allowance program has added to the rate of inflation in housing costs in Brown County. The overall rate of gross-rent inflation, the increased rate for single-family dwellings, and the shift in emphasis from fuel cost increases to shelter-rent increases are all consistent with national and regional trends. Participants' rent increases have been consistently below marketwide averages.

RECOMMENDATIONS FOR COMPENSATING CHANGES IN R^*

The evidence is clear that housing costs in Brown County have risen enough to require another compensating increase in the schedule of the standard cost of adequate housing. Otherwise, program participants will find it increasingly difficult to afford housing that meets program standards, and some households who need assistance will be denied it because the now-obsolete schedule of R^* also defines the income limits for eligibility.

The initial September 1973 R^* schedule has been adjusted twice. In April 1976 it was increased to compensate for inflation, mainly in fuel and utility costs. At that time it was also realigned to increase payments to smaller households and to decrease payments to larger households. In April 1977 it was increased again by a flat 6 percent

to compensate for further increases in fuel and utility costs. Those changes are shown in Table 5.1.

Table 5.1

CHANGES IN R^*: BROWN COUNTY, 1976 AND 1977

HAO Occupancy Standard		Standard Cost of Adequate Housing ($ per month)			
			April 1976		
Number of Persons	Number of Rooms	September 1973 Schedule	Realignment	Increase for Inflation	April 1977 Increase for Inflation
1	1-2	100	+10	15	5
2	1-3	125	+ 5	15	10
3-4	4	155	--	20	10
5-6	5	170	--	25	10
7-8	6	190	-10	30	10
9+	6	220	-15	25	15

SOURCE: Occupancy standards, original schedule, and April 1976 realignment are from Table 1.4; April 1976 inflation adjustment is from Lowry, *Inflation in the Standard Cost of Adequate Housing, Site I, 1973-1976;* April 1977 adjustment from letter to HUD by Charles E. Nelson, 15 February 1977.

Table 5.2 presents our recommendations for a new schedule to become effective April 1978.* Drawing on the analysis in Sec. II, we have calculated the adjustments to the schedule implied by the rates of increase in gross rent between September 1973 and March 1977, assuming that the same rates persisted through March 1978. Those rates are specific to the size of housing unit and amount of 1973 gross rent, as indicated in the table. The table shows the exact effects on R^* of our method of compounding the annual gross-rent increases given in Table 4.5 over the 54 months from September 1973 through March 1978. The exact amounts are then rounded to produce the schedule proposed for April 1978. Note that the procedure does not depend on the appropriateness of any intervening schedule adjustments.

*The recommendations and a summary of the supporting evidence were sent to HUD in a letter on 15 February 1978. With HUD's approval, the changes were adopted by the Brown County HAO and were reflected in payments for 1 May 1978.

Table 5.2

RECOMMENDED CHANGES IN R^* TO COMPENSATE FOR RENT INFLATION, 1973-78

HAO Occupancy Standard		September 1973 Schedule, Realigned[a] ($/mo.)	Proposed Increase for Inflation, Sept. 1973-Mar. 1978		Proposed Schedule for Apr. 1978 ($/mo.)
Number of Persons	Number of Rooms		Amount ($)	Percent	
1	1-2	110	31.90	29.0	140
2	1-3	130	38.87	29.9	170
3-4	4	155	45.42	29.3	200
5-6	5	170	67.15	39.5	235
7-8	6	180	85.32	47.4	265
9+	6	205	97.17	47.4	300

SOURCE: Occupancy standards and former schedules are from the *HAO Handbook* for Brown County; inflation adjustments are based on rates in Table 4.5.

NOTE: All dollar amounts in original and proposed schedules are rounded to the nearest $5.

[a]In April 1976, the original September 1973 schedule was realigned to increase the amounts for 1-2 persons and decrease the amounts for 7+ persons. The realigned schedule serves as the base for all inflation adjustments.

The net adjustments we now propose in the schedule thus consist of our 54-month inflation estimates minus the inflation adjustments adopted in 1976 and 1977. The resulting schedule is shown in Table 5.3.

The proposed new schedule exceeds the current schedule by $10 to $55, the larger amounts pertaining to the larger households. In percentage terms, the increases range from 8 to 22 percent. The analysis in Sec. II showed that from 1975 to 1977, rent increased most (in both absolute and percentage terms) for the larger sized units, most of which are single-family houses. That fact was not reflected in the 1976 and 1977 R^* adjustments. Consequently, our recommended 1978 adjustments are substantially greater for those larger sized units.

Although the evidence on which the proposed adjustments are based relates most directly to rental housing, we think it applies with few qualifications to owner-occupied homes as well. That is because of the strong indications that housing cost increases during the period were caused by rising prices for fuel and utility services. For renters,

Table 5.3

PROPOSED CHANGES IN SCHEDULE OF PAYMENTS:
BROWN COUNTY, APRIL 1978

HAO Occupancy Standard		Standard Cost of Adequate Housing		
		April 1977 Schedule ($/ mo.)	Proposed Increase for Inflation	
Number of Persons	Number of Rooms		Amount ($)	Percent
1	1-2	130	10	7.7
2	1-3	155	15	9.7
3-4	4	185	15	8.1
5-6	5	205	30	14.6
7-8	6	220	45	20.5
9+	6	245	55	22.4

SOURCE: Calculated by HASE staff from data in Tables 5.1 and 5.2.

the higher prices are reflected partly in higher contract rent, partly in larger bills for items paid directly by tenants; but all are subsumed in gross-rent increases. Homeowners face the same price changes but pay all the bills directly.

EFFECTS OF THE RECOMMENDED CHANGES

The proposed adjustments to R^* compensate only for past inflation. Although there are many reasons to expect that housing costs in Brown County will continue to rise, we do not think it would be wise to anticipate future increases in the standard cost of adequate housing by overadjusting the current schedule. Such an action would not be properly understood by program participants or by the community in general. When the time came for another review of the schedule, most people would assume that all inflation that had occurred since the last revision should be compensated. The risk of underpaying participants seems preferable to the risk of overinflating their expectations.

Another argument for conservatism in adjusting the payment schedule is the possibility that higher allowances would encourage further inflation in housing costs. We cannot reject the possibility out of hand, but the evidence to date denies that allowance payments have

perceptibly influenced the market price of housing in Brown County, either for program participants or for others.

It is easy to see why the program has had a negligible effect on the market. In December 1977, the HAO made payments to 3,223 households, and an additional 295 enrollees were in the process of finding certifiable housing. Including the latter, the households in the program amounted to less than 8 percent of all households in the county. The 2,039 renters receiving payments and the 245 for whom payment authorization was pending amounted to about 17 percent of all renter households in the county; the 1,184 homeowners receiving payments and the 50 for whom payment authorization was pending amounted to about 4 percent of all homeowners. Over half the participants were still in the housing units they occupied when they enrolled, although many dwellings had been repaired or improved to meet program standards.

Focusing on renters, the allowance payments received in December 1977 totaled $147,000, averaging $72 per recipient household. From 1973 data on landlord revenues, we estimate that the monthly income from rental housing in January 1978 was about $1.75 million. Even if the entire amount of the allowance payments was a net addition to housing expenditures, it would have increased them by less than 8.5 percent. The actual increase in the housing expenditures of program participants is clearly much less than $147,000 per month because so few have moved to more expensive housing since enrolling.

Allowance payments to homeowners in December 1977 totaled about $80,000, averaging less than $68 per recipient household. Although the allowances helped homeowners to meet their mortgage payments, tax bills, and monthly operating costs, they obviously had no effect on the price of houses. Only a handful of former renters have purchased homes since enrolling in the program.

Even though allowance payments have created no significant inflationary pressure in the Brown County housing market, the proposed increases could have such an effect. We think the risk is small, especially given the evidence that the force behind current inflation is not excess local housing demand but a worldwide increase in fuel prices.

Nonetheless, the reader should understand that the proposed increases are large relative to current payments, even though they are small relative to the standard cost of adequate housing. Table 5.4 illustrates the point using data from December 1977. If the proposed new schedule of R^* had been in effect then, the amount disbursed in allowance payments would have increased from $227,000 to $275,000, or by 21 percent. That would be because, under the allowance entitlement formula, an increase in R^* is matched exactly by an increase in allowance entitlement for each participating household.*

The proposed changes in R^* would also increase the income limit for participants in the program by an amount four times as large as the increase in R^*. The consequences are illustrated in Table 5.5. Income limits would rise by $480 for a household of one or two persons to

Table 5.4

INCREASE IN ALLOWANCE PAYMENTS FOR DECEMBER 1977 IF PROPOSED R^* REVISIONS HAD BEEN ADOPTED

Number of Persons	Proposed Monthly Increase ($)	Payments to Renters		Payments to Homeowners		Total Increase ($)
		Number of Cases	Amount of Increase ($)	Number of Cases	Amount of Increase ($)	
1	10	756	7,560	511	5,110	12,670
2	15	516	7,740	329	4,935	12,675
3-4	15	652	9,780	210	3,150	12,930
5-6	30	105	3,150	103	3,090	6,240
7-8	45	23	1,035	21	945	1,980
9+	55	9	495	12	660	1,155
All cases	(a)	2,061	29,760	1,186	17,890	47,650

SOURCE: Calculated by HASE staff from data in the HAO client characteristics file for Site I and Table 5.3.

[a]Not applicable.

*See p. 2, above, for the relevant algebra.

Table 5.5

INCREASE IN INCOME LIMITS FOR PROGRAM PARTICIPANTS IF R^* REVISIONS ARE ADOPTED

Number of Persons	Current Program Standard		Proposed Program Standard		Increase in Y^* Due to Increase in R^* ($ per year)
	R^* ($ per month)	Y^* ($ per year)	R^* ($ per month)	Y^* ($ per year)	
1	130	6,240	140	6,720	480
2	155	7,440	170	8,160	720
3-4	185	8,880	200	9,600	720
5-6	205	9,840	235	11,280	1,440
7-8	220	10,560	265	12,720	2,160
9+	245	11,760	300	14,400	2,640

SOURCE: Calculated by HASE staff from HAO records for Site I.

NOTE: R^* is the standard cost of adequate housing; Y^* is the amount of adjusted gross income at which allowance entitlement drops to zero.

$2,640 for a household of seven or eight persons. The significance of a higher income limit is that more households become eligible for assistance. Under the current limits, we estimate that 7,000 to 8,000 households in Brown County were eligible in late 1977. Using the same data base,* rough calculations indicate that 1,000 to 2,000 households then ineligible would become eligible under the proposed schedule. Of course, incomes as well as housing expenses have increased since 1977, so the correct figure for 1978 is probably less.

Because the newly eligible households with incomes close to the upper limit would be entitled to very small allowances, we would not expect many of them to enroll; nor would they add much to program costs if they did enroll. A more likely source of new enrollment is households that are now eligible but whose allowance entitlement under the

*The baseline survey of households, in which 1974 incomes are reported. We applied program rules to calculate adjusted gross income for each respondent.

current schedule is too small to motivate them to enroll. Currently, for example, a family of 7 whose adjusted annual gross income is $10,000 would be entitled to a monthly allowance of less than $12. According to the Brown County HAO, many applicants in such borderline circumstances drop out when they learn how small their payments would be. Under the proposed new schedule, the family cited above would be entitled to $55 monthly, which might well be enough to prompt enrolling.

Finally, there are over 1,000 households whose enrollment was terminated when a semiannual or annual recertification disclosed income above the limit for continued participation. Many of those households would be eligible under the proposed schedule, and the HAO would notify them of their opportunity to reenroll. In principle, that group is a subset of all newly eligible households; but because of their prior experience with the program they might respond differently to the new schedule than households that had not participated.

Reenrollment and new enrollment would not occur all at once after the adoption of the proposed schedule, and the eventual yield in program participation is necessarily speculative. We estimate that the new schedule would produce 500 to 1,000 additional enrollments in a year, increasing monthly disbursements at the end of that time by $10,000 to $15,000.

In summary, the immediate effect of adjusting the R^* schedule to compensate for inflation would be to increase the payments to households already enrolled, enabling them to afford housing that meets HAO standards without spending more than a fourth of their nonallowance income. That result would be achieved at the cost of an increase of $48,000 in monthly disbursements by the Brown County HAO. The long-run effect would be to increase enrollment beyond what would be expected under the current schedule. The increase could be as many as 1,000 households, and their allowances would add about $15,000 to current monthly disbursements.

Using current figures as a base, those projections imply up to a 28 percent increase in the number of households active in the program (from 3,518 to 4,518) over the course of a year; and an immediate

increase of 21 percent in HAO monthly disbursements (from $227,000 to $275,000), climbing to 28 percent over the course of a year (to $290,000). Of course, even if the proposed schedule changes are not adopted, some increased enrollment is expected among those already eligible, but we judge that the program in Brown County is approaching a steady state under the current payment schedule.

Appendix A

ALTERNATIVE ESTIMATES OF INFLATION RATES: 1977 RATES COMPUTED SEPARATELY

This appendix consists of Tables A.1 through A.3, which estimate the inflation rate in contract rent, gross rent, and both types of rent together. Here the 1977 data from the wave 4 survey are computed separately instead of being combined with the 1976 data, as in Sec. II.

Table A.1

INFLATION IN CONTRACT RENT FOR DIFFERENT PROPERTY TYPES, 1973-78

Sampling Stratum		Inflation Rate (%)									
		1974		1975		1976		1977		Average[a]	
Number	Type of Property	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
	Low-Rent Urban										
1	Single-family	4.96	1.27	4.84	1.31	2.87	2.14	20.21	15.49	8.48	3.55
2	2-4 units	4.92	0.64	5.94	0.70	6.53	1.16	3.59	5.54	5.13	1.41
3	5+ units	5.41	1.04	4.40	1.19	2.03	2.04	33.21	13.68	11.44	2.85
	Medium-Rent Urban										
4	Single-family	3.94	0.84	4.39	0.96	1.28	1.63	13.56	9.55	6.02	2.22
5	2-4 units	3.15	0.58	4.64	0.65	3.99	1.10	7.91	5.96	4.97	1.45
6	5+ units	3.18	0.56	4.18	0.62	1.68	1.08	12.02	6.82	5.45	1.61
	High-Rent Urban										
7	Single-family	4.10	1.30	3.01	1.36	1.95	2.36	20.56	17.31	7.68	3.90
8	2-4 units	1.33	1.00	1.93	1.11	6.77	2.03	-7.22	9.66	0.17	2.62
9	5+ units	1.90	0.98	3.84	1.07	0.74	2.08	15.57	12.02	5.70	2.71
	Rural										
10	Low or medium rent	6.77	1.16	4.16	1.24	2.79	2.09	13.61	10.20	7.13	2.34
11	High rent	2.43	2.33	3.44	2.88	1.72	5.04	18.15	34.87	6.64	7.83
	All types	3.50	0.28	4.18	0.31	3.84	0.54	8.18	3.03	5.01	0.74

SOURCE: Tabulations by HASE staff of records from the rent-inflation analysis file for Site I.

[a]Rates are weighted as follows: 15 months of the 1974 rate (to include the last 3 months of 1973 after approval of the initial R^* schedule); 12 months each of the 1975 and 1976 rates; and 15 months of the 1977 rate (to include the first 3 months of 1978).

Table A.2

INFLATION IN GROSS RENT FOR DIFFERENT PROPERTY TYPES, 1973-78

Sampling Stratum		Inflation Rate (%)									
		1974		1975		1976		1977		Average[a]	
Number	Type of Property	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
	Low-Rent Urban										
1	Single-family	9.52	1.61	11.91	1.70	6.52	2.69	18.22	18.52	11.72	4.44
2	2-4 units	5.60	0.78	8.70	0.88	9.66	1.45	1.94	6.63	6.13	1.73
3	5+ units	5.10	1.26	6.18	1.47	6.22	2.58	9.23	13.63	6.73	3.32
	Medium-Rent Urban										
4	Single-family	3.89	1.01	12.76	1.26	6.80	2.08	1.82	10.41	5.86	2.70
5	2-4 units	4.40	0.71	7.97	0.81	5.52	1.35	13.59	7.63	7.98	1.81
6	5+ units	4.63	0.70	6.17	0.77	2.50	1.32	7.48	7.95	5.27	1.95
	High-Rent Urban										
7	Single-family	4.94	1.59	8.89	1.75	5.77	2.97	29.01	22.52	12.25	4.95
8	2-4 units	2.70	1.23	7.28	1.42	8.08	2.50	1.10	12.80	4.43	3.32
9	5+ units	2.83	1.20	5.28	1.32	0.90	2.54	15.92	14.66	6.42	3.32
	Rural										
10	Low or medium rent	5.83	1.40	7.22	1.56	4.84	2.59	20.82	13.19	9.89	2.92
11	High rent	7.44	2.97	5.19	3.56	10.01	6.63	-0.39	35.80	5.27	9.40
	All types	4.53	0.35	7.74	0.39	6.06	0.68	8.58	3.70	6.70	0.91

SOURCE: Tabulations by HASE staff of records from the rent-inflation analysis file for Site I.

[a]Rates are weighted as follows: 15 months of the 1974 rate (to include the last 3 months of 1973 after approval of the initial R^* schedule); 12 months each of the 1975 and 1976 rates; and 15 months of the 1977 rate (to include the first 3 months of 1978).

Table A.3

INFLATION IN CONTRACT AND GROSS RENT FOR DIFFERENT-SIZED UNITS, 1973-78

Number of Rooms	Inflation Rate (%)									
	1974		1975		1976		1977		Average[a]	
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Contract Rent										
1 or 2	3.45	0.90	4.62	1.00	4.15	1.62	8.24	8.15	5.18	1.96
3	3.27	0.55	4.11	0.60	4.35	1.10	11.17	6.35	5.84	1.51
4	3.18	0.45	4.11	0.49	4.01	0.86	5.62	4.68	4.25	1.16
5	3.56	0.58	3.86	0.64	3.31	1.12	9.71	6.83	5.24	1.64
6+	4.99	0.82	4.97	0.94	3.16	1.55	9.02	7.78	5.67	1.87
All sizes	3.50	0.28	4.18	0.31	3.84	0.54	8.18	3.03	5.01	0.74
Gross Rent										
1 or 2	4.80	1.11	4.91	1.23	6.26	2.01	4.78	9.59	5.14	2.38
3	3.67	0.67	5.56	0.74	7.07	1.37	3.68	7.20	4.84	1.82
4	4.44	0.55	7.65	0.62	5.39	1.06	3.24	5.57	5.02	1.42
5	5.79	0.72	8.32	0.81	6.19	1.40	15.89	8.77	9.17	2.07
6+	3.92	0.98	12.54	1.23	6.25	1.94	27.04	11.03	12.40	2.42
All sizes	4.53	0.35	7.74	0.39	6.06	0.68	8.58	3.70	6.70	0.91

SOURCE: Tabulations by HASE staff of records from the rent-inflation analysis file for Site I.

[a]Rates are weighted as follows: 15 months of the 1974 estimated rate (to include the last 3 months of 1973 after approval of the initial R^* schedule); 12 months each of the 1975 and 1976 rates; and 15 months of the 1977 rates (to include the first 3 months of 1978).

Appendix B

RATE SCHEDULES FOR FUEL AND UTILITY SERVICES, 1973-78

Tables B.1 through B.5 show the various rate schedules on which the analysis of changes in the cost of fuel and utility services in Sec. III is based.

Table B.1

RESIDENTIAL ELECTRICITY RATES: BROWN COUNTY, 1973-78

Type of Charge	Amount			
	All-year Urban (Rg-1)		All-year Rural (Rg-2)	
September 1973				
Annual minimum ($)	30.00		39.00	
Fixed monthly ($)	.75		.75	
	Nov.-June	July-Oct.	Nov.-June	July-Oct.
Monthly meter rate (¢/kWh):				
First 100 kWh	3.647	3.647	5.137	5.137
Next 500 kWh	2.457	2.457	2.777	2.777
Next 900 kWh	2.117	2.267	2.427	2.577
Over 1500 kWh	1.907	2.057	2.227	2.377
Sales tax (%)	4.0			
March 1974				
Annual minimum ($)	32.40		42.00	
Fixed monthly ($)	1.00		1.00	
	Nov.-June	July-Oct.	Nov.-June	July-Oct.
Monthly meter rate (¢/kWh):				
First 100 kWh	3.80	3.80	5.35	5.35
Next 500 kWh	2.60	2.60	2.94	2.94
Next 900 kWh	2.25	2.40	2.60	2.80
Over 1500 kWh	2.05	2.25	2.40	2.60
Sales tax (%)	4.0			
February 1975				
Annual minimum ($)	44.40		66.00	
Fixed monthly ($)	2.00		3.00	
	Nov.-June	July-Oct.	Nov.-June	July-Oct.
Monthly meter rate (¢/kWh):				
First 200 kWh	4.30	4.50	5.70	6.10
Next 1300 kWh	2.60	2.80	2.60	2.80
Over 1500 kWh	2.15	2.80	2.15	2.80
Sales tax (%)	4.0			

Table B.1 (continued)

Type of Charge	Amount			
	All-year Urban (Rg-1)		All-year Rural (Rg-2)	
January 1976				
Annual minimum ($)	44.40		66.00	
Fixed monthly ($)	2.00		3.00	
	Nov.-June	July-Oct.	Nov.-June	July-Oct.
Monthly meter rate (¢/kWh):				
First 200 kWh	4.567	4.767	5.967	6.367
Next 1300 kWh	2.867	3.067	2.867	3.067
Over 1500 kWh	2.417	3.067	2.417	3.067
Surcharge (%)	10.3			
Sales tax (%)	4.0			
January 1977				
Annual minimum ($)	44.40		66.00	
Fixed monthly ($)	2.00		3.00	
	Nov.-June	July-Oct.	Nov.-June	July-Oct.
Monthly meter rate (¢/kWh):				
First 200 kWh	4.428	4.628	5.828	6.228
Next 1300 kWh	2.728	2.928	2.728	2.928
Over 1500 kWh	2.278	2.928	2.278	2.928
Surcharge (%)	10.3			
Sales tax (%)	4.0			
January 1978				
Annual minimum ($)	48.60		72.60	
Fixed monthly ($)	2.75		4.25	
	Nov.-June	July-Oct.	Nov.-June	July-Oct.
Monthly meter rate (¢/kWh)				
First 200 kWh	4.423	4.693	5.753	5.993
Next 1300 kWh	3.213	3.823	3.283	3.823
Over 1500 kWh	2.943	3.823	2.943	3.823
Sales tax (%)	4.0			

SOURCE: Wisconsin Public Service Corporation.

NOTE: Fuel cost adjustment is included where applicable in the meter rate.

Table B.2

MONTHLY RATES FOR RESIDENTIAL NATURAL GAS: BROWN COUNTY, 1973-78

Type of Charge	Amount					
	September 1973		March 1974		February 1975	
	Rg-1[a]	Rg-2[b]	Rg-1[a]	Rg-2[b]	Rg-1[a]	Rg-2[b]
Fixed monthly ($)	.75	.75	.75	.75	1.50	1.50
Meter rate (¢/therm):						
First 20 therms	15.79	17.79	16.42	18.42	18.47	20.60
Next 30 therms	11.45	12.39	12.09	13.03	14.02	15.04
Over 50 therms	10.14	10.24	10.79	10.89	12.69	12.83
Sales tax (%)	4.0		4.0		4.0	

Type of Charge	January 1976		January 1977		January 1978	
	Rg-1[a]	Rg-2[b]	Rg-1[a]	Rg-2[b]	Rg-1[a]	Rg-2[b]
Fixed monthly ($)	1.50	1.50	1.50	1.50	2.00	2.00
Meter rate (¢/therm):						
First 20 therms	20.21	22.34	25.69	27.82	24.074	25.414
Next 30 therms	15.76	16.78	21.24	22.26	24.074	25.414
Over 50 therms	14.43	14.57	19.91	20.05	21.534	21.734
Surcharge (%)	1.2		1.2		--	
Sales tax (%)	4.0		4.0		4.0	

SOURCE: Wisconsin Public Service Corporation.

NOTE: One therm equals 100,000 BTU or 96.62 cubic feet (U.S. average). The monthly fixed charge is also the minimum monthly charge. Fuel cost adjustment is included where applicable in the meter rate.

[a]All-year service to urban customers.

[b]All-year service to rural customers.

Table B.3

PRICES QUOTED FOR NO. 2 FUEL OIL DELIVERED TO BROWN COUNTY RESIDENCES, 1973-75

Dealer	Price (¢ per gal)					
	July 1973	July 1974	Mar. 1975	Dec. 1975	Jan. 1977	Jan. 1978
A[a]	16.2	32.4	(b)	(b)	(b)	(b)
B	28.9	35.7	32.7	37.7	41.9	45.9
C	18.9	33.9	30.9	37.7	41.9	45.9
D	21.9	34.0	34.5	37.5	41.5	44.5
E	22.8	35.5	33.8	38.4	41.3	44.5
F	(b)	(b)	32.9	(c)	(c)	(c)
G	(b)	(b)	(b)	35.6	41.9	45.9
H	(b)	(b)	(b)	37.9	41.9	43.2
I	(b)	(b)	(b)	(b)	42.7	53.9
Average	21.7[d]	34.3[d]	33.0	37.5	41.9	46.3

SOURCE: Compiled by HASE staff from queries to dealers.

NOTE: A 4 percent sales tax must be added to all prices. Dealers' names are on file at HASE site office.

[a]In 1975, it was learned that Dealer A's prices were for bulk deliveries of 7,000 gallons or more, rarely to residential customers. That dealer was subsequently dropped from the price survey.

[b]No quotation obtained.

[c]No longer in business

[d]Excluding Dealer A, the average price per gallon would be 23.1 cents in July 1973 and 34.8 cents in July 1974.

Table B.4

QUARTERLY RESIDENTIAL WATER RATES: SELECTED JURISDICTIONS IN BROWN COUNTY, 1973-78

Type of Charge	Amount ($)			
	September 1973	December 1975	January 1977	January 1978
City of Green Bay				
Fixed:				
5/8" meter	2.70	3.65[a]	3.65	3.65
3/4" meter	4.00	5.25[a]	5.25	5.25
Meter rate per 100 cu ft:				
First 3,750 cu ft	.30	.40[a]	.40	.40
Next 71,250 cu ft	.25	.34[a]	.34	.34
Next 1,050,000 cu ft	.20	.29[a]	.29	.29
Over 1,125,000 cu ft	.13	.19[a]	.19	.19
Surcharge (%)	20	(*b*)	(*b*)	(*b*)
City of DePere				
Minimum	3.50	3.50	3.50	3.50
Meter rate per 1,000 gal:				
First 5,000 gal	.90	.90	.90	.90
Next 15,000 gal	.50	.50	.50	.50
Next 30,000 gal	.30	.30	.30	.30
Town of Allouez				
Minimum (first 6,000 gal)				
5/8" meter	3.70	5.00	5.00	5.00
3/4" meter	(*b*)	(*b*)	6.75	6.75
Meter rate per 1,000 gal:				
Next 19,000 gal	.38	.52	.52	.52
Next 50,000 gal	.25	.35	.35	.35
Next 625,000 gal	.20	.27	.27	.27
Village of Howard				
Minimum (first 10,000 gal):				
5/8" meter	5.25[c]	7.25	7.25	7.25
3/4" meter	6.75[c]	9.50	9.50	9.50
1.0" meter	10.00[c]	13.75	13.75	13.75
1.5" meter	19.00[c]	25.00	25.00	25.00
2.0" meter	31.00[c]	38.00	38.00	38.00
Meter rate per 1,000 gal:				
Next 40,000 gal	.35[c]	.47	.47	.47
Next 150,000 gal	.20[c]	.27	.27	.27
Next 200,000 gal	.12[c]	.17	.17	.17
Over 400,000 gal	.08[c]	.17	.17	.17

Table B.4 (continued)

Type of Charge	Amount ($)			
	September 1973	December 1975	January 1977	January 1978
Village of Ashwaubenon				
Minimum (first 10,000 gal):				
5/8" meter	5.00	5.00	5.00	6.55
3/4" meter	(b)	(b)	(b)	8.50
Meter rate per 1,000 gal:				
Next 40,000 gal	.30	.30	.30	.38
Next 50,000 gal	.25	.25	.25	.33
Next 300,000 gal	.17	.17	.17	.23
Over 400,000 gal	.10	.10	.10	.15
Town of Bellevue				
Minimum (first 7,500 gal)	10.00	10.00	10.00	10.00
Meter rate per 1,000 gal for over 7,500 gal	.50	.50	.50	.50
Village of Pulaski				
Minimum (first 10,000 gal)	6.00	6.00	6.00	6.00
Meter rate per 1,000 gal:				
Next 20,000 gal	.40	.40	.40	.40
Next 70,000 gal	.30	.30	.30	.30

SOURCE: Local water departments.

NOTE: A typical household consumes 20,000 gal per quarter. Rates for larger amounts usually apply only to multiple dwellings with a single meter.

[a]Effective 1 July 1975.

[b]Not applicable.

[c]Effective until mid-December 1975.

Table B.5

QUARTERLY RESIDENTIAL SEWAGE RATES: SELECTED JURISDICTIONS IN BROWN COUNTY, 1973-78

Type of Charge	Amount ($)			
	September 1973	December 1975	January 1977	January 1978
City of Green Bay				
Tax per $1,000 assessed value	.80	(a)	(a)	(a)
Minimum	(a)	12.00[b]	10.50	12.00
Meter rate per 1,000 gal	(a)	.57	.70	.80
City of DePere				
Minimum	1.75	1.75	5.00	5.00
Meter rate per 1,000 gal:				
First 5,000 gal	.45	.45	1.40	1.40
Next 15,000 gal	.25	.25	1.00	1.00
Next 30,000 gal	.17	.17	1.00	1.00
Town of Allouez				
Tax per $1,000 assessed value:				
Metropolitan Sewer District	.55	(a)	(a)	(a)
Fox River Sewer District	.57	(a)	(a)	(a)
Southeast Sewer District	.96	(a)	(a)	(a)
Minimum	(a)	(a)	(a)	8.00
Meter rate per 1,000 gal	(a)	.70	.70	1.10
Village of Howard				
Multiple of water bill[c]	(1.25)	(2.10)	(a)	(a)
Minimum (first 10,000 gal)	(a)	(a)	12.50	13.50
Meter rate per 1,000 gal for over 10,000 gal	(a)	(a)	.77	1.31
Village of Ashwaubenon				
Multiple of water bill[c]	(.90)	(a)	(a)	(a)
Minimum (first 16,000 gal)	(a)	9.00	9.00	9.00
Meter rate per 1,000 gal for over 16,000 gal	(a)	.56	.56	.56

Table B.5 (continued)

Type of Charge	Amount ($)			
	September 1973	December 1975	January 1977	January 1978
Town of Bellevue				
Fixed	6.00	(a)	(a)	(a)
Minimum (first 10,000 gal)	(a)	7.50[c]	7.50[c]	10.00[d]
Meter rate per 1,000 gal for over 10,000 gal	(a)	.57	.57	1.00
Village of Pulaski				
Minimum (first 10,000 gal)	6.00	6.00	6.00	6.00
Meter rate per 1,000 gal:				
Next 20,000 gal	.40	.40	.40	.40
Next 70,000 gal	.30	.30	.30	.30

SOURCE: Local sewer departments.

NOTE: Annual tax rates on assessed value have been converted to quarterly equivalents. Meter rates are based on gallons of water metered to the customer.

[a]Not applicable. Jurisdiction changed the basis for its charges between 1973 and 1975.

[b]Reduced to $9.00 effective January 1976.

[c]Minimum charge is $11.00 if residence does not also have water service.

[d]Minimum charge is $19.30 if residence does not also have water service.

Appendix C

RENT CHANGE IN BROWN COUNTY AS A RESPONSE TO FUEL OIL COST INCREASES

Brown County experienced acute inflation in fuel oil prices in 1973-74. We saw in Appendix B (Table B.3) that average fuel oil prices increased by over 50 percent between July 1973 and July 1974. Affected property owners probably reacted to the increase differently depending on whether they or their tenants had to pay the bill. This appendix explores one aspect of landlord responses by examining rent changes between the baseline and wave 2 HASE surveys.*

Only 14 percent of all rental units in Brown County use fuel oil for space heating (see Table C.1). For 10 percent of the units, the landlord assumes the entire burden of payment; in 3 percent the tenants have full responsibility; and in 1 percent owners and renters share the liability. Landlords nearly always pay for fuel oil used to heat properties with 5+ units, whereas they rarely do for single-family houses. Responsibility tends to be shared for the smaller multiunit properties.

As Table C.1 shows, properties where landlords and tenants share responsibility for the bill had the highest fuel oil cost per unit, but the owners paid only a small portion. Small sample size, however, casts doubt on the numbers associated with joint responsibility. Units where renters pay all the fuel cost had considerably higher bills than those totally supported by landlords ($265 in contrast to $143). Most of the disparity probably arises from the nature of the units heated; single-family houses cost more to heat than small apartments.

---

*Other possible landlord responses, not studied here, include implementing a conservation program, switching to a cheaper energy source by conversion or purchase, and shifting the responsibility for payment to tenants. The baseline survey, conducted early in 1974, recorded fuel and utility costs for 1973. The 1975 wave 2 survey recorded costs for 1974.

Table C.1

1973 FUEL OIL COST AND RESPONSIBILITY FOR PAYMENT COMPARED WITH 1973-74 RENT CHANGE

Responsibility for Payment	1973 Cost of Fuel Oil per Unit ($)			Percent of All Units	1973-74 Rent Change (%)[a]
	Paid by Landlord	Paid by Tenant	Total		
Landlord only	143.07	(b)	143.07	10	7.72 (2.54)
Tenant only	(b)	265.40	265.40	3	1.20 (2.81)
Joint	41.07	272.74	313.81	1	7.81 (4.68)
Not applicable (fuel oil not used)	(b)	(b)	(b)	86	5.04 (0.72)
All	14.38	10.07	24.45	100	5.21 (0.67)

SOURCE: Tabulations by HASE staff of records from the survey of landlords and tenants, Site I, baseline and wave 2.

NOTE: The wave 2 units used in this tabulation had not undergone major physical modification in 1974. All units are assumed to have full occupancy.

[a]Change in average contract rent per unit. Numbers in parentheses are approximate standard errors.

[b]Not applicable.

The fuel costs just cited are a substantial part of operating costs. How do unexpected and dramatic increases in fuel oil charges translate into rent changes? It seems logical that a landlord who pays for fuel oil will pass along some or all of the increase to his tenants in the form of higher rent. Conversely, if the burden falls directly on renters, they may resist concurrent increases in contract rent. The last column in Table C.1--percentage change in per unit contract rent between 1973 and 1974--tends to verify those hypotheses. Overall, contract rent increased by 5.21 percent from baseline to wave 2. The average rent for units whose landlords pay for fuel oil increased by 7.72 percent. In contrast, the average rent for units whose tenants

pay all the cost rose by only 1.20 percent. A one-tailed test confirms that the latter two rent increases differ significantly.*

Besides cross-tabulating, we used regression analysis to quantify the interplay between fuel oil price inflation and rent. With weighted observations,** the equation that best accounts for the 1973-74 percentage change in rent is as follows:

$$C = 4.589 + \underset{(.158)}{0.627}^{*} L - \underset{(.093)}{0.109}\ T,$$

$$\text{with } R^2 = 0.028,\ Eq.\ F = 8.6 \text{ and } n = 603,$$

where C = annual 1973-74 percentage change in residential contract rent per unit,

L = 1973 landlord fuel oil payments as a percentage of baseline contract rent,

T = 1973 tenant fuel oil payments as a percentage of baseline contract rent,

$( )$ = approximate standard errors,

$*$ = coefficient is statistically different from zero at the 0.01 level of significance,

R^2 = coefficient of determination corrected for degrees of freedom,

$Eq.\ F$ = F statistic indicating the significance of the entire equation, and

n = number of observations.

The expression's F statistic signifies that the observed relationship would occur by chance in less than 1 out of 100 such samples.

---

*The statistical significance statement follows from the facts that the absolute difference is $7.72 - 1.20 = 6.52$; the standard error of difference is $\sqrt{(2.54)^2 + (2.81)^2} = 3.79$; the t-statistic for testing significant difference from zero is $6.52/3.79 = 1.72$; and the critical value of t for a one-tailed test with 95 percent confidence is 1.65.

**Including cases in which fuel oil was not used, e.g., $L = T = 0$. As noted in Table C.1, these account for 86 percent of the weighted observations.

The results imply that 63 percent of the increase in a landlord's fuel oil bill is likely to be shifted within a year's time to his tenants. When a tenant's fuel oil costs increase, his contract rent tends to increase less than the norm; in effect, his landlord absorbs 11 percent of the tenant's incremental fuel-oil costs during that year.