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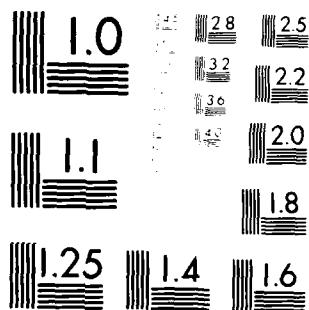UNCLASSIFIED   F/G 5/2   NL

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DESIGNING READABLE AND PERSUASIVE TABLES

Ira S. Lowry

December 1983

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PREFACE

In 1976, Rand's Publications Department designed a short course in effective expository writing, offered first to the research staff and subsequently to all employees of the corporation. At the invitation of the first instructor, I conducted a two-hour workshop on the effective use of tables in research reports.

My notes for that workshop were reproduced for the students and have since circulated among the research and editorial staffs without benefit of formal publication. In subsequent years, I tried several times to generalize and polish the exposition and to assemble more examples, but research commitments always intervened. In 1983, I finally found the time to complete the work in a form that serves both as a general guide to the inexperienced and a reference for writers facing specific formatting problems.

At different times, Donna Betancourt and Penny Post helped by assembling exemplary material and improving the text. Gwen Shepherdson and Rose-Marie Vigil prepared the final typescript.

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INTRODUCTION

Tables have various uses. One is simply to store information in a compact, readily accessible, and self-documented form. Another is to persuade a reader that an argument presented in the text of an article, report, or book is valid. Another--regrettably common in research reports--is to demonstrate that the author has done a lot of work.

Tables often fail the storage function because critical elements of data have been omitted, because the data are poorly labeled, or just because they look untrustworthy. They often fail as evidence in support of an argument for those same reasons and also because the reader can't see the alleged pattern clearly. He needs help from the author both in the text and in the design of the table.

This essay distills the author's experience as a writer, editor, and reader of research reports into a practical guide to table design. Its advice is aimed primarily at authors--researchers who have assembled data that they plan to use as evidence in a professional article, research report, or book. The guide should also help professional editors who often must advise authors how to improve their drafts without fully understanding the import of the data offered.

The essay stresses expositional purposes and devices for achieving them rather than the more-or-less arbitrary typographical conventions that must be observed by an author or an institution for consistency's sake. For instance, I will explain what information should be in a table title, and why; but will offer no explicit guidance on typefaces, capitalization, or punctuation of table titles. The exemplary tables in the main text and appendix reflect typographical conventions that are widely used, but each research institution and publishing house has its own stylebook for such matters.

While composing this essay, I realized that editors ("word people") and statisticians ("number people") lack a common vocabulary for discussing the presentation of data. I therefore compiled a glossary of the key concepts, choosing names and definitions for them that I thought would be intelligible to both groups even if not wholly satisfying to either. Readers who encounter unfamiliar terms in the main text are encouraged to consult that glossary (pp. 25-30) before proceeding.

Finally, the appendix (pp. 31-80) contains 50 exemplary tables drawn from my files. Each table was chosen to illustrate a workable solution to some common problem of table design. There follows an index to table features (pp. 81-82), so that an author or editor confronted by a specific problem of table design can readily locate a helpful example.

WHERE TO START

Suppose that you are writing a report and have a sheaf of numbers that bear on your subject. Your first question should be whether a table is necessary.

If the evidence you need to support your argument can be boiled down to three or four numbers, that many can easily be presented in a paragraph of the text. Resort to a table (or figure) only if you want to direct the reader's attention to a pattern in the data that is too large or too complex to fit neatly into sentences. If you want to store lots of information for permanent reference but don't need much of it for your argument, try an appendix table.

One sees patterns in numbers by comparing them. The limit on comparisons in paragraph form is that the numbers and their identifying labels must be intermingled to make sense as sentences. If the labels are complicated and especially if the labels themselves contain numbers, it's easy to lose track of the pertinent comparisons. The following examples are in order of increasing difficulty for the reader.

Example 1

Fifteen percent of the apartments in multiple dwellings were vacant, as compared with 10 percent of the single-family houses.

Example 2

Eleven percent of the apartments renting for less than $75 monthly were vacant as compared with 10 percent of those renting for between $75 and $149 and 8 percent of those renting for $150 or more.

Example 3

Ten percent of the buildings had 27 percent of all
vacancies, 20 percent of the buildings had 48 percent of all
vacancies, 30 percent of the buildings had 63 percent of all
vacancies, and 40 percent of the buildings had 72 percent of
all vacancies. The remaining vacancies--28 percent of the
total--were scattered among 60 percent of all buildings.

Example 3 in particular is a real challenge to the reader. He may
be quite satisfied to be told simply that

> Vacancies were unevenly distributed among buildings. Although
> the average was three vacancies per building, some had as many
> as ten vacancies and 30 percent of the buildings had none.

But if you judge that he really needs the details to be persuaded, try a
text table.

TEXT TABLES

A text table makes comparisons easy on the eye and brain by
segregating the comparable numbers from their labels. But because the
table is placed naturally between paragraphs of text (or even within a
paragraph), the reader can easily assimilate its contents without
breaking away from the flow of your exposition. Hasty readers often
ignore full tables, relying on the text's summary of them. No one skips
a text table.

The other side of the coin is that a text table must be brief,
containing only a few rows and columns and very simple labels. The
preceding text can help by incorporating much of the labeling
information that would be needed for a full table, as in Example 4:

Example 4

Our sample of 273 buildings contained 1,876 dwellings,
of which 216 were vacant at the time of the survey. As

shown below, the vacancies were unevenly distributed among
the buildings:

Vacancy Rate (%)	Percent of All Buildings	Percent of All Vacancies
0	32	--
1-5	61	71
6-10	6	21
11+	1	8
All buildings	100	100

Because they must follow the text that introduces them and cannot
be split between successive pages, text tables of more than a few rows
are likely to complicate page-formatting. And because they lack table
numbers or titles, text tables cannot be listed in a table of contents
or easily cross-referenced elsewhere in a long document.

One way to get the expository advantages of a text table without
these disadvantages is to include a more comprehensive or detailed
presentation of the same data in an appendix table that can be readily
located by the reader who is consulting your report as a reference.

FULLY FORMATTED TABLES

A full table is preferable to a text table whenever you judge that
the amount or complexity of information to be presented is so great that
a reader couldn't assimilate its contents at a glance and return to the
main text without losing the thread of the argument.

When you choose a full table for presenting data, the text should
call it to the reader's attention when its contents first become
relevant to your argument. Since the table is readily available for the
reader's inspection, it isn't necessary to describe it. Instead, tell
the reader what conclusions you draw from the data and why. If he's
skeptical, he can look for himself.

To me, the dullest of expositions are those that paraphrase the title, stub entries, and column heads, and repeat most of the data in the accompanying table (see Example 5). Usually this happens because the author really hasn't learned much from the table but feels that there ought to be some text between that table and the next. If you can't find a clear message in a table, leave it out.

Example 5

Table 16 shows the distribution of rental housing units in Brown County by monthly gross rent and number of rooms per unit. The median rent for each size of unit, shown at the bottom of the table, increases from $76 for one room to $89 for two rooms, $107 for three rooms, and so on up to $196 for six rooms. The interesting feature of the table is that the median rent increases faster than does unit size, indicating a rising marginal cost per room: $13 for the second room, $18 for the third room, $26 for the fourth room, $28 for the fifth, and $35 for the sixth room.

Example 5 does have a message: Contrary to the author's expectations, the marginal cost per room rises as unit size increases. But most of the text is obviously redundant with the table (not shown here) and most of the table is superfluous. The only entries that are used to make his point are the median rents at the bottom of the table. Example 6 would have served better:

Example 6

Gross rents in Brown County increase with size of dwelling. Surprisingly, the marginal rent per room rises instead of falling as the number of rooms increases beyond one:

Number of Rooms	Median Monthly Gross Rent ($)	Marginal Rent per Room ($)
1	76	--
2	89	13
3	107	18
4	133	26
5	161	28
6	196	35

Note in this example that the third column is the one that carries the author's message. The second column is there only to make the reader feel at home with the data. He can easily judge whether the median rents for these dwellings correspond with those he knows of from other sources; and if he is uncertain what the author meant by "marginal rent," he can check the derivations of entries in the third column. Those kinds of subtle assistance to the reader add to a table's persuasiveness.

In Example 6 we retreated from a full table to a text table. That's often a good idea. But let's get back to the problems of formatting full tables.

FORMATTING A FULL TABLE

First, formatting is a lot of work. The author himself often doesn't see a message in the data until he's tried one or more layouts. Once you've decided what the message is to be, you can decide which numbers you need to make your point. Then, you must lay out those numbers so that the appropriate comparisons are obvious to the hurrying eye.

For me, what follows is a lot of tinkering with the details of the table. The table is usually an array of data to be fit onto a page that is 8.5 x 11 inches, or even smaller. Which elements should form rows, which columns, and in what order? What auxiliary entries, not essential

to the main message, will add to the table's persuasiveness? How can I balance readability with precision in the stub entries and column heads? Are the labels consistent with the language of the text and the labels of related tables in the same report? Even when no further computations are needed, I seldom achieve an adequate layout in less than three trials and often tinker for an hour with the title, stub entries, column headings, and footnotes.

I strongly recommend laying out tables on quarter-inch grid paper, complete with column rules, labels, and notes, as in Example 7. It forces you to think through the details rather than leaving them to your typist's imagination. Even the most skillful typist can't interpolate information that's missing; and, not being familiar with the table's message, can't reformat to make the message clear. What typists can do-- usually very well--is to translate manuscript spacing into typewriter spacing and give tables a professional polish that will redound to your credit. They are entitled to your help.

Since the invention of typewriters with readily changeable type faces, one has more typographical freedom than formerly. I use italics for centered stub items, footnote markers, and titles of source materials. To help my typist, I use red pencil for italics, black for roman. Also, it's useful to learn the conventions for capital and lower-case type in table titles, stub entries, etc. Apply them clearly in your manuscript to save headaches for you, your typist, and your editor.

Although the typewriter is rapidly giving way to the electronic wordprocessor for preparing text, even today few wordprocessing systems (and fewer operators) are capable of producing tables that are tightly formatted and typographically inviting. I expect that the wordprocessor's capabilities for tabular presentation will soon outstrip the typewriter's, but the interaction between author and keyboard operator will not be much altered unless the entire process of document production is shifted to the author himself. In that event, table entries can be moved directly from magnetic storage into their proper places in the table, without an intervening manuscript. But table layout will remain a problem to be solved by trial and error, whether on a video screen or on paper.

Example 7

EVALUATION RESULTS FOR DWELLINGS OCCUPIED AT TIME OF
ENROLLMENT: HOUSING ALLOWANCE PROGRAMS IN BROWN AND
ST. JOSEPH COUNTIES

Evaluation Result, by Enrollee's Tenure	Brown County, through Year 2		St. Joseph County, through Year 1	
	Number of Cases	Percent of Total	Number of Cases	Percent of Total
Homeowners				
Acceptable	1,021	53.9	742	45.3
Not acceptable	874	46.1	896	54.7
All evaluations	1,895	100.0	1,638	100.0
Renters				
Acceptable	1,563	56.6	526	37.7
Not acceptable	1,200	43.4	869	62.3
All evaluations	2,763	100.0	1,395	100.0
Homeowners and Renters				
Acceptable	2,584	55.5	1,268	41.8
Not acceptable	2,074	44.5	1,765	58.2
All evaluations	4,658	100.0	3,033	100.0

SOURCE: Tabulated by HASE staff from HAO records for Site I through 25 June 1976 and for Site II through 12 December 1975.

NOTE: Preenrollment dwellings were evaluated to obtain research data even though the enrollee indicated that he planned to move. However, 188 preenrollment dwellings in Brown County and 207 in St. Joseph County were not evaluated for various technical reasons. Nearly all were rented dwellings. Also, 30 evaluation records in Brown County and 53 in St. Joseph County are excluded because preenrollment tenure was not indicated.

ELEMENTS OF A FULL TABLE

A full table has three main elements: the data, its identifying labels, and its credentials. Your job is to combine these into an easily readable and persuasive format. There are many good ways to treat each element; what counts is the overall effect. Below, I offer some tactical hints and warnings for the manipulation of each element. The appendix to this guide contains examples of at least one solution for each of the most common problems.

Organizing and Simplifying Data

The basic principle of tabulation is that numbers that are to be compared should be adjacent. For up to six numbers, horizontal comparisons are easiest; for seven or more, vertical comparisons have an edge. (Sometimes your purpose requires both.) Also, the dimensions of your page are important; an extra row in a table usually requires considerably less space than an extra column.

The more numbers to be compared, the fewer digits each should have. Don't hesitate to round off even though your computer output or desk calculator gives you accuracy to the fifth decimal place. If your message depends on the exact values of lower-order digits, it's probably too subtle to be persuasive anyway. If you want your reader to look at the higher-order digits, show him those only.[1] Rescale sets of large or small numbers to get rid of trailing or leading zeros.

There's much to be gained by transformations of raw data. If your message hinges on the relative sizes of two or more numbers, transform them to percentages or ratios (index numbers). If you save the reader work, he'll reward you by greater comprehension. But some authors are too helpful, doubling every row and column of data with corresponding percentages. The reader must then skip rows or columns to make appropriate comparisons. Consider whether he wouldn't be better served by one or the other--perhaps percentages, with row or column marginals of absolute numbers.

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[1] The counterpoise to this advice comes under the heading of data credentials. See below, p. 22.

Null and repetitive entries often pose problems. If a row or column has only one or two nonzero entries or if all its entries are identical, consider omitting that row or column (or combining it with its neighbor) and providing the information in a footnote. Be careful to distinguish a known zero, "not applicable," and "applicable but not available." There are various conventions for each, and the reader shouldn't have to guess which conventions you use.

Minus signs are another headache, partly because they tend to get lost in transcription. Emphasize them in your draft.

Finally, *check your numbers.* It's easy to make errors in calculations or transcriptions. If you give your typist a correct table, it's reasonable to hold him responsible for transcribing it correctly. But even so, I advise you to proofread and audit the typescript. It's embarrassing to have someone point out egregious errors in a published table, and by then you will probably have thrown out the worksheets that would make correction easy.

Labeling the Data

Once you've solved the basic layout of rows and columns, your next problem is labeling the entries. In a well-labeled table, the reader can interpret each entry without further assistance. Since so many different kinds of data can be tabulated, it's not possible to offer a comprehensive guide to labeling, but four kinds of information are usually needed to interpret an entry:

- The attribute that is measured.
- The unit of account.
- The population or set to which the attribute pertains.
- The subset to which the entry pertains.

The problem is to reduce all this information to a minimum of words so that it will fit neatly into the space available and leave the reader with time to ponder the entries rather than the labels.

There are three possible places in the table where this information can be presented: the title, the stub items and column heads, and the keyed notes at the bottom. Use these resources selectively to support each other and to guide readers to the depth of information they need. As you move from one to the next, get increasingly specific rather than just repeating.

Table Titles. Like a book's title or a newspaper headline, a table title should contain enough information so that the reader can decide whether to linger or pass on. A short title is preferable. It doesn't have to tell the whole story, only enough to distinguish the table from others in the report.

Try always to lead the title with the name of the attribute that is measured in the table. That's the first screen that the reader would *normally* use in directing his further attention. Cross-classifications come second, population definitions come last. Below is a bad example; imagine yourself trying to sort out the information you need from a glance at:

Example 8

BROWN COUNTY RENTERS IN 1974, CLASSIFIED BY HOUSEHOLD INCOME IN 1980 DOLLARS, AGE OF HEAD, MARITAL STATUS, AND PRESENCE OF CHILDREN, AND MONTHLY CONTRACT RENT AND UTILITY EXPENSES

Example 9, below, is better, though still wordy. This title first identifies the attribute that is measured (housing expenses); then the population subsets to which the entries pertain (income categories and life-cycle stages); and finally, the population itself (renter households in Brown County, Wisconsin, in 1974). At this point, the reader doesn't need to know the unit of account for housing expenses; nor does he need details of the income and life-cycle categories.

Example 9

HOUSING EXPENSES, BY INCOME AND LIFE-CYCLE STAGE:
RENTER HOUSEHOLDS IN BROWN COUNTY, WISCONSIN, 1974

Depending on context, the definition of the population given in Example 9 may be overly explicit. For instance, in a report that was entirely about Brown County in 1974, the reader could be trusted to infer that your data on housing expenses were for Brown County, and the following would suffice, as in Example 10.[2]

Example 10

RENTER'S HOUSING EXPENSES, BY INCOME
AND LIFE-CYCLE STAGE

Finally, check other tables in the same report to be sure that each title is distinctive and uses the same language to describe like things. For a long report, I find it useful to type a list of the table titles, then edit them for both distinctiveness and consistency. It's surprising how often I then notice unintended changes in terminology or phrasing.

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[2] According to one tradition of table design, every table should be fully self-documented, so that if it were ripped out of context it would still make complete sense. I've come increasingly to question this principle because it burdens all readers in the interest of an unlikely event.

Stub Items and Column Heads. The reader learns from the title what the table is about. The stub items and column heads should enable him to interpret every entry *precisely enough for your purposes.* The qualification is important; don't overburden labels with information that could be relegated to notes at the bottom of the table.

The easiest tables to format and label are those that describe only one attribute and in which all entries have the same unit of account. Then, the column heads define subsets of the population along one dimension and the stub items define subsets along another. Each entry is defined as the attribute of the intersection of two subsets, as shown in Example 11.

Note that both the table title and superior boxhead describe the attribute measured, but the latter is much more specific: "housing expenses" becomes "average monthly gross rent." That's enough for most readers; but for those interested, a footnote defines the term. The superior boxhead (or "spanner") also gives the unit of account ($) and the dimension of the column subsets of all renter households (income ($) in 1973). Because the exact definition of income seems unimportant to the author, it is not given. You'll often have to make that kind of judgment.

The lower boxheads, one for each column, are as terse as possible because they usually determine column width. Compact tables obviously require less space, but they are also easier to read. By putting information applicable to all columns (for example, dollar signs) in the superior box, the author avoided repetition in each lower box.

The leftmost boxhead describes the stub dimension. In Example 11, the author depended on context to explain terse stub items. The text discussed the significance of life-cycle stages and in earlier table defined each one precisely. But notice that the items shown are not in themselves mysterious. A normally intelligent reader could place approximate boundaries on each category and would see the pattern of the items as successive stages in household composition.[3]

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[3]The stages were numbered to reinforce the idea of succession; ordinarily, stub items or columns are numbered only if the notes must explain computations involving them (e.g., "Col. 6 = Col. 3 Col. 1").

Example 11

Housing Expenses, by Income and Life-cycle Stage:
Renter Households in Brown County, Wisconsin, 1974

	Average Monthly Gross Rent [a] ($) by Income ($) in 1973			
Stage in Life-cycle	Under 5,000	5,000- 9,999	10,000 or Over	All Incomes
1. Young single head, no children	116	131	150	133
2. Young couple, no children	129	132	158	158
3. Young couple, young children	137	145	157	150
4. Young couple, older children	141	149	173	166
5. Older couple, older children	126	150	150	145
6. Older couple, no children	130	124	143	134
7. Older single head, no children	100	113	124	111
8. Single head with children	152	100	125	141
All stages	121	135	158	149

SOURCE: Tabulations by BASL staff of records of the survey of tenants and homeowners, Site 1, baseline.

NOTE: Entries are based on a stratified probability sample of 2,163 renter households who paid fair market rents for their units and who provided full information about household income. Data base also excludes occupants of mobile homes and lodgers, about 5 percent of all renter households in Brown County.

[a] Contract rent plus respondent's estimate of charges for fuel and utilities paid directly by the tenant.

Estimate based on fewer than 10 observations.

Researchers who use computers grow accustomed to the data-labeling conventions devised for computer programming, so have a regrettable tendency to use the same conventions in their research reports. For example, the computer label for "young single head, no children" is apt

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to be something like "YGSGNO." Others may be more tolerant, but when I encounter a table stub composed of such cryptic items, I look for something else to read.

Most authors are better at designing column heads than table stubs, probably because the boxlines in column heads help them subordinate detailed labels below more general ones. In designing a table stub, several devices can be used for emphasis and subordination: centered headings, variant typefaces, indentation, and vertical space or horizontal rules between items. Example 12 displays most of these devices.

Example 12

Distribution of Rental Properties and Housing Units, by Type of Property: Brown County, Wisconsin, 1973

Type of Property	Number of Properties	Number of Housing Units		
		Owner Occupied	Rented or Vacant	Total
5+ units	[illegible]	[illegible]	[illegible]	[illegible]
2-4 units	[illegible]	1,652	[illegible]	4,442
1 unit, urban	1,265	--	1,265	1,265
1 unit, rural	266	16	259	275
Total regular	[illegible]	[illegible]	[illegible]	[illegible]
Mobile home	[illegible]	[illegible]	[illegible]	[illegible]
Rooming house	[illegible]	[illegible]	[illegible]	[illegible]
Farm	[illegible]	[illegible]	[illegible]	[illegible]
Total nonregular	409	[illegible]	[illegible]	1,580
Total	[illegible]	[illegible]	13,613	16,239

SOURCE: Tabulations by BASE staff of records of the survey of landlords, Site 1, baseline.

[illegible footnote] Units occupied by the landlord for all twelve months of 1973 (total of 1,739 units) and mobile homes occupied by owners who rent the mobile home space (total of 888 units, 855 of them on mobile home properties).

Nine of these properties have a mobile home space for rent, in addition to the nonmobile home unit counted when determining property type. Seven of the nine properties have a resident landlord but are classified as rental rather than homeowner because of the rented mobile home space.

Tables that compare different attributes of the same population are often harder to format, especially if the units of account vary. In Example 13, the author had to choose between grouping first by attribute and grouping first by tenure. His choice emphasizes comparisons between owners and renters rather than between attributes. In fact, the only obvious reason for putting all three attributes in a single table is to save space.

Example 13

Household Characteristics of Owners and Renters, by Life-cycle Stage: Brown County, Wisconsin, 1974

Stage in life cycle	Average Number of Members		Average Age of Male or only Head		Median Income ($) in 1973	
	Owners	Renters	Owners	Renters	Owners	Renters
1. Young single head, no children	1.26	1.68	6.4	2.7	10,902	...
2. Young couple, no children	2.00	...	79.4	26.9	17,652	13,065
3. Young couple, young children	4.75	4.53	32.5	27.1	15,084	16,57.
4. Young couple, older children	5.16	5.17	49...	40.4	14,735	1,58.
5. Older couple, older children	5.46	5.55	41.7	44..	75,218	13,..
6. Older couple, no children	...8	2.19	56.7	64..	11,906	...
7. Older single head, no children	1.29	1.14	6.26	68.9	...7	..45
8. Single head with children	5.06	4.25	44.7	41..	9,.4.	.,5...
All stages	5.81	2.42	.	46.4	14,..	....

SOURCE: Tabulations by PASE staff of records of the survey of tenants and homeowners, Site I, baseline.

NOTE: Entries for household size and age of head are based on a stratified probability sample of 887 owner households and 2,540 renter households. Entries for household income are based on samples of 739 owner households and 2,490 renter households who provided full information about household income. Data base excludes about 12 percent of all households living in Brown County in 1974; see text for explanation of exclusions.

Example 13 also nicely displays alternative treatments of attribute and unit of account labels. The boxhead over the first two columns manages to name both attribute and unit of account in one breath--the best way. The second superior boxhead is unfortunately incomplete; the reader must guess that age is measured in years. The third gives the unit of account parenthetically.

In a multi-attribute table, it is much better to have each attribute in a column rather than in a row. Entries that change in form or in order of magnitude are hard to read vertically but not horizontally. The row entries in Example 13 change in these respects; Example 14 shows how they would look if transformed to column entries.

Example 14

1.26		1.26
1.68		1.68
35.3	or, even worse,	35.3
24.7		24.7
10,907		10,907
7,313		7,313

A third type of table shows distributions of a population total among subsets defined by stub items and column heads, as in Example 15. Here, the distributions are vertical percentages because a horizontal layout would have required an excessive 14 columns. Note that the auxiliary statistics given at the bottom of the table do not conform to the main column labels--i.e., they are not percentages. This awkwardness might have been avoided by reversing the axes of the table, putting the auxiliary statistics in separately labeled columns instead of rows. Because of the clumsiness of a 14-column table, the format shown is the better alternative. Although the column heads are nicely

Example 15

Distribution of Owner-occupied Housing Units by Market Value by Number of Bedrooms: St. Joseph County, Indiana, 1974

Estimated Market Value (\$)[i]	Percentage Distribution, by Number of Bedrooms per Unit[i]					All Sizes
	0 or 1	2	3	4	5+	
Under 5,000	5.0	2.3	1.2	.1	.2	1.5
5,000- 9,999	14.3	13.9	5.6	6.9	12.0	9.0
10,000-14,999	37.1	31.9	11.0	17.8	5.6	19.4
15,000-19,999	14.0	32.9	18.2	8.9	9.4	20.7
20,000-24,999	11.0	7.8	19.8	11.8	9.4	14.1
25,000-29,999	4.6	6.9	18.1	14.4	2.0	12.8
30,000-34,999	.7	1.2	10.8	4.1	9.5	6.3
35,000-39,999	.5	.8	5.2	9.1	9.0	4.4
40,000-44,999	7.7	1.2	5.2	10.7	10.1	5.2
45,000-49,999	1.9	.5	.1	2.7	8.9	1.1
50,000 or more	2.5	.7	4.7	13.7	24.0	5.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of units	2,529	14,917	22,547	7,611	2,131	49,735
Median value (\$)	14,100	15,300	23,500	26,600	36,100	19,900

SOURCE: Tabulations by HASE staff of records of the screening survey for Site II.

NOTE: Estimates are based on a sample 2,564 complete and 595 incomplete records for owner-occupied housing units, together representing a population of 49,735 such units. The population of units represented by incomplete records has been allocated by size of unit and market value within sampling strata and subareas of the county. Percentage distributions may not add exactly to 100.0 because of rounding.

The county total of owner-occupied housing units is estimated to be 58,383. Those excluded from this tabulation are 1,400 mobile homes and 7,300 conventional units for which survey information was lacking.

[i] Estimated by respondent.

[i] Excludes unventilated bedrooms.

terse, the stub is needlessly cluttered. A better stub would have abbreviated the items as shown in Example 16. In that example,

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Example 16

Estimated Market
Value ($000)

Under 5

5-9

10-14

etc.

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the boundaries of the value intervals are inferrable from the first item; in any case, such estimates are not accurate to the nearest dollar, so precise boundaries (e.g., $14,999) are unimportant.

In tabular distributions, try to avoid interspersing subtotals among the rows or columns. They confuse the logical flow of comparisons. If subtotals are important, first give the detailed distribution, then add rows or columns that condense the same distribution into the desired subtotals. If that's clumsy, use analytical breaks (e.g., skip a line following a row of subtotals) to make the reader pause in his scanning.

Keyed Notes. Stub items and column heads should be brief. When the entry that they define is too complex for brevity but the reader should know the details, invent a short label for the stub item or column head and explain it in a footnote.

Example 12, above, illustrates the problem and its solution. The table shows distributions of rental properties and housing units by type of property, but one of the columns is headed "Owner-Occupied." A footnote keyed to that label explains how a rental housing unit can be owner-occupied.

Often, an analyst will modify reported data to correct biases or make them comparable to other data he plans to use. The corrections may be important, but not explicable in a word or two. The analyst can invent a label for the corrected data (e.g., "Adjusted Gross Income" or "Reverberation Index") and explain the label in a keyed footnote.

Nonconforming entries in a row or column should also be footnoted. For instance, if the last entry in an annual time series is based on data for the first six months, that fact can be explained in a footnote keyed to that entry. A missing entry can be represented by a footnote key, usually in parentheses; the note then explains why the entry is missing (see Appendix Example A-18).

Persuasive Credentials

If you've persuaded the reader to look at your table with a specific issue in mind and if you have formatted and labeled the data so that he understands the comparisons you want him to make, you should get his assent to your conclusions. But you can still lose a reader who decides that your data are untrustworthy. Especially if he disapproves of your conclusions, he's likely to seek this way out. So it's important to supply your data with convincing credentials.

The most important credential is a clear account of where the numbers came from and what happened to them along the way. Every table should carry beneath it a source note that would enable the reader to start where you did and work forward to where you came out. He's not likely to do so, but if he thinks you are concealing something by vagueness, down goes your credibility.

There are standard forms for citing published sources of data. However, .npublished sources are more common in original research. If the data are drawn from a well-defined file that you or your colleagues created, give it a name and cite it as the source. If the file exists in several versions, it's worth recording which one you used while it's still fresh in your mind.

How much of this information needs to be attached to the table depends on context. A report on original research commonly has an introductory section or an appendix that describes the data sources and

how the data were manipulated. The table citation need only be specific enough to be understood in that context. Without that kind of background, you need to say more, either in the table or in the adjacent text.

A second kind of credential explicitly qualifies the data's interpretation or reliability. Consider the following general note that was attached to a distribution of owner-occupied homes by market value, similar to the table in Example 15:

Example 17

NOTE: Estimates are based on data from a sample of 2,541 housing units, including 371 for which market value was not reported; the latter are distributed by value in the pattern of other units of the same sizes. Entries exclude an estimated 1,630 owner-occupied mobile homes. Distributions may not add exactly to totals because of rounding.

The first sentence tells the sample sizes from which the distribution was estimated, a general indicator of the reliability of individual entries; it also notes some minor funny business with incomplete records. The second sentence explains that a marginal category of owner-occupied homes was excluded from the data. Finally, the third sentence reassures the reader who may add a column and come out with a total of 99.8 instead of 100.0. Altogether, the note should leave the reader with the sense that the author is careful with numbers and their interpretation, and is not afraid to reveal shortcuts he has taken because he's confident that they are undamaging.[4]

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[4] The general note attached to the table in Example 15 is both wordier and less reassuring. If one works carefully through the qualifications, it appears that the distribution presented is based on sample data pertaining to only two-thirds of the population ostensibly described. The wordiness probably reflects the author's discomfort with this limitation.

Depending on the nature of the data, there are other things you can do to build credibility. One that helps the author avoid mistakes and helps the suspicious reader to believe the data is to format distributions so that each row or column can be checked for internal consistency. For example, components should add to an explicitly given total; to complete the account, you may need a category such as "Other, unspecified." Showing the number of cases on which a percentage distribution is based (as in Example 15) is another aid to credibility and also gives the reader the information he would need to back-transform the entries to their original unit of account.

For estimates based on sample data, it is customary to report standard errors, confidence intervals, or significance tests. Put them in the table if they are important, but try for a format in which the pertinent comparisons between point estimates are not visually obstructed by an intervening standard error (see appendix examples indexed under "Reliability"). It may be adequate to say in the text or table note that you have made the appropriate statistical tests and your conclusions survived them.

Rounding is a double-edged device. Referring once again to Example 15, notice that the columns are 11-interval distributions based on small samples.[5] Reliability to one decimal place for each entry is manifestly absurd. But rounding would create two problems. First, you would lose closure; the components would not add to totals, so transcription errors would be harder to catch. Second, back-transformations would not reproduce the raw data well. I've never solved this problem to my satisfaction.

Finally, general neatness counts for a good deal. Evidence of sloppiness in small matters will lead most readers to suspect sloppiness in large ones.

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[5] Since the average sampling weight is $(55,208/2,541 = 21.7)$, the estimated total of 2,053 units with 5+ bedrooms is probably based on no more than 100 observations.

PUTTING THE PIECES TOGETHER

Like a crossword puzzle, table design entails solving a number of small problems, each solution imposing constraints on those to come. I quite regularly find that an ingenious solution to one problem blocks all reasonable solutions to the next. Then, it's back to Square One.

The best advice I can offer is to be prodigal with time and paper. When you find halfway through a layout that it won't work, start over on a fresh sheet of grid paper. And work in erasable pencil, not ink. A draft table with extra columns squeezed in as afterthoughts and with three layers of emendation to the labels usually contains errors that would be caught if you made a fresh copy, and will certainly confuse the typist.

Those who like clear rules and universal principles may be distressed by the amount of judgment entailed in designing a table. There *are* fundamental purposes from which all tactics derive; they can be summarized as follows:

- *To* persuade the reader to look at your table.
- *To* enable him to see in it the message or conclusion that you draw from the data.
- *To* convince him that the data are trustworthy.

If you'll keep these purposes firmly in mind, your tables may fall short of perfection, but they will never be disasters.

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GLOSSARY

ARRAY. An ordered set of data, usually numbers. In tabular array, the numbers are organized into rows and columns according to some logical principle.

ATTRIBUTE. A characteristic of a POPULATION that has a range or set of possible values which collectively encompass all members of the population. Examples: For a population of persons, attributes include age, race, income, duration of residence, reason for last move.

CELL. A position in a tabular ARRAY. The entry in a particular cell is defined by the corresponding STUB ITEM and COLUMN HEAD.

COLUMN HEAD. The topmost row or rows of a table, when used to specify ATTRIBUTES, ATTRIBUTE VALUES, and UNITS OF ACCOUNT pertaining to each column of table entries. SUPERIOR heads (or "spanners") extend across and apply to two or more columns; their meaning is completed by INFERIOR heads that apply to single columns. Heads may be numeric or alphabetic; their domains (the columns to which they apply) are often indicated by box rules (solid lines) dividing them.

CREDENTIALS. A general term for table features that enable the reader to judge the reliability of the data presented. Credentials include the SOURCE NOTE; methodological material in a GENERAL NOTE; some KEYED NOTES; supplementary information given at the margins of a table, such as row or column totals or sample sizes; and formal statistical measures of the reliability of estimators, such as standard errors or significance tests.

DIMENSIONALITY. A table's dimensionality is the number of different ATTRIBUTES used to assign population ELEMENTS to SUBSETS of a NESTED DISTRIBUTION. Because paper has only two physical dimensions, special graphic or formatting devices are needed to show three or more dimensions. Examples of one dimension: households by age of head; two dimensions: households cross-classified by age and race of head; three dimensions: households cross-classified by age of head, race of head, and duration of residence. PARALLEL DISTRIBUTIONS do not add dimensions to a table.

DISTRIBUTION. The assignment of population ELEMENTS to SUBSETS; mathematicians may call this process "partitioning a set." Distributions may be either NESTED or PARALLEL. In a nested distribution, population elements are assigned to subsets defined by cross-classification of two or more attributes; in parallel distributions, population elements are assigned to subsets defined by values of one attribute, then reassigned to subsets defined by values of another attribute. Example of nested distributions: households cross-classified by age and race of head. Example of parallel distribution: households classified by age of head; same households classified by race of head.

ELEMENT. The smallest enumerated entity in a POPULATION. In a NESTED DISTRIBUTION, each element must be assigned to one and only one category of the distribution. Examples: household, person, bottle of milk, dollar.

ENTRY. A datum reported in the body of a table; the POPULATION SUBSET to which it applies and the ATTRIBUTE or ATTRIBUTE VALUE it represents are specified by the corresponding STUB ITEM and COLUMN HEAD. Table entries may be either numeric or alphabetic. The position of an entry in a table is often called a CELL.

FLOWCHART. An alternative to tabular format in which the relation-
ships between boxed entries is clarified by a network of arrows
or lines connecting them.

FULLY FORMATTED TABLE. An array of data that is fully equipped
with TITLE, LABELS, AND CREDENTIALS, so that it is virtually
self-explanatory. Small arrays are better treated as TEXT
TABLES.

GENERAL NOTE. Text placed at the bottom of a table that qualifies
all ENTRIES. General notes sometimes report supplementary
information such as sample sizes, explain calculations or
analytical methods, or define the POPULATION described in the
table.

HEADLINE. A brief text, usually in large type, placed above a table
to convey the table's main message. Headlines are effective in
informal documents in lieu of table titles, but the information
usually contained in a title must then be conveyed either in the
text or column heads.

KEYED NOTES. Text placed at the bottom of a table and keyed by
markers (usually asterisks, italic letters, or superscript
numerals) to specific STUB ITEMS, COLUMN HEADS, or ENTRIES.
The text qualifies the marked item. Keyed notes are usually listed
in the order in which the keys are encountered when the table is
read row by row.

LABELS. A general term for table features that explain the meaning
of table entries. It includes the STUB ITEMS and COLUMN HEADS
and KEYED NOTES that qualify them.

NONCONFORMING ENTRY. A table entry that is incorrectly defined by
the STUB ITEM and COLUMN HEAD, usually because its unit of account
differs from that of most entries in the table. Nonconforming

entries are usually rows added to provide supplementary infor-
mation, such as column medians or sample sizes for vertical
distributions, or standard errors for parameter estimates.

NULL ENTRY. Symbols that identify table entries which are (a) known
to be zeros, (b) rounded to zero, (c) possibly nonzero but not
known, or (d) inapplicable because the stub and column head define
a logically impossible or uninteresting subset. Different symbols
should be used for each condition, and their meanings should be
clear; for example, "NA" is ambiguous (not applicable, not avail-
able). The best practice is to insert a marker in the appropriate
cell of the table and explain its meaning in a KEYED NOTE.

PANEL. A portion of a table set off from the remainder, usually by
strong horizontal or vertical lines. Side-by-side panels are most
often used to continue long but narrow tables, using space that
would otherwise be wasted. Upper and lower panels are most often
used to provide a third dimension to a tabular format.

PARAMETER. A number that describes the distribution of an ATTRIBUTE's
values within a specified POPULATION or SUBSET. Examples: mean,
median, range, standard deviation, regression coefficient. Popula-
tion parameters are often estimated from sample data.

POPULATION. The largest defined set of ELEMENTS described in a table.
Although a table may sometimes describe more than one population,
the different populations do not add to a meaningful total. Examples
of different populations: all households in Brown County, 1975; all
persons in Brown County, 1975.

RESCALING. A TRANSFORMATION designed to make table ENTRIES easier
to read without altering the number of significant digits. Thus,
in a table whose characteristic entry is .00056, all entries
may be multiplied by 1,000; whereupon the entry would be .56.
Rescaling entails a change in the UNIT OF ACCOUNT.

ROUNDING. Deleting lower-order digits from table ENTRIES in order
to avoid overstating reliability or to make the entries easier
to read. The last retained digit is rounded up or down to the
nearest integer. Conventionally, when the deleted digits are
exactly 555...., the last retained digit is rounded to the nearest
even number. A rounded distribution may not add exactly to the
correct total; the table's GENERAL NOTE should so indicate
(e.g., "Distributions do not add exactly to totals because of
rounding.").

SOURCE NOTE. Text placed at the bottom of a table that specifies
the source of the data reported in the table. If sources are
fully identified elsewhere in the text, the note can be
abbreviated by cross-referencing the more complete description
("See p. 7"; "Same as Table 8"). Source notes should not be
used to explain computations.

STUB. The lefthand column of a table, when used to specify
ATTRIBUTES or ATTRIBUTE VALUES pertaining to each row of table
entries. May be alphabetic or numeric. Each line of the stub
constitutes an ITEM.

SUBSET. A collection of population ELEMENTS that is, or could be,
less than the full set. It is formed by distributing elements
among logical categories, or by choosing elements at random
(sampling) from the full set. Examples of distributive subsets
of all households in Brown County, 1975: owner households,
renter households.

TEXT TABLE. A small array of data inserted in the text of a docu-
ment for ease of reference. It does not have a TITLE, and its
LABELS and CREDENTIALS are usually laconic, depending on the text
for their interpretation.

TITLE. Text placed at the top of a table to briefly describe its

contents. Differs from a HEADLINE, which conveys the table's main message. Do not use both.

TRANSFORMATION. A change of form for numerical data, usually intended to simplify its interpretation. Examples: absolute values to percentages or index numbers; ratios of two numbers that are to be compared. A transformation usually changes the UNIT OF ACCOUNT.

UNIT OF ACCOUNT. Definition of the POPULATION SUBSET or ATTRIBUTE value corresponding to a table entry of "1". In a population DISTRIBUTION, the unit of account is normally the population ELEMENT (1 household), but may be a group of elements (1,000 households). ATTRIBUTES of a population may be measured in various ways (square feet, years of age, thousands of dollars, percentage of total).

Appendix

EXAMPLES OF TABULAR FORMATS

APPENDIX

EXAMPLES OF TABULAR FORMATS

In the following pages, I present some 50 examples of fully formatted tables that illustrate the principles of table design discussed in the main text. Scanning these examples will suggest to the reader the variety of formatting devices that can be used to solve design problems. The "Index to Table Features" which follows this appendix can help with specific formatting problems by guiding the reader to the relevant examples.

For convenience, I have drawn all the examples from Rand publications, and nearly all from the publications of research projects with which I was associated and whose tabular formats I either devised or influenced. That fact explains the monotony of subject matter and the general consistency of details such as typefaces, capitalization, and abbreviations, as well as page layouts. Conventions in these matters differ among institutions, publishers, and authors; the only universal requirement is consistency within a single document. For example, all but two of the tables presented here have boxed heads and column rules, which are sometimes omitted, especially in letterpress (as opposed to typescript) copy.

However, the tables exemplify much more than typographical conventions. Examples A-1 to A-13 were chosen to display various ways to organize *distributions* of populations according to their attributes, in up to four dimensions. Examples A-14 to A-32 present alternatives for arraying commonly used population *parameters*, ranging from simple averages to regression coefficients. Examples A-33 to A-37 show ways to present *time series*. Examples A-38 to A-44 suggest various ways to present *accounts* in which components are derived from, or combined to form, totals. The final group, Examples A-45 to A-50, offer suggestions for formatting *nonnumeric entries*.

The index lists these substantive topics as major headings that subsume more specific cases; and also lists all general features of tabular formats, such as column heads and source notes, together with

variants tailored to particular circumstances. There are a few index entries for which no examples are provided; I have included them to forestall fruitless searching.

Though each table exemplifies an important principle or useful formatting device, few if any are perfect of their kind. In retrospect, I can see ways to improve most of them so that their messages would emerge more clearly or their credentials would be more persuasive.

Example A-1

Distribution of Reasons Why Housing Units Failed Their Initial Evaluations: Brown County Housing Allowance Program, First Year

Reason for Failure	Frequency of Occurrence	
	Number	Percent
Hazardous Conditions		
Stairs or railings absent or unsafe	1,063	39.4
Hazardous conditions in kitchen or bath[a]	69	2.6
Unsanitary conditions or unsafe storage of hazardous materials	57	2.1
Walls structurally unsound or in need of repainting[b]	53	2.0
Exterior doors missing or broken	36	1.3
Ceilings structurally unsound or in need of repainting[b]	26	1.0
Floors structurally unsound or water-permeable[c]	25	.9
Foundation structurally unsound or water-permeable	22	.8
Fire exits inadequate for safety	18	.7
Roof structurally unsound or leaky	17	.6
Accessory structures near house unsafe	16	.6
Inadequate storm drainage, seepage, erosion	3	.1
Group total	1,405	52.1
Light and Ventilation		
Inadequate ventilation in kitchen or bath	277	10.3
Windows or screens damaged or missing	207	7.7
Inadequate ceiling height in kitchen	22	.8
Inadequate natural light in kitchen	3	.1
Overgrown bushes or trees block natural light	2	.1
Group total	511	18.9
Kitchen Facilities		
Hot-and-cold sink absent or inoperable	62	2.3
Cooking range absent or inoperable	23	.8
Refrigerator absent or inoperable	15	.6
Group total	100	3.7
Bathroom Facilities		
Hot-and-cold bath absent or inoperable	41	1.5
Hot-and-cold sink absent or inoperable	53	2.0
Flush toilet absent or inoperable	26	1.0
No heat in bathroom	17	.6
Inadequate enclosure for privacy	22	.8
Group total	159	5.9
Utility Systems		
Water heater absent or inoperable	179	6.6
Heating system inadequate or unsafe	57	2.1
No running water or inadequate plumbing	53	2.0
Too few or inoperable electrical outlets[d]	23	.8
No electrical service or unsafe wiring	31	1.2
Group total	343	12.7
Other		
No habitable sleeping rooms	178	6.6
All reasons	2,696	100.0

SOURCE: Tabulation by HASE staff of HAO records for Site I through 20 June 1975.

NOTE: Frequencies are based on records for 1,234 units that failed their initial housing evaluations during the program's first year. These do not include 161 units that were otherwise acceptable but too small for the applicant's household and 86 records that had not been processed as of 20 June 1975. Total frequency of reasons for failure is larger because some units failed for two or more reasons. A general deficiency sometimes results in several specific failure ratings. Percentage distributions may not always add exactly to subtotals or totals because of rounding.

[a] Gas leakage, electrical shock hazard, undrained water leakage, fire hazard, no sewage connection.

[b] Repainting required because of flaking lead-based paint.

[c] Floors in kitchen and bathrooms must be impermeable.

[d] Two convenience outlets required for kitchen, one for bath.

Example A-2

Distribution of Unsubsidized Renter-occupied Housing Units by Monthly Gross Rent by Number of Bedrooms: St. Joseph County, Indiana, 1974

Monthly Gross Rent (S)	Percentage Distribution, by Number of Bedrooms per Unit					
	0	1	2	3	4+	All Sizes
Under 60	15.0	1.2	.7	.1	--	1.3
60-79	10.2	8.5	1.9	.3	8.0	4.3
80-99	19.5	18.7	5.2	1.2	7.2	9.6
100-119	11.8	22.8	12.7	21.6	6.8	17.2
120-139	19.7	15.8	17.0	9.8	8.9	15.2
140-159	8.5	11.7	18.0	13.9	19.7	15.0
160-179	13.3	11.4	8.4	11.3	14.6	10.3
180-199	--	7.8	7.9	12.4	10.3	8.4
200-219	2.0	1.7	13.9	6.9	7.3	8.0
220-239	--	.1	4.7	3.8	4.6	2.8
240-259	--	--	4.8	8.3	2.7	3.6
260 or more	--	.3	4.7	10.4	9.8	4.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of units	609	4,771	6,328	2,475	545	14,728
Median rent (S)	109	119	154	165	159	143

SOURCE: Tabulations by HASE staff of records of the screening survey for Site II.

NOTE: Estimates are based on a sample of 3,145 complete and 1,113 incomplete records for renter-occupied housing units, together representing a population of 14,728 such units. The population of units represented by incomplete records has been allocated by size of unit and rent within sampling strata and subareas of the county. Percentage distributions may not add exactly to 100.0 because of rounding.

The county total of unsubsidized renter-occupied units is estimated to be 15,800. Those excluded from this table are about 930 single-family houses and about 140 rented mobile homes.

Contract rent plus an estimate by HASE staff of the average monthly cost of utilities that the respondent reported were not included in contract rent.

Excludes unventilated bedrooms.

Example A-5

Selected Characteristics of Currently Enrolled Households: Housing Allowance
Programs in Brown and St. Joseph Counties, Year 5

| | Percent of All Currently Enrolled Households | | | | | |
| Client Characteristic | Brown County | | | St. Joseph County | | |
	Renters	Owners	Total	Renters	Owners	Total
Age of Head						
Under 62 years	78	43	68	83	38	61
62+ years	22	57	32	17	62	39
Total	100	100	100	100	100	100
Race of Head						
White non-Latin	95	99	96	65	85	75
Other	5	1	4	35	15	25
Total	100	100	100	100	100	100
Household Size						
1 person	40	41	40	40	47	43
2 persons	26	29	27	25	30	28
3-4 persons	26	21	25	28	17	23
5-6 persons	6	7	6	6	5	5
7+ persons	2	2	2	1	1	1
Total	100	100	100	100	100	100

SOURCE: Tabulated by HASE staff from HAO records for Brown
and St. Joseph counties.

NOTE: Entries include all households enrolled at the end of
year 5 in each site: in Brown County, 2,934 renters and 1,202
owners; in St. Joseph County, 3,709 renters and 3,658 owners.
Not all were currently receiving payments.

Example A-6

Changes in the Housing Inventory, by Occupancy Status: Selected Areas of St. Joseph County, 1970-1974

Occupancy Status	Number of Housing Units		Percentage Distribution by Occupancy Status		Percentage Change, 1970-1974
	1970	1974	1970	1974	
(City of ...)					
Occupied by renter	10,973	11,917	25.2	28.0	8.6
Occupied by owner	30,309	28,494	69.6	66.8	-6.0
Vacant, for rent	985	1,091	2.3	2.6	10.8
Vacant, for sale	502	495	1.2	1.2	-1.4
Vacant, not available	752	627	1.7	1.5	-16.6
Total	43,521	42,624	100.0	100.0	-2.1
(City of Mishawaka)					
Occupied by renter	3,163	3,416	25.4	25.5	8.0
Occupied by owner	8,888	9,203	71.3	68.9	3.5
Vacant, for rent	203	419	1.6	3.1	106.4
Vacant, for sale	56	38	.4	.3	-32.1
Vacant, not available	150	278	1.2	2.1	85.3
Total	12,460	13,354	100.0	100.0	7.2
(Remainder of County)					
Occupied by renter	3,181	2,885	13.9	11.8	-9.3
Occupied by owner	19,152	20,686	83.6	84.9	8.0
Vacant, for rent	114	215	.5	.9	88.6
Vacant, for sale	140	124	.6	.5	-11.4
Vacant, not available	333	465	1.5	1.9	39.6
Total	22,920	24,375	100.0	100.0	6.3
(Total, St. Joseph County)					
Occupied by renter	17,317	18,218	21.9	22.7	5.2
Occupied by owner	58,349	58,383	74.0	72.6	--
Vacant, for rent	1,302	1,725	1.7	2.1	32.5
Vacant, for sale	698	657	.9	.8	-5.9
Vacant, not available	1,235	1,370	1.6	1.7	10.9
Total	78,901	80,353	100.0	100.0	1.8

SOURCE: U.S. Bureau of the Census, *1970 Census of Population and Housing: Census Tracts*, Series PHC(1)-200; and tabulations by HASE staff of property information and screening survey records for Site II.

NOTE: Entries for both 1970 and 1974 are probably slight underestimates. The average underestimation in areas with mailback census procedures in 1970 was 1.0 percent for occupied units and 10.5 percent for vacant units. The screening survey sampling frame excluded an estimated 2,700 housing units on residential properties whose tax records did not clearly indicate residential uses; nearly all are single-family homes, probably owner-occupied.

[a]The interval between reference dates of the census and screening surveys is 4.3 years. Percentage changes in the numbers of vacant units are less reliable than percentage changes in the numbers of occupied units because of the greater likelihood of enumeration or sampling error for vacant units and because of their small numbers.

[b]Census counts include units rented or purchased but not yet occupied, seasonal homes, and housing reserved for migratory workers. Units unfit for habitation and vacant mobile homes are not counted as part of the housing inventory. In the screening survey, vacant mobile homes are included as part of the inventory.

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Example A-7

Comparison of Participation Rates in the Supply and Demand Experiments: Renter Households Offered "Housing-Gap," Minimum Housing Standards Program, by Site

Eligibility Status and Outcome	Percent of Indicated Total			
	Supply Experiment		Demand Experiment	
	Brown County	St. Joseph County	Pittsburgh	Phoenix
Summary				
Eligible to enroll	100	100	100	100
Ever enrolled	65	64	75	84
Ever qualified for payments	55	46	30	45
Detail				
Eligible to enroll	100	100	100	100
Informed about program	85	85	100	100
Not informed	15	15	--	--
Informed eligible	100	100	100	100
Ever enrolled	77	75	75	84
Never enrolled	23	25	25	16
Enrollee	100	100	100	100
Qualified for payments[a]	46	28	33	29
Had to repair or move[b]	54	72	67	71
Had to repair or move[b]	100	100	100	100
Ever qualified for payments	71	61	34	42
Never qualified for payments	29	39	66	58

SOURCES: For Supply Experiment, Table 4.5, above, and additional detail from HAO records; for Demand Experiment, Kennedy and MacMillan, 1980, Tables 2-4 and 2-9.

NOTE: Differences between experiments in program design and record systems qualify the parallelism of entries. Difference in outcomes reflects both differences in program design and differences in the eligible populations. See text for discussion.

[a] Qualified immediately after enrolling and completing an initial housing evaluation.

[b] For the Supply Experiment, this group includes enrollees who did not complete an initial evaluation on the enrollment dwelling, failed such an evaluation, or passed the evaluation but did not submit a lease agreement. In the Demand Experiment, all were evaluation failures.

Example A-8

Results of Housing Evaluations for Recipient Households:
Housing Allowance Programs in Brown and
St. Joseph Counties Through Year 5

Evaluation Result	Brown County			St. Joseph County		
	Renter	Owner	Total	Renter	Owner	Total
Annual Evaluation of Recipient's Dwelling[a]						
Number of cases	5,466	3,726	9,192	5,366	8,769	14,135
Percentage distribution:						
Acceptable	77.3	84.2	80.1	56.4	73.7	67.1
Not acceptable	22.7	15.8	19.9	43.6	26.3	32.9
Evaluation of Other Recipient-Nominated Dwelling						
Number of cases	1,411	92	1,503	1,561	143	1,704
Percentage distribution:						
Acceptable	57.7	59.8	57.8	36.3	46.9	37.1
Not acceptable	42.3	40.2	42.2	63.7	53.1	62.9
Reevaluation of Failed Dwelling						
Number of cases	1,158	490	1,648	2,481	2,015	4,496
Percentage distribution:						
Acceptable	91.2	95.5	92.5	81.3	91.8	86.0
Not acceptable	8.8	4.5	7.5	18.7	8.2	14.0

SOURCE: HAO management information reports for 29 June 1979 in Brown County and 28 December 1979 in St. Joseph County.

NOTE: Recipients' dwellings are reevaluated annually; if defects found by these evaluations are not promptly remedied, allowance payments are suspended. When a recipient moves, the new dwelling must be evaluated and certified for occupancy to avoid payment suspension. Failed units are reevaluated (presumably after being repaired) at the recipient's request.

[a] Data on annual evaluations include a few in each site for enrollees who never qualified for payments but maintained their enrollments by completing semiannual and annual eligibility recertification requirements.

Example A-9

Distribution of Primary Reasons for Last Local Move, by Life-cycle Stage: Brown County, Wisconsin, 1974

Stage in Life Cycle	Percentage Distribution of Households by Primary Reasons for Moving[1]							
	Change in Family Circumstances	Wanted Cheaper Housing	Wanted Change in Tenure or Structure Type	Wanted Change in Space or Quality	Wanted More Convenient Location	Wanted Better Neighborhood	Had to Leave Former Residence	All Reasons
1. Young single head, no children	45.4	11.4	3.4	16.7	3.9	7.9	11.4	100.0
2. Young couple, no children	45.4	10.5	12.4	17.0	2.0	8.0	4.7	100.0
3. Young couple, young children	15.5	3.6	37.0	28.0	.6	10.3	4.9	100.0
4. Young couple, older children	10.8	3.2	32.5	32.7	2.5	10.7	7.7	100.0
5. Older couple, older children	11.4	1.0	10.5	6.1	41.4	18.0	9.5	100.0
6. Older couple, no children	22.1	5.6	4.0	23.3	22.8	12.8	9.4	100.0
7. Older single head, no children	42.3	3.7	5.0	21.3	2.2	8.6	26.8	100.0
8. Single head, with children	24.3	11.8	2.6	34.4	2.9	6.3	17.6	100.0
All stages	26.8	6.4	19.5	23.6	4.7	9.6	9.3	100.0

SOURCE: Tabulations by HASE staff of records of the survey of tenants and homeowners, Site 1, baseline.

NOTE: Distributions are based on a stratified probability sample of 2,039 households whose last move was within Brown County. Data base excludes about 12 percent of all households in Brown County in 1974; see text for explanation of exclusions.

[1] See Table 4.17 for characteristic responses included in each reason for moving.

Example A-10

Residential Properties and Housing Units by Type of Property and Occupancy Status of Unit: Brown County (1974) and St. Joseph County (1975)

Type of Property	Number of Properties	Number of Housing Units, by Occupancy Status				Percentage Distribution	
		Owner-Occupied	Renter-Occupied	Vacant	Total	Properties	Housing Units
Brown County, 1974							
1 unit	34,389	31,950	2,085	354	34,389	87.9	69.8
2-4 units	4,380	1,969	7,425	360	9,754	11.2	19.8
5-19 units	231	37	1,822	123	1,982	0.6	4.0
20-99 units	43	2	1,520	89	1,611	0.1	3.3
100+ units	2	--	255	15	270	(c)	.6
Mobile-home park	13	807	--	40	897	(c)	1.8
Rooming house	40	10	326	29	365	0.1	0.7
Total	39,098	34,775	13,433	1,060	49,268	100.0	100.0
St. Joseph County, 1975							
1 unit	62,373	54,548	5,720	2,105	62,373	94.8	78.3
2-4 units	3,169	1,295	5,176	914	7,385	4.8	9.3
5-19 units	179	39	1,037	188	1,264	0.3	1.6
20-99 units	28	39	987	161	1,187	(c)	1.5
100+ units	27	1,098	3,998	506	5,602	(c)	7.0
Mobile-home park	18	1,681	--	172	1,853	(c)	2.3
Rooming house	5	1	25	8	34	(c)	(c)
Total	65,799	58,701	16,943	4,054	79,698	100.0	100.0

SOURCE: Reconciliation by HASE staff of sampling and survey records for the baseline surveys of landlords, tenants, and homeowners in both sites.

NOTE: Estimates are based on sample data, but the samples cover all known residential properties in each site at the time of the surveys. Rented rooms in private homes are not counted as separate units. Mobile homes outside of mobile-home parks are counted in the property-size categories in which they occur. In Brown County, vacancies in 1,240 federally subsidized units were estimated without survey data.

Includes owner-occupied units in cooperatives and condominiums and units occupied by resident landlords on rental properties. Also includes mobile homes owned by the occupant even though the vehicle may be in a rented space.

Less than 0.1 percent.

Mobile-home parks have five or more mobile-home spaces. Vacancies refer to vacant spaces rather than vacant vehicles.

Rooming houses have five or more units that lack either complete kitchen facilities, a private bath, or a separate entrance.

Example A-11

Distribution of Applicants, by Age
of Head and Housing Tenure:
South Bend Housing Allowance
Program, Through September 1975

Housing Tenure	Age of Head		
	Under 62 Years	62 Years or over	Total
Number of applicants			
Homeowner	1,786	1,211	2,997
Renter	2,301	301	2,602
Total	4,087	1,512	5,599
Percentage distribution			
Homeowner	43.7	80.1	53.5
Renter	56.3	19.9	46.5
Total	100.0	100.0	100.0

SOURCE: HAO management information
report for Site II as of 6 September
1975.

Example A-12

Distribution of First-year Housing Evaluations, by Type of
Evaluation and Result of Evaluation:
Brown County Housing Allowance Program

Type of Evaluation	Evaluations Completed[a]		Percentage Distribution by Evaluation Result		
	Number	Percent	Pass	Fail[b]	Total
Initial evaluations					
Preenrollment unit	2,706	67.5	54.4	45.6	100.0
Other unit	359	8.9	59.9	40.1	100.0
Total initial	3,065	76.4	57.2	42.9	100.0
Reevaluations					
Annual	60	1.5	80.0	20.0	100.0
Failed unit	884	22.1	99.0	1.0	100.0
Total reevaluations	944	23.6	89.5	10.5	100.0
All types	4,009	100.0	73.3	26.7	100.0

SOURCE: Tabulations by HASE staff of HAO records for Site I
through 20 June 1975.

[a]All evaluations completed during the program's first year of
operations.

[b]Failures do not include units that were otherwise acceptable
but were too small for the applicant's household.

Example A-13

Recipients' Evaluations of Selected Federal
Housing Assistance Programs

Respondent's Evaluation	Percentage Distribution of Households in Each Program			
	Housing Allowances (n = 381)	Sec. 236 Rent Subsidy (n = 556)	Sec. 235 Mortgage Subsidy (n = 391)	Public Housing (n = 511)
Own Experience with Program				
Satisfactory	95	84	86	77
Neutral, no opinion	3	5	3	9
Unsatisfactory	2	11	11	14
Is the program run the way it should be?				
Yes	91	69	68	63
Neutral, no opinion	5	13	16	20
No	4	18	16	17
Should the program be changed in any way?				
No	78	52	49	48
Neutral, no opinion	2	12	16	29
Yes	19	36	35	23

SOURCES: For housing allowances, tabulated by HASE staff from
weighted records of the wave 4 surveys of households. For other pro-
grams, Louis Harris and Associates, 1976, pp. 1,427-31.

NOTE: HASE and Harris questions are nearly parallel in wording;
however, responses to the "own experience" question were independently
scaled by the two sources so may not be exactly comparable. Harris
surveyed a national sample of participants in each program in 1973;
the HASE data are for 1978-79.

Example A-14

Distribution of Households and Selected Household Characteristics, by Life-cycle Stage: Brown County, Wisconsin, 1974

	Distribution of Households		Average Age of Male or Only Head	Average Number of Members		
				All Members	Other than Heads	
Stage in Life Cycle	Number	Percent			Under 18	18 or Over
1. Young single head, no children	3,656	8.6	25.4	1.65	--	.65
2. Young couple, no children	3,093	7.3	26.4	2.01	--	.01
3. Young couple, young children	11,073	26.0	31.5	4.53	2.47	.06
4. Young couple, older children	4,332	10.2	38.9	5.16	2.78	.38
5. Older couple, older children	5,007	11.8	51.8	5.46	2.41	1.05
6. Older couple, no children	7,649	18.0	62.8	2.27	--	.27
7. Older single head, no children	5,548	13.0	67.1	1.23	--	.23
8. Single head, with children	2,164	5.1	37.2	3.60	2.17	.43
All stages	42,587	100.0	44.3	3.39	1.32	.33

SOURCE: Tabulations by HASE staff of records of the survey of tenants and home-owners, Site I, baseline.

NOTE: Entries are estimates based on a stratified probability sample of 3,722 households. Data base excludes about 12 percent of all households living in Brown County in 1974; see text for explanation of exclusions.

All households living in unsubsidized regular housing units except resident landlords. Total includes an estimated 66 households not classified by life-cycle stage. Distribution does not add exactly to total because of rounding.

Average for all households with children is 2.48.

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Example A-15

Housing Expenses, by Income and Life-cycle Stage:
Renter Households in Brown County, Wisconsin, 1974

Stage in Life Cycle	Average Monthly Gross Rent[a] ($) by Income ($) in 1973			
	Under 5,000	5,000-9,999	10,000 or Over	All Incomes
1. Young single head, no children	116	131	150	133
2. Young couple, no children	129	132	158	148
3. Young couple, young children	137	145	157	150
4. Young couple, older children	141	149	173	166
5. Older couple, older children	126[b]	150	150	145
6. Older couple, no children	130	124	193	154
7. Older single head, no children	100	113	144	111
8. Single head with children	147	150	174	151
All stages	121	135	158	140

SOURCE: Tabulations by HASE staff of records of the survey of tenants and homeowners, Site I, baseline.

NOTE: Entries are based on a stratified probability sample of 2,163 renter households who paid full market rents for their units and who provided full information about household income. Data base also excludes occupants of mobile homes and lodgers, about 3 percent of all renter households in Brown County.

[a]Contract rent plus respondent's estimate of charges for fuel and utilities paid directly by the tenant.

[b]Estimate based on fewer than 10 observations.

Example A-16

Means and Standard Deviations for Variables Used to Fit a Hedonic Index for Rental Dwellings: St. Joseph County, Indiana, 1975

		Statistics	
Variable	Range of Values	Mean	Standard Deviation

Dependent

Gross rent ($/month)	45-365	133.46	40.68

Building Attributes

Size

Number of rooms (ln)	0-2.4	1.35	.42
Number of bathrooms (squared)	0-9	1.67	.43

Quality

Number of appliances supplied by landlord (squared)	0-25	4.07	4.63
Presence of thermostat	Yes = 1, no = 0	.67	.47
Building age (years)	1-124	60.84	23.02
Building age (squared)	1-15,376	4,231.19	2,548.60
Lot size per dwelling (1,000 square feet)	1-10.9	3.09	2.32
Single-family dwelling	Yes = 1, no = 0	.17	.37
Composite rating of comparative building quality	0-2	1.04	.40
Presence of commercial unit in building	Yes = 1, no = 0	.03	.18
Presence of brick or stone exterior	Yes = 1, no = 0	.14	.35

Location Attributes

Accessibility

Generalized access to employment	0-2.6	1.97	.51

Neighborhood Quality

Composite rating of neighborhood quality	0-3	1.84	.24
Located in southeast suburbs	Yes = 1, no = 0	.01	.10
Located in central South Bend	Yes = 1, no = 0	.60	.49

Blockface Quality

Presence of other residential land	Yes = 1, no = 0	.98	.14
Presence of mixed residential and commercial land	Yes = 1, no = 0	.14	.35
Presence of farmland	Yes = 1, no = 0	.02	.13
Presence of abandoned buildings or vehicles	Yes = 1, no = 0	.13	.34
Presence of vacant lots	Yes = 1, no = 0	.52	.50
Presence of commercial land	Yes = 1, no = 0	.38	.49
Composite rating of buildings, yards, and property maintenance	0-3	1.39	.42
Street maintenance	0-3	2.28	.60

Price Adjustments

Length of stay (years)	0-44.0	2.80	4.82
Length of stay exceeding 3.5 years	0-40.5	1.28	4.07
Presence of a resident landlord	Yes = 1, no = 0	.13	.34

SOURCE: Tabulated by the author from 1,129 records composed from baseline household, residential building, landlord, and neighborhood surveys for St. Joseph County, Indiana.

NOTE: Analysis uses only data for dwellings whose occupants pay full rent and with complete information on the variables listed.

Example A-17

Size of Housing Unit and Number of Persons per Room by Life-cycle
Stage: Renter Households, Brown County, Wisconsin, 1974

Stage in Life Cycle	Average Number of Rooms per Unit		Average Number of Persons per Room	
	Mean	Standard Error	Mean	Standard Error
1. Young single head, no children	3.69	.04	.46	.01
2. Young couple, no children	3.99	.04	.54	.01
3. Young couple, young children	4.66	.05	.83	.01
4. Young couple, older children	5.39	.17	.98	.04
5. Older couple, older children	5.81	.18	.96	.05
6. Older couple, no children	4.42	.10	.52	.01
7. Older single head, no children	3.81	.05	.32	.01
8. Single head with children	4.77	.07	.68	.02
All stages	4.19	.02	.57	.004

SOURCE: Tabulations by HASE staff of records of the survey of tenants and homeowners, Site I, baseline.

NOTE: Entries are estimates based on a stratified probability sample of 2,835 renter households. The data base excludes about 7 percent of all renter households living in Brown County in 1974; see Sec. I for an explanation of exclusions.

Example A-18

Employment Characteristics of Households by Life-cycle Stage: Brown County (1974) and St. Joseph County (1975)

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Stage in life cycle	Percentage of Households with:						Average Number of Workers	
	Male or Only Head Employed		Wife Employed		No Members Employed			
	Brown County	St. Joseph County	Brown County	St. Joseph County	Brown County	St. Joseph County	Brown County	St. Joseph County
1. Young single head, no children	83.7	80.6	(-)	(-)	7.1	13.2	1.40	1.04
2. Young couple, no children	90.9	86.7	67.2	74.5	1.8	4.9	1.59	1.67
3. Young couple, young children	95.6	85.8	30.6	25.2	2.4	8.7	1.30	1.19
4. Young couple, older children	97.9	94.6	48.6	48.8	1.1	2.1	1.74	1.74
5. Older couple, older children	92.3	89.0	34.2	56.0	1.2	4.9	2.15	1.80
6. Older couple, no children	61.2	56.8	27.1	36.3	29.6	31.5	1.07	1.10
7. Older single head, no children	35.3	41.7	(-)	(-)	57.5	50.5	.51	.70
8. Single head with children	56.4	55.8	(-)	(-)	35.6	37.4	.75	.91
All stages	77.9	71.0	46.5	42.3	16.3	22.2	1.30	1.19

Example A-19

Preenrollment Housing Expense Compared with the Standard Cost
of Adequate Housing: Enrollees Through Program Year 3, by Site

Household size (persons)	Brown County			St. Joseph County		
	Standard Cost ($/mo.)	Average Expense/ Standard Cost		Standard Cost ($/mo.)	Average Expense/ Standard Cost	
		Renter	Owner		Renter	Owner
1	120	1.03	1.63	108	1.19	1.55
2	142	1.11	1.43	135	1.08	1.30
3-4	169	1.01	1.43	157	1.05	1.24
5-6	185	1.00	1.30	173	1.04	1.15
7+	196	1.01	1.11	184	1.01	1.04
All sizes	153	1.03	1.42	143	1.08	1.25

SOURCE: Tabulated by HASE staff from HAO records through June
1977 in Brown County and December 1977 in St. Joseph County.

NOTE: The standard cost of adequate housing was estimated for
each site from rental market surveys before enrollment began.
The figures shown here were derived by inflating those estimates
to prices current at the midpoint of the period covered by the
enrollment data; the inflation factors were derived from Stucker,
1981, and Lindsay and Lowry, 1980.

For renters, expenses are gross rents reported at the time of
enrollment. For owners, expenses include mortgage interest, real-
estate taxes, maintenance and repair, fuel and utilities, and the
opportunity cost of the owner's equity investment. Because these
are low-income owners, the tax benefits of ownership are minimal.

Example A-20

Index of Locational Preferences of Local Movers by Life-cycle,
Stage: Areas Within Brown County, Wisconsin, 1974

	Ratio of Move-ins to Move-outs				Number of Last Local Moves
Stage in Life Cycle	Inner City	Outer City	Suburbs	Rural Area	
1. Young single head, no children	1.12	1.10	.66	.70	2,532
2. Young couple, no children	.86	1.31	1.02	1.05	2,273
3. Young couple, young children	.66	1.20	1.69	.86	6,068
4. Young couple, older children	.53	1.36	.88	2.24^a	848
5. Older couple, older children	.52	4.07^a	$.64^a$	1.00^a	588
6. Older couple, no children	.79	1.47	.87	3.39^a	1,085
7. Older single head, no children	.99	1.38	.96	$.31^a$	1,409
8. Single head, with children	.96	1.64	.87	$.93^a$	1,132
All stages	.83	1.32	1.12	1.03	15,994

SOURCE: Tabulations by HASE staff of records of the survey of tenants and homeowners, Site I baseline.

NOTE: Distributions are based on a stratified probability sample of 2,039 households whose last move occurred within the five years preceding the survey and who moved within Brown County. Data base excludes about 12 percent of all households in Brown County in 1974; see text for explanation of exclusions.

^{a}Either the numerator or the denominator or both are based on fewer than ten observations.

Example A-21

Income and Housing Expenditure Without and With Housing Allowances:
Year 3 Recipients, by Site and Tenure

| Item | Year 3 Average Annual Amount ($) | | | |
| | Brown County | | St. Joseph County | |
	Renter	Owner	Renter	Owner
Gross Income				
Without program	4,569	5,081	3,632	4,198
With program	5,530	5,877	4,698	4,965
Difference (housing allowance)	961	796	1,066	767
Housing Expenditure[a]				
Without program	2,053	2,004	1,975	1,944
With program	2,212	2,182	2,137	2,097
Difference (program effect)	159	178	162	153

SOURCE: Estimated by HASE staff from HAO records for households
receiving payments at the end of program year 3 in each site and
from housing expenditure models fit to household survey data for
each site.

NOTE: "With program" entries for housing expenditure are aver-
ages based on HAO records for each recipient. "Without program"
entries are averages of estimates for the same recipients, based on
nonallowance income and household characteristics. See text for
explanation of estimating methods.

[a]For renters, gross rent expenditure; for owners, gross rent
equivalent of property value. Because renter recipients paid a
small premium over market price for their housing, their with-
program gross rents have been adjusted downward to reflect the
market value of the housing services they consumed.

Example A-22

Rent Changes for Participants' and Nonparticipants' Dwellings During
the First Three Program Years, by Site

	Average Annual Change (%) in Gross Rent			
	Participants' Dwellings	Nonparticipants' Dwellings	Difference	
Period [a]			Amount	Standard Error
Brown County				
Period 1	8.8	5.6	3.2	1.7
Period 2	12.2	9.6	2.6	1.3
Period 3	9.2	7.2	2.0	1.1
All periods	9.9	7.4	2.5	.8
St. Joseph County				
Period 1	7.4	4.3	3.1	2.5
Period 2	9.5	7.4	2.1	2.1
Period 3	6.3	5.3	1.0	1.5
All periods	7.5	5.5	2.0	.9

SOURCE: Estimated by HASE staff from linked records of the annual surveys of households in each site. For additional detail on St. Joseph County, see Lindsay and Lowry, 1980, Tables 4.1 and 4.2. Parallel tables for Brown County are available but unpublished.

NOTE: Entries in the first column are estimates of average rent changes for dwellings occupied by participants during at least part of the observation interval. Entries in the second column are for dwellings not occupied by participants during the interval of observation. A given dwelling could appear in both columns but for different periods. Annual differences between participants' and nonparticipants' rent increases are not cumulative; see text for explanation.

[a] Periods correspond roughly to program years; calendar intervals differ by site.

Example A-23

Trends in Rental Property Operating Expense and Income
During the First Three Program Years, by Site

Item	Annual Amount ($) per Dwelling		Ratio (Year 4: Year 1)	Price Index (Year 1 = 1.000)	Real Change (%)
	Year 1[a]	Year 4[b]			
Brown County					
Operating expense[c]	1,063	1,482	1.394	1.348	3.4
Vacancy loss and related items[d]	121	142	1.174	1.285	- 8.6
Net operating income[e]	576	638	1.108	1.281	-13.5
Gross rent[f]	1,760	2,262	1.285	1.281	.3
St. Joseph County					
Operating expense[c]	1,323	1,696	1.282	1.332	- 3.8
Vacancy loss and related items[d]	216	244	1.130	1.265	-10.6
Net operating income[e]	228	296	1.298	1.229	5.6
Gross rent[f]	1,767	2,236	1.265	1.229	2.9

SOURCE: Estimated by HASE staff from records of the surveys of rental proper-
ties in each site and from price indexes constructed by HASE staff for each site.
See Neels, 1982a and 1982b, for details of property accounts; and Noland, 1981 and
1982, for details of price indexes.

NOTE: Entries are averages for regular rental properties (excluding farms,
mobile-home parks, rooming houses, and properties with commercial space) opera-
ting in each site for the full calendar year preceding the baseline and wave 4
surveys respectively. To make the accounts comparable between properties, all
expenses are included whether paid directly by the tenant or included in contract
rent. The entries were formed by computing average values per dwelling on each
sampled property, then weighting the properties to reflect their sampling proba-
bilities.

[a]For Brown County, 1973; for St. Joseph County, 1974.

[b]For Brown County, 1976; for St. Joseph County, 1977.

[c]Includes fuel and utilities, maintenance, janitorial service, management,
property tax, and insurance. Excludes capital improvements.

[d]Vacancy rent-loss, including an allowance for utilities that would have been
paid by the tenant; uncollectable rent; and the rental value of appliances sup-
plied by the tenant. The corresponding price index is the rate of increase in
gross rent.

[e]Income available to the landlord for debt service and equity return; the cor-
responding price index is the national consumer price index.

[f]Gross rent, assuming 100-percent occupancy; the corresponding price index is
the national consumer price index.

Example A-24

Rent Changes for Dwellings Whose Occupants Enrolled
in the Allowance Program, by Site

Repair Status	Average Monthly Gross Rent ($)		Average Increase (%)
	Enrollment Interview	Certification for Payments	
Brown County			
No repair required	164	167	1.6
Repair required	151	155	2.5
All cases	159	162	1.9
St. Joseph County			
No repair required	157	158	.7
Repair required	152	155	1.7
All cases	155	156	1.2

SOURCE: Tabulated by HASE staff from HAO records through program year 3 in each site.

NOTE: Entries are fc renter enrollees who did not move when they entered the program. They reported their contract rents when they enrolled and again when their dwellings were certified for occupancy; the HAO estimated the value of tenant-paid utilities in each case from standard tables. The average interval between the enrollment interview and first certification was 1.6 months in Brown County and 2.1 months in St. Joseph County.

Example A-25

First-year Participation Rates, by Age of Household Head and Housing Tenure: Brown County Housing Allowance Program

Age of Oldest Household Head, by Housing Tenure	Number of Households Eligible	Number of Households Enrolled	Participation Rate (%)
Renters			
Under 62 years	1,996	709	35.5
62 years or older	2,078	546	26.3
Total	4,074	1,255	30.8
Owners			
Under 62 years	2,382	1,368	57.4
62 years or older	1,156	462	40.3
Total	3,527	1,830	51.9
All households			
Under 62 years	4,378	2,077	47.4
62 years or older	3,225	1,008	31.3
Total	7,603	3,085	44.6

SOURCE: Tabulations by HASE staff of records of the survey of tenants and homeowners, Site I, baseline; and HAO records for Site I through 30 June 1975.

NOTE: Program standards distinguish between households whose oldest head is under or over 62 years of age. Estimates of eligible households exclude those receiving assistance under other federal housing programs.

Estimated from survey data.

Example A-26

Program-Induced Housing Consumption Increases Before and After Enrollment by Mobility Status: Renter Recipients, by Site

Site	Total	Before Enrolling[a]	After Enrolling[b] Total	After Enrolling[b] Nonmover	After Enrolling[b] Mover
Brown County	7.8	.4	7.4	1.7	16.4
St. Joseph County	8.2	2.6	5.6	.5	16.6
Average	8.0	1.5	6.5	1.1	16.5

(Percent Increase in Housing Consumption)

SOURCE: Estimated by HASE staff from HAO records for households receiving payments at the end of program year 3 and from models fit to household survey data for each site.

[a] Ratio of average gross rent at enrollment to average gross rent without the program, expressed as a percentage. Both rent variables were adjusted to year 3 dollars.

[b] Ratio of average gross rent at the end of year 3 to average gross rent at enrollment, expressed as a percentage. Both rent variables were adjusted to year 3 dollars. Mobility status indicates whether or not a recipient moved between enrollment and the end of year 3.

Example A-27

Estimated Rates of Inflation in Contract and Gross Rents by Size of Unit, Rental Housing Units in Brown County, Wisconsin, 1973 to 1975

| Number of Rooms | Percentage Change in Rent, Compounded Monthly | | | | | | Probability of Larger Chance Difference From Grand Mean (%) |
| | Monthly Change | | Annual Equivalent | | 30-Month Equivalent | | |
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	
Contract Rent							
1 or 2	.2409	.0388	2.93	.4?	7.48	1.25	7.1
3	.4052	.0607	4.97	.5?	12.90	2.05	22.4
4	.3284	.0240	4.01	.30	10.34	.79	78.3
5	.3197	.0380	3.90	.47	10.05	1.25	67.8
6+	.3143	.0576	3.84	.72	9.87	1.89	71.8
All sizes	.3348	.0191	4.09	.24	10.55	.63	(*a*)
Gross Rent							
1 or 2	.2796	.0403	3.41	.50	8.74	1.31	.4
3	.4258	.0454	5.23	.57	13.60	1.54	14.4
4	.4823	.0229	5.94	.39	15.53	.79	60.1
5	.6049	.0392	7.51	.50	19.83	1.40	2.1
6+	.5431	.0494	6.71	.63	17.64	1.73	33.0
All sizes	.4931	.0168	6.08	.21	15.90	.58	(*a*)

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

*a*Not applicable. The probability that the difference between the grand mean (all property types) and zero could occur by chance is less than .01 percent.

Example A-28

Selected Characteristics of Neighborhoods in Each Site, Grouped by Level of Program Activity

Neighborhoods, by Program Activity Level	Annual Income ($) per Household	Property Value ($) per Dwelling	Index of Dwelling Quality[a]	Incidence (%) of Owner Occupancy
Brown County				
1 (high)	9,534	16,141	1.00	50
2	10,761	20,862	1.06	63
3	12,393	22,005	1.05	72
4	14,067	25,320	1.15	79
5 (low)	15,330	24,928	1.17	87
St. Joseph County				
1 (high)	8,758	8,613	1.00	63
2	10,431	9,266	.99	59
3	11,566	11,601	1.04	76
4	13,264	14,382	1.09	81
5 (low)	14,015	20,127	1.11	88

SOURCE: Tabulated by HASE staff from records of the surveys of households, landlords, and neighborhoods, wave 1, in each site. See Hillestad and McDowell, 1982, for details.

NOTE: All data refer to neighborhood conditions at the time of survey wave 1, just before the allowance program began. Data for individual neighborhoods within each group were pooled to calculate the measures shown.

[a]Based on observer ratings of residential quality on a scale of 1 (poor) to 4 (good), divided by the average rating for neighborhood group 1.

Example A-29

Vacancy and Turnover Statistics for Rental Housing Units, by Type of Property: Brown County, Wisconsin, 1973

Type of Property	Vacancy Rate (%)		Annual Turnover per 100 Units	Average Vacancy Duration (Weeks)
	Seasonal (Winter 1973-74)	Annual Average, 1973		
Regular				
5+ units	4.67	6.45	50.6	6.6
2-4 units	2.39	4.59	43.8	5.4
1 unit, urban	1.29	4.46	45.5	6.4
1 unit, rural	2.23	3.98	12.9	11.4
All regular	2.85	5.09	44.1	6.5
Nonregular				
Mobile home	6.81	9.29	10.1	45.0
Rooming house	24.82	19.43	83.4	11.4
Farm	2.47	2.40	25.5	4.2
All nonregular	10.94	10.96	29.6	19.2
All properties	4.66	5.64	42.6	6.9

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

Example A-30

Selected Household Characteristics by Race of Household Head:
St. Joseph County, 1975

Household Characteristic	Race of Male or Only Head	
	Black	White
Demographic Characteristics		
Average age (years) of male or only head	40.6	45.7
Average number of household members	3.13	2.94
Percentage of all households:		
Without children	43.3	55.4
Single head	26.4	28.6
Married couple	16.9	26.8
With children	56.7	44.6
Single head	25.5	6.4
Married couple	31.2	38.2
Economic Characteristics		
Percentage of male or only heads employed	57.9	72.2
Percentage of wives employed	51.6	42.2
Percentage of households with no employed members	29.6	21.5
Average number of workers	.97	1.21
Median income ($) in 1974	7,328	11,422

SOURCE: Tabulation by HASE staff of records from the baseline survey of tenants and homeowners in Site II.

NOTE: All entries except median income are based on samples of 432 black and 2,272 white households. Median income estimates are based on samples of 390 black and 2,039 white households who reported total household income in 1974. Latin Americans, native Americans, and Orientals, altogether accounting for less than 2 percent of all households, are excluded from this tabulation.

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Example A-31

Regression of Program Awareness on Respondent Characteristics
and Attitudes: All Respondents

Variable	Unit of Measurement	Regression Statistics			
		Coefficient		Standard Error (σ_b)	Value of F
		β	b		
Dependent					
Program awareness	Some = 1, none = 0	--	--	--	--
Independent					
Respondent characteristics:					
Education	Years of schooling	.096	.001	.003	14.9[a]
Age	Years	.081	.002	.000	11.8[a]
Occupational status	Positive scale, 1-8	.057	.008	.003	5.5[a]
Race	Black = 1, other = 0	.047	.046	.021	4.9[a]
Household income	$1,000 per year	.037	.002	.001	2.0[b]
Organization memberships	Number of organizations	.033	.010	.006	2.7[b]
Program eligibility	Eligible = 1, ineligible = 0	.033	.023	.019	1.5
Sex	Female = 1, male = 0	-.023	-.016	.015	1.3
Housing tenure	Renter = 1, owner = 0	-.009	-.009	.019	.2
Residential location	Urban = 1, rural = 0	.003	.003	.022	.1
Respondent attitudes:					
Neighborhood integration	Positive scale, 1-7	.100	.017	.004	18.5[a]
Neighborhood trend	Decline = 1, other = 0	.043	.049	.023	4.3[a]
Landlords	Positive scale, 1-7	-.039	.008	.004	3.9[a]
Blacks	Positive scale, 1-7	.012	-.002	.005	.3
Own dwelling trend	Decline = 1, other = 0	.020	.019	.020	.9
Regression constant	--		-.178	.355	--

SOURCE: Analysis by HASE staff of records of the survey of tenants and homeowners, Site II, baseline.

NOTE: Regression analysis was performed on records of 2,561 respondents who provided information on all variables listed. $\bar{R} = .04$, $\bar{F} = 6.92$ with 15 degrees of freedom. Regression coefficients are given in both measured units (b) and standard units (β). The independent variables are defined in Table 3.1.

[a] Coefficient significantly different from zero at the .95 level of confidence under a two-tailed test.

[b] Coefficient significantly different from zero at the .95 level of confidence under a one-tailed test.

Example A-32

Estimated Coefficients of Alternative Regression Models Used to Explain
Differences in Gross Rent Inflation Within the Brown County Housing Market

| Regression Model | Estimated Regression Coefficients[a] | | | | R^2 |
	Constant	1973 Gross Rent ($)	Number of Rooms	Number of Units	
Model A	.7754 (.0887)	-.0045 (.0004)	.0925 (.0178)	-.0170 (.0060)	.1132
Model B	.6378 (.0746)	-.0049 (.0005)	.1223 (.0145)	-- --	.1069
Model C					
1 or 2 rooms	.3322 (.0388)	-.0005 (.0000)	-- --	-- --	.9193
3 rooms	.6266 (.0347)	-.0019 (.0003)	-- --	-- --	.6894
4 rooms	.8063 (.0321)	-.0021 (.0002)	-- --	-- --	.8773
5 rooms	.7610 (.0405)	-.0012 (.0002)	-- --	-- --	.5233
6+ rooms	.9208 (.0240)	-.0024 (.0002)	-- --	-- --	.9154

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

NOTE: Regression Models A and B were fitted to 1,135 un-
weighted observations. Model C was fitted separately for
each size of unit to groups of observations whose 1973 gross
rents fell within $40 intervals. The number of data points
fitted ranges from three to six, hence the high values for R^2.

[a]Coefficients are scaled to estimate the monthly percentage
change in gross rent. Standard errors are shown in parentheses
below each estimated coefficient; those for Model C, however,
were computed without regard for the model's violation of cer-
tain standard assumptions.

Example A-33

Gross Rent Index for Urban Consumers: United States, 1960-80

	Price Index (1967 = 100)			Price Index x Gross Rent Component Weights			
					Tenant-Paid Items		
Year	Residential Rent	Gas and Electricity	Water and Sewage	Contract Rent	Fuel[a]	Other[b]	Gross Rent
1960	91.7	98.6	100.0[c]	74.3	16.4	2.4	93.1
1961	92.9	99.4	100.0[c]	75.4	16.3	2.3	94.0
1962	94.0	99.4	100.0[c]	76.5	16.1	2.3	94.9
1963	95.0	99.4	100.0[c]	77.5	16.0	2.2	95.7
1964	95.9	99.4	100.0[c]	78.4	15.9	2.2	96.5
1965	96.9	99.4	100.0[c]	79.5	15.7	2.2	97.4
1966	98.2	99.6	100.0[c]	80.7	15.5	2.1	98.3
1967	100.0	100.0	100.0	82.3	15.5	2.1	100.0
1968	102.4	100.9	104.7	84.5	15.5	2.2	102.2
1969	105.7	102.8	111.8	87.4	15.6	2.2	105.2
1970	110.1	107.3	120.4	91.3	16.2	2.4	109.9
1971	115.2	114.7	133.4	95.7	17.2	2.7	115.6
1972	119.2	120.5	138.5	99.1	17.8	2.8	119.7
1973	124.3	126.4	146.1	103.5	18.6	2.8	124.9
1974	130.6	145.8	154.8	108.9	21.4	2.9	133.2
1975	137.3	169.6	169.9[d]	114.8	24.6	3.2	142.6[d]
1976	144.7	189.0	186.8[d]	121.0	27.6	3.5	152.1[d]
1977	153.5	213.4[d]	208.3[d]	128.6	30.7	3.7	163.0[d]
1978	164.0[d]	236.5[d]	231.1[d]	137.3	34.1	4.2	175.6[d]
1979	174.7[d]	259.3[d]	244.5[d]	146.2	37.1	4.4	187.7[d]
1980	190.8[d]	308.5[d]	260.5[d]	160.1	43.8	4.7	208.6[d]

SOURCES: U.S. Bureau of the Census, *Statistical Abstract of the United States, 1979*, Table 790; U.S. Bureau of Labor Statistics, *Handbook of Labor Statistics. 1976*, Table 120; U.S. Bureau of Labor Statistics, *CPI Detailed Reports*, June 1976-June 1980, Table 12; and Table A.3.

NOTE: The price indexes are those reported by the Bureau of Labor Statistics for a national sample of urban consumers. The gross rent weights are for all SMSAs, as estimated in Table A.3.

[a]Weight includes expenditures for fuel oil and coal as well as gas and electricity.

[b]Weight includes rubbish removal as well as water and sewage charges.

[c]Not separately compiled; assumes no change, 1960-67.

[d]Index for June of indicated year, seasonally adjusted where appropriate.

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Example A-34

Annual Administrative Expense and Allowance Payments:
Housing Allowance Programs Through Year 5, by Site

Type of Expense	Annual Amount ($000), by Program Year					Five-Year Total
	1	2	3	4	5	
Administration:						
Salaries and benefits	686	706	772	720	685	3,569
Offices and equipment[a]	109	118	111	109	110	556
Supplies	63	64	59	53	54	294
Other	382	202	115	136	135	969
Total	1,240	1,089	1,056	1,018	985	5,388
Allowance payments	744	1,902	2,780	3,022	3,486	11,934
Total expense	1,983	2,992	3,837	4,040	4,471	17,323
Administration:						
Salaries and benefits	878	1,117	1,140	1,171	1,243	5,549
Offices and equipment[a]	136	146	163	165	166	776
Supplies	90	113	101	93	102	498
Other	342	274	237	307	221	1,381
Total	1,445	1,649	1,641	1,736	1,733	8,204
Allowance payments	1,255	3,047	4,595	5,121	6,315	20,334
Total expense	2,701	4,696	6,236	6,875	8,049	28,539

SOURCE: Tabulated from HAO accounting records. See Kingsley and Schlegel, 1982, for details.

NOTE: All expenses are in current dollars.

[a]Rental payments only. Purchases are included with "Other."

Example A-35

- Rent Increases During the First Program Years Were Below National and Regional Averages . . . .

Area	Average Annual ... ... Contract Rent ...				
All U.S. cities	...				
North central cities, by size:					
Over 1,400,000	6.8	...			
250,000–1,400,000	2...	...			
50,000–250,000	2.8	...			
2,500–50,000	..1	...			
Brown County					
St. Joseph County					

SOURCE: U.S. Bureau of Labor Statistics, ... various issues, and special tabulations for north central ..., Brown and St. Joseph county entries are averages ... for each dwelling in a market-wide sample, ... in each site.

[a] Entries for the U.S. and north central ... are ... the BLS index of "residential rent," definit..., ... contract rent. Changes are calculated ...

[b] Increase for December 1976 to September 19..., ...

Example A-36

Inflation Rates for Selected Intervals: All Items,
Contract Rent, and Gross Rent: Urban Consumers,
United States, 1960-80

		Percentage Change			
	CPI (All Items)	Contract Rent		Gross Rent	
Interval		Unadjusted	Adjusted	Unadjusted	Adjusted
Total Change					
1960–65	6.5	5.7	9.5	4.6	7.8
1965–70	23.1	13.6	18.2	12.8	16.5
1970–75	38.6	24.7	30.1	29.8	34.3
1975–80	53.6	39.0	44.1	46.3	50.9
1960–70	31.1	20.1	29.5	18.0	25.7
1970–80	112.9	73.3	87.4	89.8	102.7
1960–80	179.1	108.1	142.7	124.1	154.7
Average Annual Change					
1960–65	1.3	1.1	1.8	.9	1.5
1965–70	4.2	2.6	3.4	2.4	3.1
1970–75	6.7	4.5	5.4	4.7	6.1
1975–80	9.0	6.8	7.6	7.9	8.6
1960–70	2.7	1.8	2.6	1.7	2.3
1970–80	7.8	5.7	6.5	6.6	7.3
1960–80	5.3	3.7	4.5	4.1	4.8

SOURCE: Computed from entries in Table A.10.

NOTE: Contract rent is the tenant's payment to his landlord (= BLS "residential rent"). Gross rent includes direct tenant payments for fuel and utilities. Adjusted values correct for understatement of annual price changes due to annual deterioration of existing dwellings. The index values for 1980 used in these computations are for June; all others are annual average values.

Example A-37

Occupied Rental Dwellings by Year Built: All 1970 SMSAS,
United States, 1960-80

Year Structure Was Built	Number (000) of Occupied Rental Dwellings, by Survey Date			
	1 April 1960	1 April 1970	Aug-Oct 1974	Oct 1978 -Jan 1979
1975-78	(a)	(a)	(a)	3,676
1970-74	(a)	(a)	2,541	
1965-69	(a)	2,268	2,252	2,443
1960-64	(a)	2,026	1,824	1,925
1950-59	2,455	2,829	2,335	2,451
1940-49	1,953	2,484	1,849	1,930
1939 or earlier	10,090	8,163	8,165	7,907
All years	14,498	17,769	18,966	20,332

SOURCES: U.S. Bureau of the Census, selected publications; for 1960, *Census of Housing: 1970*, Final Report HC(4)-1, *Components of Inventory Change*, Table 1; for 1970 and 1974, *Annual Housing Survey: 1974*, Current Housing Reports, Final Report H-150-74, *General Housing Characteristics for the United States and Regions*, Table A-1; for 1978, *Annual Housing Survey: 1978*, Current Housing Reports, Series H-150-78, *Financial Characteristics of the Housing Inventory for the United States and Regions: 1978*, Table A-1.

NOTE: Census publications differ as to the age distribution of renter-occupied dwellings in 1970; the entries shown are the most recently published figures.

^aNot applicable.

Example A-38

Selection of Rent-Inflation Analysis File From
Among All Linked Records

Item	Number of records
Linked records with compatible gross rent for both screening and wave 2 interviews	
Records deleted from file, by reason for deletion:	
Tenant reported receiving subsidized rent at prior interview	
Housing unit asked to sample for overqualified sale	
Evidence of erroneous linking, to same or new owner, or change in housing unit characteristics	
Gross rent increased by 50 percent or more due to large increase in estimated utility costs	
Gross rent increased by 50 percent or more due to large increase in estimated utility costs	
Total records deleted	
Records remaining after deletion	

SOURCE: Case-by-case analysis by HASE staff of linked records of the screening and wave 2 surveys of renter households in site I.

Rent reductions to relatives, friends, or employees of the landlord or to tenants in exchange for work on the premises.

These records would be usable for this analysis except that their sampling histories differ from those of housing units selected for the permanent panel (wave 2) and their inclusion would pose difficulties for sample stratification and weighting.

Example A-39

Final Status of All Housing Unit Records Ever Opened:
Site 1 Screening Survey, September 1973

	Number of Records

Records opened:
Initial sample list	?,??
Added during fieldwork	?,??
Added after fieldwork	??
Total	??,???

Records retired because interviews were inappropriate:
Special strata of residential properties	???
Properties not in residential use	?
Duplicate or incorrect listings	???
Vacant housing units	???
Total	?

Records for which interviews were desired:
No contact with occupants	??
Contact, no interview	??
Interview partially completed	??
Interview completed	?,???
Total	?,???

Records opened after fieldwork was completed:
Probable seasonal properties	???
Rooming-house units	??
Additional units on sample properties	??
Total	???

SOURCE: Tabulations of Site 1 screening survey records, preliminary and final master files.

NOTE: See tables ? and ? for additional detail.

Reasons for excluding these records were generally discovered during the interview attempt or during the interview itself. Interviews were completed for ?? of these cases.

These records were opened because the properties or actual units were considered eligible for the baseline sample even though they had not been screened.

Example A-40

Trends in Rental Property Return on Equity During the First Three
Program Years, by Site

Item	Brown County		St. Joseph County	
	1973	1976	1974	1977
Annual Amount ($) per Dwelling				
Current Equity Income				
Net operating income	576	638	228	296
Less: Mortgage interest payments	341	453	143	147
Equals: Current equity income	235	185	85	149
Total Equity Income				
Current equity income	235	185	85	149
Plus: Property value appreciation	919	1,129	512	488
Less: Capital additions	-69	-36	-67	-28
Equals: Total equity income	1,085	1,278	530	609
Midyear Amount ($) per Dwelling				
Landlord's Equity				
Property value^a	12,220	15,822	8,888	10,680
Less: Outstanding mortgage debt	-3,790	-3,846	-1,831	-1,248
Equals: Landlord's equity	8,430	11,976	7,057	9,432
Annual Rate of Return (%)				
Current equity return^b	2.8	1.5	1.2	1.6
Total equity return^c	12.9	10.7	7.5	6.5

SOURCE: Tabulated by HASE staff from records of the surveys of
rental properties in each site. For additional detail, see Neels,
1982a and 1982b.

NOTE: See Table 6.4 for general qualifications.

^{a}Average of estimates made by three alternative methods. Excludes
value of tenant-owned appliances.

^{b}Current equity income divided by landlord's equity.

^{c}Total equity income divided by landlord's equity.

Example A-41

Selected Enrollment and Payment Authorization Statistics: Housing Allowance Programs in Brown and St. Joseph Counties Through Year 5

Item	Brown County		St. Joseph County	
	Number of Cases	Percent of Total	Number of Cases	Percent of Total
Enrollment				
All applicants	16,602	100	34,474	100
Screened out before interview[a]	4,603	28	10,019	29
Screened out by interview[b]	2,669	16	6,861	20
Awaiting interview or processing	197	1	1,501	4
Eligible and enrolled	9,133	55	16,093	47
Payment Authorization				
All enrollees	9,133	100	16,093	100
Authorized for payments	7,681	84	12,337	77
Currently receiving payments	3,563	39	5,891	37
Payments suspended[c]	356	4	673	4
Enrollment terminated[d]	3,762	41	5,773	36
Never authorized for payments	1,452	16	3,756	23
Authorization pending[e]	217	2	755	5
Enrollment terminated[d]	1,235	14	3,001	18

SOURCE: HAO management information reports for 29 June 1979 in Brown County and 28 December 1979 in St. Joseph County.

NOTE: Payments are not authorized until the housing unit chosen by an enrollee has been evaluated by the HAO and certified for occupancy; and, for a rental unit, until an executed copy of an acceptable lease agreement has been filed with the HAO.

[a]Applicant ineligible or declined to be interviewed.

[b]Applicant ineligible, declined to complete interview, or declined enrollment.

[c]Current housing is not certified, or enrollee has violated reporting requirements or other program rules.

[d]Voluntary or involuntary. Involuntary terminations usually result from change in income or family circumstances that affect eligibility.

[e]Awaiting housing certification or lease agreement. See Note above.

Example A-42

Enrollment and Participation in Central South Bend by Race and Housing Tenure: Housing Allowance Program in St. Joseph County Through Year 2
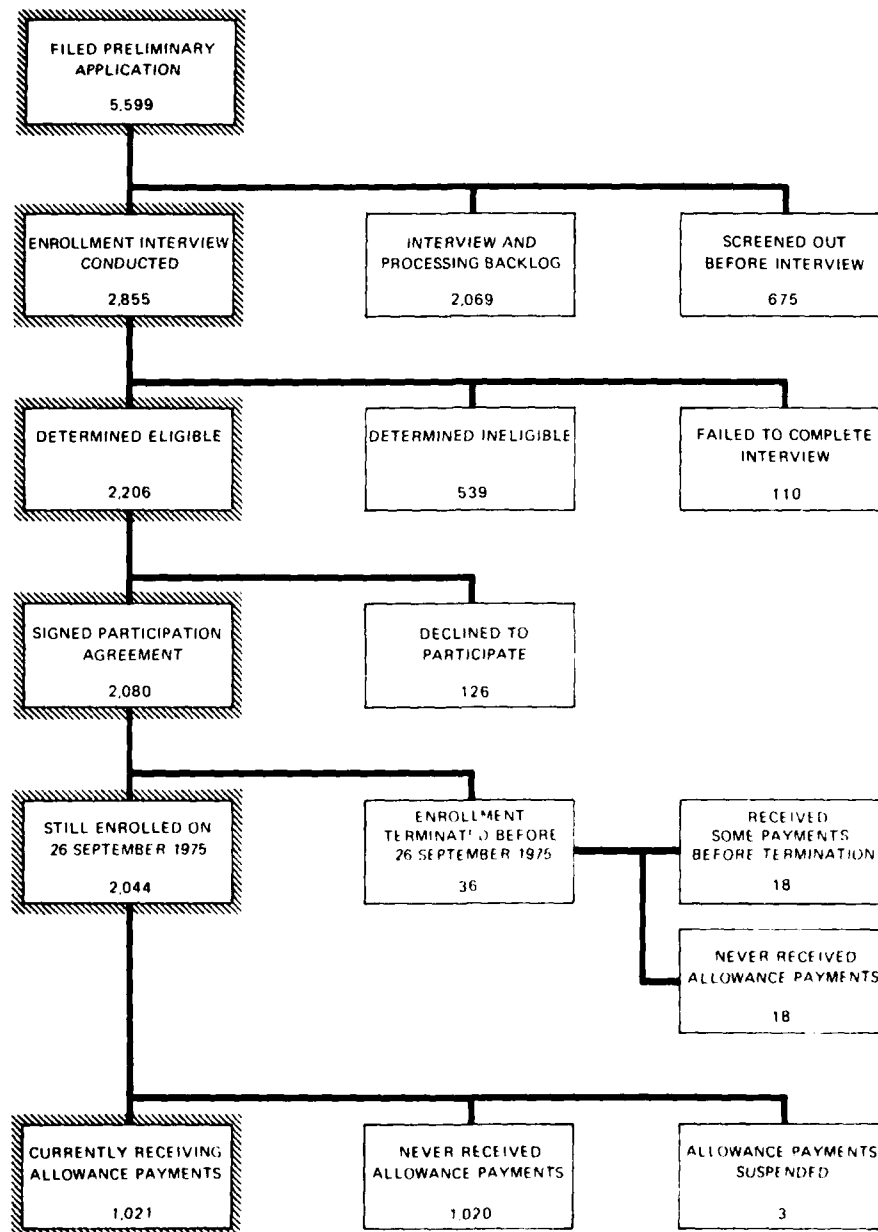
Program Status	Households, by Race of Head			
	White		Black or Other[1]	
	Number	Percent	Number	Percent
Renters				
Population in 1974	6,031	100	2,887	100
Enrolled, first two years	1,031	17	1,342	46
Ever authorized for payments	702	12	840	29
Still authorized, end of year 2	471	8	554	19
Owners				
Population in 1974	10,087	100	3,154	100
Enrolled, first two years	1,088	11	752	24
Ever authorized for payments	921	9	563	18
Still authorized, end of year 2	734	7	448	14
Renters and owners				
Population in 1974	16,118	100	6,041	100
Enrolled, first two years	2,119	13	2,094	35
Ever authorized for payments	1,623	10	1,403	23
Still authorized, end of year 2	1,205	7	1,002	17

SOURCE: Population estimated by HASE staff from records of the baseline survey of households. Enrollment and participation figures tabulated from HAO records through December 1976.

NOTE: Entries for those enrolled and those ever authorized are based on enrollment address and housing tenure. Entries for those still authorized at the end of year 2 are based on current address and housing tenure.

[1] Includes Latin origin or descent.

Example A - 43

FILED PRELIMINARY
APPLICATION

5,599

ENROLLMENT INTERVIEW
CONDUCTED

2,855

INTERVIEW AND
PROCESSING BACKLOG

2,069

SCREENED OUT
BEFORE INTERVIEW

675

DETERMINED ELIGIBLE

2,206

DETERMINED INELIGIBLE

539

FAILED TO COMPLETE
INTERVIEW

110

SIGNED PARTICIPATION
AGREEMENT

2,080

DECLINED TO
PARTICIPATE

126

STILL ENROLLED ON
26 SEPTEMBER 1975

2,044

ENROLLMENT
TERMINAT'D BEFORE
26 SEPTEMBER 1975

36

RECEIVED
SOME PAYMENTS
BEFORE TERMINATION

18

NEVER RECEIVED
ALLOWANCE PAYMENTS

18

CURRENTLY RECEIVING
ALLOWANCE PAYMENTS

1,021

NEVER RECEIVED
ALLOWANCE PAYMENTS

1,020

ALLOWANCE PAYMENTS
SUSPENDED

3

SOURCE   HAO management information reports for Site II through 26 September 1975

Fig. 5.1—Status of all preliminary applications filed during first nine months:
South Bend housing allowance program, September 1975

Example A - 44

BROWN COUNTY
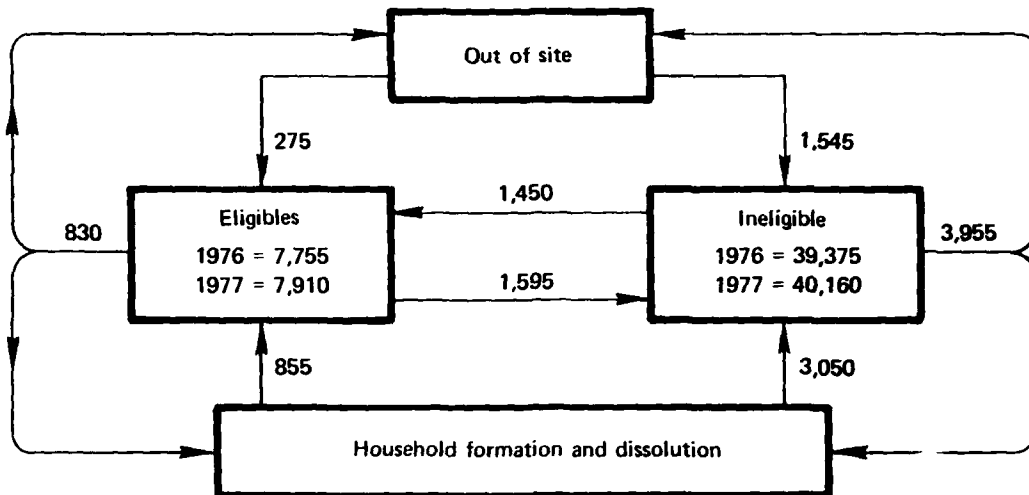
ST. JOSEPH COUNTY
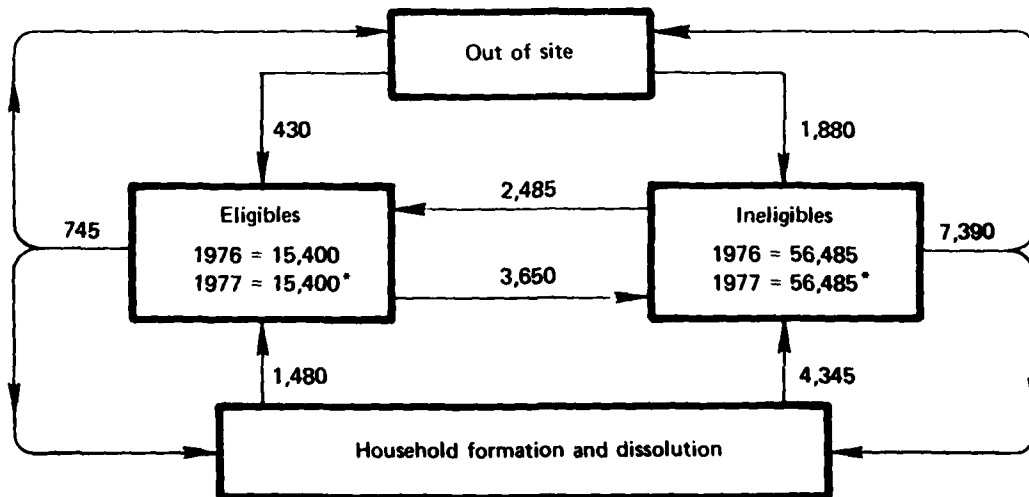
SOURCE: Estimated from household survey and HAO records.
Flow rates for Brown County are 2-year averages.
*Observed changes, 1976–77, were statistically insignificant.

Fig. 4.1 — Annual changes in eligibility status of households, by site

Example A-45

Consolidated Financial Statement for 6,846 Rental Properties:
Brown County, Wisconsin, 1973

Income Item	Annual Amount ($000)	Percentage Distribution	Expense Item	Annual Amount ($000)	Percentage Distribution	Performance Measures	Amount ($000) or Rate (%)
Cash Receipts and Waivers			*Cash Operating Expenses*			*Net Income and Cash Flow*	
Residential rent	16,738	75.2	Real estate taxes	4,176	28.3	Net cash income[a]	8,464
Services to tenants	51	.2	Insurance premiums	596	4.0	Net operating income[b]	6,321
Commercial rent & services	616	2.7	Professional services	178	1.2	Debt service[c]	8,496
Total cash receipts	17,405	77.1	Office expenses	164	1.1	Amortizable improvements	2,903
Residential rent waived	3,649	16.1	Fuel and utilities	2,102	14.3	Pretax cash flow[d]	(2,935)
Total cash and waivers	21,054	94.2	Wages and salaries	438	3.0	• Cash flow rate (%)[e]	(13.0)
Income Lost			Contract building services	82	.6	*Return on Capital*	
Residential vacancy loss	1,102	4.9	Maintenance supplies	205	1.4	Net operating income[b]	6,321
Uncollectible residential rent	164	.7	Repairs—labor & materials	1,000	6.8	Depreciation allowance[f]	1,417
Commercial rent loss	267	1.2	Total cash expenses	8,941	60.7	Net return to capital[g]	4,904
Total income lost	1,533	6.8	Value of unpaid labor	5,792	39.3	Estimated market value[h]	205,149
Total cash and waivers	21,054	94.2	Total operating expenses	14,733	100.0	• Gross rate of return (%)[i]	3.1
Total income lost	1,533	6.8				• Net rate of return (%)[j]	2.4
Potential gross income	22,587	100.0					

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

NOTE: Income and expense entries are estimates for all rental properties, based on a sample of 1,396 records containing all responses needed for complete accounts. Cash-flow and return-on-capital entries are based on smaller samples. Total and ITS records, respectively, but are estimated to make them comparable with income and expense entities. Negative entries are enclosed in parentheses.

[a] Includes imputed rents for units occupied by resident landlords, rent waivers to relatives or friends, and rent waivers to employees or to tenants in return for services rendered.

[b] Assumes all units rented for full year at full market rent, and all rent paid when due.

[c] Includes cash wages and waived rent for resident employees.

[d] Includes some unpaid labor by persons other than owners or tenants; value of unpaid labor was estimated by respondent.

[e] Includes unpaid labor by owners, their families, or friends. Usually the value of the labor was estimated by the owner; where imputation was necessary, labor was valued at $4 per hours.

[a] Total cash receipts less total cash expenses.

[b] Total cash and waivers less total operating expenses.

[c] Principal and interest payments on mortgage debt or land contracts for which the sample property was collateral.

[d] Net cash income less debt service and cost of improvements.

[e] Pretax cash flow as percentage of potential gross income.

[f] Estimate by HASE staff of real annual depreciation due to age of capital improvements on each sample property. Unrelated to depreciation allowances for income tax reporting.

[g] Net operating income less depreciation allowance.

[h] Estimated by the owner.

[i] Net operating income as percent of estimated market value.

[j] Net return to capital as percent of estimated market value.

Example A-46

A Life-cycle Classification of Households

Stage in Life Cycle	Definition
1. Young single head, no children	Household headed by single adult (man or woman) under 46 years old, no members under 18 years old.
2. Young couple, no children	Household headed by married couple, husband under 46 years old, no other members under 18 years old.
3. Young couple, young children	Household headed by married couple, husband under 46 years old, at least one other member under 6 years old.
4. Young couple, older children	Household headed by married couple, husband under 46 years old, at least one other member between 6 and 18 years old.
5. Older couple, older children	Household headed by married couple, husband at least 46 years old, at least one other member under 18 years old.
6. Older couple, no children	Household headed by married couple, husband at least 46 years old, no other members under 18 years old.
7. Older single head, no children	Household headed by single person (man or woman) at least 46 years old, no other members under 18 years old.
8. Single head with children	Household headed by single person (man or woman) under 60 years old, at least one other member under 18 years old.
9. All other	Residual category; most are households headed by single persons over 60 years old who live with married children and grandchildren.

SOURCE: Classification scheme devised by HASE staff for analysis of data from surveys of tenants and homeowners.

NOTE: Household heads are designated by survey respondents. A married couple consists of a cohabiting man and woman. A single household head may have never been married; or may have been married but was separated, divorced, or widowed at the time of the interview. Other household members need not be but usually are related to the household head(s); those under 18 are usually children of the head(s).

Example A-47

Classification of Primary Reasons for Local Moves and Response Frequencies: Brown County, Wisconsin, 1974

Primary Reason for Moving	Characteristic Responses Included	Response Frequency	
		Number	Percent
● Change in family circumstances	● Change in marital status, change in family size, establish own household, family or health problem, new job, job search, attend school.	4,285	26.8
● Wanted cheaper housing	● Wanted lower rent, cheaper place to live.	1,043	6.5
● Wanted change in tenure or structure type	● Wanted to own, wanted to rent, wanted single-family house.	3,114	19.5
● Wanted change in space or quality	● Wanted larger or smaller unit, larger rooms, specific floorplan, nicer place, cleaner place, better quality.	3,784	23.6
● Wanted more convenient location	● Wanted to be closer to work, to schools, to retail stores.	756	4.7
● Wanted better neighborhood	● Wanted quieter neighbors, friendlier neighbors, more neighboring children, nicer neighborhood, safer area, more open space, more trees and yards.	1,538	9.6
● Had to leave former residence	● Residence no longer available, problems with landlord.	1,494	9.3
All reasons		16,004	100.0

SOURCE: Tabulations by HASE staff of records of the survey of tenants and home-owners, Site I, baseline.

NOTE: Population response frequencies are estimated from a stratified probability sample of 2,039 households whose last move occurred within the five years preceding the survey and who moved within Brown County. Data base excludes about 12 percent of all households in Brown County in 1974; see text for explanation of exclusions.

Example A-48

Definition of Variables Tested for Effects on Program Knowledge

Variable	Definition and Unit of Measurement
Respondent Characteristics	
Race (interviewer's judgment)	0 = Nonblack 1 = Black
Education	Years of schooling
Age	Age at last birthday (years)
Income	Total household income ($1,000)
Residential location	0 = Rural 1 = Urban
Sex	0 = Male 1 = Female
Occupational status	Occupation of head of household ranked on a scale of prestige from 1 (service workers) to 8 (professionals)
Program eligibility	0 = Ineligible 1 = Eligible (on basis of household size and income)
Tenure	0 = Homeowner 1 = Renter
Organization memberships	Number of organizations to which the respondent belongs
Respondent Attitudes	
Toward neighborhood integration	Scale ranging from 1 (strongly prefers that blacks and whites live in separate neighborhoods) to 7 (strongly prefers that blacks and whites live in same neighborhoods)
Toward landlords	Scale ranging from 1 (very unfavorable) to 7 (very favorable)
Neighborhood trend (compared with last year)	0 = Respondent feels more satisfied with his neighborhood or feels about the same 1 = Respondent feels less satisfied with his neighborhood (perceived decline)
Own dwelling trend (compared with last year)	0 = Respondent feels more satisfied with his housing unit or feels about the same 1 = Respondent feels less satisfied with his housing unit (perceived decline)
Toward renters	Scale ranging from 1 (very unfavorable) to 7 (very favorable)
Toward blacks	Scale ranging from 1 (very unfavorable) to 7 (very favorable)

SOURCE: Compiled by author.

Example A-49

Stratum Definitions for the Screening Survey Sample

Stratum Number	Stratum Description[2]	Logical Definition
	Urban Rental	(TU = 1-4, 14-18, 22-29) and [(NUNITS > 1) or (ADDR ≠ PADDR)]
1	1 unit, lower tercile	(NUNITS = 1) and (0 < SIMPR ≤ 1,880)
2	2-4 units, lower tercile	{ (NUNITS = 2) and (0 < SIMPR ≤ 2,810) (NUNITS = 3) and (0 < SIMPR ≤ 2,970) (NUNITS = 4) and (0 < SIMPR ≤ 3,750) }
3	5+ units and other[b]	(NUNITS ≥ 5) or (PTYP = mobile home) or (ATP = grouped parcel)
4	1 unit, middle tercile	(NUNITS = 1) and (1,880 < SIMPR ≤ 2,000)
5	2-4 units, middle tercile	{ (NUNITS = 2) and (2,810 < SIMPR ≤ 3,665) (NUNITS = 3) and (2,970 < SIMPR ≤ 4,933) (NUNITS = 4) and (3,750 < SIMPR ≤ 6,400) }
7	1 unit, upper tercile	(NUNITS = 1) and (2,000 < SIMPR)
8	2-4 units, upper tercile	{ (NUNITS = 2) and (3,665 < SIMPR) (NUNITS = 3) and (4,933 < SIMPR) (NUNITS = 4) and (6,400 < SIMPR) }
	Rural rental	(TU = 5-13, 19-21) and [(NUNITS > 1) or (ADDR ≠ PADDR)]
10	2+ units and other[b]	(NUNITS ≥ 2) or (PTYP = mobile home) or (ATP = grouped parcel)
11	1 unit	(NUNITS = 1)
	Urban ownership	(TU = 1-4, 14-18, 22-29) and (NUNITS = 1) and (ADDR = PADDR)
12	Lower quartile	SIMPR + min (SLAND, 2,000) ≤ 2,213
13	2nd quartile	2,213 < SIMPR + min (SLAND, 2,000) ≤ 3,201
14	3rd and upper quartile	3,201 < SIMPR + min (SLAND, 2,000)
	Rural ownership	(TU = 5-13, 19-21) and (NUNITS = 1) and (ADDR = PADDR)
15	Lower and 2nd quartile	SIMPR + min (SLAND, 2,000) ≤ 3,201
16	3rd and upper quartile	3,201 < SIMPR + min (SLAND, 2,000)
--	Nonresidential	All other records

SOURCE: Site II sample selection program documentation.

[2]Tercile stratification of urban rental properties refers to equalized assessed value of improvements per unit. Quartile stratification of ownership properties refers to equalized assessed value of land and improvements. See text for details.

[b]"Other" includes mobile home properties and grouped parcels.

Example A-50

Effects of Functional Variables on Participation Probabilities for Eligible Households: Summary by Program Step

Variable Affecting Outcome	Direction of Change in:				
		Conditional Probability[a] of:			
	Probability of Knowing about Program	Enrolling	Passing Initial Housing Evaluation	Repairing or Moving After Failure	Probability of Ever Receiving Payments
Lower income, larger entitlement	+	+	-	+	+
Longer expected eligibility	0	+	-	+	+
Fewer assets	0	+	-	-	+
Greater housing expense, better housing, less crowding[b]	+	+	· (c)	+	+
Less aversion to assistance	0	+	(d)	(d)	+

SOURCE: Estimated by HASE staff from household survey and HAO records. See Wendt, 1982; Coleman, 1982; and Carter and Wendt, 1982, for additional details.

NOTE: Each entry shows the direction of change in the indicated probability that is associated with the variable change shown in the stub, controlling on other functional variables as well as on housing tenure and demographic characteristics. All nonzero entries in the first four columns represent findings that were statistically significant at the 95-percent confidence level or better; statistical tests were not feasible for the results shown in the last column.

[a] Probability of enrolling, given knowledge; probability of passing initial evaluation, given enrollment; and probability of either repairing or moving, given evaluation failure.

[b] Different measures of housing circumstances were used at each stage of analysis. In the knowledge model, "housing cost/income" was included as a variable, but so was allowance entitlement, so the partial coefficient should reflect only housing cost. In the enrollment model, rent per room and persons per room were included, and their coefficients had the same signs. In the response-to-failure model, estimated cost of repair and indicators for occupancy and condition failures were included.

[c] Inappropriate for probability-of-failure model.

[d] These models were estimated from HAO records that did not include attitudinal information.

INDEX TO TABLE FEATURES

Except as otherwise indicated, examples are located in Appendix A, pp. 33-80. In the appendix, the example numbers shown here are prefixed by "A-".

Feature	Example Number	Feature	Example Number
Pairs of numbers and their ratios	23,24,25	Time series	22,33,36
Percentage distribut- tions with absolute marginals	2,8	Totals and subtotals	1,7,12, 34,41
		Wordy stubs	1,30,38, 39,47
RELIABILITY INDICATORS:		**SUBTOTALS:**	
Confidence intervals ...	no examples	Collected	6,7
Sample sizes	13,20,30	Interspersed	1,12,34, 39,41
Significance tests	27,31		
Standard errors	17,22,27, 31,32	**TEXT TABLE** .... see pp. 4 and 6	
SOURCE CITATIONS:		**TIME SERIES:**	
Originated by author	46,48	Annual	33,34
Prior table	7,36	Irregular	35,37
Published source	33,37,50	Nested intervals	36
Unpublished source	1,38,39		
STUB ITEMS:		**UNITS OF ACCOUNT:**	
Attribute categories	1,4,9	In column heads	2,3,5,10, 15,19,23, 29,34
Attribute intervals	2,3,28,37		
Nested attributes	6,7,25, 30,41	In nonconforming rows	3
Parallel attributes	5,21,30	In panel breaks	11,36,40
Several populations	no examples	In stubs	30
		In table titles	no examples

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