Housing Allowance Demand Experiment

Income Reporting and Verification in the Housing Allowance Demand Experiment

David C. Hoaglin
Catherine A. Joseph

June 1980

Abt Associates Inc., Cambridge, Massachusetts

ABSTRACT

This report analyzes the extent to which participants in the Housing Allowance Demand Experiment accurately reported their income. Reporting errors were defined by comparing income amounts reported by participants with those reported by the participant's reported sources of income, such as employers, public agencies, and pension plans.

Discrepancies between income amounts reported by households and those reported by employers or public agencies are analyzed, and the impact of these discrepancies on payments is discussed. The relationship between reporting error and experimental and demographic variables is examined to determine whether households receiving income-conditioned payments tended to underreport income more than other households and whether some demographic groups were less accurate in their reporting than others. The administrative feasibility of third-party income verification is discussed. Finally, the report indicates a number of areas for possible future research.

The research and studies forming the basis of this report were conducted pursuant to a contract with the Department of Housing and Urban Development (HUD). The statements and conclusions contained herein are those of the contractor and do not necessarily reflect the views of the U.S. government in general or HUD in particular. Neither the United States nor HUD makes any warranty, expressed or implied, or assumes responsibility for the accuracy or completeness of the information contained herein.

ABT ASSOCIATES INC
55 WHEELER STREET, CAMBRIDGE, MASSACHUSETTS 02138
TELEPHONE • AREA 617-492-7100

Submitted to:

Office of Policy Development and Research
U.S. Department of Housing and Urban Development
Washington, D.C.

INCOME REPORTING AND VERIFICATION IN THE HOUSING ALLOWANCE DEMAND EXPERIMENT

Contract H-2040R Task 3.2.4

April 3, 1978 AAI# 78-36
(Revised June 1980)

Principal Authors: David C. Hoaglin
Catherine A. Joseph

Contract Manager	Quality Control Reviewer	Management Reviewer
Kirk D. Kennedy	Walter R. Stellwagen	Barbara C. Sampson

ACKNOWLEDGEMENTS

It is our pleasure to acknowledge the contribution of others who have aided in the preparation of this report.

Howard Chernick, Avis Vidal, and Glen Weisbrod carried out an extensive preliminary analysis of the data from verification at enrollment.

Joseph Friedman investigated the effects of imposing income eligibility limits on the sample and developed the analysis discussed in Appendix VII.

Helen Bakeman, Deputy Contract Manager, coordinated the many phases of analysis, writing, review, and production.

Stephen Kennedy, Project Director, and Walter Stellwagen, principal reviewer for the Demand Experiment, provided valuable insights throughout the analysis and the preparation of this report.

James Wallace, Director of Design and Analysis, and William Hamilton, who directed the Administrative Agency Experiment, helped us to maintain a broad perspective and to improve our exposition of analyses and conclusions.

Nouna Kettaneh, Yi-Shan Cheng, Frederick Luhmann, Irma Rivera-Veve, Ellen Katzenstein, and Charles Brooks provided essential assistance with data processing.

Phyllis Bremer, with the help of Billie Renos and Mary Ann Spartichino, provided valuable assistance by typing the numerous drafts.

David Hoaglin was primarily responsible for the analyses of income reporting errors (Chapter 3). Catherine Joseph carried out the analyses of third-party response and administrative feasibility (Chapter 5). The remaining chapters of the report reflect the combined efforts of both authors.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

SUMMARY

This report is one of a series describing results of programs tested in the Housing Allowance Demand Experiment. The Demand Experiment is one of three experiments being conducted by the Department of Housing and Urban Development as a part of the Experimental Housing Allowance Program (EHAP). These experiments, authorized by Congress in the Housing Act of 1970, are designed to test the concept of direct cash assistance to low-income households to enable them to rent suitable housing. The focus of the Demand Experiment is on how households use their allowances. The Demand Experiment was conducted in Allegheny County (Pittsburgh), Pennsylvania and Maricopa County (Phoenix), Arizona. It tests a variety of allowance plans and is the only one of the three experiments with a randomized control group. Data were collected on approximately 1,200 Experimental households and 600 Control households at each site.

Although the main purpose of the Demand Experiment is to provide information on how households would use housing allowances, it also provides information on a variety of administrative issues. This report concerns one of these issues--verification of the income reported by households. The report focuses on topics for which the Demand Experiment provides especially useful information--in particular, detailed examination of the structure of reporting errors, of the relationship between errors and demographic or income characteristics, of the relationship between errors and the incentives to underreport income provided by income-conditioned payments, and of administrative feasibility in terms of the accuracy and completeness of third-party responses. It should be read in conjunction with reports on this topic from the other experiments, especially the Administrative Agency Experiment, where results are available on a variety of administrative methods of income verification.

Many factors affect the accuracy of household income reporting. Respondents may fail to understand the type of income to report (and, for example, report take-home pay rather than gross wages). They may not be attentive to the precision required in income reporting, or they may find the questionnaire itself unclear or difficult to interpret. They may misrecollect their

income, because of the time lapse between the receipt of income and the administration of the questionnaire. In addition, more variable types of income, such as wages, may be more difficult for the respondent to report accurately than more stable types such as Social Security. Finally, respondents may deliberately under- or overreport their income. This is a special concern for income-conditioned programs, where the payment made to the household depends on household income.

Verification of income by third-party sources, such as employers and public agencies, provides an indication of the reporting accuracy of households. Although third parties may also err in reporting, information provided by them is assumed in this report to be more accurate than self-declared income and is used as the best estimate of true household income. The magnitude and extent of reporting errors indicate the degree to which inaccurate income reporting is a problem. In addition, if the magnitude and extent of reporting errors vary for particular types of income or among households with different demographic characteristics, or if reporting errors persist over time for particular households, they may indicate specific groups for which it would be advantageous to concentrate future verification efforts. Finally, the differences in reporting errors across experimental groups can be used to determine whether households receiving income-conditioned payments are more accurate or less accurate in their reporting than other households.

Third-party verification can yield important information about the accuracy of income reporting. However, the population being verified--in this case low-income households--may regard it as intrusive, bothersome, or unjustified, and third parties may object to the time and effort required in retrieving income information. Analysis of household reactions to the verification process and of third-party cooperation rates can therefore provide insight into the way in which verification is received by its major participants.

Reported income was verified twice during the Demand Experiment--during the enrollment process and approximately 18 months after a household's enrollment in the program. Verification of income was an important part of the enrollment process, since only households with annual net incomes

below certain fixed limits were eligible to enroll. After a household completed an Initial Household Report Form, on which it reported the income received during the past year by all household members over 17 years of age (as well as rental expenditures and demographic information), it was required to sign waiver forms permitting the verification of income by third-party sources.[1] Requests for confidential income information were sent to all sources of verifiable income.[2] When the requests were returned, verified annual income amounts were used to determine the household's initial eligibility status: if the verified net income was below the initial income eligibility limit, the household was enrolled in the experiment.

Once enrolled, a household was required to submit monthly Household Report Forms, in which it reported the previous month's income (as well as rental expenditures and demographic information) and from which payment determinations were made. A sample of these reports were reverified approximately 18 months after enrollment. Although verified income data were again collected for an entire 12-month period for most types of verifiable income, reverification was based mainly on the reported income received during one month.[3] If a large discrepancy occurred between the monthly reported and verified amounts, the entire period for which data were collected was checked. If a nontrivial discrepancy still existed, a household's payments were adjusted and its subsequent Household Report Forms were monitored.

Approximately 42 percent of the households in the Demand Experiment were assigned to experimental plans with income-conditioned payments. Under these "Housing Gap" plans the allowance payments were calculated as:

$$P = C - bY$$

where C was the estimated cost of modest existing standard housing for a

---

[1] All Experimental households and a 20 percent random sample of Control households were required to be verified.

[2] Incomes considered verifiable were wages and salaries, pensions, welfare, Social Security and Supplemental Security Income.

[3] In addition to the types of income verified at enrollment, Unemployment Compensation was added as a verifiable type of income.

particular household size, Y was net reported income, and b was the rate at which the payment was reduced as income increased. For Housing Gap households, therefore, the amount of payment increased as the reported net household income decreased. For households in other treatment groups, reported income had no such direct effect on payments: one of the groups (the Percent of Rent households) received rent-conditioned payments, while the other group (the Control households) received $10 monthly cooperation payments. Households in all treatment groups were informed of the program requirements and on what their payments would be based. It is thus possible, by comparing the reporting errors of the households that could receive higher payments by underreporting their income and those of other households, to test for evidence of deliberate misreporting in response to the payment offer.

The implementation of the verification process twice during the Demand Experiment provides a variety of information not only about deliberate misreporting of income but also about the overall ability of households to report income accurately, about the willingness of households and third parties to cooperate with verification, and about the impact of administrative procedures on third-party response rates. The primary results are summarized below.

1. Relatively few households reported their income with no error. Although most errors were small and almost evenly divided between under- and over-reporting, there were still a substantial number of large errors in both directions.

   Only about 10 percent of the households at enrollment and 30 percent at reverification were able to report their income correctly (that is, there was no difference between the reported and verified income amounts). A sizable percentage of the errors, however, were rather small: in addition to those that reported without error, another 45 percent of the households at enrollment and 30 percent at reverification had errors no larger than $20 per month. A smaller percentage of households had relatively large errors: 3 percent of the households at enrollment and 10 percent of the households at reverification had errors of at least $200 per month.

Errors were about evenly divided between over- and underreporting. Thus, at enrollment the average monthly error was -$5 in Pittsburgh and $3 in Phoenix, while the median monthly errors were -$2 and $0 respectively.[1] At reverification, the average monthly error was -$27 in Pittsburgh and -$37 in Phoenix, while the median monthly error was -$1 in Pittsburgh and $0 in Phoenix. The range of monthly errors was large, running from -$562 to $490 at enrollment and from -$1,280 to $825 at reverification.

2. There is no evidence that households receiving income-conditioned payments misreport income more than other households.

Incidence data and summary statistics indicate that in neither Pittsburgh nor Phoenix was underreporting significantly more common for Housing Gap households. In fact, the pattern of reporting errors for Housing Gap households was similar to that for Percent of Rent and Control households. Furthermore, Housing Gap households generally reported income without error more frequently than other treatment groups, possibly because the income dependence of their payment caused more attention to accuracy.

Multiple regression equations allowing for household characteristics provided no strong or consistent evidence that Housing Gap households tended to underreport income more than did other households. Separate equations for over- and underreporters indicated that overreporters in the Housing Gap group tended to overreport less, but that underreporters did not follow any clear pattern. It should be noted, however, that these verification results refer only to the income sources identified by the households. Additional analyses were inconclusive as to whether these households misreported by failing to identify all sources of income.

For households that had their income verified both at enrollment and at reverification, a comparison of reporting errors over time

---

[1] Negative errors indicate underreporting; positive errors indicate overreporting.

indicates that there was no strong relationship between a household's error in income reporting at enrollment and its error in income reporting 18 months later.

3. Wage income appears to be the only type of income which was consistently prone to reporting error. It was also one of the most difficult types of income to verify.

   Reporting errors in wage income were frequent, especially at enrollment. In contrast, a substantial percentage of households made little error in reporting welfare, pension, and Supplemental Security Income at enrollment and all types of income (other than wages) at reverification. At enrollment, the response rate of employers to requests for income information was also lower than that for most other types of income. (At reverification the response rate improved, but this may have been because the period of time for which information was requested was shortened from 12 months to 3 months.) The nature of wage income may cause more reporting difficulty: wages tend to be more variable than other incomes and to be affected by overtime, shift differentials, commissions, tips and bonuses. The results suggest that, of all types of verifiable income, wage income information may require special attention when it is collected from households and also when it is verified by third parties.

4. Although wages were likely to be reported less accurately, no set of demographic or income characteristics predicted reporting accuracy well enough to suggest a policy of selective verification. There also is little evidence that households made the same types of reporting errors over time.

   A number of demographic and income characteristics were tested in regression equations. Some of the coefficients (particularly those for total income and for dependence on wages as the largest single type of income) were significantly different from zero, but examination of their effects on reporting error does not yield an equation which can predict error with any great degree of confidence. Separate equations for over- and underreporters improve

the predictability for underreporters, but they fall short of providing conclusive characterizations of households that misreport.

If verification could be carried out only for a sample of households, the regression results would suggest that some types of households be sampled more frequently than others. On the other hand, because the analyses do not predict reporting accuracy well, they do not suggest that a policy of verifying only a sample of households would be desirable--no households can be identified as being extremely unlikely to report inaccurately and hence not worth verifying.

For households that had their income verified both at enrollment and at reverification, a comparison of reporting errors over time indicates that there was no strong relationship between a household's error in income reporting at enrollment and its error in income reporting 18 months later.

5. Households generally responded favorably to the verification process. Most households did not consider verification to be a bother, and most felt that some form of verification was necessary for all households that receive payments.

   Over 96 percent of all households cooperated with income verification. In response to questions on Periodic Interviews, between 86 and 90 percent of households stated that they did not mind income verification, and approximately 93 percent reacted positively to the necessity for some degree of verification.

6. Third parties generally cooperated with the verification process. The forms and procedures designed to implement verification affect its feasibility.

   Third parties cooperated with verification: between 77 and 93 percent of all sources responded to requests for income information at enrollment, and between 91 and 96 percent responded at reverification. These responses varied by the type of in-

come: public agencies generally had a higher response rate than employers or pension funds.

The third-party response rate increased at reverification, in part because of modifications that were made in the verification process, especially shortening the time period covered for wage income and clarifying the forms. Procedures which had proved useful at enrollment were again employed, such as maintaining personal or telephone contacts at public agencies and large employers to facilitate the processing of the verification forms. Finally, staff were more experienced. The results obtained at enrollment and reverification suggest that the methods by which information is requested and the administrative procedures used to implement the verification process influence the rate at which third parties respond and the extent to which they provide clear and useful information.

7. The inclusion of monthly verification in a payment system does not produce a net savings in cost, but it can reduce overall reporting errors.

Income verification resulted in only small mean payment savings per household, both at enrollment and at reverification. However, with a $12 estimated cost of verifying a household, the process did not result in a net saving for monthly verification. A small net saving might be possible if several months' income were verified at once or if the rate at which payments change with income were substantially higher than 25 percent. As a method of controlling general errors in both over- and underreporting, however, verification would be more useful. The process resulted in moderate average reductions in errors at both enrollment and reverification.

8. Taken as a whole, reporting errors followed a similar distribution in Pittsburgh and Phoenix.

Reporting errors were comparable between Pittsburgh and Phoenix in their typical values and in their variability. Although the distributions were similar for each site, their shape varied

slightly from enrollment to reverification. Reporting errors tended to be more variable at reverification than at enrollment. In addition, overreporting was longer-tailed at reverification while underreporting was shorter-tailed, suggesting that more frequent large overreporting errors and less frequent large underreporting errors occurred at reverification.

SOURCE OF STATEMENTS:

The following indicates the source in the text of the summary points.

1. For summary statistics on reporting errors, see Table 3-1 and its accompanying discussion in Section 3.2.

2. For the comparison of reporting errors for treatment groups, see Tables 4-1 and 4-2 in Section 4.1. For the multiple regression equations, see Tables 4-3 through 4-8 and their accompanying discussion in Section 4.1. For the analysis of the misreporting of the number of income sources, see Table 4-17 and its accompanying discussion in Section 4.2.

3. For comparisons of reporting errors by types of income, see Table 3-3 and its accompanying discussion in Section 3.4 and also see Appendix VI. For the response rate of employers, see Tables 5-6 and 5-9 and their accompanying discussion in Section 5.2.

4. For the analysis of demographic and income characteristics, see Tables 4-13 through 4-16 and their accompanying discussion in Section 4.2. For the comparison of reporting errors over time, see Table 3-2, Figures 3-2 and 3-3, and their accompanying discussion in Section 3.3.

5. For the response rate of households, see the discussion in Section 5.1. For their reactions to verification, see Tables 5-1 and 5-3 in Section 5.1.

6. For the response rate of third parties, see Tables 5-6 and 5-9 and their accompanying discussion in Section 5.2. For a discussion of the modifications made to the verification process, see Section 5.2.

7. For summary statistics on the payment impact, see Table 3-4 and the accompanying discussion in Section 3.5. For a discussion of net savings and frequency of verification, see Section 6.1.

8. For a comparison of the distributions of reporting errors between Pittsburgh and Phoenix, see Table 3-1 and Figure 3-1 and their accompanying discussion in Section 3.2. Also see Appendix V.

CHAPTER 1

INTRODUCTION

A key requirement in any income-conditioned program is accurate information on the income of participants. If income is a major criterion for determining eligibility and level of payment, inaccuracies in the information used will create inequities: participants in the program will be overpaid or underpaid; at the extremes, some recipients of benefits may actually be ineligible, and some eligibles may be incorrectly excluded. One approach to improving the accuracy of income information is to use parallel information from income sources to verify the income amounts reported by participants. The usefulness of such third-party verification depends in part on how accurately households report their income and on how completely third parties respond to requests for information. If households report accurately or if usable third-party reports are difficult to obtain, then a verification program may yield small benefits in relation to its costs. In addition, the desirability of verification may depend in part on whether misreporting appears to reflect random errors that cancel one another or a consistent pattern of underreporting leading to substantial overpayments.

The reporting errors with which this report is concerned are solely those made by participants, and the data collected for individual households make it possible to investigate such errors in some detail. The analyses presented here are not concerned with "error rates" of the type examined in many transfer programs, which generally count cases as in error if they involve errors in attributes other than income (for example, an AFDC case would be in error if the client did not report the correct number of children or if the agency failed to follow-up on an impending change in the client's circumstances that would affect eligibility or level of assistance), can reflect administrative as well as participant errors, and often aggregate data (for example, at a statewide level) in calculating the error rate.[1]

---

[1] A common focus of concern is the recertification process: recertification of eligibility may be made infrequently, participants may fail to report changes in their situation which would affect eligibility or payment (footnote continued on next page)

The results of income verification in the Housing Allowance Demand Experiment can be used to address these issues.[1] In the Demand Experiment both income-conditioned and non-income-conditioned allowances were offered to approximately 1200 low-income, renter households selected at random at each of two sites--Allegheny County (Pittsburgh), Pennsylvania, and Maricopa County (Phoenix), Arizona.[2] The monthly payment for an Experimental household was calculated according to one of two formulas--Housing Gap or Percent of Rent.[3] The Housing Gap formula provided an allowance equal to the difference between a basic payment level and some reasonable fraction of family income. Specifically, the payment P was calculated as

$$P = C - bY,$$

where C is the basic payment level (related to the cost of modest existing standard housing and to household size[4]), Y is net family income,[5] and "b" is the tax rate, i.e., the rate at which the allowance is reduced as income

---

(footnote continued from previous page)

level, or agencies may be slow to check for such changes. These issues are more closely related to the accounting period and frequency of reporting used by the program than to the accuracy of participant reports, when they are made. Income accounting periods in the context of the Demand Experiment are the subject os a separate report (Jacobson, 1980).

[1]Another important source of information is the Administrative Agency Experiment (see Dickson, 1977).

[2]In addition, approximately 600 households at each site participated in the experiment as members of a randomly selected control group.

[3]Appendix I describes the Demand Experiment and these allowance plans in more detail.

[4]Thus, a household's reported size could affect the amount of its payment under the Housing Gap formula. Appendix IX discusses the data on household size collected during the Demand Experiment and presents several analyses focusing on distributions and patterns of change.

[5]The definition of net income appears at the beginning of Appendix VII.

increases. Under the Percent of Rent formula, the payment was

$$P = aR,$$

where R is rent and "a" is the fraction of rent paid by the allowance. From the payment formulas it is evident that the Housing Gap allowance depended directly on income, while the Percent of Rent allowance did not.[1] However, only households with net income below certain fixed limits were eligible to receive allowance payments, so verifying the annual income reported by households was an important part of the enrollment process.

After obtaining waiver forms from potential participants, Demand Experiment personnel asked the income sources (employers or welfare agencies or local offices of the Social Security Administration, for example) to furnish detailed information on the amounts actually paid during the previous twelve months. If a household's net income, calculated from these responses, was within the eligibility limit, the household was then enrolled.[2]

After about eighteen months of participation in the experiment, a sample of households was asked to complete another set of waiver forms so that their income could once again be verified. This reverification, based primarily on one month's reported income, yielded information which bears on the routine operation of a verification program.

Two factors necessarily limit the generality of conclusions which can be drawn from the results of income verification in the Demand Experiment. First, only reported income amounts could be verified; concealed sources of income generally would not be discovered by the routine verification

---

[1] Although the Percent of Rent payment formula does not depend on income, provision was made to reduce Percent of Rent payments for households with very large incomes. This income constraint affected only 0.4 percent of all Percent of Rent households at enrollment and 7 percent of all households active at two years.

[2] The incomes of a sample of Control households were verified in the same way, but no decision on eligibility was involved.

procedures.[1] Second, because participants knew that their income would be verified at enrollment and might be verified again later, it is not possible to determine whether they reported more accurately than would have been the case if they had known that no verification would take place.

Chapter 2 of this report describes the verification process, both during enrollment and during the subsequent reverification. Chapter 3 analyzes reporting errors--that is, discrepancies between amounts reported by households and the amounts reported by employers or agencies--for households whose income could be verified completely. The distributions of reporting errors indicate how accurately households reported income of different types; they also provide a basis for assessing the contribution of reporting errors to payment errors. Chapter 4 focuses on reporting errors among participants whose payment formulas provided larger payments for lower incomes, a situation which might be perceived as an incentive for such households to underreport their income. Chapter 4 also examines a set of regression equations for the relationship between reporting accuracy and the demographic and income characteristics of participants. Chapter 5 discusses the cooperation of participants, employers, and various government agencies in the verification process; these factors contribute to the feasibility of third-party income verification. Finally, Chapter 6 summarizes the conclusions of this study of income verification and suggests a number of areas for further research.

[1] Demand Experiment staff monitored household income reports to see that amounts were reasonable and to spot changes from month to month, but this procedure would not necessarily detect an unreported source.

REFERENCES

Donald E. Dickson, Certification: Determining Eligibility and Payment Levels in the Administrative Agency Experiment, Cambridge, Mass., Abt Associates Inc., March 1977.

Jacobson, Alvin L., Income Accounting Periods in the Housing Allowance Demand Experiment, Cambridge, Mass., Abt Associates Inc., 1980.

CHAPTER 2

THE INCOME VERIFICATION PROCESS

Before enrollment in the Demand Experiment, all households that accepted the enrollment offer were asked to disclose (on the Initial Household Report Form)[1] all income received by each member of the household during the previous twelve months. This disclosure included a statement, signed by the head of household or spouse, declaring the income information to be accurate and complete. In addition, all Experimental households and a 20 percent random sample of Control households were required to sign waiver forms allowing employers and agencies from which they had received income to disclose income information to housing allowance personnel.[2]

After enrollment every household participating in the Demand Experiment was required to submit a monthly Household Report Form,[3] declaring the amounts of income received by each household member, the amount of rent paid, and other demographic information. Households were also required to submit rent receipts. For households receiving an allowance under the Housing Gap formula, this income information determined the amount of the next allowance check. (Households in some Housing Gap treatment groups were also required to meet certain housing standards in order to receive a full allowance payment. Households that had not yet met these standards received a $10 monthly cooperation payment for completing and submitting the Household Report Form and other information.) For households under the Percent of Rent formula, the amount of rent paid determined the amount of the allowance payment.[4] Control households simply received a $10 monthly payment for providing information.

---

[1] A copy of this form is reproduced in Appendix VIII.

[2] There was no systematic procedure for discovering income sources not disclosed by the household in its signed statement, and reporting errors of this type are examined only indirectly in this report.

[3] A copy of this form is reproduced in Appendix VIII.

[4] Rent receipts provided direct verification of the rent paid by Percent of Rent households.

To determine the accuracy of income information reported on the monthly Household Report Form, a sample of households was reverified during their second year of participation in the experiment. At each site the planned composition of this sample was 300 Housing Gap households, 150 Percent of Rent households, and 200 Control households. These numbers represent approximately 50 percent of the Housing Gap and Control households and 35 percent of the Percent of Rent households that had been active for about eighteen months in the program. Most of these reverifications concerned income reported by the household during its eighteenth or twentieth month in the program. A smaller, but not negligible, number of reverifications took place after the twenty-fourth month because all Housing Gap households that were receiving a full allowance payment and had been in the program for two years were required to be reverified if they had not been reverified earlier.

After receiving the household's Household Report Form for the month on which reverification was to be based, site staff contacted the household and requested that waiver forms be signed for every source of verifiable income reported.[1] Experimental households that refused to sign waiver forms were recontacted and, if they still refused, were dropped from the program after two months or after their twenty-sixth month of participation, whichever occurred later.[2] Experimental households were generally quite willing to comply with this request: only 5 percent in Pittsburgh and 2 percent in Phoenix refused.[3] Control households received a $25 cooperation payment if they signed the waiver forms; they were not terminated if they refused.

Verification covered the following types of household income:

Wages and salaries,

Social Security payments,

---

[1]The types of income considered verifiable are discussed below.

[2]So that two full years of data could be collected for as many households as possible, no household that refused to be reverified was terminated until after the twenty-sixth month of participation.

[3]Many households that refused reverification voluntarily terminated soon after they refused. (The numbers of households that refused reverification are given in Table II-2.) See Chapter 5 for further discussion of households that refused reverification.

Supplemental Security Income payments (Old Age Assistance, Aid to the Blind, Aid to the Permanently and Totally Disabled),

Welfare payments (Aid to Families with Dependent Children, General Assistance, other Welfare), and

Pensions.

At reverification, unemployment compensation was also verified. Table 2-1 gives the incidence of these types of income at enrollment and at reverification, and Table 2-2 shows their average amounts. To simplify comparison of the annual amounts reported at enrollment and the monthly amounts reported at reverification, Table 2-2 also converts the annual amounts to average monthly figures. Households also reported other types of income, such as Workmen's Compensation and alimony, which were not verified; these are discussed in Appendix IV.

Wages, Social Security, and welfare were clearly the most frequently reported types of income, but their incidence and average amounts differed between Pittsburgh and Phoenix and between enrollment and reverification. Most notable were the between-site differences in the incidence of wages and welfare. A substantially higher proportion of Phoenix households received income from wages. This was especially marked at enrollment, when 74 percent of these households reported wage and salary income during the previous twelve months, compared to 41 percent of Pittsburgh households. Also, the average amount of wage income reported by Phoenix households was $5,595 at enrollment, considerably higher than the $4,192 reported in Pittsburgh. For welfare, the difference is in the other direction: incidence was about three times as high in Pittsburgh as in Phoenix at both enrollment and reverification; the average amounts were also higher in Pittsburgh, by a ratio of approximately 5 to 3.[1]

The incidence of each income type was generally higher at enrollment than at reverification, especially in wages and welfare. This is to be expected. It seems plausible that many participating households did not receive these types of income every month.[2] This also helps to explain why, for income

[1]These site differences in part reflect the higher income eligibility limits in Phoenix.

[2]See Jacobson (1980), Chapter 3, for a discussion of month-to-month variability in income.

Table 2-1

INCIDENCE OF INCOME TYPES

INCOME TYPE	ENROLLMENT		REVERIFICATION	
	Pittsburgh (Number of Households)	Phoenix (Number of Households)	Pittsburgh (Number of Households)	Phoenix (Number of Households)
Wages	41.5% (523)	74.0% (984)	31.5% (266)	48.2% (379)
Social Security	30.1 (379)	23.5 (313)	28.7 (242)	23.1 (182)
Supplemental Security Income	2.5 (32)	8.3 (111)	6.4 (54)	6.0 (47)
Welfare	49.6 (626)	17.3 (230)	37.2 (314)	13.6 (107)
Pensions	12.1 (153)	8.9 (119)	11.3 (95)	8.8 (69)
Unemployment Compensation	5.7 (72)	6.6 (88)	3.1 (26)	9.0 (71)
Some verifiable income[a]	97.4 (1,228)	99.4 (1,322)	89.2 (753)	81.6 (642)
Some verifiable income[b]	---	---	91.1 (769)	86.8 (683)
SAMPLE TOTAL	(1,261)	(1,330)	(844)	(787)

SAMPLE: Enrollment Sample: All enrolled households contacted for verification, excluding those with enrollment incomes above the eligibility limits, and those with data problems. Reverification Sample: All enrolled households selected for reverification, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. By enrollment definition, does not include Unemployment Compensation.

b. By reverification definition, includes Unemployment Compensation.

Table 2-2

MEAN REPORTED HOUSEHOLD INCOME, BY INCOME TYPE

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
INCOME TYPE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Wages	$ 4,192	$ 5,595	$ 349	$ 466	$ 620	$ 613
Social Security	2,076	2,028	173	169	217	206
Supplemental Security Income	1,362	940	114	78	127	98
Welfare	2,499	1,481	208	123	255	154
Pensions	1,360	1,574	113	131	131	142
Unemployment Compensation	1,219	583	102	49	335	261
Some verifiable income[a]	3,904	5,175	325	431	421	469
Some verifiable income[b]	---	---	---	---	424	468
SAMPLE TOTAL	(1,261)	(1,330)	(1,261)	(1,330)	(844)	(787)

SAMPLE: Enrollment Sample: All enrolled households contacted for verification, excluding those with enrollment incomes above the eligibility limits, and those with data problems. Reverification Sample: All enrolled households selected for reverification, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. By enrollment definition, does not include Unemployment Compensation.

b. By reverification definition, includes Unemployment Compensation.

types other than wages, the monthly amount at reverification was roughly 20 percent larger than the average monthly amount at enrollment. For wage income, these ratios are even larger: roughly 1.8 in Pittsburgh and 1.3 in Phoenix.

When a household returned its waiver forms, authorizing each income source (i.e., employer or agency) to disclose amounts paid, the forms were mailed to the sources. Public agencies that were major sources of income were asked to designate a specific person to receive and process verification forms. Forms were sometimes hand-carried to and from that person. A similar procedure was followed for one or two large employers at each site. This arrangement provided a recontact point if income information supplied by the agency or employer appeared incorrect.

Both the forms and the procedures for handling them changed somewhat between enrollment and reverification.[1] In each case there were separate forms for employment income and benefit income, but experience at enrollment suggested that more detailed forms might improve the accuracy of third-party response. Thus the forms used at reverification listed each calendar month for which income information was requested and asked the source to fill in the corresponding amount. Also, the number of months for which employment income information was requested was reduced from twelve at enrollment to three at reverification. (Requests for benefit income still covered a twelve-month period.)

If the Income Verification Form or other suitable response[2] was not returned, a follow-up letter was sent or a telephone call was made to the source. At enrollment, the verification process for a household was considered complete when third-party responses covering at least 80 percent of the household's

---

[1] Copies of these forms are reproduced in Appendix VIII.

[2] In a few cases, sources returned letters, W-2 forms, or their own forms instead of the standard form.

income had been received. The household's eligibility was then determined,[1] and eligible households were enrolled. If no statement could be obtained from a source within two months, the amount of income declared by the household was used in determining eligibility.[2] A two-month limit was also used as the cutoff date during reverification; third-party information received after this time would not cause an adjustment in the household's payment. The verification procedure at reverification included a test for substantial discrepancies between income amounts reported by households and those supplied by sources. For each source, when the difference between reported and verified income for the month of reverification was greater than 10 percent, the reported and verified incomes for the entire period (3 months for employment income and 12 months for benefit income) were compared. Cases involving substantial[3] misreporting of income led to payment adjustments and subsequent monitoring of Household Report Forms submitted by the household.

---

[1]The definition of income used in determining eligibility is Net Income for Eligibility (NIE), calculated from the twelve months of data on the IHRF. NIE is described in Appendix Section III.1. Eligibility determination was based upon verified income for each income type, unless the difference between reported and verified income was less than 10 percent, in which case the reported amount was used. The initial payment under the Housing Gap formula was based on the income and expenses reported by the household on the HRF for the month prior to that payment. (After submitting an IHRF, households submitted monthly HRFs and received a $10 cooperation payment during the time--up to two months--that verification was being carried out at enrollment.)

[2]There were three reasons for this rule: first, the timetable for conducting the experiment required such a procedure; second, to deny benefits because of someone else's inaction would have been inequitable; third, in many of the cases that were verified, using the declared amount, even if incorrect, would have been unlikely to change the household's eligibility status (because most reporting errors were relatively small, as discussed in Chapter 3 and Appendix V), and only under the Housing Gap payment formula would an error change the amount of the payment.

[3]Specifically, a difference between declared and verified income (three-month total for employment income, twelve-month total for benefit income) whose magnitude was either greater than $84 or greater than the larger of 10 percent and $10.

The errors made by households in reporting income at enrollment and at reverification are the basic data required for any analysis of how accurately participants were able to report their income and of whether there was evidence of systematic misreporting. Chapters 3 and 4, respectively, deal with these questions. Because a net income figure calculated from total reported household income was used in determining eligibility and calculating payments, the appropriate sample for analysis consists of those households for which all verifiable income was completely verified (that is, usable information was received from all sources) and no data problems were present.[1] This constraint reduces the size of the sample. Seventy-six percent of the households in Pittsburgh and 45 percent in Phoenix were completely verified at enrollment. At reverification the results were better: 89 percent in Pittsburgh and 82 percent in Phoenix. (Chapter 5 examines completeness of verification in more detail, and Appendix II discusses the definition of the samples used in analyzing reporting errors.)

Because analyses of reporting errors in total verifiable income must be based on completely verified households, it is important to compare the income characteristics of these subsamples at enrollment and at reverification with those of the samples of all households contacted for verification. In terms of incidence and average amounts of various types of income, these subsamples of completely verified households do not differ greatly from the larger samples of households. Tables 2-3 and 2-4 present the figures for comparison with Tables 2-1 and 2-2, respectively.[2]

Most types of income showed slightly higher incidence among completely verified households at enrollment, and all types increased at reverification. The largest increase was in Phoenix at reverification, where 56 percent of the completely verified households had income from wages, 8 percentage points higher than the incidence among all households for which reverification was attempted. In contrast, the difference in Phoenix at enrollment was 10

---

[1] See Appendix II for a discussion of data problems and the numbers of households excluded because of them.

[2] Other summary statistics for completely verified households are given in Appendix VI.

Table 2-3

INCIDENCE OF INCOME TYPES FOR COMPLETELY VERIFIED HOUSEHOLDS

INCOME TYPE	ENROLLMENT		REVERIFICATION	
	Pittsburgh (Number of Households)	Phoenix (Number of Households)	Pittsburgh (Number of Households)	Phoenix (Number of Households)
Wages	37.3% (358)	64.0% (384)	34.1% (253)	56.5% (357)
Social Security	31.8 (306)	26.8 (161)	31.6 (235)	27.2 (172)
Supplemental Security Income	2.6 (25)	10.2 (61)	7.0 (52)	7.3 (46)
Welfare	51.5 (495)	17.5 (105)	41.2 (306)	15.5 (98)
Pensions	11.1 (107)	7.5 (45)	12.5 (93)	9.0 (57)
Unemployment Compensation	5.0 (48)	4.3 (26)	3.5 (26)	10.0 (63)
Some verifiable income[a]	100.0 (961)	100.0 (600)	97.8 (727)	94.0 (594)
Some verifiable income[b]	---	---	100.0 (743)	99.4 (628)
SAMPLE TOTAL	(961)	(600)	(743)	(632)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. By enrollment definition, does not include Unemployment Compensation.

b. By reverification definition, includes Unemployment Compensation.

Table 2-4

MEAN REPORTED HOUSEHOLD INCOME, BY INCOME TYPE, FOR COMPLETELY VERIFIED HOUSEHOLDS

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
INCOME TYPE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Wages	$ 4,273	$ 5,801	$ 356	$ 483	$ 627	$ 623
Social Security	2,121	2,002	177	167	218	207
Supplemental Security Income	1,348	994	112	83	130	98
Welfare	2,554	1,648	213	137	256	157
Pensions	1,396	1,526	116	127	130	144
Unemployment Compensation	1,229	572	102	48	335	259
Some verifiable income[a]	3,773	4,754	314	396	422	481
Some verifiable income[b]	---	---	---	---	425	481
SAMPLE TOTAL	(961)	(600)	(961)	(600)	(743)	(632)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification forms.

a. By enrollment definition, does not include Unemployment Compensation.

b. By reverification definition, includes Unemployment Compensation.

percentage points in the opposite direction; the incidence of wages in Pittsburgh also dropped by 4 percentage points at enrollment. One reason for this is the relatively low rate of response by wage sources at enrollment and the relatively high response rate at reverification (see Section 5.2, especially Table 5-6).

Increases of about 4 percentage points were present at reverification for welfare in Pittsburgh and Social Security income in Phoenix. Otherwise the changes in incidence did not seem unusually large. Almost all the differences between the mean monthly amounts in Table 2-4 and those in Table 2-2 were quite small. Wages in Phoenix was the only noticeable exception: the figure for completely verified households was $17 per month higher at enrollment and $10 per month higher at reverification. On balance, the subsamples of completely verified households, which are the basis for the analyses of reporting error, are reasonable facsimiles of the larger samples of households at enrollment and reverification. Indeed, since completeness of verification depends on the cooperation of income sources rather than of recipients, it is unlikely that reporting error would be related to completion. Thus, use of the subsamples should not affect major conclusions, especially if the type of income is controlled for in the analysis.

REFERENCES

Jacobson, Alvin L., Income Accounting Periods in the Housing Allowance Demand Experiment, Cambridge, Mass., Abt Associates Inc., 1980.

CHAPTER 3

ERRORS IN REPORTING

This chapter focuses on the magnitude and direction of errors which households made in reporting their income, both at enrollment and at reverification. This analysis has several purposes: to describe the distributions of reporting errors; to determine whether reporting errors were comparable between sites and over time; to explore the possibility that household reporting errors tended to persist from enrollment to reverification; to determine whether some types of income were more subject to substantial reporting errors than others (so that verification could be concentrated on the troublesome types of income); and to measure the impact of reporting error on payments.

3.1 DEFINITIONS OF DIFFERENCES

A household's error in reporting its income is defined as

(reporting error) = (reported income) - (verified income).[1]

Positive errors correspond to overreporting; negative errors correspond to underreporting. At enrollment the reported and verified incomes are for the preceding twelve months, while at reverification they are based on one month. Both reported income and verified income are approximations of true income. Participant declarations may be in error because of poor records, inaccurate recall, failure to understand reporting rules (reporting net wages rather than gross wages, for example), or intentional concealment of income.[2] Third-party reporting of income may be inaccurate because of failure to consult records, failure to understand what information was being requested (again, for example, reporting net pay rather than gross earnings), or incompatibility of record-keeping categories (reporting for wrong or incommensurable

[1] This measure of discrepancy does not include errors in reporting types of income which were not subjected to verification. Appendix IV discusses these types of income.

[2] Inaccurate recall should be less frequent at reverification because income was being reported each month on the Household Report Form.

time periods, such as weeks instead of months)[1], or because no third-party records were available for certain categories of income (e.g., tips). Although such problems exist for both measures, third-party reporting is assumed to be more accurate than self-declared income and is therefore used as the best estimate of true household income.[2]

The samples for this analysis are restricted to eligible households that were completely verified (that is, the number of Income Verification Forms returned matched the number of income sources declared, and no information was missing or incomplete) and for which the time periods were consistent and other minor inconsistencies and data problems were absent.[3] At enrollment this sample consisted of 961 households in Pittsburgh and 600 in Phoenix; at reverification there were 740 households in Pittsburgh and 625 in Phoenix.

3.2 REPORTING ERROR IN TOTAL VERIFIABLE INCOME

As a first step in describing errors in reporting total verifiable income, Table 3-1 shows selected summary values at enrollment and at reverification. In both Pittsburgh and Phoenix the errors at enrollment are reasonably well-balanced around 0, with a slight tendency toward more frequent underreporting --the median is -24 dollars per year in Pittsburgh and -2 dollars per year in Phoenix, and the percentages of households underreporting are 55 percent and 50 percent in Pittsburgh and Phoenix, respectively. The mean values give a slightly different picture, primarily because they are sensitive to the extreme errors present at both sites. If such errors as overreporting by $5,159 and underreporting by $6,739 in Pittsburgh at enrollment were isolated stray values, far from the rest of the data, it would be

---

[1]This can lead to rather substantial errors when, for example, a participant is paid biweekly and receives three paychecks in one month (the reporting error in wages could be 50 percent). The likelihood of such errors could be reduced by using special forms which take pay period into account.

[2]If a third-party amount appeared to be incorrect, especially at reverification, site staff attempted to obtain the correct amount. Households whose verified income was affected by a recognized third-party mistake were excluded from the analytic samples.

[3]Appendix II discusses the selection process which produced the samples for this analysis.

Table 3-1

SELECTED SUMMARY VALUES FOR REPORTING ERROR
IN TOTAL VERIFIABLE INCOME

	ENROLLMENT				REVERIFICATION[a]	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 5,159	$ 5,874	$ 430	$ 490	$ 825	$ 606
Upper quartile	63	239	5	20	0	0
Median	-24	-2	-2	0	-1	0
Lower quartile	-204	-216	-17	-18	-27	-38
Minimum	-6,739	-3,940	-562	-328	-1,246	-1,280
Interquartile range	267	455	22	38	27	38
Mean	-63	37	-5	3	-27	-37
Standard deviation	845	839	70	70	123	136
Frequency of exact zero	11.3%	7.7%	11.3%	7.7%	33.4%	29.8%
SAMPLE TOTAL	(961)	(600)	(961)	(600)	(740)	(625)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with a reporting period problem in the third-party response.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. Does not include Unemployment Compensation.

appropriate to set them aside and recalculate the mean without them. In fact, however, other instances of quite substantial overreporting and underreporting occurred in both Pittsburgh and Phoenix, and (as Appendix V shows) they generally fit into the overall distributional shape of the reporting errors. Thus no simple screening of the data will protect the mean from such sensitivity. In contrast to the presence of very large errors, a number of households reported their total verifiable income without error: 11 percent in Pittsburgh and 8 percent in Phoenix.[1]

At reverification, reporting without error is more frequent: 33 percent of the households in Pittsburgh and 30 percent in Phoenix reported without error. The median errors are -1 dollar per month and 0 dollars per month, respectively; but both sites show a tendency of skewness toward underreporting.

A comparison of variability could be based on the standard deviations, which are nearly equal for the two sites, but this measure is substantially influenced by extreme values. It is more informative to note that in Pittsburgh the middle half of the errors at enrollment lies between -204 and +63 dollars per year and that the corresponding limits in Phoenix are -216 and +239 dollars per year. The limits for reverification are -27 and 0 dollars per month in Pittsburgh and -38 to 0 dollars per month in Phoenix. Thus variability is somewhat greater in Phoenix.[2]

For direct comparison with reverification, the summary statistics at enrollment are also given in dollars per month. These indicate substantially larger monthly reporting errors at reverification than at enrollment. This is more evident in the maximum and minimum and the mean and standard deviation than in the median and interquartile range.[3] The reasons for this

---

[1] When this criterion is expanded from no error to "moderate" error (under- or overreporting by less than $50 per year), the proportions increase to 28 percent and 23 percent, respectively.

[2] The proportion of households that misreported by no more than $20 per month ($240 per year at enrollment) provides another indication of this tendency. Among Pittsburgh households, 59 percent at enrollment and 64 percent at reverification had reporting errors within these limits. In Phoenix the proportions were lower: 52 percent and 55 percent, respectively.

[3] The interquartile range, sometimes abbreviated IQR, is defined as the upper quartile minus the lower quartile. It is thus the spread or width of the middle half of the sample.

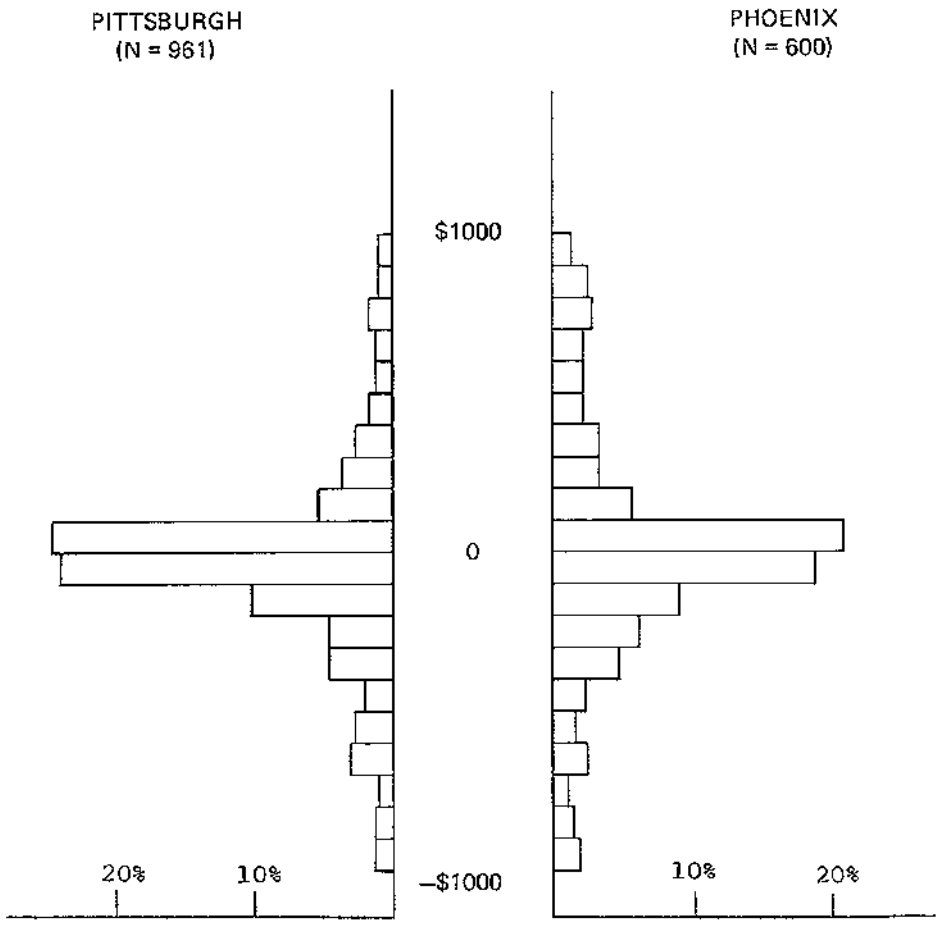
appearance are not clear. It may be that in any given month a small fraction of households made extreme errors in reporting but that these were not repeated from month to month. Indeed, if an annual error were simply the sum of twelve monthly errors drawn independently with the same distribution as reverification errors, the annual standard deviation would be expected to be $\sqrt{12}$ times the monthly standard deviation (so that the standard deviation of mean monthly error at enrollment would be smaller than that at reverification by a factor of $1/\sqrt{12} \approx .29$). In fact, the standard deviation of the annual figure for enrollment is not this much smaller than the variability of monthly figures at reverification. In addition, the interquartile range for monthly errors is almost the same at the two time periods. Thus the variability of errors at verification is larger than would be expected if verification error simply reflected the sum of twelve independent monthly errors with the same standard deviation as that found at reverification.

Many reasons may be advanced for this. Most obviously, additional error may be introduced at verification by the fact that participants must recall income over an entire year. Alternatively, if reporting errors tend to persist from month to month, then the overall variability of annual figures would be greater than would be the case if a household's reporting errors in different months were independent of each other. If this were the case, however, the additional months of income (two preceding months for employment income and eleven for benefit income) which were collected at reverification should have yielded errors that were clearly related to the error at the reverification month. A brief examination of these data by regression techniques, however, revealed no systematic relationship between the sum of reporting errors over the preceding months and the reporting error in the reverification month.[1]

To indicate the general shape of the distributions of reporting errors and to compare them across sites, histograms may be used. Back-to-back histograms in Figure 3-1 display the distributions of reporting errors in total

[1]This comparison is subject to an important limitation. The difference between reported and verified income for the preceding two or eleven months is not necessarily the same as the household's actual reporting error in those months because reverification collected income information only for sources and household members present during the reverification month, while income declared by households on the monthly forms included all sources and members for the household in the month covered by the form.

FIGURE 3-1
HISTOGRAMS FOR REPORTING ERRORS IN TOTAL VERIFIABLE INCOME AT ENROLLMENT[a]



[a] The histograms have been normalized to compensate for differences in sample size, errors below –1000 dollars and above +1000 dollars are not shown

verifiable income at enrollment.[1] The most noticeable features of this display are the large number of small errors, the similarity of the distributions for the two sites, and the fact that the ends of the distributions do not fall off nearly as rapidly as one would expect from their height in the center.[2] Other graphical techniques are better for comparing a distribution of data with a theoretical reference distribution (most commonly the normal distribution) or with another data distribution (as should be done here to determine whether the distributions of errors in Pittsburgh and Phoenix have nearly the same shape). Appendix V discusses these techniques and comparisons in greater detail. The simplest evidence in support of comparability of errors between the two sites, however, is summarized in Table 3-1, which shows that they are similar in general level (as reflected, for example, by the median) and not greatly different in variability (measured by the standard deviation or, preferably, by the interquartile range and supported by the maximum and minimum).

3.3 PERSISTENCE OF REPORTING ERRORS FROM ENROLLMENT TO REVERIFICATION

For households whose income was completely verified at both enrollment and reverification, comparing the directions of the reporting errors on these two occasions represents a first step in determining whether a substantial number of households persistently overreported or underreported income. Table 3-2 shows the result of classifying households according to whether they underreported or overreported.[3] The tendency toward persistence was not marked, but it was stronger in Pittsburgh than in Phoenix, primarily because underreporting tended to persist more in Pittsburgh, while overreporting persisted to the same degree at the two sites.[4] Among the three

---

[1] To avoid compressing the scale too greatly, the 67 and 38 values below -1000 dollars, and the 58 and 50 values above +1000 dollars, have not been included.

[2] Removing the exact zero errors from the distributions reduces their height in the center, but the ends still fall off more slowly than one would expect.

[3] Zero errors have been included with "overreporting" because of the particular attention given later to underreporting.

[4] The association measure, ϕ, for a two-by-two table allows for the fact that the data for Pittsburgh represent nearly twice as many households as those for Phoenix. In terms of the χ^2 statistic, $\phi = \chi^2/N$, where N is the total number of observations included in the two-by-two table. The value of ϕ must lie between 0 and 1, and for Table 3-2 it is .141 in Pittsburgh and .077 in Phoenix.

Table 3-2

CLASSIFICATION OF HOUSEHOLDS BY DIRECTION OF REPORTING ERROR AT ENROLLMENT AND REVERIFICATION

ENROLLMENT	REVERIFICATION		SAMPLE TOTAL
	Underreporting	Overreporting	
	PITTSBURGH (ϕ = .141)		
Underreporting	138 (58%)	99 (42%)	237 (100%)
Overreporting	93 (44%)	118 (56%)	211 (100%)
SAMPLE TOTAL	231	217	448
	PHOENIX (ϕ = .077)		
Underreporting	70 (52%)	65 (48%)	135 (100%)
Overreporting	53 (44%)	67 (56%)	120 (100%)
SAMPLE TOTAL	123	132	255

SAMPLE: All enrolled households whose income was completely verified at enrollment and at reverification, excluding those with enrollment incomes above the eligibility limits and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

major treatment groups in the Demand Experiment (Housing Gap, Percent of Rent, and Control) this pattern of association was strongest for Percent of Rent households in Pittsburgh and Control households in Phoenix. More detailed examination by means of the scatterplots in Figures 3-2 and 3-3 discloses no noteworthy evidence of systematic relationship between reporting errors at enrollment and reverification. The large reporting errors at enrollment influence the scaling of the horizontal axis, but they do not seem to be paired disproportionately with errors in the direction of either overreporting or underreporting at reverification. Thus, use of underreporting by more than a specified amount at enrollment to select households for more careful scrutiny at reverification would not have accomplished the objective of identifying and focusing on those households that underreported at reverification. To touch on one of the questions considered in the next chapter, the evidence for treatment groups indicates that Housing Gap households, which might have gained from underreporting, were no more likely to persist in underreporting than were Percent of Rent or Control households.

3.4 REPORTING ERROR BY TYPE OF INCOME

All the questions which arise for overall reporting error can be posed in turn for each type of income that was subjected to verification. Table 3-3 provides a condensed summary, giving annual and monthly values for enrollment and monthly values for reverification. More extensive summary tables appear in Appendix VI. With the exception of wage and salary income at reverification, the median error for Pittsburgh is lower than or equal to the median error for Phoenix. Since these median values are not positive for any income type, a reasonable interpretation is that there was more underreporting in Pittsburgh than in Phoenix. The median reporting error for Social Security income shows the only really substantial departures from zero.[1] A substantial fraction of households made no error in reporting welfare, Supplemental Security Income, and pension income at enrollment and all types of income at reverification. The patterns of exact reporting are

[1] An explanation is that, at least in some cases, households reported the (net) amount of the check they received, which differs from the gross payment by the amount of the deduction for Medicare, while the Social Security Administration reported the gross payment.

FIGURE 3-2

SCATTER PLOT OF REPORTING ERROR AT REVERIFICATION VERSUS REPORTING ERROR AT ENROLLMENT FOR HOUSEHOLDS IN PITTSBURGH

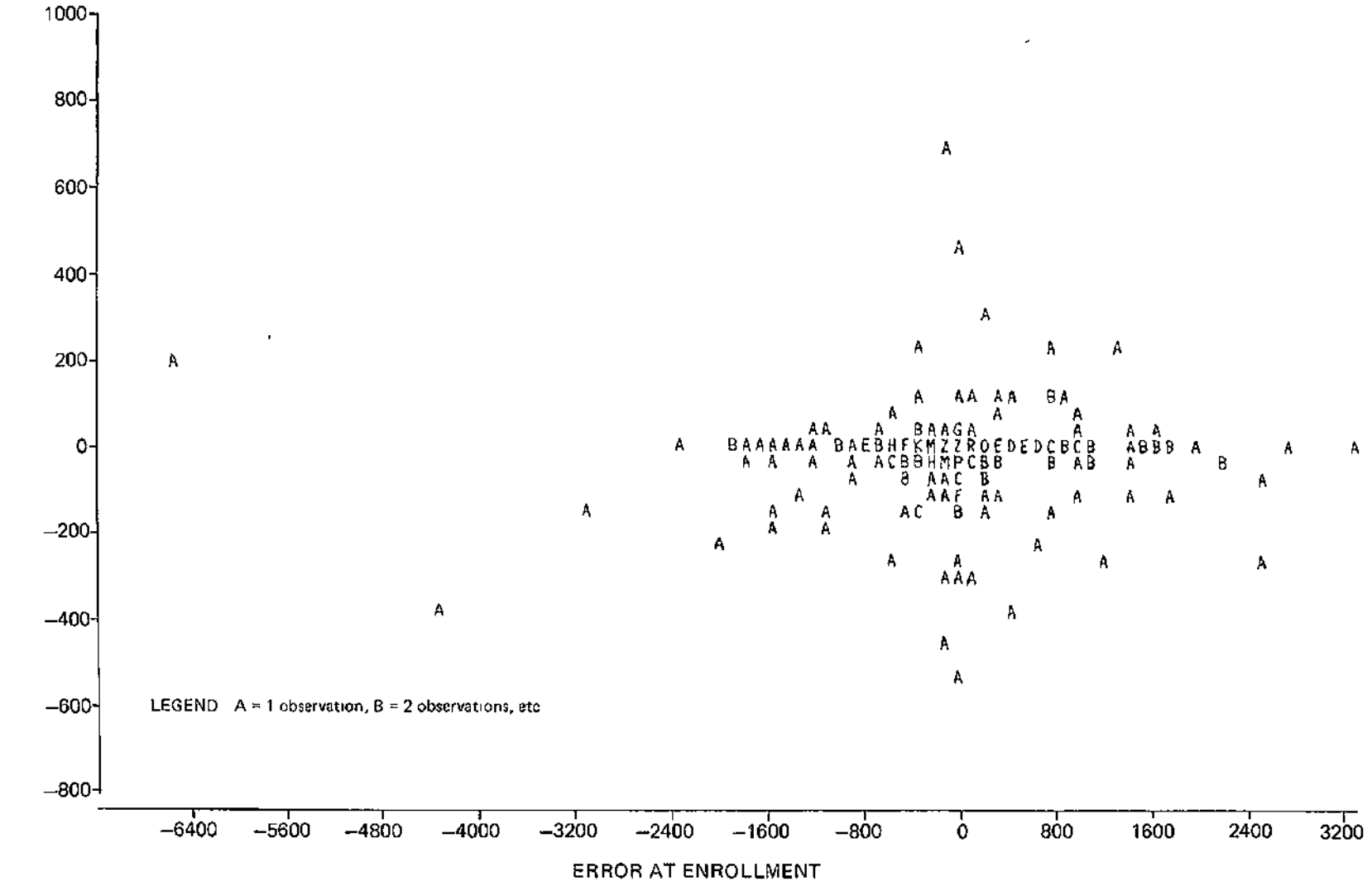


FIGURE 3-3

SCATTER PLOT OF REPORTING ERROR AT REVERIFICATION VERSUS REPORTING ERROR AT ENROLLMENT FOR HOUSEHOLDS IN PHOENIX

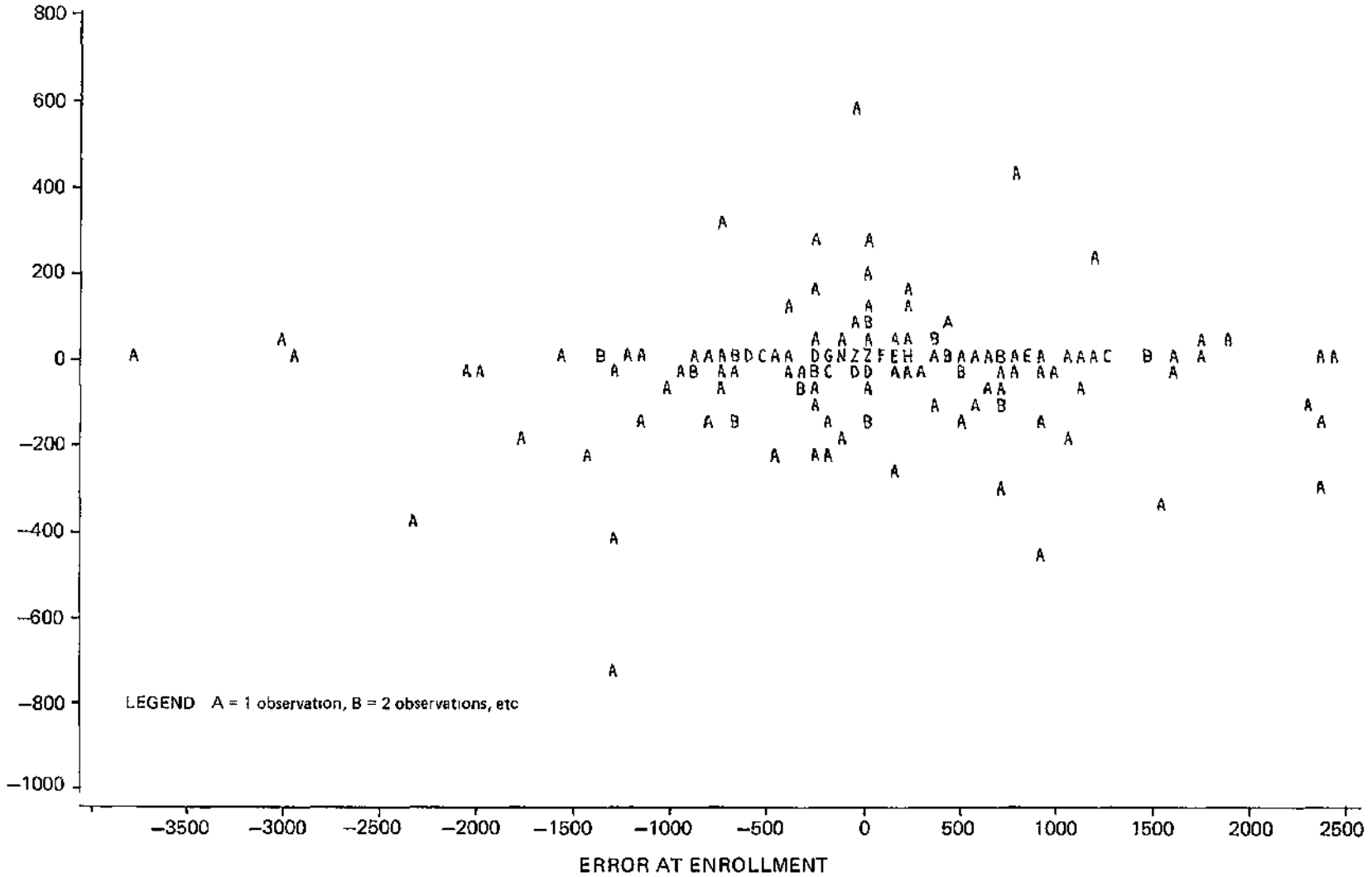


Table 3-3

SUMMARY STATISTICS FOR REPORTING ERROR BY TYPE OF INCOME

SUMMARY VALUE	ENROLLMENT					REVERIFICATION					
	Wages and Salary	Social Security	Supplemental Security	Welfare	Pension	Wages and Salary	Social Security	Supplemental Security	Welfare	Pension	Unemployment Compensation
PITTSBURGH											
ANNUAL											
Upper quartile	$ 283	$ 0	$ 72	$ 34	$ 0						
Median	-15	-72	0	0	-4						
Lower quartile	-422	-96	-18	-126	-39						
IQR[a]	705	96	90	160	39						
MONTHLY											
Upper quartile	24	0	6	3	0	$ 1	$ -1	$ 0	$ 0	$ 0	$ 0
Median	-1	-6	0	0	-0	0	-7	0	0	-1	0
Lower quartile	-35	-8	-2	-10	-3	-108	-14	-10	-1	-8	-99
IQR[a]	59	8	8	13	3	109	13	10	1	8	99
PERCENT = 0	4%	8%	36%	22%	31%	24%	18%	49%	59%	43%	44%
SAMPLE TOTAL	(358)	(306)	(25)	(495)	(107)	(254)	(234)	(57)	(307)	(95)	(27)
PHOENIX											
ANNUAL											
Upper quartile	428	0	34	42	7						
Median	-4	-54	0	0	0						
Lower quartile	-354	-84	-4	-90	-24						
IQR[a]	782	84	38	132	31						
MONTHLY											
Upper quartile	36	0	3	4	1	1	0	0	0	0	0
Median	-0	-4	0	0	0	-2	-2	0	0	0	0
Lower quartile	-30	-7	-0	-8	-2	-104	-14	-1	-2	-1	-65
IQR[a]	66	7	3	11	3	105	14	1	2	1	65
PERCENT = 0	2%	18%	30%	23%	22%	22%	30%	50%	54%	50%	48%
SAMPLE TOTAL	(384)	(161)	(61)	(105)	(45)	(359)	(175)	(48)	(100)	(58)	(64)

SAMPLE Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample. All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with a reporting period problem in the third-party response.

DATA SOURCES Initial and monthly Household Report Forms, Income Verification and Reverification Forms

a Interquartile range

reasonably consistent from enrollment to reverification and for the two sites. Perhaps the most evident departure between sites appears in Social Security income, which was reported exactly by about 10 percent more households in Phoenix than in Pittsburgh, both at enrollment and at reverification. Except for wage and salary income at enrollment, variability (as measured by the interquartile range) is generally somewhat greater in Pittsburgh than in Phoenix. This does not contradict the evidence in Table 3-1 that errors in total verifiable income are somewhat more variable in Phoenix; the explanation lies in the much higher incidence in Phoenix (Table 2-3) of wage and salary income, which was by far the most variable type of income.

On the basis of its large interquartile range and low rate of exact reporting at enrollment (4 percent in Pittsburgh and 2 percent in Phoenix), wage and salary income should be considered for primary attention in an income verification program. Even though the rate of exact reporting for wage and salary income improved considerably at reverification (to 24 percent in Pittsburgh and 22 percent in Phoenix), the interquartile range was still much larger than that for any other income type except unemployment (which is based on far fewer households), so that the evidence from both enrollment and reverification supports concentrating verification efforts on wage and salary income.

3.5 IMPACT OF REPORTING ERRORS ON PAYMENTS

An important policy concern in income-conditioned transfer programs is the potential reduction in payment error which can be achieved by third-party verification of income. Two relevant dimensions of payment error are the net payment change realized by the program (or, alternatively, the net cost to the program of not verifying incomes), and the improvement in program equity resulting from reducing the level of mispayments, regardless of whether the mispayment is higher or lower than the proper level. The latter can be regarded as an allocation effect because it reflects the effect of allocating payments on the basis of the need indicated by a household's verified income rather than its reported income.[1]

[1] For a discussion of these two measures see Dickson (1977), Appendix E.

Net payment change is defined as the average increase or decrease in household payments resulting from verification.[1] The allocation effect is equal to the average of the absolute value of payment error. The payment formula used to translate income reporting error into payment error is that of the modal treatment cell in the Housing Gap portion of the Demand Experiment:

$$P = C^* - 0.25Y.$$

Thus the payment change under this formula is 0.25 times the difference between declared income and verified income.[2]

As shown in Table 3-4, the annual payment change which would have resulted at enrollment was small--a $16 saving per household in Pittsburgh and a $9 increase in outlays in Phoenix. The changes in monthly payments implied by the results of reverification are decreases of $7 per month in Pittsburgh and $9 per month in Phoenix for the same definition of verifiable income used at enrollment. When unemployment compensation payments are included, the savings are $7 per month and $10 per month, respectively. On an annual basis, these changes are considerably larger than those at enrollment.

The overall re-allocation of payments among households is somewhat more substantial--$110 average annual change per household in Pittsburgh and a $123 change in Phoenix at enrollment, and average monthly changes of $13 and $16 per household, respectively, at reverification.[3] The enrollment figures

---

[1] Strictly speaking, these are gross savings, because administrative costs are not accounted for. The Administrative Agency Experiment provided a cost estimate of $12 per household for third-party verification. See Dickson (1977), p. 30.

[2] This is an approximation for two reasons. First, the payment formula is based on net income (see Appendix VII), while the reporting errors analyzed in this report are in gross income. Second, not all households were paid according to this payment formula (see Appendix I). Further, in a program with a tax rate different from 0.25, the same income reporting errors would yield different payment errors.

[3] Because the sample excludes households whose verified income rendered them ineligible, the results presented here understate the gains from verification as opposed to simply using declared income. By definition, most such households underreported their incomes (some fell into the $500 margin between the limit for verification and that for eligibility). Therefore, the mean difference between declared and verified income and the mean overpayment for all households eligible on the basis of declared income would have been larger in a program without verification than that indicated here.

Table 3-4

AVERAGE PAYMENT CHANGE (IN DOLLARS)
RESULTING FROM INCOME VERIFICATION

	ENROLLMENT (ANNUAL)		REVERIFICATION (MONTHLY)			
			PITTSBURGH		PHOENIX	
	PITTSBURGH	PHOENIX	Excluding Unemployment Compensation	Including Unemployment Compensation	Excluding Unemployment Compensation	Including Unemployment Compensation
Mean algebraic error	-$63	$37	-$27	-$28	-$37	-$39
Average payment change	-16	9	-7	-7	-9	-10
Mean absolute error	441	493	51	54	65	69
Allocation effect	110	123	13	14	16	17
SAMPLE TOTAL	(961)	(600)	(740)		(625)	

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with a reporting period problem in the third-party response.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

are close to the annual allocation effect of $110 found in the Administrative Agency Experiment.[1] Because households tended to report wage and salary income at enrollment less accurately than other types of income (see Table 3-3 and Appendix VI), the lower incidence of wage and salary income in the analysis sample (see Tables 2-1 and 2-3) suggests that the allocation effect of income verification at enrollment may be somewhat larger than the values just presented.

3.6 SUMMARY

The picture which emerges from analyzing errors in reporting is one of contrasts. While an appreciable fraction of households were able to report their total verifiable income without error, especially at reverification, other households either underreported or overreported by rather large amounts. On a monthly basis, errors at enrollment were frequently smaller than errors at reverification. This is consistent with a normal tendency for monthly errors to average out over time. Indeed, the relative size of errors at verification suggests that this tendency was partially offset by other factors, such as recalling income information for the preceding twelve months, whereas reverification involved recalling only one month's information and occurred after approximately eighteen months of regular reporting.[2]

There was some evidence that the direction of a household's reporting error tended to be the same at reverification as at enrollment, but this pattern of persistence was weak, and there was little relationship between the numerical values of the errors at the two times.

Calculations of average annual payment change from average reporting error in total verifiable income showed that using verified income instead of declared income would have made very little difference at enrollment. At reverification, monthly savings of up to $10 per household would have resulted. The allocation effects, obtained by disregarding the sign of

---

[1] See Dickson (1977), pp. 28-29.

[2] There were also differences in the methods of eliciting income information at enrollment and at reverification. For example, at enrollment, households provided most of the information in personal interviews, while the monthly Household Report Form (from which the household's reported income was taken for reverification) made substantial use of exception reporting.

reporting error, were roughly $115 per year at enrollment and $15 per month at reverification.

Examination of the reporting errors for each type of income identified only one type--wages and salaries--with errors substantial enough to deserve more concentrated verification. The result would have been reductions both in net payments and allocation effects, especially at reverification.

In a system based on a monthly accounting period, the cost of verification (using the figure of $12 per third-party verification from the Administrative Agency Experiment) would outweigh the resulting savings in net payment costs. The larger allocation effects, however, indicate that verification would be more advantageous in controlling reporting error in either direction, instead of simply reducing net underreporting.[1]

These features of reporting error were present in both Pittsburgh and Phoenix. On the whole, the distributions of reporting error were quite similar in shape at the two sites. Further, the median error was essentially the same, and variability in Pittsburgh was not greatly different from that in Phoenix.

The next chapter examines contributions which the experimental treatments or the characteristics of households might make to the behavior of reporting error.

---

[1]It should be noted that the results do not permit ready reflection on the effect of a single annual reverification of the previous twelve months' reports. Given the evidence of limited persistence in reporting error, much of the monthly allocation effect might be expected to diminish over a year as errors offset one another. On the other hand, the mean error at reverification was large enough that, if it held for all twelve months, the average savings in payments could be as much as $120 per year.

REFERENCES

Dickson, Donald E., Certification: Determining Eligibility and Setting Payment Levels in the Administrative Agency Experiment, Cambridge, Mass., Abt Associates Inc., March 1977.

CHAPTER 4

EFFECTS OF EXPERIMENTAL TREATMENTS AND HOUSEHOLD CHARACTERISTICS ON REPORTING ERROR

The previous chapter introduced household reporting error, summarized it quantitatively in various ways, and developed estimates of its impact on payments. For a more detailed analysis of reporting errors, two questions are of particular interest:

> Was there systematic misreporting connected with allowance payments? Specifically, since the dependence of payments on income in the Housing Gap treatment groups gave those households an incentive to underreport, is there evidence of underreporting in response to these incentives?
>
> Were certain household characteristics associated with larger reporting errors? If so, it might be advantageous to concentrate verification efforts on such households.

The present chapter describes the structure of incentive to misreport, examines the effects of these incentives, and analyzes the relationship between reporting error and household characteristics.

4.1 INTENTIONAL MISREPORTING

It would seem likely that at least some participating households deliberately misreported their income; but a detailed investigation of the household's actions, as well as substantial factual evidence, would be required to support such an assertion. Misreporting can benefit a household only when its payment depends on income, however. If underreporting is substantially more common among households whose payment formula depends on income, it might be possible to establish this tendency statistically. The design of the Demand Experiment provides a natural structure for separating effects of incentives to underreport income from effects of other causes of reporting error. After explaining how these incentives might operate, this section analyzes incidence of underreporting, amount of reporting error, and number of income sources declared in order to determine whether the incentives had any effect.

Structure of Incentives to Misreport

When income was declared on the Initial Household Report Form, households had already been assigned to treatment groups. Those assigned to the various Housing Gap treatment groups were informed that their payments would depend on their income.[1] Specifically, as mentioned in Chapter 1 (see Appendix I for more details), the Housing Gap payment formula is

$$P = \alpha C^* - bY,$$

where C^* is the cost of a unit of standard housing, Y is household income, and the parameters α and "b" vary with treatment group. Since an increase in payment is related to a decrease in income through "b," it is the parameter of interest here.[2]

Although neither the value of "b" nor the precise dependence of payment on income was disclosed in explaining a particular allowance plan to a household, Housing Gap households could gain a higher payment if they reported a lower income. In this sense, they had an incentive to underreport their income or, at least, not to overreport it. If this incentive operated, one would expect the distribution of reporting errors to be shifted toward more underreporting or less overreporting in the Housing Gap treatment groups.

For Percent of Rent and Control households there was no direct connection between payment levels and income. The Percent of Rent payment formula is

$$P = aR,$$

where R is rent and "a" varies (with treatment group) between 0.6 and 0.2. Only if household income rose well above initial eligibility levels would payments decline. Thus Percent of Rent and Control households had no incentive to underreport their income or to avoid overreporting.

---

[1] The booklets given to Housing Gap households during their enrollment interview simply stated, "The amount of your monthly payment also depends on how much money your family makes each month.... If your income or family size changes, the amount of your monthly check will change too."

[2] For treatment groups 1 through 9 and 12, b = 0.25; group 10 had b = 0.15, and group 11 had b = 0.35 (see Appendix I).

The logic underlying analyses of incentives to misreport is as follows: only Housing Gap households had an incentive to underreport income, because only they could gain from underreporting. Thus the effect of the incentive, if it is substantial, should show up as a tendency toward greater underreporting among Housing Gap households than among Percent of Rent and Control households.

The primary unit of observation is the household, because underreporting reduces the household's overall level of declared income. Tests for particular effects of incentives to underreport will be more sensitive if the group in which the incentive could operate is compared with the largest possible group of households that do not have that incentive. Thus the latter group should combine Percent of Rent households and Control households.[1] In addition, two subgroups of Housing Gap households may have had stronger incentives to underreport income. The first of these (referred to as Housing Gap Full Payment households) consists of households that met the housing requirements of the Demand Experiment; such households were immediately entitled to subsidies determined by income, while households that did not meet the housing requirements received only the Minimum Payment of $10.[2]

If not all program participants understood the offer, then tests of underreporting should take this into account. At the time of the First Periodic Interview, six months after enrollment in the experiment, households were asked whether they thought their allowance payments would increase, decrease, or stay the same if their income went up. The same question was asked on

---

[1] At enrollment the alternative of using only Control households is unreliable because the sample sizes are quite small (completely verified Control households numbered only 36 in Pittsburgh and 25 in Phoenix).

[2] Of course, households that expected to meet requirements would also have had an incentive to underreport. In addition, some households, especially those under the Minimum Standards housing requirements, may not have known whether they met the requirements when they completed the Initial Household Report Form, since housing evaluations followed the submission of the Initial Household Report Form. Housing Gap households under the Minimum Rent requirements, however, were more likely to have known whether they met the required level.

the Third Periodic Interview, approximately two years after enrollment. To account for program understanding, the second subgroup consists of Housing Gap Full Payment households that understood the program, and the reference group is modified by excluding Percent of Rent households that thought their payments would decrease as income went up.[1]

At enrollment all households were aware that the income which they declared on the Initial Household Report Form would be verified. They signed waivers allowing employers and/or agencies from which they had received income to disclose income information to Demand Experiment personnel. Thus this study relates only to the reporting behavior of households that have been informed that their income will be verified.[2] It is also important to stress that the present data involve only misreporting of declared income sources. The verification procedures in the Demand Experiment yield no direct information on unreported income sources. It is possible, however, to investigate whether certain groups of households reported fewer sources of income. This is examined briefly later in this section.

Effects of Incentives to Misreport

If Housing Gap households as a group tended to respond to the incentive to underreport their incomes, this treatment group would show a higher incidence of underreporting, larger amounts of underreporting, or a smaller number of declared sources. These effects should be even stronger among households in the two previously identified subgroups--Housing Gap Full Payment households and Housing Gap Full Payment households that understood the program.

---

[1]At the First Periodic Interview approximately 60 percent of Percent of Rent households believed this to be the case. Because this interview was administered more than six months after Initial Household Report Form income information was obtained and verified, the program understanding variables are imperfect proxies for program understanding at enrollment. For most households a similar lag was present between reverification and the Third Periodic Interview.

[2]The effect of this information is likely to have been less at reverification. Participants were told at enrollment that there would be an interim reverification, but they were not subsequently reminded of this, and they received the waiver forms for reverification only after they had submitted the monthly Household Report Form on which reverification would be based.

The analyses in this section begin by comparing Housing Gap households with Percent of Rent and Control households in terms of reporting error in total verifiable income, continue by allowing for the subgroups in regressions for reporting error and absolute reporting error, and conclude with regressions for the number of sources declared.

Incidence of underreporting provides the simplest indication of how Housing Gap households compare with those in the other two major treatment groups. In neither Pittsburgh nor Phoenix was underreporting significantly more common in the Housing Gap treatment group than in either the Control group or the combination of Percent of Rent and Control groups. As Table 4-1 shows, incidence at both sites was approximately the same for all treatment groups.[1] One can also ask whether the incidence of underreporting is consistent with the assumption that under- and overreporting were equally likely. The result of doing this is that only among Percent of Rent households in Pittsburgh at enrollment was the proportion of underreporting significantly greater than one would expect by chance (one-tailed $p < 0.0005$), and these households had no incentive.

A somewhat more detailed picture of reporting error in the three major treatment groups is available in the same sort of summary statistics presented in Chapter 3. Table 4-2 gives these for annual error at enrollment and monthly error at reverification. With the exception of Phoenix at reverification, it is noteworthy that reporting without error is more frequent among Housing Gap households than among Percent of Rent or Control households. While the median reporting error is negative for all three groups in Pittsburgh, the value for Housing Gap households is at least as close to zero as those for the other two groups; the lower quartile shows

---

[1] This finding is similar to the results of the quality control program for Aid to Families with Dependent Children. For example, state-by-state figures for the January - June 1977 review period indicate that from 0.3 to 5.5 percent of the AFDC cases examined had earned income that was not reflected in the case record; the median rate for this error was 1.6 percent, and the lower and upper quartiles were 0.9 and 2.2 percent, respectively. (See Aid to Families with Dependent Children, Quality Control Findings, January-June 1977, Social Security Administration, Department of Health, Education, and Welfare, April 1978, Table 22.)

Table 4-1

INCIDENCE OF UNDERREPORTING BY TREATMENT GROUP

	ENROLLMENT		REVERIFICATION	
TREATMENT GROUP	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Housing Gap households	53%	52%	53%	50%
Percent of Rent households	59	49	56	48
Control households	53	44	52	43
All households	55	50	53	48
SAMPLE TOTAL	(961)	(600)	(740)	(625)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with a reporting period problem in the third-party response.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table 4-2

REPORTING ERROR IN TOTAL VERIFIABLE INCOME BY TREATMENT GROUP

SUMMARY VALUES	PITTSBURGH			PHOENIX		
	HOUSING GAP	PERCENT OF RENT	CONTROL	HOUSING GAP	PERCENT OF RENT	CONTROL
	ENROLLMENT (Annual)					
Maximum	$ 5,159	$ 4,561	$ 2,560	$ 2,978	$ 5,874	$ 1,758
Upper quartile	62	64	116	191	346	363
Median	-12	-39	-34	-6	0	13
Lower quartile	-192	-273	-242	-254	-183	-113
Minimum	-2,379	-5,468	-6,739	-3,938	-2,071	-3,940
Percent = 0	14%	9%	8%	9%	6%	4%
SAMPLE TOTAL	(538)	(387)	(36)	(343)	(232)	(25)
	REVERIFICATION (Monthly)					
Maximum	$ 718	$ 495	$ 825	$ 606	$ 440	$ 483
Upper quartile	0	0	0	0	0	0
Median	-1	-6	-1	0	0	0
Lower quartile	-24	-34	-31	-42	-38	-30
Minimum	-569	-469	-1,246	-752	-893	-1,280
Percent = 0	36%	30%	31%	29%	28%	34%
SAMPLE TOTAL	(407)	(128)	(205)	(352)	(124)	(149)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with a reporting period problem in the third-party response.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

the same behavior even more clearly. In Phoenix, the pattern seems to be the reverse, but the differences involved are not at all large. Altogether, this evidence does not reveal greater underreporting by Housing Gap households.

A more formal framework for testing the effects of incentives to misreport income is based on simple regression equations in which reporting error in total verifiable income is the response variable and the two explanatory variables are total income[1] and a dummy variable for the Housing Gap group or subgroup which could benefit from underreporting. Tables 4-3 and 4-4 present the results of fitting these equations to the data at enrollment and at reverification, respectively. Even though in all cases total income makes a highly significant contribution, the fitted equations account for only a small fraction of the variation in reporting error. The adjusted R^2 never exceeds 0.25. While none of the dummy variables reach significance at the 0.05 level, three of them are significant at the 0.1 level. These effects, however, are not large and do not fit into a strong pattern. Thus there is only rather weak evidence that Housing Gap households, Housing Gap households on Full Payment status, or Housing Gap households on Full Payment status that understood the direction of the relationship between their income and their payment tended in some instances to be shifted toward underreporting relative to other households. Even where present, the overall extent of the shift was modest.

To allow for the possibility that households that underreported and those that overreported behaved in different ways, the same simple regression equations were fitted separately to the data for underreporters and overreporters. Tables 4-5 and 4-6 give the resulting estimates at enrollment, and Tables 4-7 and 4-8 give those for reverification. One key appearance in these tables is that the equations for underreporters account for substantially more variability than those for overreporters. In Pittsburgh at

---

[1] Total income is defined as verified income plus income not subjected to verification. Because regressions of reporting error on household characteristics (described in Section 4.2) reveal that reporting error is strongly related to total income, it is desirable to adjust for between-group differences in total income by including it here.

Table 4-3

REGRESSION OF REPORTING ERROR AT ENROLLMENT ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	498	-.138** (.0132)	11.2 (53.0)	--	--	.110	(896)
2[a]	557	-.152** (.0172)	--	64.8 (75.8)	--	.116	(601)
3[b]	534	-.133** (.0267)	--	--	110.0 (111)	.075	(315)
				PHOENIX			
1	489	-.0762** (.0124)	-131.0† (71.0)	--	--	.067	(535)
2[a]	449	-.0682** (.0165)	--	1.15 (98.4)	--	.041	(350)
3[b]	422	-.0616** (.0214)	--	--	51.1 (119)	.033	(191)

SAMPLE: All enrolled households whose income was completely verified and that completed the First Periodic Interview, excluding those with enrollment income above the eligibility limits, those with data problems, and those with missing values for any variable in the equation.

DATA SOURCES: Initial Household Report Form, Income Verification Form, First Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

** Significant at the 0.01 level.

† Significant at the 0.1 level.

Table 4-4

REGRESSION OF REPORTING ERROR AT REVERIFICATION ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	63.0	-.184** (.0134)	-9.74 (8.33)	--	--	.204	(729)
2[a]	73.2	-.203** (.0154)	--	-16.2† (9.58)	--	.226	(594)
3[b]	80.4	-.213** (.0185)	--	--	-22.5† (12.2)	.233	(433)
				PHOENIX			
1	57.2	-.168** (.0137)	-10.5 (10.1)	--	--	.197	(600)
2[a]	48.4	-.151** (.0158)	--	-10.8 (11.5)	--	.160	(472)
3[b]	56.2	-.172** (.0199)	--	--	-10.2 (14.6)	.173	(351)

SAMPLE: All enrolled households whose income was completely verified and that completed the Third Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES: Household Report Form, Income Reverification Form, Third Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

** Significant at the 0.01 level.

† Significant at the 0.1 level.

Table 4-5

UNDERREPORTERS AT ENROLLMENT
REGRESSION OF REPORTING ERROR ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	239	-.163** (.0136)	72.4 (57.4)	--	--	.237	(488)
2[a]	311	-.179** (.0179)	--	57.3 (82.7)	--	.232	(335)
3[b]	277	-.175* (.0279)	--	--	184 (122)	.198	(168)
				PHOENIX			
1	228	-.110** (.0107)	-128.6* (63.7)	--	--	.287	(271)
2[a]	228	0.110** (.0132)	--	-150.0† (83.4)	--	.293	(173)
3[b]	113	-.0845** (.0186)	--	--	-114 (110)	.174	(93)

SAMPLE: All enrolled households whose income was completely verified, that completed the First Periodic Interview, and whose reported income was less than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems and those with missing values for any variable in the equation.

DATA SOURCES: Initial Household Report Form, Income Verification Form, First Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

* Significant at the 0.05 level.

** Significant at the 0.01 level.

† Significant at the 0.1 level.

Table 4-6

OVERREPORTERS AT ENROLLMENT
REGRESSION OF REPORTING ERROR ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	580	.00530 (.0234)	-72.8 (88.1)	--	--	-.004	(305)
2[a]	654	-.0139 (.0299)	--	69.3 (126)	--	-.007	(206)
3[b]	788	-.0181 (.0427)	--	--	27.4 (173)	-.016	(116)
				PHOENIX			
1	512	.0350† (.0198)	-46.0 (103)	--	--	.007	(223)
2[a]	535	.0301 (.0257)	--	73.4 (139)	--	-.002	(156)
3[b]	609	-.00348 (.0300)	--	--	169.0 (152)	-.008	(609)

SAMPLE: All enrolled households whose income was completely verified, that completed the First Periodic Interview, and whose reported income was greater than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems and those with missing values for any variable in the equation.

DATA SOURCES: Initial Household Report Form, Income Verification Form, First Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payments status, and Housing Gap households that did not understand the income-dependence of payments.

† Significant at the 0.1 level.

Table 4-7

UNDERREPORTERS AT REVERIFICATION
REGRESSION OF REPORTING ERROR ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	62.0	-.281** (.0152)	1.07 (9.94)	--	--	.480	(387)
2[a]	81.2	-.316** (.0177)	--	-10.8 (11.6)	--	.573	(312)
3[b]	93.8	-.330** (.0210)	--	--	-18.5 (14.5)	.526	(230)
				PHOENIX			
1	21.8	-.216** (.0186)	7.04 (15.3)	--	--	.321	(285)
2[a]	7.41	-.193** (.0232)	--	15.2 (18.6)	--	.238	(219)
3[b]	16.4	-.226** (.0293)	--	--	11.5 (24.3)	.276	(157)

SAMPLE: All enrolled households whose income was completely verified, that completed the Third Periodic Interview and whose reported income was less than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES: Household Report Form, Income Reverification Form, Third Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

** Significant at the 0.01 level.

Table 4-8

OVERREPORTERS AT REVERIFICATION
REGRESSION OF REPORTING ERROR ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	162	-.0859* (.0396)	-56.8* (27.8)	--	--	.063	(99)
2[a]	166	-.0924* (.0427)	--	-64.3* (30.4)	--	.075	(82)
3[b]	155	-.0677 (.0547)	--	--	-72.3† (39.9)	.038	(60)
				PHOENIX			
1	85.0	-.0159 (.0270)	-23.4 (17.9)	--	--	-.0005	(135)
2[a]	74.7	.00391 (.0277)	--	-35.7† (18.3)	--	.018	(105)
3[b]	75.9	-.00093 (.0330)	--	--	-27.4 (21.8)	-.005	(83)

SAMPLE: All enrolled households whose income was completely verified, that completed the Third Periodic Interview and whose reported income was greater than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES: Household Report Form, Income Reverification Form, Third Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

* Significant at the 0.05 level.

† Significant at the 0.1 level.

reverification the fitted equations for underreporters have values of adjusted R^2 as large as 0.5. Total income continues to be highly significant for underreporters, but for overreporters it only occasionally makes a significant contribution. Some of the dummy variables are significant, and two patterns deserve comment. Among Phoenix underreporters at enrollment the dummy variables indicate a shift toward more underreporting, but the situation is opposite in Pittsburgh, where the shift is weaker but toward less underreporting. Among Pittsburgh overreporters at reverification, all three groups of Housing Gap households tended to overreport less than other households; the same pattern is evident, but much weaker, in Phoenix. Overall, the evidence from these separate analyses suggests some tendency within the three groups of Housing Gap households for errors among underreporters to be shifted in the opposite direction from errors among overreporters. This indication is strongest in Phoenix, but the directions are opposite at enrollment and reverification. In view of this conflicting evidence, it does not appear that households tended to underreport more in response to an incentive to do so.

It is possible that Housing Gap households at all three levels of incentive tended to overreport by smaller amounts in an attempt to be more accurate in their reporting. This can be pursued a step further by analyzing the absolute value of reporting error instead of reporting error itself, thus treating as equivalent errors of the same size, regardless of their direction. For the same regression variables as those used in the preceding equations, Tables 4-9 and 4-10 give the results at enrollment and reverification, respectively. As for earlier equations, rather little of the variation in absolute error is accounted for by the fitted equations. Total income is significant in all cases, but the dummy variables are not significant. In Pittsburgh at enrollment and at both sites at reverification, the coefficient of each dummy variable is negative, suggesting a consistent pattern of slightly smaller reporting errors, but within the Housing Gap group greater incentive did not seem to induce greater accuracy. In Phoenix at enrollment the coefficients are positive, and they increase with increasing incentive. That is, reporting was less accurate in the Housing Gap treatment group and its two subgroups. From the earlier equation in Tables 4-5 and 4-6 it appears that both underreporters and overreporters contributed to this result.

Table 4-9

REGRESSION OF ABSOLUTE REPORTING ERROR AT ENROLLMENT ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	47.1	.107** (.0114)	-80.9† (45.7)	--	--	.096	(896)
2[a]	44.7	.107** (.0151)	--	-28.6 (66.3)	--	.077	(601)
3[b]	117.6	.102** (.0231)	--	--	-85.0 (95.8)	.059	(315)
				PHOENIX			
1	96.6	.0783** (.00987)	29.2 (56.5)	--	--	.103	(535)
2[a]	112.4	.0757** (.0131)	--	98.9 (78.1)	--	.087	(350)
3[b]	217.5	.0460** (.0170)	--	--	125.1 (94.1)	.036	(191)

SAMPLE: All enrolled households whose income was completely verified and that completed the First Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any variable in the equation.

DATA SOURCES: Initial Household Report Form, Income Verification Form, First Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

** Significant at the 0.01 level.,

† Significant at the 0.1 level.

Table 4-10

REGRESSION OF ABSOLUTE REPORTING ERROR AT REVERIFICATION ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH			
1	-18.5	.168** (.0125)	-14.3† (7.75)	--	--	.213	(729)
2[a]	-27.2	.185** (.0144)	--	-10.3 (8.93)	--	.231	(594)
3[b]	-36.5	.198** (.0172)	--	--	-4.16 (11.3)	.247	(433)
				PHOENIX			
1	-14.6	.156** (.0126)	-2.84 (9.22)	--	--	.204	(600)
2[a]	-9.75	.147** (.0144)	--	-9.01 (10.4)	--	.182	(472)
3[b]	-15.9	.168** (.0180)	--	--	-7.00 (13.3)	.201	(351)

SAMPLE: All enrolled households whose income was completely verified and that completed the Third Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES: Household Report Form, Income Reverification Form, Third Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

** Significant at the 0.01 level.

† Significant at the 0.1 level.

To investigate whether the incentive to underreport income led households to report fewer sources of income, another set of regression equations was used. In addition to total income and the dummy variables, these include household size as an explanatory variable to adjust for differences in the number of persons who might receive income. Tables 4-11 and 4-12 show the results of fitting these equations to the number of income sources declared at enrollment and at reverification, respectively. All the equations are remarkable for the small fraction of variability in number of sources which they account for--the adjusted R^2 hardly rises above 0.1. Total income and household size generally make significant contributions, and the dummy variables generally do not. The most notable exception among the dummy variables is the one in Pittsburgh at enrollment for Housing Gap Full Payment households that understood the program. This subgroup reported significantly fewer sources of income, but its behavior was not duplicated in Phoenix. At reverification the dummy variables have negative coefficients at both sites, and those for the two subgroups in Phoenix are significant at the 0.1 level. Taken together, these appearances add up to a suggestion that households with an incentive may possibly conceal some sources of income. Failure by about 10 percent of such households to report one source of income would be consistent with the coefficients observed. It is important to remember, however, that no information is available to indicate whether a household actually failed to report a source of income. Also, the present analysis has made no attempt to allow for differences in demographic characteristics which might account for differences in the number of sources of household income.[1]

On the whole it would seem best to conclude that households which have an incentive to misreport their income, either by underreporting its amount or by concealing sources, do not do so to any important degree. Evidence to the contrary is not wholly absent in the analyses discussed in this section, but it is generally weak and often contradictory. A graphical display, Figure 4-1, summarizes the directions of the individual pieces of evidence on the effects of incentives to misreport income. By looking at the signs of the dummy variables in this way, it is possible to see that

[1] One attempt to do this appears at the end of Section 4.2 (see Table 4-17).

Table 4-11

REGRESSION OF NUMBER OF DECLARED SOURCES AT ENROLLMENT ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	HOUSEHOLD SIZE	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH				
1	1.18	-.0829** (.0170)	.00014** (.00002)	-.00561 (.0528)	--	--	.105	(747)
2[a]	1.24	-.0737** (.0232)	.00012** (.00002)	--	.0164 (.0698)	--	.077	(513)
3[b]	1.27	-.0463 (.0290)	.00012** (.00002)	--	--	-.215* (.0919)	.115	(247)
				PHOENIX				
1	1.66	-.0597* (.0266)	.00008** (.00002)	-.00083 (.0972)	--	--	.039	(492)
2[a]	1.73	-.0731* (.0350)	.00008** (.00002)	--	.0200 (.127)	--	.036	(329)
3[b]	1.64	-.0475 (.0448)	.00006† (.00003)	--	--	.111 (.159)	.016	(179)

SAMPLE: All enrolled households whose income was completely verified and that completed the First Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems and those with missing values for any variable in the equation or for any variable used in the equations examining household characteristics (see Table 4-17).

DATA SOURCES: Initial Household Report Form, Income Verification Form, First Periodic Interview.

a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

* Significant at the 0.05 level.

** Significant at the 0.01 level.

† Significant at the 0.1 level.

Table 4-12

REGRESSION OF DECLARED SOURCES AT REVERIFICATION ON TREATMENT GROUP VARIABLES
(STANDARD ERROR IN PARENTHESES)

EQUATION	CONSTANT	HOUSEHOLD SIZE	TOTAL INCOME	HOUSING GAP	HOUSING GAP FULL PAYMENTS	HOUSING GAP FULL PAYMENTS THAT UNDERSTOOD INCOME-DEPENDENCE OF PAYMENTS	$\bar{R}^2$	SAMPLE SIZE
				PITTSBURGH				
1	1.49	-.0782** (.0175)	.00045** (.00009)	-.0706 (.0534)	--	--	.049	(646)
2[a]	1.47	-.0697** (.0199)	.00043** (.00010)	--	-.0896 (.0598)	--	.043	(532)
3[b]	1.45	-.0622** (.0224)	.00039** (.00012)	--	--	-.0791 (.0706)	.035	(397)
				PHOENIX				
1	1.39	-.00885 (.0144)	.00025** (.00008)	-.0433 (.0578)	--	--	.014	(575)
2[a]	1.34	.00351 (.0160)	.00028** (.00009)	--	-.112† (.0615)	--	.027	(451)
3[b]	1.30	.0106 (.0168)	.00023** (.00009)	--	--	-.127† (.0655)	.031	(339)

SAMPLE: All enrolled households whose income was completely verified and that completed the Third Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation or for any variable used in the equations examining household characteristics (see Table 4-17).

DATA SOURCES: Household Report Form, Income Reverification Form, Third Periodic Interview.

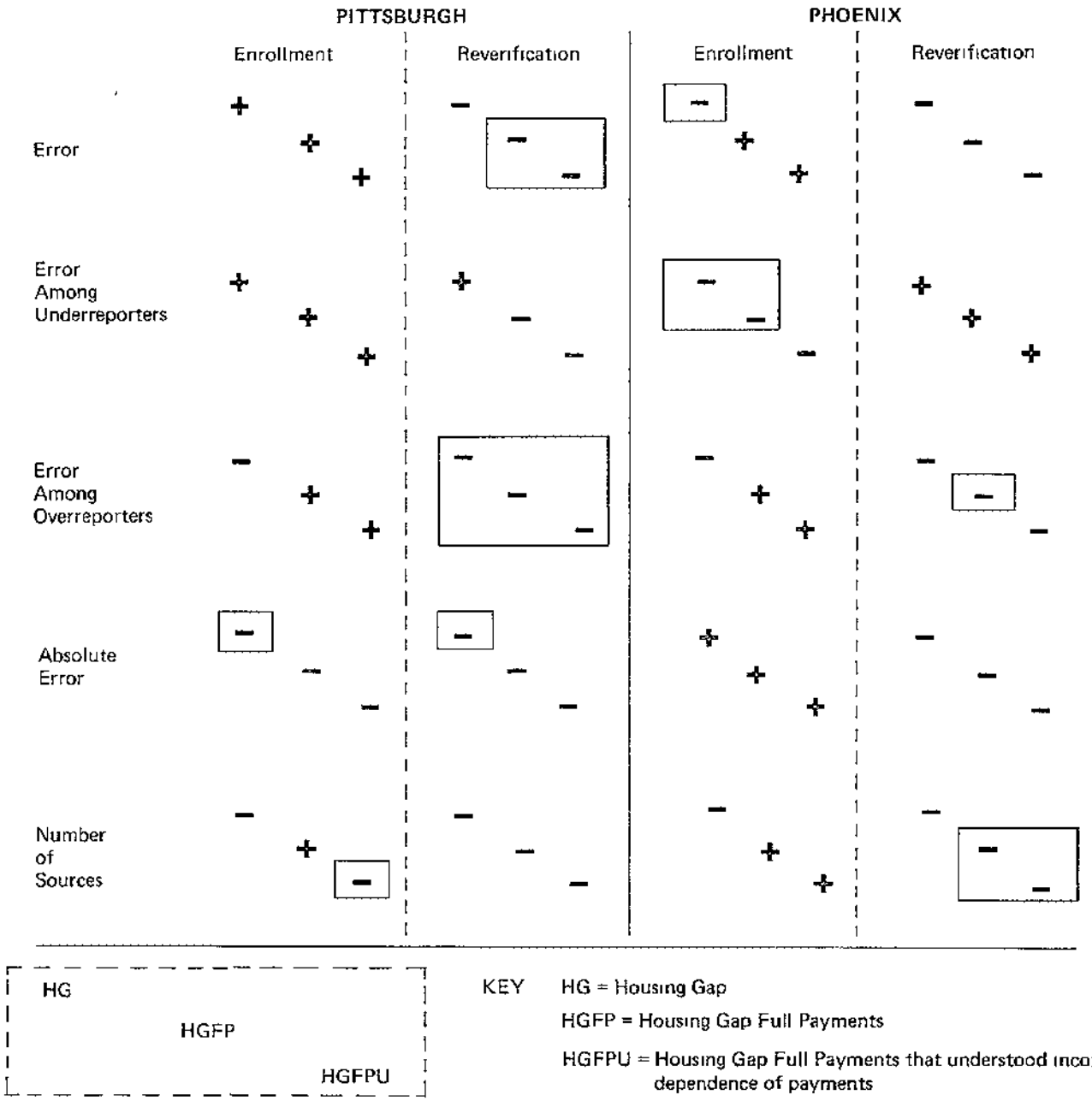
a. The sample for Equation (2) excludes Housing Gap households not on Full Payment status.

b. The sample for Equation (3) excludes Percent of Rent households that believed the program was income-conditioned, and Housing Gap households not on Full Payment status, and Housing Gap households that did not understand the income-dependence of payments.

** Significant at the 0.01 level.

† Significant at the 0.1 level.

FIGURE 4-1
SUMMARY OF SIGNS OF COEFFICIENTS OF TREATMENT GROUP VARIABLES IN TABLES 4-3 THROUGH 4-12



Entries enclosed in rectangles are significant at 0 1 level

no one pattern fits for both sites or at both enrollment and reverification. At reverification Pittsburgh and Phoenix differ in only two signs, but these are among the important group of underreporters. While the pattern of significant coefficients is fairly scattered, it does suggest that in Pittsburgh at reverification the shift toward underreporting comes more strongly from less overreporting. Still, the dominant message of Figure 4-1 is the absence of any simple pattern of effects in response to incentives.

4.2 EFFECTS OF HOUSEHOLD CHARACTERISTICS

Two relationships between a household's reporting error and its characteristics are of interest. First, if the actual (i.e., algebraic) value of the error is related to a particular characteristic (such as having wages as the major type of household income), then it might be worthwhile to emphasize verification for households with that characteristic in order to reduce reporting errors. Thus, if households for which wages are the dominant type of income tend to underreport income, selecting such households preferentially for verification or for more thorough verification would tend to reduce overpayments when the payment formula depends on income. Second, the absolute value of the error may be related to some household characteristic. This would mean that focusing verification effort on such households could reduce the magnitude of reporting errors without regard to their direction. Alternatively, identifying a group with few errors could permit less frequent or less thorough verification and thus reduce the overall cost of verification to the program, to employers, and to agencies.

The analyses in this section use several multiple regression equations to explore the relationship between a household's reporting error and its characteristics and also the relationship between its number of declared sources and its characteristics.

Household Characteristics

Household characteristics fall into two basic categories, income and demographic.[1] The income characteristics examined in the present analysis are

Total income (defined as verified income plus income not subjected to verification),

Wages as largest single type of income (dummy variable),

Presence of a relatively stable type of income (Social Security, Supplemental Security Income, or pensions) as the largest single type of income (dummy variable),

Number of household members with verifiable income, and

Number of sources.

Because larger total incomes make possible reporting errors, it is reasonable to expect some relationship between either the household's reporting error or the absolute value of that error and the household's total income. The sum of verified income and declared amounts of income not subjected to verification is probably the most accurate simple measure of total income available. Reporting errors in wage and salary income were definitely the most variable, both at enrollment and at reverification, (Table 3-3 and Appendix VI), so having a substantial wage and salary component may contribute to a household's overall discrepancy.[2] Conversely, receiving the major share of income in types which are often constant from month to month (specifically, Social Security, Supplemental Security Income, and

---

[1] Qualitative characteristics, which are either present or absent, enter an equation as dummy variables, taking the values 1 (present) and 0 (absent).

[2] A more detailed analysis could focus on the relationship between errors in reporting wage and salary income and household characteristics in an attempt to identify groups of participants whose wage and salary income might be verified more closely. This is mentioned in Section 6.2 as a possible area of further investigation.

pensions[1]) is likely to make it easier for a household to report accurately. Both the number of household members with verifiable income and total number of income sources may play a role, with more members and more sources contributing more error to the total error.

The demographic characteristics included in the model are

Minority head of household (dummy variable),
Age of head of household,
Household size, and
Female head of household (dummy variable)

While these factors by no means exhaust the list of possibilities, they identify important groups in the population and hence are included in the regression equations.

Demographic and income characteristics may, of course, be related. The strongest example is the pair of variables (1) age of head of household and (2) presence of a stable type as largest single type of income, for which the correlation was between 0.75 and 0.80 at both sites at both enrollment and reverification. Other correlations between explanatory variables are weaker, most of them substantially weaker. While these associations mean that regression analysis cannot entirely separate the effects of the factors involved, it is still possible to determine whether each factor makes a significant contribution to the variability of the response. In the present study, three responses are of interest: reporting error, absolute value of reporting error, and number of sources.

The Housing Gap dummy variable also appears in the multiple regression models to provide a check on the possibility that adjusting for differences in household characteristics may uncover differences between the Housing Gap treatment group and the other two treatment groups. The Housing Gap dummy variable is essentially uncorrelated with both income and demographic variables, so it does not interfere with those aspects of the analysis.

---

[1]These types of income are much less closely tied to current household income than is welfare income, and they are therefore more nearly constant. Because eligibility criteria and payment formulas for cash-grant welfare payments are based directly on current income, welfare income has not been included among the stable types.

Regression Analysis of Reporting Error

For the regression equation in which actual reporting error is the response variable, Table 4-13 shows the fitted coefficients and related statistics. Even with all the explanatory variables in the equation, the proportion of variation in reporting error accounted for remains disappointingly low: the largest value of adjusted R^2 is about 0.3. Thus an attempt to focus verification on particular groups of households selected according to any one of the explanatory variables could be expected to yield only a small reduction in reporting error. It is still informative, however, to examine the contributions of the income and demographic characteristics to reporting error.

Among the income characteristics, total income makes a highly significant contribution at both sites and at both enrollment and reverification. Thus, when one allows for the other variables included in the equation, it appears that at enrollment higher-income households tended to make reporting errors in the direction of underreporting by $150 or $300 per $1000 of annual total income. It would be convenient to conclude that concentrating verification on higher-income households would tend to detect more underreporting at the rate of $150 to $300 per $1000 of annual total income, but in fact income does not change independently of other characteristics. Having a larger household income is highly associated with having wage and salary incomes as well as with larger household size, so that the net effect of selecting higher-income households for closer verification would be much smaller than is indicated by the coefficient of total income. (As an indication, the coefficient of total income in Table 4-3, where the equation involves only total income and the Housing Gap dummy variable is -0.138 in Pittsburgh and -0.0762 in Phoenix.) For a given combination of other household characteristics, the range of total income is not as great as the overall range of total income values. Thus small changes in total income would tend to have the effect indicated by the coefficient of total income, but evaluating the effect of a large change requires consideration of accompanying changes in other household characteristics. Otherwise, the result would amount to an extrapolation, and such predictions are less reliable than interpolations within the combinations of characteristics represented by the data. The situation is much the same at reverification, where the

Table 4-13

COEFFICIENTS IN REGRESSION EQUATION FOR REPORTING ERROR
(Standard Error in Parentheses)

	ENROLLMENT (ANNUAL)		REVERIFICATION (MONTHLY)	
VARIABLE	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Total income (dollars)	-.321** (.0213)	-.147** (.0175)	-.339** (.0214)	-.220** (.0197)
Wages as major type	744** (86.3)	428** (136)	78.5** (13.8)	12.4 (17.1)
Major type stable	229* (95.0)	196 (172)	29.5† (15.2)	-38.3† (21.4)
Number of members with verifiable income	171* (81.9)	-22.6 (100)	21.7† (12.4)	7.69 (13.1)
Number of sources	50.6 (45.2)	24.8 (41.9)	-1.23 (8.20)	27.6** (9.69)
Minority head	2.92 (59.2)	23.2 (78.0)	-24.0* (9.90)	-4.32 (11.1)
Age of head	-2.58 (2.05)	-6.07* (2.82)	-1.25** (.338)	-.670 (407)
Household size	133** (20.5)	20.6 (23.2)	13.0** (3 23)	-10.0** (3.12)
Female head	-57.9 (58.2)	-204* (84.5)	-34.3** (9.45)	-20.6† (11.1)
Housing Gap dummy	-23.1 (50.5)	-139* (69.3)	-10.0 (7.84)	-8.18 (9.92)
CONSTANT	448	793	123	110
$\bar{R}^2$	.207	.121	.301	.227
SAMPLE SIZE	895	535	729	600
OVERALL F-STATISTIC	24.3	8.38	32.3	18.6

SAMPLE: Enrollment Sample. All enrolled households whose income was completely verified and that completed the First Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any variable in the equation. Reverification Sample: All enrolled households whose income was completely verified and that completed the Third Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms, Baseline Interview.

* Significant at the 0.05 level.
** Significant at the 0 01 level.
† Significant at the 0.1 level.

coefficient of total income indicates a shift toward monthly underreporting by roughly $20 to $30 per $100 of monthly total income. (In the simpler equation of Table 4-4 the coefficient is half to two-thirds as large.)

At enrollment the interpretation of the relationship between reporting error and total income is complicated by the fact that, under the rules for eligibility, a household's income was verified only if its Net Income for Eligibility (based on declared income) did not exceed by more than $500 the eligibility limit for the treatment group to which it had been assigned. Consequently, large errors in the direction of overreporting could not be observed for higher-income households, and this truncation becomes more pronounced as household income increases.[1] In regressing reporting error on Total Income the resulting effect would be to bias the coefficient of Total Income downward. Further, a second truncation may act to reinforce the first; reported income cannot be negative, so that large errors in the direction of underreporting would not be observed at the lower-income end of the income range. A more complicated model is required to estimate the effect of such truncations, and this problem is examined further in Appendix VII.

In discussing the relationship between reporting error and total income, it is also possible to consider behavioral assumptions. Economists frequently find evidence supporting the idea that households' decisions are based on their estimated permanent income and that correctly measured current income includes random deviations around this permanent income (regarded by the household as windfall gains and losses). From the plausible assumption that higher current household incomes will tend to involve a larger positive transitory income component, one can argue that a negative coefficient in the dependence of reporting error on total income reflects the tendency of households to report permanent income, so that reporting error measures primarily the transitory component. If this is the case, a household's

---

[1] At reverification there was no similar constraint, and the lack of persistance from enrollment to reverification in over- and underreporting (Table 3-2) suggests that the effect of the truncation should be slight.

notion of its permanent income may tend to be even more accurate than its actual current income over longer periods of time. This might be viewed as accounting for some of the behavior of reporting error at reverification, which would not have been affected by the truncation at enrollment.[1]

Among households having wages as their largest single type of income, reporting errors were shifted substantially toward overreporting, both at enrollment and at reverification. The association between Total Income and the dummy variable for wages complicates the interpretation of the numerical values of their coefficients. Even though both of these variables are negatively correlated with reporting error, the coefficient for Total Income is negative, while that for wages is positive. This is a common occurrence in multiple regression when two explanatory variables are reasonably highly correlated, and at both sites at enrollment the correlation between these two variables was almost +0.7. The correlation between total income and reporting error is substantially higher than that between wages and reporting error; and when both total income and wages are present in the equation, the additional contribution of wages is such that its coefficient is positive. In view of this situation it is safest to conclude simply that the dummy variable for wages makes a significant contribution to reporting error.

Other income characteristics are less significant in their contributions. Having a stable type of income as the major type generally shifted reporting errors toward overreporting, but Phoenix at reverification ran counter to this pattern. The number of household members receiving verifiable income and the number of income sources varied both in direction and in strength of contribution.

Among the demographic characteristics, household size comes closest to making a consistently significant contribution, but its direction at reverification is opposite at the two sites. Reporting error in female-

---

[1] A further general point to consider is that the presence of errors in verified income, which serves as an explanatory variable in Appendix VII and is the major component of total income in the analyses of this section, leads to a downward bias in the coefficient. This may contribute to the negative values of the coefficient of total income.

headed households tends to be shifted toward underreporting, sometimes substantially so.[1] Age of the head of household consistently has a negative coefficient, while minority-headed households show relatively small positive shifts at enrollment and negative shifts at reverification. In view of the generally low explanatory power of the equations, none of these characteristics is likely to be worth considering in an attempt to focus verification.

While the coefficient for the Housing Gap dummy variable is negative in all four cases, only for Phoenix at enrollment is it significantly different from zero (at the 0.05 level), and even then the impact on payments is slight. Housing Gap households, then, do not generally exhibit serious underreporting, even after adjusting for the effects of household characteristics in this more comprehensive equation.

If the values of all coefficients for the two sites were close enough, either at enrollment or at reverification, it would be appropriate to simplify the description by fitting one model for the combined data. As it happens, however, the pattern of dependence of reporting error on household characteristics is different in Pittsburgh and Phoenix, both in terms of which characteristics are significant and in terms of the direction of their influence. The primary implication of this is that characteristics such as total income, dominance of wage-and-salary income, household size, and perhaps female head of household, which contribute substantially at both sites, could be used elsewhere; but the particular values of their coefficients cannot readily be carried over to an income validation program in another locale. Further, even with the strong contributions of such characteristics, a great deal of unexplained variation in reporting error remains--the largest adjusted R^2 is 0.301, for reverification in Pittsburgh.

---

[1] Associations among characteristics again complicate the interpretation. For example, in Pittsburgh at enrollment the correlation between the dummy variables for wages as major type and female head of household is -0.4. Because the coefficient for wages is positive while that for female head is negative, the negative correlation implies that the coefficient for each of these variables is closer to zero when the other variable is included than it would be if that other variable were omitted.

To summarize this brief exploration of algebraic reporting error, it is important to recall that a large fraction of the variation remained unexplained. The failure to make much headway in explaining reporting error seems reasonable, however, if posed in terms of explaining declared income instead. In this case, the simple equation

$$Y_D = Y_V + \varepsilon,$$

where Y_D is declared income and Y_V is verified income, has an R^2 of approximately 0.8 at enrollment. (Since Y_D and Y_V are separately reported quantiles, this connection is not merely definitional.) Thus it is perhaps not surprising that further attempts to identify determinants of the error of fluctuation, ε, were not very successful. In order to use household characteristics in focusing verification effort, much more effective descriptions and models of reporting error would be essential. It might be possible to improve the present equations somewhat by expanding them to include other variables as well as interaction terms; but even if these made substantial contributions, they would be likely to lead to focusing verification on rather small groups of households and thus to yield only small reductions in reporting error. These results of the present analysis suggest that an extensive attempt at further modeling would not be fruitful.

Regression Analysis of Absolute Reporting Error

For the regression equation in which the absolute value of the reporting error is the response variable, Table 4-14 presents the estimated coefficients and related statistics. The whole equation again accounts for relatively little of the variation (adjusted R^2 values are even smaller than those for algebraic reporting error in Table 4-13), so that attention to these household characteristics offers no realistic opportunity to reduce the size of the reporting error.

At enrollment the characteristics which make significant contributions are wages as largest single type of income and larger household size, both of which tend to be associated with larger magnitudes of reporting error. Other variables generally make much smaller contributions.

Table 4-14

COEFFICIENTS IN REGRESSION EQUATION FOR ABSOLUTE REPORTING ERROR
(Standard Error in Parentheses)

VARIABLE	ENROLLMENT (ANNUAL)		REVERIFICATION (MONTHLY)	
	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Total income (dollars)	0142 (0190)	0228 (0139)	.151** (0208)	.168** (0153)
Wages as major type	473** (77 1)	403** (108)	30 5* (13 5)	-12 9 (15 9)
Major type stable	148 (84 8)	216 (137)	-36 2* (14 8)	-3 30 (19 9)
Number of members with verifiable income	-128† (73.2)	44 3 (79.6)	-13 2 (12.1)	3 33 (12 2)
Number of sources	64.9 (40 4)	31.9 (33.3)	9.10 (7 99)	-16 5† (9 00)
Minority head	52.6 (52.9)	114† (61.9)	26.4** (9.65)	24.7* (10 3)
Age of head	-1.55 (1.83)	-2 89 (2 23)	.771* (.329)	- 102 (378)
Household size	55.6** (18 3)	43.0* (18.4)	-7 53* (3.15)	-1.74 (2.90)
Female head	-37 0 (52 0)	-80 8 (67 1)	2 02 (9.21)	-5 84 (10 3)
Housing Gap dummy	-88 2† (45 1)	16 7 (55.0)	-13.3 (7.63)	-3 35 (9 21)
CONSTANT	208	-52.2	-26.3	11 2
$\bar{R}^2$	.136	158	241	.210
SAMPLE SIZE	895	535	729	600
OVERALL F-STATISTIC	15.1	11.0	24.2	16 9

SAMPLE Enrollment Sample. All enrolled households whose income was completely verified and that completed the First Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any variable in the equation
Reverification Sample All enrolled households whose income was completely verified and that completed the Third Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation

DATA SOURCES Initial and monthly Household Report Forms, Income Verification and Reverification Forms, Baseline Interview.

* Significant at the 0 05 level
** Significant at the 0.01 level.
† Significant at the 0 1 level.

At reverification, total income and minority head of household replace wages and household size as the most important variables, and both are associated with larger absolute errors. Wages, stable major income type, age of head of household, and household size attain significance at the 0.05 level in Pittsburgh, but none of these are supported by the results for Phoenix.

It would not be unreasonable to combine the data for the two sites (introducing a dummy variable for Phoenix households), but the resulting equation could not account for any more of the variation in absolute reporting error than the separate equations, and hence this equation is not pursued further here.

Separating Underreporters and Overreporters

Households that underreport and households that overreport may exhibit different relationships between their characteristics and their reporting errors, and this can be explored by fitting separate regression equations to the two groups. Tables 4-15 and 4-16 show the results for underreporters and overreporters, respectively. For underreporters there is a noticeable improvement in the fraction of variation accounted for by the equation. It is encouraging to note that the value of adjusted R^2 for underreporters in Pittsburgh at reverification is 0.514 and that, while lower, the corresponding values for Phoenix at reverification and at enrollment also represent a modest improvement over the overall values for enrollment and reverification given in Table 4-13. Among underreporters at both sites the important characteristics seem to be total income and household size. The only other significant contributions at enrollment come from the number of members with verifiable income in Pittsburgh and the Housing Gap dummy variable in Phoenix, and at reverification Pittsburgh households whose largest single type of income was Social Security, Supplemental Security Income or pensions had significantly less underreporting. At reverification, except for total income and household size (the only variables which are significant at both sites), the individual coefficients do not appear to be greatly different at the two sites. Agreement of coefficients at the two sites at enrollment is much less close.

Table 4-15

COEFFICIENTS IN REGRESSION EQUATION FOR
REPORTING ERROR OF UNDERREPORTING HOUSEHOLDS
(Standard Error in Parentheses)

	ENROLLMENT (ANNUAL)		REVERIFICATION (MONTHLY)	
VARIABLE	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Total income (dollars)	- 196**	- 0944**	- 345**	- 344**
	(0256)	(0167)	(.0252)	(0262)
Wages as major type	96 6	-90 0	27 1	25 9
	(106)	(154)	(18 0)	(35 8)
Major type stable	115	-29 2	42 7*	17 1
	(110)	(177)	(18 8)	(39 7)
Number of members with verifiable income	202*	-52 5	16.5	40.0
	(87 3)	(87 8)	(14 4)	(24 3)
Number of sources	385	-27.3	9.09	22.4
	(50 0)	(39.0)	(8 94)	(16 5)
Minority head	-69.4	-81.2	-17.0	-8 83
	(71 7)	(73 4)	(12.1)	(16 9)
Age of head	1.08	- 358	- 658	- 511
	(2 36)	(2 58)	(421)	(.621)
Household size	46.3†	-29 6	14 5**	-8 69-
	(24 6)	(22.9)	(4 37)	(4.83)
Female head	-19.0	-45.1	-17 0	1.45
	(65.9)	(75.4)	(11 3)	(17 0)
Housing Gap dummy	56 5	-115†	4.07	3 58
	(57.8)	(64.3)	(9 69)	(15.1)
CONSTANT	-88 6	464	37.5	-12.0
$\bar{R}^2$	249	.283	514	.342
SAMPLE SIZE	488	271	387	285
OVERALL F-STATISTIC	17 1	11 6	41 8	15.8

SAMPLE: Enrollment Sample All enrolled households whose income was completely verified, that completed the First Periodic Interview, and whose reported income was less than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any variable in the equation Reverification Sample All enrolled households whose income was completely verified, that completed the Third Periodic Interview and whose reported income was less than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES Initial and monthly Household Report Forms, Income Verification and Reverification Forms, Baseline Interview

* Significant at the 0.05 level
** Significant at the 0 01 level
† Significant at the 0.10 level.

Table 4-16

COEFFICIENTS IN REGRESSION EQUATION FOR REPORTING ERROR OF OVERREPORTING HOUSEHOLDS
(Standard Error in Parentheses)

VARIABLE	ENROLLMENT (ANNUAL)		REVERIFICATION (MONTHLY)	
	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Total income (dollars)	-.200**	- 0367	- 234**	- 0421
	(.0328)	(0262)	(0541)	(0367)
Wages as major type	896**	580**	64 2	-64 3*
	(125)	(178)	(43.9)	(30 6)
Major type stable	529**	364	-37.4	-128**
	(158)	(263)	(57 5)	(39 5)
Number of members with verifiable income	87.8	63.4	1 85	-.665
	(131)	(151)	(44 1)	(22 3)
Number of sources	30.0	-16.1	8.35	7 48
	(68.5)	(58.8)	(10 9)	(13.7)
Minority head	30 4	205†	10 2	4 61
	(90.3)	(111)	(38.8)	(18 8)
Age of head	-3.40	-4.19	-1.92†	-.583
	(3.36)	(4.37)	(1.03)	(.703)
Household size	178**	38 3	2.09	-16 3**
	(32 0)	(31 8)	(9 94)	(5 13)
Female head	-106	-201	-72.4*	-45.0*
	(91.9)	(127)	(31.2)	(20.6)
Housing Gap dummy	-123	-64 5	-46.4†	-10 6
	(80 8)	(100)	(26.5)	(17.2)
CONSTANT	431	393	297	245
$\bar{R}^2$	.186	086	215	142
SAMPLE SIZE	305	223	99	135
OVERALL F-STATISTIC	7.95	3.10	3 68	3.21

SAMPLE Enrollment Sample All enrolled households whose income was completely verified, that completed the First Periodic Interview, and whose reported income was greater than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any variable in the equation Reverification Sample. All enrolled households whose income was completely verified, that completed the Third Periodic Interview, and whose reported income was greater than their verified income, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES Initial and monthly Household Report Forms, Income Verification and Reverification Forms, Baseline Interview.

* Significant at the 0.05 level.
** Significant at the 0.01 level
- Significant at the 0.10 level

The regression equation for overreporters (Table 4-16) is not so successful in explaining the variation in reporting error, and at reverification the two sites seem more clearly to behave in different ways.

Comparing Tables 4-15 and 4-16 reveals that the equations for underreporters and overreporters differ in most coefficients at enrollment. At reverification there are several differences; having a stable type of income as the largest single type, having a minority head of household, and being in the Housing Gap treatment group are the most prominent of these.

The greater success of the regression equation in accounting for reporting error among underreporters calls attention once again to the Housing Gap treatment group, in which households would have been able to increase their monthly payment by underreporting. Except for a significant negative value in Phoenix at enrollment, the coefficient of the Housing Gap dummy variable (Table 4-15) at both sites is in the direction of less underreporting. Further, among overreporters (Table 4-16) the Housing Gap households tended to overreport less. This again provides a slight suggestion that Housing Gap households may have tried to report more accurately (once household characteristics have been taken into account), and it agrees with the slightly smaller reporting errors found among Housing Gap households in the analysis of absolute value of reporting error (Table 4-14). However, the low proportion of variation explained by these equations emphasizes the weakness of the evidence.[1]

Regression Analysis of Number of Declared Sources

Section 4.1 examined the relationship between the number of sources of verifiable income declared by a household and its possible incentive to misreport, arguing that households might misreport by concealing sources of income. It is now possible to return to such questions and use multiple regression equations of the same form as those developed earlier in this section (for example, Table 4-13) to adjust for differences between the Housing Gap treatment group and the other groups which were not balanced

[1]Also, there was no evidence that Housing Gap households underreported more frequently than they overreported (Table 4-1).

out by the randomized assignment of households to treatment groups. Two changes in the equation must be made, however: number of sources is now the response variable, and the number of members with verifiable income, which is subject to the same sort of misreporting, can no longer be included among the explanatory variables. Also, the interpretation of the results must take into account the fact that no independent information on a household's number of income sources was available. Thus, households with certain characteristics may have tended to report fewer sources simply because they had fewer sources; only in the case of the treatment groups, which were under experimental control, is it appropriate to interpret a tendency to report fewer sources as a possible response to an incentive to misreport.

Table 4-17 shows the results of fitting the regression equation to the data for the two sites at enrollment and reverification. The Housing Gap dummy variable has a small coefficient and is not significant in any of the four equations. These equations, however, account for only a small fraction of the variation in the number of declared sources: the adjusted R^2 never exceeds 0.27. Other variables make significant contributions, but their patterns are more complicated, and it would shed little light on misreporting to discuss them in detail here.

4.3 SUMMARY

Analyses in this chapter have examined various facets of two general questions: First, did households in the Housing Gap treatment group tend to discover and take advantage of the existence of an incentive to underreport their income? Second, was misreporting greater among households with certain identifiable characteristics? On both questions the evidence was predominantly negative.

Incidence data and simple summary statistics revealed no tendency toward greater underreporting by Housing Gap households, and simple regression equations adjusting for total income managed to account for only a rather small fraction of the variation in reporting error. These equations provided no strong or consistent evidence that Housing Gap households, Housing Gap households on Full Payment status, or Housing Gap households on Full Payment status that understood the direction of the relationship

Table 4-17

COEFFICIENTS IN REGRESSION EQUATION FOR
NUMBER OF DECLARED INCOME SOURCES
(Standard Error in Parentheses)

	ENROLLMENT (ANNUAL)		REVERIFICATION (MONTHLY)	
VARIABLE	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Total income (dollars)	.00016**	.00004†	.00071**	.00070**
	(.00002)	(.00002)	(.00012)	(.00009)
Wages as a major type	-.153-	-.155	-.154-	-.254**
	(.0884)	(.185)	(.0809)	(.0832)
Major type stable	.288**	-.118	.399**	.566**
	(.0986)	(.235)	(.0904)	(.1041)
Minority head	-.0110	-.204†	.113†	-.0566
	(.0614)	(.105)	(.0591)	(.0556)
Age of head	-.00003	-.00368	.01056**	.00527**
	(.00209)	(.00377)	(.00199)	(.00201)
Household size	-.0549**	-.0801*	.0226	.0580**
	(.0207)	(.0311)	(.0192)	(.0153)
Female head	-.119†	-.623**	-.146**	-.150**
	(.0608)	(.108)	(.0566)	(.0553)
Housing Gap dummy	-.0140	.0194	-.0689	-.0457
	(.0517)	(.0944)	(.0468)	(.0498)
CONSTANT	1.041	2.52	.566	.780
$\bar{R}^2$	.139	.102	.270	.271
SAMPLE SIZE	747	492	646	575
OVERALL F-STATISTIC	16.1	7.97	30.7	27.7

SAMPLE. Enrollment Sample: All enrolled households whose income was completely verified and that completed the First Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any variable in the equation. Reverification Sample: All enrolled households whose income was completely verified and that completed the Third Periodic Interview, excluding those with enrollment incomes above the eligibility limits, those with data problems, those with a reporting period problem in the third-party response, and those with missing values for any variable in the equation.

DATA SOURCES. Initial and monthly Household Report Forms, Income Verification and Reverification Forms, Baseline Interviews

* Significant at the 0.05 level.
** Significant at the 0.01 level.
† Significant at the 0.10 level.

between their income and their payment tended to be shifted toward underreporting. Separate equations for underreporters and overreporters indicated that overreporters in the Housing Gap group or subgroups tended to overreport less but that underreporters did not follow any clear overall pattern. Equations for the number of sources declared were generally uninformative.

A limited exploration of the effects of household characteristics revealed that some characteristics contributed significantly to reporting error, but the overall equations left so much of the variation unexplained that they provide no useful guidance for concentrating verification on groups of households. By separating underreporters from overreporters at reverification, it was possible to account for a greater proportion of the variation in reporting error among underreporters, especially in Pittsburgh, where the major contributions came from total income (defined as verified income plus income not subjected to verification), having a stable type of income (Social Security, Supplemental Security Income, or pensions) as the largest single type, and household size. This equation, however, still fell far short of providing a conclusive characterization of households that underreported by larger amounts. Other regression equations used absolute reporting error as the response variable in order to investigate size of reporting error, and these were even more disappointing than the equations for algebraic reporting error. In all these equations, as well as a set of equations for the number of income sources declared, there was no consistent evidence that Housing Gap households tended to underreport or misreport to a greater degree than other households.

CHAPTER 5

ADMINISTRATIVE FEASIBILITY OF INCOME VERIFICATION

The implementation of income verification procedures in the Demand Experiment provides data for studying the feasibility of third-party income verification and of participant responses to such verification. Participant cooperation rates and attitudinal data concerning the verification process provide measures of participant reactions to verification. Evaluating the efficacy of the process by the completeness of information received, and the procedures used to carry out verification may contribute to the effectiveness of future income verification efforts. For example, implementation of the verification process twice during the Demand Experiment indicates that the cooperation of income sources seems to vary among different sources and depends in part on the administrative procedures used to collect income information.

Section 5.1 focuses on household reactions to income verification. The cooperation rates of both Experimental households (which were required to be verified) and Control households (which were required to participate in verification at enrollment but were given the option of participating in reverification) are examined. Household attitudes toward the bother and necessity of verification are analyzed over time, by major sources of income, and by whether they participated in reverification. Section 5.2 analyzes the response of third-party sources to verification and examines some factors affecting the rate at which complete and usable responses were received. It also discusses some of the difficulties encountered in the collection and verification of income data.

5.1 HOUSEHOLD RESPONSES TO INCOME VERIFICATION

It is possible that verification of income would be resented by some households as intrusive, bothersome or unjustified. Households in the Demand Experiment could show this objection by refusing to cooperate with the verification process (refusing to sign waiver forms allowing third parties to release confidential income information, for example) or by voicing

objections to the process during Periodic Interviews.[1] This analysis of household responses to verification therefore examines both actual household behavior during the verification process (using response rates) and household attitudes toward income verification (using interview responses).

One measure of the response rate of households is available only at reverification. At enrollment, households that refused to have their income verified were not allowed to enroll in the experiment; therefore no direct measure of the response rate is available. (A sample of the households that refused to enroll in the experiment was later interviewed and asked about program requirements, one of which was income verification. Their responses are discussed later in this chapter.) All Experimental households selected for reverification were required to have their income verified; refusal caused termination from the experiment. Most Experimental households cooperated: 95 percent in Pittsburgh and 98 percent in Phoenix agreed to have their income verified.[2] Although Control households were not required to be reverified, their response rate was also relatively high: of the randomly selected Control households, 93 percent in Pittsburgh and 98 percent in Phoenix were willing to have their income verified.[3]

---

[1] See also Kennedy et al. (1977), Chapter 5, for analyses of other requirements that affect a household's participation.

[2] Experimental households that refused reverification were terminated after two years' worth of data could be collected. Of the 36 households that refused, 17 left the program, often by failing to submit further monthly Household Report Forms. Of the remaining 19 households, only four were Housing Gap households that received full monthly payments based on the amount of income they continued to report on the Household Report Form. The other 15 households were either Housing Gap households receiving minimum $10 payments or Percent of Rent households whose payments were based on reported rent rather than reported income.

It is possible that other households that objected to reverification terminated voluntarily from the experiment soon after being informed of reverification and before they were recorded as having refused reverification. However, analysis of the rates of attrition that occurred before and after reverification showed that reverification did not cause any noticeable increases in attrition.

[3] Control households were offered $25 to participate in verification. It appears that the small number of households that refused to cooperate did object strongly enough to verification to give up the $25 cooperation payment.

A direct measure of household reactions to income verification is available from the Periodic Interviews, administered six months (First Periodic), one year (Second Periodic) and two years (Third Periodic) after enrollment. During each of these interviews, Experimental households were asked how they felt about income verification.[1] In addition, a sample of households that turned down the offer to enroll in the program was asked during the Exit Interview about the necessity of income verification. Their reactions to verification can be compared to the reactions of households that did enroll in the program to determine whether a difference exists between the two groups.

As is shown in Table 5-1, 91 percent of Pittsburgh households and between 86 and 90 percent of Phoenix households stated during each interview that they did not mind verification. Undergoing the actual process of verification did not appear to have altered attitudes. As shown in Table 5-2, households that were reverified responded in similar patterns both before and after reverification, and these responses were similar to those of households that were not reverified. As would be expected, a higher proportion of households that later refused reverification responded at the Second Periodic Interview (prior to reverification) that they would mind having their income verified, although the number of these households was small. In fact, most of the households that refused responded that they did not mind verification, suggesting that other factors may have affected their decision to refuse reverification.[2]

Most households--including those that later refused reverification--felt that income verification was necessary for households that received payments. At both the First and Second Periodic Interviews, approximately

---

[1] Control households were not asked these questions, since only a random sample was verified at enrollment and none were required to be reverified.

[2] Some households, for example, did not want their employers to know they were receiving government aid, and therefore refused to sign waiver forms allowing the site office to contact their employers for income information. They may not have minded the checking of their reported income, per se; they may have minded the part of reverification which would cause their employer to discover they were receiving financial assistance.

Table 5-1

ATTITUDES TOWARD INCOME VERIFICATION

ATTITUDE TOWARD INCOME VERIFICATION[a]	PITTSBURGH			PHOENIX		
	SIX MONTHS	ONE YEAR	TWO YEARS	SIX MONTHS	ONE YEAR	TWO YEARS
Don't mind at all	91.0%	91.3%	91.1%	85.6%	89.7%	87.4%
Mind somewhat	6.8	6.3	6.5	10.4	7.6	9.0
Mind very much	2.2	2.4	2.4	3.9	2.6	3.6
SAMPLE TOTAL	1,111	1,082	941	1,093	998	752

SAMPLE: All Experimental households, excluding those with enrollment incomes above the eligibility limits.

DATA SOURCES: First, Second, and Third Periodic Interviews.

a. Response to First Periodic Interview, question 32; Second Periodic Interview, question 21; Third Periodic Interview question 29:

> How do you feel about having the program check up on your income? Would you say you mind very much, mind somewhat, or don't mind at all?

Table 5-2

ATTITUDES TOWARD INCOME VERIFICATION BY OCCURRENCE OF REVERIFICATION

ATTITUDE TOWARD INCOME VERIFICATION[a]	BEFORE REVERIFICATION (one year)			AFTER REVERIFICATION (two years)		
	Reverified	Refused Reverification	Not Reverified[b]	Reverified	Refused Reverification	Not Reverified[b]
			PITTSBURGH			
Don't mind at all	91.5%	[80.0%]	93.3%	91.2%	[70.0%]	91.5%
Mind somewhat	6.4	[10.0]	4.9	6.6	[20.0]	6.2
Mind very much	2.1	[10.0]	1.8	2.3	[10.0]	2.3
SAMPLE TOTAL	532	10	390	532	10	390
			PHOENIX			
Don't mind at all	91.4%	[85.7%]	89.3%	86.3%	[71.4%]	88.9%
Mind somewhat	6.4	[0]	8.9	9.7	[0]	8.6
Mind very much	2.2	[14.3]	1.8	4.0	[28.6]	2.5
SAMPLE TOTAL	454	7	280	454	7	280

SAMPLE: All Experimental households, excluding those with enrollment incomes above the eligibility limits and those with missing responses to one of the two interview questions.

DATA SOURCES: Income Reverification Form, Second and Third Periodic Interviews.

a. Response to Second Periodic Interview, question 21; Third Periodic Interview, question 29; see footnote (a) in Table 5-1 for wording of question.

b. Includes households not selected for reverification, those that could not be located (e.g., moved out of county), or that had no verifiable income.

NOTE: Brackets indicate entries based on 15 or fewer observations.

93 percent of the households at each site responded positively to the necessity for some degree of verification, as shown in Table 5-3. There was little difference between the attitudes of households that later agreed to reverification, refused reverification, or were not contacted for reverification. There was also little difference among the attitudes of households with different major sources of net eligibility income, as shown in Table 5-4.

This analysis of household reactions to income verification was based on the reactions of households that enrolled in the experiment. It is possible that households that opposed income verification may have turned down the enrollment offer and that, therefore, the enrolled households were atypical in their generally favorable attitudes toward verification. A sample of households that declined the enrollment offer was administered an Exit Interview, during which they were asked about the necessity of income verification. Table 5-5 contains a comparison of their responses to those of enrolled households that completed the First Periodic Interview.[1] A significant relationship existed between a household's decision to enroll in the experiment and its attitude toward income verification: enrolled households more often believed that verification was necessary for everyone, while nonenrolled households more often believed that verification was not necessary at all. However, although these differences existed, the majority of interviewed nonenrolled households (76 percent in Pittsburgh and 69 percent in Phoenix) believed that verification was necessary for everyone. Households turned down the enrollment offer for a number of reasons; opposition to income verification may have affected the decision in some cases, but it does not appear to have affected the majority of households that decided not to enroll.[2]

Income verification was positively accepted by almost all enrolled households at each site. Most of the households cooperated with the process, and both verified and nonverified households considered the

---

[1]The First Periodic Interview is the closest available indication of the reactions of enrolled households toward income verification at the time of enrollment.

[2]See Kennedy et al. (1977) for further analysis of the decision to enroll.

Table 5-3

ATTITUDES TOWARD NECESSITY OF INCOME VERIFICATION
BY OCCURRENCE OF REVERIFICATION

ATTITUDE TOWARD NECESSITY OF INCOME VERIFICATION[a]	SIX MONTHS			ONE YEAR		
	Reverified	Refused Reverification	Not Reverified[b]	Reverified	Refused Reverification	Not Reverified[b]
			PITTSBURGH			
Necessary for all	86.4%	85.7%	85.9%	83.0%	85.7%	87.1%
Necessary for some	7.4	4.8	5.6	9.9	9.5	5.5
Not necessary	6.2	9.5	8.5	7.1	4.8	7.4
SAMPLE TOTAL	567	21	519	564	21	489
			PHOENIX			
Necessary for all	81.8%	[85.7%]	79.3%	80.5%	[92.9%]	82.7%
Necessary for some	11.8	[7.1]	12.2	12.5	[0]	10.2
Not necessary	6.4	[7.1]	8.6	7.0	[7.1]	7.2
SAMPLE TOTAL	543	14	526	544	14	433

SAMPLE: All Experimental households that completed a Periodic Interview, excluding those with enrollment incomes above the eligibility limits.

DATA SOURCES: Income Reverification Form, First and Second Periodic Interviews.

a. Response to First Periodic Interview, question 31; Second Periodic Interview, question 20:
Do you feel that having the program check up on people's income is necessary for everyone who gets payments, necessary for some people, or not necessary at all?

b. Includes households not selected for reverification, those that could not be located (e.g., moved out of county), or those that had no verifiable income.

NOTE: Brackets indicate entries based on 15 or fewer observations.

Table 5-4
MAJOR SOURCE OF INCOME BY ATTITUDE TOWARD
NECESSITY OF INCOME VERIFICATION

ATTITUDE TOWARD NECESSITY OF INCOME VERIFICATION[a]	SIX MONTHS: MAJOR SOURCE OF INCOME				ONE YEAR: MAJOR SOURCE OF INCOME			
	Wages	Welfare	Other Transfers[b]	Residual Sources[c]	Wages	Welfare	Other Transfers[b]	Residual Sources[c]
				PITTSBURGH				
Necessary for all	86.0%	86.1%	86.3%	84.2%	84.7%	84.2%	84.5%	100.0%
Necessary for some	4.7	7.7	6.7	15.8	8.1	7.4	9.2	0
Not necessary	9.4	6.2	7.0	0	7.2	8.4	6.3	0
Chi-square		9.45				4.83		
SAMPLE TOTAL	342	403	315	19	347	392	303	16
				PHOENIX				
Necessary for all	82.2%	73.3%	82.8%	70.0%	82.6%	73.7%	84.3%	85.7%
Necessary for some	10.7	17.2	10.1	25.0	11.2	17.5	8.1	7.1
Not necessary	7.1	9.5	7.1	5.0	6.2	8.8	7.7	7.1
Chi-square		9.62				8.86		
SAMPLE TOTAL	662	116	238	20	597	114	248	14

SAMPLE: All Experimental households that completed a Periodic Interview, excluding those with enrollment incomes above the eligibility limits, and those with missing responses to one of the two interview questions.

DATA SOURCES: Household Report Form, Income Reverification Form, First and Second Periodic Interviews.

a. Response to First Periodic Interview, question 31; Second Periodic Interview, question 20; see footnote (a) in Table 5-3 for wording of question.

b. Other transfers include income from pensions, Social Security, Supplemental Security Income, Unemployment and Workmen's Compensation.

c. Residual sources include income from alimony, assets and charities.

Table 5-5

PROGRAM ENROLLMENT STATUS
BY ATTITUDES TOWARD NECESSITY OF INCOME VERIFICATION

ATTITUDE TOWARD NECESSITY OF INCOME VERIFICATION[a]	PITTSBURGH		PHOENIX	
	NONENROLLED HOUSEHOLDS	ENROLLED HOUSEHOLDS	NONENROLLED HOUSEHOLDS	ENROLLED HOUSEHOLDS
Necessary for all	76.4%	86.2%	68.8%	80.6%
Necessary for some	6.4	6.5	14.0	11.9
Not necessary	17.3	7.3	17.2	7.5
Chi-square	13.23***		11.53***	
SAMPLE TOTAL	110	1,107	93	1,083

SAMPLE: All households that did not have missing responses on either the Exit Interview for Nonparticipants or the First Periodic Interview. Nonenrolled: Households that rejected the offer to enroll in the program and were selected for an Exit Interview. Enrolled: Households that were enrolled in the program and completed the First Periodic Interview.

DATA SOURCES: Exit Interview for Nonparticipants, First Periodic Interview.

a. Response to Exit Interview for Nonparticipants, question 11A; First Periodic Interview, question 3:

> Do you feel that having the program check up on people's income is necessary for everyone who gets payments, necessary for some people, or not necessary at all?

***Chi-square statistic significant at the 0.005 level.

process necessary for at least some of the recipients in an income-conditioned program. Few households felt that verification was a bother. These results are similar to the results of the Administrative Agency Experiment, in which 97 percent of nearly 1200 participants sampled after income verification reported that the amount of income checking was "about right" (see Dickson, 1977, p. 33). Only 1 percent of the sample felt that there was "too much checking," and the remaining 2 percent felt that there was "not enough" checking, or that their income had not been checked.

5.2 RESPONSE OF THIRD PARTIES TO REQUESTS FOR INCOME INFORMATION

The effectiveness of a verification program depends not only on households signing waiver forms permitting verification of their reported income, but also on the sources of their income providing complete, usable information with which the reported income can be compared. The response of employers and public agencies to requests for income information, and the extent to which they provide usable information, are obviously key factors in the effectiveness of an income verification program.[1] For reported income from a given source to be considered completely verified, responses had to be received from the appropriate employer or agency, and the information had to be in complete and usable form. That is, respondents had to indicate exact amounts of payments made (rather than approximate amounts or no amount at all), had to use the correct definition of income (e.g., gross wages rather than net wages), and had to give information for the exact time period specified by the request.

In verification at enrollment, third parties honored 93 percent of all information requests in Pittsburgh and 77 percent in Phoenix (see Table 5-6). Over 90 percent of the responses used the standard Income Verification Form mailed out by the site offices, as shown in Table 5-7.

---

[1]The number of complete and usable responses from all income sources for each household determined the degree of completeness achieved at the household level and defined the sample for the analysis of reporting errors (in which total verified household income had to be calculated). The extent to which household incomes were completely verified is discussed in Appendix II.

Table 5-6

THIRD-PARTY RESPONSE TO INFORMATION REQUESTS
AT ENROLLMENT BY INCOME TYPE

INCOME TYPE	PITTSBURGH		PHOENIX	
	PERCENTAGE OF REQUESTS HONORED	TOTAL NUMBER OF REQUESTS	PERCENTAGE OF REQUESTS HONORED	TOTAL NUMBER OF REQUESTS
Wages	88.5	741	75.5%	2,274
Social Security	96.8	432	84.8	369
Supplemental Security Income	100.0	32	81.5	135
Welfare	97.6	659	80.1	256
Pensions	83.8	167	73.3	135
All Types	93.0	2,031	77.1	3,169

SAMPLE: All third-party requests sent out for households whose enrollment incomes were not above the eligibility limits, excluding those with problems in verification forms and those with only self-employment income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

Table 5-7

METHOD OF THIRD-PARTY RESPONSE
AT ENROLLMENT

METHOD OF THIRD-PARTY RESPONSE	PITTSBURGH PERCENTAGE OF TOTAL SOURCES WITH THIRD-PARTY RESPONSES	PHOENIX PERCENTAGE OF TOTAL SOURCES WITH THIRD-PARTY RESPONSES
Standard Request Form	92.2%	91.0%
Nonstandard Form	1.2	1.6
Telephone[a]	5.3	6.9
Other	1.4	0.5
TOTAL FORMS WITH THIRD-PARTY RESPONSE	1,889	2,442

SAMPLE: All third-party responses for households whose enrollment incomes were not above the eligibility limits, excluding those with problems in verification forms and those with only self-employment income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

a. Telephone recontacts of third parties to request that forms be returned or to clarify information are not included.

Telephone responses were the only other method frequently used, and they accounted for only 6 percent of all responses. These numbers conceal the amount of effort required to obtain third-party response, since they indicate only the type of initial information response. Thus, telephone calls to third parties to request that forms be returned or to clarify information on a form are not shown in Table 5-7.

The Pittsburgh response rate was consistently 11 to 18 percentage points greater than that of Phoenix for every type of income (see Table 5-6). This suggests that a uniform difference, such as differences in administrative procedures, may have been a factor affecting the response rate. Although there is no direct evidence of more follow-up in Pittsburgh than in Phoenix, it is possible that the different methods of administrative control may have facilitated the higher response rate in Pittsburgh. For example, the control systems used during verification differed at each site. Pittsburgh used a centralized control system; a record of request forms mailed out was kept in a central file, organized according to the date when forms for the household were mailed. This file could be readily checked by the supervisor, who took responsibility for seeing that follow-up calls were made when forms were not returned. Phoenix, on the other hand, used a decentralized control system during all but the last three months of the enrollment process. Each payments analyst maintained a separate card file (organized by date) to record forms sent and returned. Primary responsibility for follow-up on unreturned forms rested with the analyst. A central file was more readily accessible to the supervisor, but it was used primarily for payments purposes and was organized by household number--making supervision of the process more difficult and time-consuming. During the last three months of the enrollment process, Phoenix adopted a system similar to the one used in Pittsburgh.[1]

The difference between the response rates at the two sites may also partially be explained by site-specific characteristics. For example, census data

---

[1]This change in the system used in Phoenix occurred at the peak of enrollment. The effects of adopting this system have not been analyzed, since they are difficult to sort from the increase in caseloads which also occurred at that time.

suggest that the low-income labor market in Phoenix is characterized by a higher rate of job turnover.[1] If it is more difficult for employers to locate records of past employees, this could contribute to the lower response rates for employers in Phoenix. Likewise, the incidence of out-of-state pension sources in Phoenix may also be higher than in Pittsburgh due to the higher proportion of new residents, thus increasing the likelihood of problems occurring in contacting and verifying pension sources.

The variability of wage income made household reporting and third-party retrieval of monthly information more difficult than for other more constant income types. An individual receiving wage income might be paid on a weekly, bi-weekly or other basis; this wage rate might be calculated by the hour or by the year and might be affected by overtime and shift differentials. (For example, the individual might work two weeks at a daytime shift and two weeks at a nighttime shift, each at a different hourly rate.) Irregular sources of income, such as income from piece-work or income received by migrant fieldworkers in Phoenix, commissions, bonuses, and tips were also more difficult to collect and verify.

Converting the total income paid to a monthly amount was also sometimes difficult. One employer multiplied the bi-weekly amount by a factor of two to calculate the total amount paid for each month, which underestimated the actual amount paid during months in which three checks were issued. Another employer divided the individual's annual salary by twelve to calculate a monthly payment amount; the individual was paid bi-weekly and therefore received 26 checks each year rather than 24. This produced an overestimate of the actual amount paid in a given month.

---

[1] For residents in selected low-income areas at each site, the proportion of the employed who had been employed for less than one year was 29 percent in Phoenix compared with 17 percent in Pittsburgh. Likewise, the median number of years that workers had been employed at their current job was only 2.5 years in Phoenix, compared with 5.4 years in Pittsburgh. See Employment Profiles of Selected Low Income Areas - Pittsburgh, Phoenix, 1970 Census of Population and Housing, U.S. Department of Commerce, p. 7.

Employees and employers sometimes reported net rather than gross income. Misunderstandings also occurred with regard to the definition of "monthly" income or payment. One employer reported wages paid for a month of work performed by the employee, rather than the income paid in that month; that is, rather than reporting the employee's wages paid during the month of June, the employer reported wages paid for work done in June--some of which were actually paid in July. Advance vacation pay also caused problems: an employee leaving for vacation in July might receive advance payment from his August paychecks and record this as July income, whereas the employer might record it as August wages paid.[1]

Pension sources were difficult to verify since a number of the sources were located out-of-state or were difficult to identify. Some participants, for example, reported the source of their pension to be former employers, when in fact the employers were sponsors of the pension but the funds were actually distributed by a different source. Participants who received Railroad Retirement pensions sometimes reported them as Social Security income since they were disbursed through the Social Security Administration. (In such cases, site staff contacted the household and explained that these benefits should be reported as pension income rather than as Social Security income.)

Given these problems, it is not surprising that employers and pension funds tended to have lower response rates than public agencies (see Table 5-6). Both sites reported that verification was less difficult with public agencies than with private sources. This phenomenon probably reflects not only the problems associated with wage and pension incomes, but also the benefits associated with establishing personal contact between site offices and public agencies. Contact personnel were available to answer questions or to provide assistance to agency employees (e.g., case workers) by actually filling out request forms. Because a working relationship

---

[1] In all of these cases, efforts were made to reconcile the differences. Households with irreconcilable discrepancies between reported and verified incomes due to reporting period problems were eliminated from the analysis of reporting errors.

was established, it was also somewhat easier for site office personnel to recontact agency staff for additional information if forms were returned with incomplete information.

The extent to which third-party respondents provided complete, usable information about participant income was consistent with the pattern of third-party propensity to respond (see Table 5-8). Pittsburgh completion rates were consistently higher than rates in Phoenix. Information provided about wages and pensions was less likely to be complete and usable than information furnished about welfare and Social Security payments.

The experience acquired during verification at enrollment led to changes and improvements in the verification process. For example, at enrollment, the verification process was totally oriented toward operations. At reverification, the process was oriented toward analytical as well as operational requirements. Site staff were by this time more familiar with data collection techniques and were aware of the need to obtain complete and accurate third-party responses. When forms were returned, staff members were able to determine more easily whether recontacts were necessary to clarify information. Analysis of the modifications made to the verification procedures and the response rate of third parties at reverification indicates that the manner in which information is requested and collected affects the rate of response and the amount of usable information supplied by third parties. The changes were made simultaneously, however, making the effects of individual modifications impossible to determine.

The relatively high incidence of incomplete income information returned on the standard Income Verification Forms at enrollment caused more detail to be added in redesigning the Reverification Forms. The period of time for which information was requested was divided into specific months, and each was entered on the form by site staff. Blocks were provided in which the employer or agency could enter the amount of income distributed to the household during that month. If the forms were returned with incomplete information, site staff recontacted the agency or employer in an attempt to obtain the information requested. For wage and salary income, the reporting period was shortened from 12 to 3 months; the reporting period for all other income types remained 12 months, as it had

Table 5-8

COMPLETENESS OF THIRD-PARTY RESPONSES
AT ENROLLMENT BY TYPE OF INCOME

TYPE OF INCOME	PITTSBURGH		PHOENIX	
	PERCENTAGE COMPLETE	(N)[a]	PERCENTAGE COMPLETE	(N)[a]
Wages	88.4%	(656)	80.4%	(1,716)
Social Security	96.7	(418)	90.1	(313)
Supplemental Security Income	96.8	(32)	90.0	(110)
Welfare	91.8	(643)	90.0	(205)
Pension	88.6	(140)	66.7	(99)
All Types	91.6	(1,889)	82.3	(2,443)

SAMPLE: All third-party responses for households whose enrollment incomes were not above the eligibility limits, excluding those with problems in verification forms and those with only self-employment income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

a. (N) = the number of sources from which a third-party response was received.

been at enrollment. Regular contacts, which had been useful in achieving completion of forms at enrollment, were again arranged between the site offices and public agencies and large employers. Special arrangements were made with agencies that had been especially slow or reluctant to cooperate with the site office at enrollment. For example, both sites arranged special procedures with the local Social Security Administration.[1]

Experience with and modifications to the verification procedures contributed to higher response rates and more complete information at reverification. Approximately 96 percent of all income information requests were honored in Pittsburgh and 91 percent in Phoenix (see Table 5-9), as compared with the 93 percent Pittsburgh and 77 percent Phoenix rates at enrollment. As with verification at enrollment, almost all sources used the standard Income Verification Form mailed out by the site office (see Table 5-10). Nonstandard forms such as copies of third-party records and paycheck stubs accounted for 4 percent of Pittsburgh responses and 10 percent of Phoenix responses. (As noted above, these numbers conceal staff effort involved in recontacting sources to clarify information or to encourage response. They reflect only the initial manner in which income information was received.)

In contrast to the verification experience at enrollment, site staff were able to collect usable information from all sources that responded. Site staff at both Pittsburgh and Phoenix indicated that the redesigned standard forms contributed to the increased clarity of responses received and the greater willingness of third parties to provide complete information.

The shorter reporting period for wages may also have aided in improving the response rate of sources: it would be easier and less time-consuming for an employer to retrieve an employee's income information for the past three months than for the past year, especially if the employee were

---

[1] To facilitate the processing of forms, Pittsburgh site staff arranged to send forms to the Social Security Administration in batches at a single designated time each month. In Phoenix, the Social Security Administration at first refused to release confidential income information despite recipient permission to do so.

Table 5-9

THIRD-PARTY RESPONSE TO INFORMATION REQUESTS
AT REVERIFICATION BY INCOME TYPE

INCOME TYPE	PITTSBURGH		PHOENIX	
	PERCENTAGE OF REQUESTS HONORED	TOTAL NUMBER OF REQUESTS	PERCENTAGE OF REQUESTS HONORED	TOTAL NUMBER OF REQUESTS
Wages	92.5%	322	92.4%	502
Social Security	98.6	292	87.9	265
Supplemental Security Income	97.1	69	87.8	74
Welfare	95.0	340	92.4	132
Pensions	98.2	109	87.0	92
Unemployment Compensation	96.6	29	97.5	80
All Types	95.7	1,161	91.0	1,145

SAMPLE: All third-party requests sent out for households whose enrollment incomes were not above the eligibility limits, excluding those with only self-employment income.

DATA SOURCES: Household Report Form, Income Reverification Form.

Table 5-10

METHOD OF THIRD-PARTY RESPONSE
AT REVERIFICATION

METHOD OF THIRD-PARTY RESPONSE	PITTSBURGH PERCENTAGE OF TOTAL SOURCES WITH THIRD-PARTY RESPONSES	PHOENIX PERCENTAGE OF TOTAL SOURCES WITH THIRD-PARTY RESPONSES
Standard Request Form	94.8%	88.8%
Nonstandard Form	3.5	10.0
Telephone[a]	1.6	1.2
Other	0.1	---
TOTAL FORMS WITH THIRD-PARTY RESPONSE	1,111	1,042

SAMPLE: All third-party responses for households whose enrollment incomes were not above the eligibility limits, excluding those with only self-employment income.

DATA SOURCES: Household Report Form, Income Reverification Form.

a. Telephone recontacts of third parties to request that forms be returned or to clarify information are not included.

not currently employed at that company. In fact, the response rate of employers in Phoenix--where there was a higher job turnover rate--increased 16 percentage points from enrollment to reverification, and became identical to that of employers in Pittsburgh. (Ninety-two percent of the employers at both sites honored request forms at reverification.)

Although the response rates for most sources increased at reverification, Phoenix sources' response rates remained lower than Pittsburgh, especially for Social Security, Supplemental Security and pension incomes. These differences may indicate that some of the Phoenix site characteristics previously noted were still affecting the response rates. However, it is evident that at both sites the modified verification process was relatively successful.[1]

5.3 SUMMARY

Most households responded positively to the income verification process: over 96 percent of all households cooperated with income verification. Most households, when questioned, considered some form of income verification necessary for individuals receiving transfer payments. About 90 percent of those that had their income verified did not consider verification a bothersome requirement.

---

[1] It is worth noting that even the high levels of responsiveness and completeness observed at reverification might be increased under different procedures. The procedural rules for third-party verification in the Demand Experiment required a limit on the amount of time that could be allowed to elapse from the initiation of verification. (See Chapter 2 for a brief discussion of the reasons for placing time limits on the verification process.) Households were enrolled if no responses had been obtained from income sources within two months of the request for information, or when responses accounting for 80 percent of a household's declared verifiable income had been received. The reverification process was terminated if more than two months had passed since sources were contacted. Eliminating the 80 percent criterion for verifying income may have contributed to the increased response rates obtained at reverification. Extending the two-month time limit at reverification or intensifying follow-up efforts would probably further increase the rate of third-party response.

Third parties also cooperated with income verifications, responding at a 96 percent rate in Pittsburgh and a 91 percent rate in Phoenix at reverification. Comparisons of the results at enrollment and reverification suggest that the methods by which information is requested and the administrative procedures used to implement the verification process influence the rate at which third parties respond to requests for information and the extent to which the information provided is usable. For example, maintaining personal or telephone contact with public agencies and large employers facilitated verification. In addition, it appears that the combination of increased site staff experience, more detailed verification forms, and a shorter reporting period for wage income contributed to achieving improved response rates and more complete information at reverification.

REFERENCES

Dickson, Donald E., Certification: Determining Eligibility and Setting Payment Levels in the Administrative Agency Experiment, Cambridge, Mass., Abt Associates Inc., March 1977.

Kennedy, Stephen D., T. Krishna Kumar, and Glen Weisbrod, Participation Under a Housing Gap Form of Housing Allowance, Cambridge, Mass., Abt Associates Inc., May 1977 (revised June 1980).

CHAPTER 6

CONCLUSIONS AND POSSIBILITIES FOR FURTHER WORK

Previous chapters have examined the errors made by participating households in reporting their income, the relationship between errors in reporting and both experimental treatments and household characteristics, and the operation of the income verification program. The present chapter summarizes the major conclusions of these analyses and identifies a number of areas where further research could be advantageous.

6.1 CONCLUSIONS

It was not an easy task, either at enrollment or at reverification, for households to report their income exactly. Only about 10 percent of participating households were able to do this for their previous year's income at enrollment, and 30 percent did so for one month's income at reverification, after more than a year of experience with monthly reporting. Further, a small fraction of households either underreported or overreported by quite large amounts, running to as much as $1,000 per month at reverification and $500 per month (averaging over the 12 months) at enrollment. More commonly, however, reporting errors were rather small: no larger than $20 per month for about 55 percent of households at enrollment and about 60 percent of households at reverification, including those that reported without error.

If allowance payments had been based on unverified reported income, the overall annual payment cost would have been somewhat higher--roughly $3 per household on the basis of enrollment data, $100 per household from reverification data--than would have been the case if all income had been reported without error. There was no reliable evidence that this was due to deliberate misreporting by households. In fact, the pattern of reporting error was the same whether or not the participants could have gained a larger payment by reporting a lower income. The prevailing distribution of reporting error for all participants simply seemed to yield somewhat more underreporting than overreporting. It should be noted, however, that verification dealt only with reported sources of income; examination of the number of sources reported did not rule out the possibility that there may have been

systematic omission of sources by some households that could have gained by doing so.

Verification was required in determining eligibility, but as a means of controlling error it is unlikely to produce a net saving. The cost of third-party verification estimated in the Administrative Agency Experiment was about $12 per household.[1] Thus mean payments savings of $3 for annual verification of income, suggested by verification at enrollment, would be less than the estimated cost. Similarly, reverification results suggest that verification for a single month would yield a payment savings of about $8 per month or $96 per year. This might yield a net saving if several months could be verified at once.[2,3] It is not clear that the average payment savings would be the same for all months, however. It is possible, for example, that the typical error in any month grows with the time since the household was last verified. In this case, optional selection of a set of months to be verified would depend on the pattern of error over time.

The cost-effectiveness of verification could be improved if verification could be concentrated on selected groups of recipients that are more likely to underreport by large amounts. The relationships between reporting errors and the household characteristics analyzed, however, were not strong enough to warrant initiating a selective verification system. There was, for example, little persistence in either underreporting and overreporting. Likewise, exploration of the relationship between a household's reporting error and its demographic and income characteristics by regression techniques did not yield an equation which could predict a household's reporting error with any great degree of confidence.

---

[1] See Dickson (1977), p. 30.

[2] Although verifying several months at the same time would undoubtedly reduce the costs of getting information from sources, it would also require that monthly income reports include information on the name and address of each source, as well as waivers.

[3] Note, however, that if the rate at which payments change with income had been 50 percent, rather than 25 percent, verification would yield a small net saving based on the Demand Experiment results.

As a method for controlling both overreporting and underreporting, instead of simply reducing net underreporting, verification appears to be more advantageous. The average effect of each verification (at an estimated cost of $12) would be to remove about $115 in payment errors per household per year under a system of annual verification with an annual accounting period and about $15 in payment error per household per month for reverification of any single month.[1,2] Regression analyses indicated that systematic selection on the basis of household characteristics would be even less effective in revealing a substantial fraction of large reporting errors in both directions than it would for large errors in the direction of underreporting.[3]

Other income-conditioned programs have administered verification in various ways and with varying degrees of success. The experience of the Demand Experiment indicates that routine, 100 percent verification is feasible. Participants did not regard it as bothersome, and third-party sources of income generally cooperated. Administrative procedures played an important role in the success of verification. Experienced personnel, carefully designed forms, and close contact with public agencies which are major sources of income seemed to be very important factors in accomplishing income verification.

6.2 POSSIBILITIES FOR FURTHER WORK

The analyses on which this report is based focused on major aspects of income verification. The extensive data collected during the Demand Experiment, and the data base into which these data have been organized, would support a variety of further analyses bearing on more detailed aspects of the third-party income verification program. Possible topics for further attention include the following:

---

[1]The apparent near independence of errors from month to month indicated by preliminary analyses means that much of the allocation effect under monthly verification would tend to be offset by reverse corrections in different months over the course of a year.

[2]As mentioned above in connection with cost savings, the results of more frequent monthly reverification are difficult to predict.

[3]Again, allocation effects would be twice as large if the rate at which payments change with income was 50 percent instead of 25 percent.

Analysis of errors in reporting each type of income. The emphasis on reporting error in total verifiable income led to samples of households whose verifiable income was completely verified. Especially at enrollment, a larger number of households had complete verification on a single type of income, and separate analyses for each type of income can readily take advantage of these larger samples to examine the relationship between these reporting errors and household characteristics.

Analysis of reporting errors month by month at reverification. Using the monthly data on reported and verified income, it would be possible to examine directly month-to-month fluctuations in reporting error and to investigate whether it was common for households to report varying amounts while verified income remained constant or to report a constant amount while verified income varied. Further, the monthly data for individual types of income could be used to probe the nature of reporting errors. For example, did reported earnings vary according to the number of weeks in the month? And when a change in the level of grant income (such as welfare or Supplemental Security Income) occurred, how long was it before this change appeared in the participant's reporting? (An important step in preparing for these analyses is adjusting for changes in household composition during the period covered by reverification. Verified income amounts were obtained only for household members present at the month of reverification, and reported income amounts for the household were based on members present during the particular reporting month, so that a change in household composition would require reconstruction of income amounts and reporting errors member by member before household-level data could be used for analysis.)

Examination of models for the impact of verification on reporting error. The monthly household-level data on declared and verified income could be aggregated to longer time intervals (such as bimonthly and quarterly) as a first step in determining how frequent verification should be if it is to be cost-effective. Because the data from the Demand Experiment do not indicate how households would behave if their income were being verified every month, however, further steps would involve simulation based on models of deterioration in a household's reporting accuracy as a function of elapsed time since the most recent verification.

One reasonable assumption which might be made is that a household's reporting accuracy deteriorates in a linear fashion over time, with added payment costs equal to a multiple of the number of months elapsed since the last reverification. If reverifications cost $12 each and added monthly payment costs are $8 after 18 months (as found in this report), then linear deterioration

implies that the optimum interval between reverifications should be 7 months.[1]

Investigation of effects of length of recall period. The monthly data on income and reporting errors would also permit separate examination of this question, as well as comparison of remembering with reporting.

Further examination of behavior of households over time. Reconstructed annual data at reverification would permit comparison of annual reporting errors at enrollment and reverification to determine, for example, whether households that underreported at enrollment tended to underreport on an annual basis at reverification. One could investigate the errors at enrollment of those households that refused reverification.

Further analysis of truncation effects induced by eligibility limits. The data on the impact of eligibility limits at enrollment on reporting errors could be augmented by including those households that were not enrolled because their verified income exceeded the eligibility limit. (Some technical problems affecting the methodology for such analyses would probably have to be resolved.)

More detailed exploration of regression models for reporting error. In an attempt to develop a model for household errors in reporting income, other household characteristics and indicators of behavior could be investigated. Also, particular attention could be paid to distributional problems.

Impact of operational rules at enrollment. Third-party responses covering at least 80 percent of a household's income were considered sufficient to determine eligibility, and reported income was used if no third-party statement could be obtained within two months. It would be possible to analyze the percentage of household income actually verified, the factors which affected this percentage, and length of time required to obtain third-party responses.

---

[1] If the cost of each reverification is C and the added payment costs per month after n months equal nA, then reverification every N months leads to an average cost per month (combining the costs of reverification and those from underreporting of income) of $(C/N) + (N + 1)A/2$. This is minimized when N, the number of months between reverifications, is approximately $\sqrt{2C/A}$. With C = 12 and A = 8/18, the solution is N = 7 months.

REFERENCES

Dickson, Donald E., Certification: Determining Eligibility and Setting Payment Levels in the Administrative Agency Experiment, Cambridge, Mass., Abt Associates Inc., March 1977.

APPENDIX I

DESIGN OF THE DEMAND EXPERIMENT

This appendix presents a brief overview of the Demand Experiment's purpose, data collection procedures, experimental design, and sample allocation.

I.1 PURPOSE OF THE DEMAND EXPERIMENT

The Demand Experiment is one of three experiments established by the U.S. Department of Housing and Urban Development (HUD) as part of the Experimental Housing Allowance Program.[1] The purpose of these experiments is to test and refine the concept of housing allowances.

Under a housing allowance program, money is given directly to individual low-income households to assist them in obtaining adequate housing. The allowance may be linked to housing either by making the amount of the allowance depend on the amount of rent paid or by requiring that households meet certain housing requirements in order to receive the allowance payment. The initiative in using the allowance and the burden of meeting housing requirements are therefore placed upon households rather than upon developers, landlords, or the government.

The housing allowance experiments are intended to assess the desirability, feasibility, and appropriate structure of a housing allowance program. Housing allowances could be less expensive than some other kinds of housing programs. Allowances permit fuller utilization of existing sound housing because they are not tied to new construction. Housing allowances may also be more equitable. The amount of the allowance can be adjusted to changes in income without forcing the household to change units. Households may also, if they desire, use their own resources (either by paying higher rent or by searching carefully) to obtain better housing than is required to qualify for the allowance. As long as program requirements are met, housing allowances offer households considerable choice in selecting housing most appropriate to their needs--for example, where they live (opportunity to locate near schools, near work, near friends

---

[1] The other two experiments are the Housing Allowance Supply Experiment and the Administrative Agency Experiment.

or relatives, or to break out of racial and socioeconomic segregation) or the type of unit they live in (single-family or multifamily). Finally, housing allowances may be less costly to administer. Program requirements need not involve every detail of participant housing. The burden of obtaining housing that meets essential requirements is shifted from program administrators to participants.

These potential advantages have not gone unquestioned. Critics of the housing allowance concept have suggested that low-income households may lack the expertise necessary to make effective use of allowances; that the increased supply of housing needed for special groups such as the elderly will not be provided without direct intervention; and that an increase in the demand for housing without direct support for the construction of new units could lead to a substantial inflation of housing costs.[1]

If housing allowances prove desirable, they could be implemented through a wide range of possible allowance formulas, housing requirements, nonfinancial support (such as counseling), and administrative practices. The choice of program structure could substantially affect both the program's costs and impact.

The Demand Experiment addresses issues of feasibility, desirability, and appropriate structure by measuring how individual households (as opposed to the housing market or administrative agencies) react to various allowance formulas and housing standards requirements. The analysis and reports are designed to answer six policy questions:

1. Participation

   Who participates in a housing allowance program? How does the form of the allowance affect the extent of participation for various households?

2. Housing Improvements

   Do households that receive housing allowances improve the quality of their housing? At what cost? How do households

[1] The issue of inflation is being addressed directly as part of the Housing Allowance Supply Experiment.

that receive a housing allowance seek to improve their housing--by moving, by rehabilitation? With what success?

3. Locational Choice

For participants who move, how does their locational choice compare with existing residential patterns? Are there non-financial barriers to the effective use of a housing allowance?

4. Administrative Issues

What administrative issues and costs are involved in the implementation of a housing allowance program?

5. Form of Allowance

How do the different forms of housing allowance compare in terms of participation, housing quality achieved, locational choice, costs (including administrative costs), and equity?

6. Comparison with Other Programs

How do housing allowances compare with other housing programs and with income maintenance in terms of participation, housing quality achieved, locational choice, costs (including administrative costs), and equity?

The Demand Experiment tests alternative housing allowance programs to provide information on these policy issues. While the experiment is focused on household behavior, it also offers data on program administration to supplement information gained through the Administrative Agency Experiment. Finally, the Demand Experiment gathers direct information on participants and housing conditions for a sample of households in conventional HUD-assisted housing programs at the two experimental sites for comparison with allowance recipients.

I.2 DATA COLLECTION

The Demand Experiment was conducted at two sites--Allegheny County, Pennsylvania (Pittsburgh), and Maricopa County, Arizona (Phoenix). HUD selected these two sites from among 31 Standard Metropolitan Statistical Areas (SMSAs) on the basis of their growth rates, rental

vacancy rates, degree of racial concentration and housing costs. Pittsburgh and Phoenix were chosen to provide contrasts between an older, more slowly growing Eastern metropolitan area and a newer, relatively rapidly growing Western metropolitan area. In addition, Pittsburgh has a substantial black minority and Phoenix a substantial Spanish American minority population.

Most of the information on participating households was collected from:

> Baseline Interviews, conducted by an independent survey operation before households were offered enrollment;
>
> Initial Household Report Forms and monthly Household Report Forms, completed by participating households during and after enrollment, which provided operating and analytic data on household size and income and on housing expenditures.
>
> Supplements to the Household Report Forms, completed annually by participating households after enrollment, which provide data on assets, income from assets, actual taxes paid, income from self-employment, and extraordinary medical expenses;
>
> Payments and status data on each household maintained by the site offices;
>
> Housing Evaluation Forms, completed by site office evaluators at least once each year for every dwelling unit occupied by participants, which provide information on housing quality;
>
> Periodic Interviews, conducted approximately six, twelve, and twenty-four months after enrollment by an independent survey operation; and
>
> Exit Interviews, conducted by an independent survey operation for a sample of households that declined the enrollment offer or dropped out of the program.

Surveys and housing evaluations were also administered to a sample of participants in other housing programs: Public Housing, Section 23/8 Leased Housing, and Section 236 Interest Subsidy Housing.

Since households were enrolled throughout the first ten months of operations, the operational phase of the experiment extended over nearly four years in total. Analysis will be based on data collected from households during their first two years after enrollment in the experiment. The experimental programs were continued for a third year

in order to avoid confusion between participants' reactions to the experimental offers and their adjustment to the phaseout of the experiment. During their last year in the experiment eligible and interested households were aided in entering other housing programs.

I.3 ALLOWANCE PLANS USED IN THE DEMAND EXPERIMENT

The Demand Experiment tested a number of combinations of payment formulas and housing requirements and several variations within each of these combinations. These variations allow some possible program designs to be tested directly. More importantly, they allow estimation of key responses such as participation rates and changes in participant housing in terms of basic program parameters such as the level of allowances; the level and type of housing requirements; the minimum fraction of its own income that a household can be expected to contribute toward housing; and the way in which allowances vary with household income and rent. These response estimates can be used to address the policy questions for a larger set of candidate program plans, beyond the plans directly tested.[1]

Payment Formulas

Two payment formulas were used in the Demand Experiment--Housing Gap and Percent of Rent.

Under the Housing Gap formula, payments to households constitute the difference between a basic payment level, C, and some reasonable fraction of family income. The payment formula is:

$$P = C - bY$$

where P is the payment amount, C is the basic payment level, "b" is the rate at which the allowance is reduced as income increases, and Y is

---

[1]The basic design and analysis approach, as approved by the HUD Office of Policy Development and Research, is presented in Abt Associates Inc., Experimental Design and Analysis Plan of the Demand Experiment, Cambridge, Mass., August 1973, and in Abt Associates Inc., Summary Evaluation Design, Cambridge, Mass., June 1973. Details of the operating rules of the Demand Experiment are contained in Abt Associates Inc., Site Operating Procedures Handbook, Cambridge, Mass., April 1973.

the net family income.[1] The basic payment level, C, varies with household size, and is proportional to C*, the estimated cost of modest existing standard housing at each site.[2] Thus, payment under the Housing Gap formula can be interpreted as making up the difference between the cost of decent housing and the amount of its own income that a household should be expected to pay for housing.[3]

Under the Percent of Rent formula, the payment is a percentage of the household's rent. The payment formula is:

$$P = aR$$

where R is rent and "a" is the fraction of rent paid by the allowance. In the Demand Experiment the value of "a" remained constant once a household had been enrolled.[4]

Housing Requirements

The Percent of Rent payment formula is tied directly to rent: a household's allowance payment is proportional to the total rent. Under the Housing Gap formula, however, specific housing requirements are needed to tie the allowance to housing. Two types of housing requirement were used: Minimum Standards and Minimum Rent.

---

[1] In addition, whatever the payment calculated by the formula, the actual payment cannot exceed the rent paid.

[2] The housing cost parameter, C*, was established from estimates given by a panel of qualified housing experts in Pittsburgh and Phoenix. For more detailed discussion regarding the derivation of C*, refer to Abt Associates Inc., Working Paper on Early Findings, Cambridge, Mass., January 1975, Appendix II.

[3] As long as their housing met certain requirements (discussed below), Housing Gap households could spend more or less than C* for housing, as they desired, and hence contribute more or less than "b" of their own income. This is in contrast to other housing programs, such as Section 8 (Existing).

[4] Five values of "a" were used in the Demand Experiment. Once a family had been assigned its "a" value, the value generally stayed constant in order to aid experimental analysis. In a national Percent of Rent program, "a" would probably vary with income and/or rent. Even in the experiment, if a family's income rose beyond a certain point, the value of "a" dropped rapidly to zero. Similarly, the payment under Percent of Rent could not exceed C* (the maximum payment under the modal Housing Gap plan), which effectively limited the rents subsidized to less than C*/a.

Under the Minimum Standards requirement, participants received the allowance payment only if they occupied dwellings that met certain physical and occupancy standards. Participants occupying units that did not meet these standards either had to move or arrange to improve their current units to meet the standards. Participants already living in housing that met standards could use the allowance to pay for better housing or to reduce their rent burden (the fraction of income spent on rent) in their present units.

If housing quality is broadly defined to include all residential services, and if rent levels are highly correlated with the level of services, then a straightforward housing requirement (one that is relatively inexpensive to administer) would be that recipients spend some minimum amount on rent. Minimum Rent was considered as an alternative to Minimum Standards in the Demand Experiment, in order to observe differences in response and cost and to assess the relative merits of the two types of requirements. Although the design of the experiment used a fixed minimum rent for each household size, a direct cash assistance program could employ more flexible structures. For example, some features of the Percent of Rent formula could be combined with the Minimum Rent requirement. Instead of receiving a zero allowance if their rent is less than the Minimum Rent, households might be paid a fraction of their allowance depending on the fraction of Minimum Rent paid.

Allowance Plans Tested

The three combinations of payment formulas and housing requirements used in the Demand Experiment were Housing Gap Minimum Standards, Housing Gap Minimum Rent, and Percent of Rent. A total of 17 allowance plans were tested.

The twelve Housing Gap allowance plans are shown in Table I-1. The first nine plans include three variations in the basic payment level, C (1.2C*, C*, and 0.8C*) and three variations in housing requirements (Minimum Standards, Minimum Rent Low (0.7C*), and Minimum Rent High (0.9C*)). The value of "b"--the rate at which the allowance is reduced as income increases--is 0.25 for each of these plans. The next two

plans have the same level of C (C*) and use the Minimum Standards Housing Requirement, but use different values of "b". In the tenth plan the value of "b" is 0.15, and in the eleventh plan, 0.35. Finally, the twelfth plan is unconstrained, that is, it has no housing requirement. This unconstrained plan allows a direct comparison with a general income-transfer program.

Eligible households that did not meet the housing requirement were still able to enroll. They received full payments whenever they met the requirements during the three years of the experiment. Even before meeting the housing requirements, such households received a cooperation payment of $10 per month as long as they completed all reporting and interview requirements.

Within the Housing Gap design, the average effects of changes in the allowance level or housing requirements can be estimated for all the major responses. In addition, interactions between the allowance level and the housing requirement can be assessed. Responses to variations in the allowance/income schedule (changes in "b") can be estimated for the basic combination of the Minimum Standards housing requirement and payments level of C*.

The Percent of Rent allowance plans consist of five variations in "a" (the proportion of rent paid to the household), as shown in Table I-1.[1] A demand function for housing is estimated primarily from the Percent of Rent observations. Demand functions describe the way in which the amount people will spend on housing is related to their income, the relative price of housing and other goods, and various demographic characteristics. Such functions may be used to simulate response to a variety of possible rent subsidy programs not directly tested within the Demand Experiment. Together with estimates of supply response, they may also be used to simulate the change in market prices and housing expenditures over time due to shifts in housing demand or costs.

---

[1] Designation of multiple plans for the same "a" value reflects an early assignment convention and does not indicate that the households in these plans were treated differently for either payment purposes or analysis.

Table I-1
ALLOWANCE PLANS TESTED

HOUSING GAP: ($P = C - bY$, where C is a multiple of C*)

b VALUE	C LEVEL	HOUSING REQUIREMENTS			
		Minimum Standards	Minimum Rent Low = 0.7C*	Minimum Rent High = 0.9C*	No Requirement
b = 0.15	C*	Plan 10			
b = 0.25	1.2C*	Plan 1	Plan 4	Plan 7	
	C*	Plan 2	Plan 5	Plan 8	Plan 12
	0.8C*	Plan 3	Plan 6	Plan 9	
b = 0.35	C*	Plan 11			

Symbols: b = Rate at which the allowance decreases as the income increases.
C* = Basic payment level (varied by family size and also by site).

PERCENT OF RENT ($P = aR$) :

a = 0.6	a = 0.5	a = 0.4	a = 0.3	a = 0.2
Plan 13	Plans 14 - 16	Plans 17 - 19	Plans 20 - 22	Plan 23

CONTROLS:

With Housing Information	Without Housing Information
Plan 24	Plan 25

Control Groups

In addition to the various allowance plans, control groups were necessary in order to establish a reference level for responses, since a number of uncontrolled factors could also induce changes in family behavior during the course of the experiment. Control households received a cooperation payment of $10 per month. They reported the same information as families that received allowance payments, including household composition and income; they permitted housing evaluations; and they completed the Baseline Interview and the three Periodic Interviews. (Control families were paid an additional $25 fee for each Periodic Interview.)

Two control groups were used in the Demand Experiment. Members of one group (Plan 24) were offered a Housing Information Program when they joined the experiment and were paid $10 for each of five sessions attended. (This program was also offered to households enrolled in the experimental allowance plans but they were not paid for their attendance.) The other control group (Plan 25) was not offered the Housing Information Program.

All the households in the various allowance plans had to meet a basic income eligibility requirement. This limit was approximately the income level at which the household would receive no payment under the Housing Gap formula:

$$\text{Income Eligibility Limit} = \frac{C^*}{0.25}$$

In addition, households in plans with lower payment levels (Plans 3, 6, 9 and 11) had to have incomes low enough at enrollment to receive payment under these plans. Finally, only households with incomes in the lower third of the eligible population were eligible for enrollment in Plan 13, and only those in the upper two-thirds were eligible for Plan 23.

I.4 FINAL SAMPLE

Final analysis of the impact of the housing allowance will be based on the first two years of experimental data. Thus, the key sample size

for this report and the other reports in this series is the number of households in the experiment at the end of the first two years. The two-year sample size is shown in Table I-2, and comprises households that were still active, in the sense that they were continuing to fulfill reporting requirements. The sample size for a particular analysis may be smaller. For example, analysis of the housing expenditures of movers uses only those households that moved during the first two years after enrollment.

Table I-2

SAMPLE SIZE AFTER TWO YEARS

HOUSING GAP: (P = C - bY, where C is a multiple of C*)

b VALUE	C LEVEL	HOUSING REQUIREMENTS			
		Minimum Standards	Minimum Rent Low = 0.7C*	Minimum Rent High = 0.9C*	No Requirement
b = 0.15	C*	Plan 10 PIT = 45 PHX = 36			
b = 0.25	1.2C*	Plan 1 PIT = 33 PHX = 30	Plan 4 PIT = 34 PHX = 24	Plan 7 PIT = 30 PHX = 30	
	C*	Plan 2 PIT = 42 PHX = 35	Plan 5 PIT = 50 PHX = 39	Plan 8 PIT = 44 PHX = 44	Plan 12 PIT = 63 PHX = 40
	0.8C*	Plan 3 PIT = 43 PHX = 39	Plan 6 PIT = 44 PHX = 35	Plan 9 PIT = 43 PHX = 35	
b = 0.35	C*	Plan 11 PIT = 41 PHX = 34			

Total Housing Gap: 512 households in Pittsburgh, 421 households in Phoenix

Symbols: b = Rate at which the allowance decreases as the income increases
C* = Basic payment level (varied by family size and also by site)

PERCENT OF RENT (P = aR):

a = 0.6	a = 0.5	a = 0.4	a = 0.3	a = 0.2
Plan 13 PIT = 28 PHX = 21	Plans 14 - 16 PIT = 109 PHX = 81	Plans 17 - 19 PIT = 113 PHX = 66	Plans 20 - 22 PIT = 92 PHX = 84	Plan 23 PIT = 65 PHX = 46

Total Percent of Rent: 407 households in Pittsburgh, 298 households in Phoenix

CONTROLS.

With Housing Information	Without Housing Information
Plan 24 PIT = 159 PHX = 137	Plan 25 PIT = 162 PHX = 145

Total Controls: 321 households in Pittsburgh, 282 households in Phoenix.

NOTE: This sample includes households that were active, although not necessarily receiving payments, after two years of enrollment; households whose enrollment income was above the eligibility limits or that moved into subsidized housing or their own homes are excluded. While data on the excluded households may be useful for special analyses, particular analyses may also require the use of a still more restricted sample than the one shown here.

APPENDIX II

DESCRIPTION OF THE ANALYTIC SAMPLES

This appendix discusses the criteria by which households were selected for the analytic samples used in this report and explores some of the factors which affect the inclusion of households in the samples. In addition, since the final analytic samples are smaller than the original samples of verified households at enrollment and reverification, the comparability between the final samples and the original samples is examined.

All samples exclude households enrolled with incomes above the eligibility limit. Most households were not allowed to enroll in the experiment if their verified income exceeded the eligibility limit for their treatment group.[1] Near the end of the enrollment period, however, a number of households were allowed to enroll before their income was verified; in some of these cases income was verified above the eligibility limit.

The primary criteria by which households were selected for particular analytic samples are listed in Tables II-1 and II-2. The criteria differ slightly by enrollment and reverification, due to the difference in the verification process at these two points.[2] At both enrollment and reverification, the sample of households with incomes below the eligibility limit was reduced by eliminating households for which third-party verification could not be carried out (i.e., households with no verifiable income or that could not be contacted due to a move out of county) and households with data problems that would cause misinterpretation of the type of income present or of the rates of completeness of verification (for example, coding problems that indicated a household was completely verified when in fact a source of income had been overlooked). At enrollment, this produced a sample of 1,249 households in Pittsburgh and 1,330 in Phoenix; at reverification the samples totalled 839 in Pittsburgh and 772 in Phoenix. Much of the analysis of the administrative feasibility of income verification (Chapter 5) uses these samples.

---

[1] See Appendix III for a detailed explanation of the determination of initial income eligibility status.

[2] See Chapters 2 and 5 for a discussion of these differences.

Table II-1

VERIFICATION SAMPLE AT DIFFERENT LEVELS OF COMPLETENESS, AT ENROLLMENT

SAMPLE	PITTSBURGH		PHOENIX	
	NUMBER OF HOUSEHOLDS	NUMBER OF HOUSEHOLDS AS A PERCENTAGE OF PREVIOUS SAMPLE[a]	NUMBER OF HOUSEHOLDS	NUMBER OF HOUSEHOLDS AS A PERCENTAGE OF PREVIOUS SAMPLE[a]
Total number of households contacted for verification	1,321	100 0%	1,372	100 0%
Excluding households with enrollment incomes above the eligibility limits	1,267	95.9	1,347	93 2
Excluding households with no verifiable income	1,255	99.0	1,346	99 9
Excluding households with problems in the verification process or forms[b]	1,249	99.5	1,330	98 8
Total number of households contacted for verification, excluding households with enrollment incomes above the eligibility limits, those with no verifiable income, and those with problems in verification process or forms	1,249	100.0%	1,330	100 0%
Excluding households that lacked a third-party response for at least one source	1,121	89.8	895	67 3
Excluding households with incomplete information on at least one third-party response	985	87.9	605	67.6
Excluding households with Initial Household Report Form (IHRF) problem or problem in mapping IHRF and verification forms[c]	975	99.0	600	99 2
Excluding households with missing values for any reported verifiable income	961	98.5	600	100.0

SAMPLE All enrolled households contacted for verification.

DATA SOURCES Initial Household Report Form, Income Verification Form.

a Number of households as a percentage of previous sample indicates what percentage of the previous sample remained after selected households were excluded.

b Problems in the verification process or forms were errors such as in coding the verification form.

c Problems in the Initial Household Report Form refer mainly to coding or data base problems Mapping problems occurred when the number and type of sources covered on the Verification Forms did not match those reported on the IHRF.

Table II-2

REVERIFICATION SAMPLE AT DIFFERENT LEVELS OF COMPLETENESS

SAMPLE	PITTSBURGH		PHOENIX	
	NUMBER OF HOUSEHOLDS	NUMBER OF HOUSEHOLDS AS A PERCENTAGE OF PREVIOUS SAMPLE[a]	NUMBER OF HOUSEHOLDS	NUMBER OF HOUSEHOLDS AS A PERCENTAGE OF PREVIOUS SAMPLE[a]
Total number of households selected for reverification	907	100.0%	845	100.0%
Excluding households with enrollment incomes above the eligibility limits	851	93.8	820	97.0
Excluding households that could not be located or had moved out of county	851	100.0	799	97.4
Excluding households with no verifiable income	839	98.6	772	96.6
Total number of households contacted for reverification, excluding households with enrollment incomes above the eligibility limits and those with no verifiable income	839	100.0	772	100 0
Excluding households that refused verification	799	95.2	754	97.7
Excluding households that lacked a third-party response for at least one source	750	93.9	661	87.7
Excluding households with incomplete information on at least one third-party response	750	100.0	661	100.0
Excluding households with Household Report Form problems or problems in mapping the Household Report Form and Income Reverification Forms[b]	743	99.1	632	95.6
Excluding households that had reporting period problems	740	99.6	625	98.9

SAMPLE: All enrolled households selected for reverification.

DATA SOURCES. Household Report Form, Income Reverification Form.

a. Number of households as a percentage of previous sample indicates what percentage of the previous sample remained after selected households were excluded

b. Household Report Form problems were problems in coding and transferring the information to the data files. Mapping problems occurred when the number and type of sources covered on the Reverification Forms did not match those reported on the Household Report Forms.

For the analyses of reporting errors (Chapters 3 and 4) a more stringently defined sample was required: the analysis concerns only households for which total verified income could be derived. For analytic purposes, then, a key concern is whether households were completely verified, i.e., whether each household member agreed to be verified and whether all income sources for the household responded with full and useable information so that total verified household income could be calculated. The rate of success of verifying income with respect to household and third-party responses for each source of income was discussed in Chapter 5; the number of complete and useable responses from all sources for each household indicates the degree of completeness achieved at the household level.

For this sample at enrollment, responses to requests for information were received from all third-party sources for 90 percent of Pittsburgh households and 67 percent of Phoenix households (see Table II-1). Of these households, 88 percent in Pittsburgh and 68 percent in Phoenix had responses with complete and useable information. At each site, 1 percent of this sample with complete and useable third-party information was excluded due to data problems on the Initial Household Report Form or Income Verification Form (such as matching information across the two forms) or to missing values for any type of reported verifiable income.

At reverification, although the sample was also reduced for the analysis of reporting errors, the percentage of households lost was lower than at enrollment (see Table II-2). At enrollment, 21 percent of the households in Pittsburgh and 54 percent in Phoenix were eliminated due to lack of complete or useable third-party responses. At reverification, only 6 percent of Pittsburgh households and 12 percent of the Phoenix households were eliminated by these criteria. This improvement is not surprising since, as discussed in Chapter 5, modifications to the verification process resulted in higher response rates for most sources at reverification and enabled the collection of useable information for 100 percent of the sources with responses.

In examining the completeness of verification at the household level, three factors should be noted. First, it is clear that, as one would expect, the more sources of income a household has, the less likely it is that every one of them will be verified (see Tables II-3 and II-4). The difference in the

Table II-3

EXTENT OF RESPONSE AT ENROLLMENT
BY NUMBER OF INCOME SOURCES

TYPE OF INCOME	NUMBER OF SOURCES OF THAT TYPE	PERCENTAGE OF HOUSEHOLDS WITH THIRD-PARTY RESPONSE FOR ALL INCOME SOURCES OF THAT TYPE			
		PITTSBURGH	(N)[a]	PHOENIX	(N)[a]
Wages	1	91%	(403)	81%	(390)
	2	79	(86)	71	(275)
	3 or more	61	(46)	52	(326)
Social Security	1	98	(337)	84	(265)
	2 or more	89	(46)	86	(50)
Supplemental Security Income	1	100	(30)	78	(96)
	2 or more	[100]	(1)	89	(18)
Welfare	1	98	(604)	81	(207)
	2 or more	85	(27)	62	(24)
Pension	1	87	(147)	74	(106)
	2 or more	[50]	(10)	[57]	(14)
All Types	1	97	(690)	85	(414)
	2	88	(400)	73	(445)
	3 or more	70	(158)	51	(465)
ALL HOUSEHOLDS		90	(1,248)	69	(1,324)

SAMPLE: All enrolled households contacted for verification, excluding those with no verifiable income, those with enrollment incomes above the eligibility limits, those with problems in verification forms, and those with only self-employment income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

a. (N) = the number of households in the base population.

NOTE: Brackets indicate entries based on 15 or fewer observations.

Table II-4

EXTENT OF RESPONSE AT REVERIFICATION
BY NUMBER OF INCOME SOURCES

TYPE OF INCOME	NUMBER OF SOURCES OF THAT TYPE	PERCENTAGE OF HOUSEHOLDS WITH THIRD-PARTY RESPONSE FOR ALL INCOME SOURCES OF THAT TYPE[a]			
		PITTSBURGH	(N)[b]	PHOENIX	(N)[b]
Wages	1	87%	(268)	92%	(359)
	2	71	(42)	74	(83)
Social Security	1	94	(216)	85	(188)
	2 or more	98	(41)	88	(40)
Supplemental Security Income	1	95	(56)	86	(51)
	2	[100]	(7)	[83]	(12)
Welfare	1	92	(342)	91	(113)
	2	[100]	(7)	[82]	(11)
Pension	1	94	(95)	87	(77)
	2	[100]	(9)	[62]	(8)
Unemployment Compensation	1	90	(31)	92	(75)
	2	--	--	[100]	(5)
All Types	1	90	(536)	94	(425)
	2	89	(236)	78	(276)
	3 or more	85	(67)	73	(63)
ALL HOUSEHOLDS		89	(839)	86	(764)

SAMPLE: All enrolled households contacted for reverification, excluding those with no verifiable income, those with enrollment incomes above the eligibility limits, and those with only self-employment income.

DATA SOURCES: Household Report Form, Income Reverification Form.

a. The extent of complete response here indicates the extent of response received from both households and third parties. The few households refusing to be reverified are included to indicate the overall extent of complete responses received for all income sources of each type.

b. (N) = the number of households in the base population.

NOTE: Brackets indicate entries based on 15 or fewer observations.

completion rates between the sites at enrollment (90 percent of Pittsburgh households had third-party responses from all sources, compared to 67 percent of Phoenix households) is partly due to this factor. In Pittsburgh, only 13 percent of the households had three or more sources of income, compared with 35 percent in Phoenix. Similarly, 75 percent of Phoenix households had wage income, where the pattern is most striking, versus 43 percent of Pittsburgh households.

Second, it is likely that the necessity for placing a limit on the amount of elapsed time for verification also affected the completion rates. As discussed in Chapters 2 and 5, the procedural rules at enrollment and reverification allowed a household to be enrolled or to be considered verified when no response from a source arrived within two months after the request was sent (both verifications) or when responses had been received from sources accounting for 80 percent of declared verifiable income (enrollment only). The figures in Tables II-1 through II-4 may therefore overestimate somewhat the difficulty of fully verifying households.

Third, the analytic definition of completeness, with its stringent requirements for quality of information, eliminated 14 percent of households with full third-party response at enrollment in Pittsburgh and 33 percent in Phoenix. Many of these non-useable third-party responses had income amounts present but did not specify the period of time for which the income was reported. Others that provided monthly breakdowns of income contained at least one missing month of data. At reverification, more detailed reverification forms and more frequent recontact of employers and agencies when incomplete information was returned caused only 1 percent of households with full third-party response to be eliminated in Pittsburgh and 4 percent in Phoenix.

After completely verified households were selected for the sample, a final exclusion was made of households that had data problems which would cause misinterpretation of reporting error (for example, different reporting periods at reverification or coding problems on the Household Report Forms or Verification Forms).[1]

[1]Data problems can occur in coding and keypunching the Household Report Forms or Income Verification Forms. During construction of the Verification data files, most of these errors were corrected. For a small number of households, however, the errors could not be resolved. These households were eliminated from the analytic sample.

Since the final samples for the analyses of reporting errors are smaller than the number of households for which verification was attempted at both enrollment and at reverification, the two samples were compared to determine whether the final sample is sufficiently representative of the original sample. At enrollment, the cumulative effect of nonresponse and incomplete responses is to reduce the proportion of the sample with wage and salary income from 42 percent to 37 percent in Pittsburgh and from 74 percent to 63 percent in Phoenix (see Table II-5). Because households with wage and salary income more commonly have multiple sources of income, the proportion of multiple-source households is also lower. The final sample at reverification appears to be representative of the original sample of households to be reverified (see Table II-6). The proportion of households with each type of income remains relatively constant from the original sample to the final analytic sample.

Table II-5

INCIDENCE OF INCOME TYPES
AT ENROLLMENT

TYPE OF INCOME	PITTSBURGH		PHOENIX	
	ALL HOUSEHOLDS	HOUSEHOLDS USED IN ANALYSIS OF REPORTING ERRORS AND IN THE FINAL EQUATIONS	ALL HOUSEHOLDS	HOUSEHOLDS USED IN ANALYSIS OF REPORTING ERRORS AND IN THE FINAL EQUATIONS
Wages	41.5%	36.5%	74.0%	63.4%
Social Security	30.1	32.0	23.5	27.2
Supplemental Security Income	2.5	2.6	8.3	9.1
Welfare	49.6	51.7	17.3	18.8
Pensions	12.1	11.3	8.9	7.8
SAMPLE TOTAL	(1261)[a]	(899)[b]	(1330)[a]	(536)[b]

SAMPLE: All enrolled households contacted for verification, excluding those with enrollment incomes above the eligibility limits.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

a. This sample is smaller than the original sample of households selected for verification due to exclusion of households that had data problems.

b. This sample is smaller than the final sample contained in Table VI-1 due to exclusion of households that had missing values for any of the interview or demographic data used in the final equations.

Table II-6

INCIDENCE OF INCOME TYPES
AT REVERIFICATION

TYPE OF INCOME	PITTSBURGH		PHOENIX	
	ALL REVERIFIED HOUSEHOLDS	HOUSEHOLDS USED IN ANALYSIS OF REPORTING ERRORS	ALL REVERIFIED HOUSEHOLDS	HOUSEHOLDS USED IN ANALYSIS OF REPORTING ERRORS
Wages	34.6%	33.9%	55.5%	55.9%
Social Security	3.15	31.6	26.6	27.9
Supplemental Security Income	7.0	6.8	6.9	7.1
Welfare	40.8	41.4	15.7	15.9
Pensions	12.4	12.6	10.1	9.0
Unemployment	3.4	3.4	10.4	10.3
SAMPLE TOTAL	(769)	(729)[a]	(683)	(603)[a]

SAMPLE: All enrolled households selected for reverification, excluding those with enrollment incomes above the eligibility limits, those with no verifiable income, or those with data problems.

DATA SOURCES: Household Report Form, Income Reverification Form.

a. This sample is smaller than the final sample contained in Table VI-2 due to exclusion of households that had missing values for any of the interview or demographic data used in the final equations.

APPENDIX III

MAJOR VARIABLES USED IN THE ANALYSIS

Section III.1 describes the major variables used in the analysis. Section III.2 summarizes the data sources used to derive each of these variables.

III.1 MAJOR VARIABLES

Household Characteristics

Household characteristics describe the household at enrollment and reverification. All demographic and some income characteristics describe the household for the month in which verification was initiated; other income characteristics cover the past year of income, ending with the month in which verification was initiated.

Household Size - The definition of household size corresponds to the program definition of household size used to determine eligibility and payments. It includes all persons living with the household except roomers, boarders, and lodgers.

Female Head of Household - (A dummy variable, equal to 1 if head of household is female, 0 if head is male). The census convention was used to determine the head of household: unless the household has a single female head, it is classified as having a male head. To establish the census head of household, the sex and relationship of each household member to the designated head were checked. If the designated head was female and a male spouse was present, the census head of household was considered male.

Age of Head of Household - Age is derived from date of birth information for the individual identified as the census head of household.

Minority Household - (A dummy variable, equal to 1 if household is minority, 0 if nonminority.) Race of the household is based on interviewer observations of the main respondent to the Baseline Interview. The observations are modified to be consistent with site-specific U.S. Census conventions: a household was designated as Spanish American if its surname matched a name on the list of over 8,000 Spanish surnames used by the U.S. Census to identify Spanish American households. To determine whether the household was minority, the following categories of minority identification were used: minority--black, Spanish American, American Indian, other minority.

Net Income for Eligibility - Net income for eligibility defines an annual net disposable income for eligibility and payment purposes which is easily and accurately measured and which is defined as equitably as possible for demographically different households that receive income from a variety of sources. Net income for eligibility was derived by adding the annual incomes of all household members who were at least 18 years of age, and subtracting taxes, work-related expenses, alimony paid, and major medical expenses. Table III-1 compares this definition with the census definition and the analytic definition of income (which is used in a number of other Demand Experiment reports).

Major Source of Income in Net Income for Eligibility - The major source of income is defined as the largest amount of the four classifications of income: Earned Income, Income-Conditioned Transfers, Other Transfers or Other Income. See Table III-1 for identification of the specific income items contained within each classification.

Declared Income - Declared income refers to the income reported by the household on the Initial and monthly Household Report Forms.

Verified Income - Verified income refers to payments to the household reported by third parties on the Verification Forms.

Declared Verifiable Income - The amount of declared verifiable income is defined as the total amount of income reported by the household during the past year (verification at enrollment) or in the current month (reverification) for each source of verifiable income. Incomes considered verifiable are:[1] wages and salaries, welfare, Supplemental Security Income, Social Security, pensions, and Unemployment Compensation (reverification only).

Total Verified Income - Total verified income is defined as the total amount of household income verified by third parties for the past year (enrollment) or for the current month (reverification) for all sources of verifiable income (see above for list of types of verifiable income).

Total Income - Total income is defined as the sum of total verified income plus total unverifiable income. See above for list of the types of verifiable income. Income types considered unverifiable are: Workmen's Compensation, alimony received, educational grants, income from charities, other regular sources of income, and Unemployment Compensation (verification at enrollment only).

---

[1]Self-employment income was verified but is excluded from analysis, since it did not have third-party verification.

Table III-1

COMPONENTS INCLUDED IN THE DEFINITION OF NET INCOME FOR ANALYSIS AND COMPARISON WITH CENSUS AND PROGRAM ELIGIBILITY DEFINITIONS

COMPONENTS	NET INCOME FOR ELIGIBILITY	NET INCOME FOR ANALYSIS	CENSUS (GROSS INCOME)
I. GROSS INCOME			
A. Earned Income			
1. Wages and Salaries	X	X	X
2. Net Business Income	X	X	X
B. Income-Conditioned Transfers			
1. Aid for Dependent Children	X	X	X
2. General Assistance	X	X	X
3. Other Welfare	X	X	X
4. Food Stamps Subsidy	-	X*	-
C. Other Transfers			
1. Supplemental Security Income (Old Age Assistance, Aid to the Blind, Aid to the Disabled)	X	X	X
2. Social Security	X	X	X
3. Unemployment Compensation	X	X	X
4. Workmen's Compensation	X	X	X
5. Government Pensions	X	X	X
6. Private Pensions	X	X	X
7. Veterans Pensions	X	X	X
D. Other Income			
1. Education Grants	X	X	X
2. Regular Cash Payments	X	X	X
3. Other Regular Income	X	X	X
4. Alimony Received	X	X	X
5. Asset Income	X*	X*	X*
6. Income from Roomers and Boarders	-	-	X
II. GROSS EXPENSES			
A. Taxes			
1. Federal Tax Withheld	X*	X*	-
2. State Tax Withheld	X*	X*	-
3. FICA Tax Withheld	X*	X*	-
B. Work-Conditioned Expenses			
1. Child Care Expenses	X	-	-
2. Care of Sick at Home	X	-	-
3 Work Related Expenses	X*	-	-
C. Other Expenses			
1. Alimony Paid Out	X	X	-
2. Major Medical Expenses	X	-	-

*The amounts of these income and expense items are derived using data reported by the household. All other amounts are included in the income variables exactly as reported by the household.

Wages as Major Type of Income - A dummy variable, equal to 1 if the single largest source of verified income was wages, and equal to 0 if the largest source was some other type of income.

Stable Income Type as Major Income Type - A dummy variable, equal to 1 if the single largest source of verified income was pension, Social Security, or S.S.I. and equal to 0 if the largest source was some other type of income.

Reporting Error - The reporting error is defined as the difference between reported and verified incomes: Reporting error = (total declared verifiable income) - (total verified income). It is valid only for households that were completely verified, i.e., all sources of verifiable income have both a declared and a verified amount present.

Number of Sources of Verifiable Income - The number of sources of verifiable income for a household is defined as the total number of sources of verifiable income reported by all household members.

Number of Household Members with Verifiable Income - The number of household members with verifiable income is the sum of all household members 18 years of age or older who reported receiving income from at least one source of verifiable income.

Program Status Variables

Income Eligibility Status at Enrollment - The value of this variable (overincome/not overincome) indicates whether the household was enrolled within the income eligibility limits for its assigned treatment group (Experimental households) or within the modal eligibility limit (Control households). For most of the enrollment period, an Experimental household was not allowed to enroll unless its reported income was completely verified and a net income for eligibility was calculated as being within the eligibility limit for the household's treatment group (see Table III-2 for the site- and household size-specific tables used for eligibility limits). Toward the end of the enrollment period, however, some households were enrolled on the basis of reported income. If a household's income was later verified as over the eligibility limits, the household was regarded as overincome. Control households were coded as overincome if their income exceeded the modal eligibility limits (even though the actual limits applied to them during enrollment were higher). This variable therefore identified higher-income households that might cause a bias in the initial income distribution of enrolled households.

Data were collected in several ways. Experimental households that were verified as overincome were identified by the site offices. Control households with incomes above modal eligibility limits were identified from Household Event List data.[1] Only a 20 percent

[1] See Section III.2 for a description of Household Event List data.

Table III-2

INCOME ELIGIBILITY LIMITS AT ENROLLMENT

DESIGN POINT	HOUSEHOLD SIZE 1	2	3,4	5,6	7+
	PITTSBURGH				
Modal Income Eligibility Limits[a]	$5,050	$5,800	$6,750	$7,700	$9,150
TG 3,6,9	4,050	4,650	5,400	6,150	7,300
TG 11	3,750	4,250	4,950	5,650	6,650
TG 13	3,002	3,600	4,537	5,060	5,257
TG 24, 25[b]	12,500	12,500	12,500	12,500	12,500
	PHOENIX				
Modal Income Eligibility Limits[a]	$6,000	$7,450	$8,650	$10,600	$12,750
TG 3,6,9	4,800	5,950	6,950	8,450	10,200
TG 11	4,450	5,450	6,350	7,700	9,250
TG 13	2,700	4,100	4,500	4,700	5,400
TG 24, 25[b]	15,500	15,500	15,500	15,500	15,000

a. The following treatment groups are assessed in relation to these figures: TG = 1, 2, 4, 5, 7, 8, 10, 12, 14-23. Refer to the summary experimental design in Appendix I for identification of these groups.

b. These amounts were used as criteria in the actual enrollment process. Note, however, that households in these treatment groups are considered to be overincome for this income eligibility status at enrollment if their income is greater than the Model Income Eligibility Limits.

NOTE: TG = assigned treatment group. Indicated amounts are $500 greater than formal eligibility limits. A $500 margin of error is allowed. Only households with incomes more than $500 above the formal limits are considered to be overincome.

sample of Control households went through income verification. Therefore, the incomes for Control households reported on the Household Event List, from which regular eligibility was determined, were either the verified amount or that reported by the household on the Initial Household Report Form.

Current Status - Status of the household at the time of enrollment or at reverification is defined as one of the following:

Active

Full Payments
Minimum Payments

Inactive, reactivated for later cycles (for example, households that moved out of county and then moved back into the county)

Inactive, never reactivated in later cycles

Terminated.

Reasons for minimum-payments status are:

Household owns home
Household lives in subsidized housing
Rent receipt not returned
Failure to meet housing requirements (Housing Gap Minimum Rent and Minimum Standards groups only).

Reasons for inactive or terminated status are:

Move out of county
Ineligible household composition
Residing in institution
Cannot locate
Periodic Interview refused
Housing Evaluation refused
Missing Evaluation refused
Missing Household Report Forms
New household members refused to comply with requirements.

Additional reasons for termination are:

Household deceased
Ineligible household split
Fraud
Received ineligible relocation benefits
Termination other (conflict of interest)
Reverification refused
Quit (voluntary termination).

The Verification Process and Impact

Method of Verification - The method by which reported income was verified is defined as the type of information response initially received from the third party. Telephone calls that third parties made to site staff to ask questions about the request for information are not regarded as initial information responses. Likewise, if the site received a standard verification form completed by the third party, and had to telephone the third party to clarify the information, the method of verification is considered to be the standard request form, not the telephone recontact. Methods of verification are classified as:

Standard request form (see Appendix VIII for copies of these forms)
Nonstandard request form (i.e., agency's or employer's own form or letter containing the requested information)
Telephone contact
Other (W-2 forms, pay stubs, paychecks).

Status of Verification - The status of verification determines the level of response achieved in attempting to verify each income source. Status of verification is classified by the categories listed below. An asterisk (*) denotes a status applicable only at reverification.

Verification not completed:

*Household cannot be located (moved out of county, missing address)
*Household has terminated from the program
*Household refuses verification--no waiver form has been received from the household
Agency/employer has not responded--no income information has been received.

Verification complete:

Waiver form has been received from household and a response has been received from agency/employer.[1]

---

[1]This is the operational definition of complete verification. The analytic definition of a completely verified household requires that all responses received from agencies/employers contain complete and usable information.

Payment Change - To translate reporting error into an estimate of payment error or payment change, the payment formula of the modal Housing Gap treatment group is used.[1] Under this formula, the amount of payment is equal to the difference between the cost of modest housing and 1/4 of the household's net eligibility income. Since any error in reporting net eligibility income would cause a payment change, the estimated payment change is 1/4 of the difference between the household's declared and verified income:

Payment change = 1/4(total declared income - total verifiable income)

Allocation Effect - The allocation effect is an estimate of the overall re-allocation of payments due to reporting error. It is the absolute value of the estimated payment change.

III.2 DATA SOURCES

Table III-3 indicates the data sources used for each variable defined in Section III.1. The data sources are described below.

Initial Household Report Form

All households that accepted the enrollment offer were required to fill in these forms prior to enrollment, generally during the enrollment interview. Initial Household Report Forms were completed between April 1973 and February 1974. Detailed information was collected on each household's composition, housing expenditures (rent, utilities, furnishings, and so forth), and asset holdings (savings bonds, stocks, and so forth), as of the time of the interview. Income data were collected for each of the previous 12 months for each type of income (e.g., wages, Social Security, welfare) for each household member 18 years of age or over. Household expenses (e.g., alimony, child care, medical) were also collected for the 12 most current months. Data from the Initial Household Report Form were used operationally to determine whether initial household composition and income eligibility requirements had been met. Analytically, these data have been used to describe the household's demographic characteristics and income just prior to participation in the program.

---

[1] See Appendix I for the design of the Demand Experiment.

Table III-3

DATA SOURCES USED TO DERIVE KEY VARIABLES

VARIABLE	DATA SOURCES
DEMOGRAPHIC CHARACTERISTICS	
Household size Female head of household Age of head of household	Initial Household Report Forms - enrollment Monthly Household Report Forms - reverification
Minority household	Baseline Interview
INCOME CHARACTERISTICS	
Net income for eligibility Major source of income in net income for eligibility Declared income Declared verifiable income Number of sources of verifiable income Number of household members with verifiable income	Initial Household Report Forms - enrollment Monthly Household Report Forms - reverification
Verified income Total verified income Wages as major type of income Stable income type as major income type	Income Verification or Reverification Forms
Total income Reporting error Total income Reporting error	Initial Household Report Forms - enrollment Monthly Household Report Forms - reverification Income Verification or Reverification Forms
PROGRAM STATUS VARIABLES	
Income eligibility status at enrollment	Initial Household Report Form, Household Events List
Current status	Payments File
THE VERIFICATION PROCESS AND IMPACT	
Method of verification Status of verification	Income Verification or Reverification Forms
Payment change	Initial Household Report Form or Household Report Form
Allocation effect	Income Verification or Reverification Forms

Monthly Household Report Forms

After households were enrolled, they were required to complete monthly Household Report Forms which collected detailed information on the household's composition, expenditures, rent, and income for the previous month. The information was similar to that collected on the Initial Household Report Form and was used to determine the household's monthly payment. Analytically, these data are used to describe the household's demographic characteristics and its total annual income in each month of participation.

Income Verification and Reverification Forms

After completing the Initial Household Report Form, all Experimental households and a 20 percent random sample of Control households were required to sign waiver forms allowing employers and agencies from which they received income to disclose income information. Verification forms were designed to collect third-party disclosures of income paid to a given household. Most forms were distributed prior to a household's enrolling in the program. After approximately 18 months of participation, a random sample of households was selected to undergo reverification. The occurrence of reverification for these households, as indicated by the program month of participation, is summarized in Table III-4. After receipt of the Household Report Form on which reverification was to be based, the household was contacted to sign waiver forms allowing third parties to disclose income information. Reverification forms, which differed slightly from the verification forms used at enrollment,[1] were sent to all third-party sources. Copies of the Income Verification and Reverification forms are contained in Appendix VIII.

Payments Data

After each monthly payment cycle, the household's current payment status, reasons for the status (if other than Full Payments status), payment period

[1] See Chapters 2 and 5 for a discussion of the differences between the forms used at Enrollment and Reverification.

Table III-4

OCCURRENCE OF REVERIFICATION
BY MONTH IN PROGRAM

MONTH OF PARTICIPATION IN THE PROGRAM	NUMBER OF HOUSEHOLDS SELECTED FOR REVERIFICATION	
	Pittsburgh	Phoenix
17	1	3
18	254	347
19	1	14
20	539	410
21	14	5
22	1	0
23	0	1
24	0	0
25	97	60
TOTAL	907	840
OVERLAPPED[a]	0	5

SAMPLE: All enrolled households selected for reverification.
DATA SOURCE: Income Reverification Form.
a. Parts of the reverification for these households took place in each of two consecutive months.

number, payment amount, and the intermediate variables used to calculate the payment were extracted from the operational payments system and entered into a permanent Payments File.

Baseline Interview

Baseline Interviews[1] were administered to all households before offers to enroll in the program occurred, and were completed between March 1973 and January 1974. Data were collected in the following general categories: housing expenditures and consumption; location and housing search; neighborhood and housing preferences and satisfaction; maintenance and upgrading; household composition; household assets, income, and expenses; and participation in other government programs. The interviews provided measures of the household's position prior to the experiment.

Periodic Interviews

Periodic Interviews were administered to all enrolled households at approximately six months, one year and two years after enrollment. Data were collected on a number of subjects included in either the Baseline Interview or the Exit Interviews. Subject areas included housing expenditures and consumption; location and housing search; preferences and satisfaction; maintenance and upgrading; and participation in other government programs. In addition, the Periodic Interviews included questions relating to participant expectations at the time of enrollment and impressions of various aspects of the program, such as the Housing Information Program, the housing and reporting requirements, and the amount and variability of the allowance payment.

[1]This interview, as well as the Exit Interview for Non-Participants, and the First, Second, and Third Periodic Interviews, were designed by Abt Associates Inc. and administered in the field by the National Opinion Research Center.

Exit Interview for Non-Participants

These interviews were administered to a sample of households that rejected the offer to enroll in the program and were completed between February and April 1974. Data were collected in the following general areas: reasons for not enrolling; attitudes toward program requirements; attitudes toward the subsidy; and effects of experimental requirements on enrollment.

The Household Events List

The Household Events List was the data source used to track households through the stages of enrollment. Operationally, these data were used to monitor the enrollment effort. The following steps in the enrollment process are recorded in the Household Events List: when the site office received the name and address of the household; when the contact letter was sent out; when the enrollment interview was completed; when a subsidy estimate was given; when the enrollment agreement was signed; when the Initial Household Report Form was completed; when verification was completed; and when the official enrollment letter was sent to the household. Reasons for not successfully completing enrollment were also recorded.

APPENDIX IV

TYPES OF INCOME REPORTED BUT NOT VERIFIED

In addition to income derived from wages and salaries, Social Security, welfare, Supplemental Security Income, and pensions (and Unemployment Compensation at reverification), households reported receiving

Alimony,

Workmen's Compensation,

Self-employment income, and

Other forms of income (such as education benefits, gifts, and income from charitable sources).

These types of income were not verified, either at enrollment or at reverification, primarily because of the administrative difficulty of obtaining third-party information or because they were infrequent or represented rather small amounts.[1] Alimony provides an extreme sample of possible difficulties. Careful verification would require obtaining sworn statements from both parties as to the amount paid, and this might, for example, be the subject of litigation.

To give an overall picture of the incidence and average amounts of all types of reported income, Tables IV-1 through IV-4 repeat the information in Tables 2-1 through 2-4 and add the corresponding information on types of income which were not verified. In Tables IV-1 and IV-2 it is evident that the incidence of these types of income is generally comparable in Pittsburgh and Phoenix. Other income at enrollment and Unemployment Compensation at reverification are the most noticeable departures. Differences in average amounts are more apparent: self-employment income, Unemployment Compensation and other income at enrollment, and Unemployment Compensation and Workmen's Compensation at reverification. Very low incidence, however, tends to make such comparisons quite imprecise.

---

[1]The few households that had self-employment income were asked to substantiate it by submitting copies of their income tax returns, but no third-party verification was possible.

Table IV-1

INCIDENCE OF INCOME TYPES

INCOME TYPE	ENROLLMENT		REVERIFICATION	
	Pittsburgh (Number of Households)	Phoenix (Number of Households)	Pittsburgh (Number of Households)	Phoenix (Number of Households)
Wages	41.5% (523)	74.0% (984)	31.5% (266)	48.2% (379)
Social Security	30.1 (379)	23.5 (313)	28.7 (242)	23.1 (182)
Supplemental Security Income	2.5 (32)	8.3 (111)	6.4 (54)	6.0 (47)
Welfare	49.6 (626)	17.3 (230)	37.2 (314)	13.6 (107)
Pensions	12.1 (153)	8.9 (119)	11.3 (95)	8.8 (69)
Unemployment Compensation	5.7 (72)	6.6 (88)	3.1 (26)	9.0 (71)
Alimony	6.7 (84)	8.7 (116)	7.0 (59)	6.5 (51)
Workmen's Compensation	1.6 (20)	2.3 (31)	0.6 (5)	0.5 (4)
Self-employment[a]	0.3 (4)	1.7 (23)	---	---
Other	3.2 (40)	5.3 (70)	1.2 (10)	2.7 (21)
Some verifiable income[b]	97.4 (1,228)	99.4 (1,322)	89.2 (753)	81.6 (642)
Some verifiable income[c]	---	---	91.1 (769)	86.8 (683)
SAMPLE TOTAL	(1,261)	(1,330)	(844)	(787)

SAMPLE: Enrollment Sample: All enrolled households contacted for verification, excluding those with enrollment incomes above the eligibility limits, and those with data problems. Reverification Sample: All enrolled households selected for reverification, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. At reverification only an annual amount for self-employment income was available.

b. By enrollment definition, does not include Unemployment Compensation.

c. By reverification definition, includes Unemployment Compensation.

Table IV-2

MEAN REPORTED HOUSEHOLD INCOME, BY INCOME TYPE

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
INCOME TYPE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Wages	$ 4,192	$ 5,595	$ 349	$ 466	$ 620	$ 613
Social Security	2,076	2,028	173	169	217	206
Supplemental Security Income	1,362	940	114	78	127	98
Welfare	2,499	1,481	208	123	255	154
Pensions	1,360	1,574	113	131	131	142
Unemployment Compensation	1,219	583	102	49	335	261
Alimony	1,077	1,038	90	86	121	125
Workmen's Compensation	990	963	82	80	479	364
Self-employment[a]	4,737	2,993	395	249	---	---
Other	1,272	963	106	80	110	124
Some verifiable income[b]	3,904	5,175	325	431	421	469
Some verifiable income[c]	---	---	---	---	424	468
SAMPLE TOTAL	(1,261)	(1,330)	(1,261)	(1,330)	(844)	(787)

SAMPLE: Enrollment Sample: All enrolled households contacted for verification, excluding those with enrollment incomes above the eligibility limits, and those with data problems. Reverification Sample: All enrolled households selected for reverification, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. At reverification only an annual amount for self-employment income was available.

b. By enrollment definition, does not include Unemployment Compensation.

c. By reverification definition, includes Unemployment Compensation.

Table IV-3

INCIDENCE OF INCOME TYPES FOR COMPLETELY VERIFIED HOUSEHOLDS

INCOME TYPE	ENROLLMENT		REVERIFICATION	
	Pittsburgh (Number of Households)	Phoenix (Number of Households)	Pittsburgh (Number of Households)	Phoenix (Number of Households)
Wages	37.3% (358)	64.0% (384)	34.1% (253)	56.5% (357)
Social Security	31.8 (306)	26.8 (161)	31.6 (235)	27.2 (172)
Supplemental Security Income	2.6 (25)	10.2 (61)	7.0 (52)	7.3 (46)
Welfare	51.5 (495)	17.5 (105)	41.2 (306)	15.5 (98)
Pensions	11.1 (107)	7.5 (45)	12.5 (93)	9.0 (57)
Unemployment Compensation	5.0 (48)	4.3 (26)	3.5 (26)	10.0 (63)
Alimony	6.2 (60)	9.3 (56)	6.9 (51)	5.5 (35)
Workmen's Compensation	1.5 (14)	1.5 (9)	0.3 (2)	0.0 (0)
Self-employment[a]	0.0 (0)	0.0 (0)	---	---
Other	2.9 (28)	4.8 (29)	1.1 (8)	2.1 (13)
Some verifiable income[b]	100.0 (961)	100.0 (600)	97.8 (727)	94.0 (594)
Some verifiable income[c]	---	---	100.0 (743)	99.4 (628)
SAMPLE TOTAL	(961)	(600)	(743)	(632)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. At reverification only an annual amount for self-employment income was available.

b. By enrollment definition, does not include Unemployment Compensation.

c. By reverification definition, includes Unemployment Compensation.

Table IV-4

MEAN REPORTED HOUSEHOLD INCOME, BY INCOME TYPE, FOR COMPLETELY VERIFIED HOUSEHOLDS

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
INCOME TYPE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Wages	$ 4,273	$ 5,801	$ 356	$ 483	$ 627	$ 623
Social Security	2,121	2,002	177	167	218	207
Supplemental Security Income	1,348	994	112	83	130	98
Welfare	2,554	1,648	213	137	256	157
Pensions	1,396	1,526	116	127	130	144
Unemployment Compensation	1,229	572	102	48	335	259
Alimony	1,070	1,110	89	96	110	109
Workmen's Compensation	832	948	69	79	372	---
Self-employment[a]	---	---	---	---	---	---
Other	1,259	1,164	105	97	68	111
Some verifiable income[b]	3,773	4,754	314	396	422	481
Some verifiable income[c]	---	---	---	---	425	481
SAMPLE TOTAL	(961)	(600)	(961)	(600)	(743)	(632)

SAMPLE: Enrollment Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

a. At reverification only an annual amount for self-employment income was available.

b. By enrollment definition, does not include Unemployment Compensation.

c. By reverification definition, includes Unemployment Compensation.

Comparing Tables IV-1 and IV-3 shows that these types of income are present to nearly the same extent in the samples of completely verified households as in the larger samples. Some of the mean values for Workmen's Compensation in Table IV-4 differ noticeably from the corresponding values in Table IV-2, and the same is true for other income, but the small numbers of households involved mean that the averages cannot be expected to be particularly stable.

In summary, the data on incidence and average amounts of types of income which were not verified confirm that these types were relatively infrequent and had smaller amounts than the verifiable types of income. These data also indicate that the samples of completely verified households differ very little in their overall pattern of income from the initial samples of enrolled households for which reverification was attempted.

APPENDIX V

DISTRIBUTION OF REPORTING ERRORS

Chapter 3 began, by presenting histograms of reporting error in total verifiable income at enrollment (Figure 3-1), to consider whether the distributions of reporting error were comparable in Pittsburgh and Phoenix. This appendix pursues this question in more detail and examines two related questions: whether the distributions were comparable from enrollment to reverification, and whether these distributions can be adequately approximated by normal distributions.

Comparison of two distributions involves more than simply determining whether they have the same mean and standard deviation (or, more generally, the same location and scale); it is primarily a matter of seeing whether they have the same shape. If they do have the same shape, at least to a good approximation, then it suffices to compare them by stating the location and scale of one distribution relative to the other. Thus, if a set of data follows a normal distribution, it can be completely described by giving its mean and standard deviation; and from this information it is possible to make a variety of inferences and calculations. For example, if reporting errors were well modeled by a normal distribution with mean 0 and specified standard deviation, one could easily calculate the likelihood of underreporting by more than a given amount in another sample of households subject to the same conditions. If, on the other hand, distributions of reporting errors varied substantially in shape and were not well approximated by normal distributions, then comparisons among them would become more complicated, and an appropriate probability model would have to be developed in order to make calculations and predictions.

Distribution Shape and Probability Plots

The shape of a distribution is essentially what remains after location and scale have been removed or standardized; that is, recentering and rescaling a distribution do not change its shape. A simple theoretical example is the family of normal distributions, in which the individual

distribution is specified by its mean μ and its standard deviation σ (or its variance σ^2); the normal shape is what they all have in common.

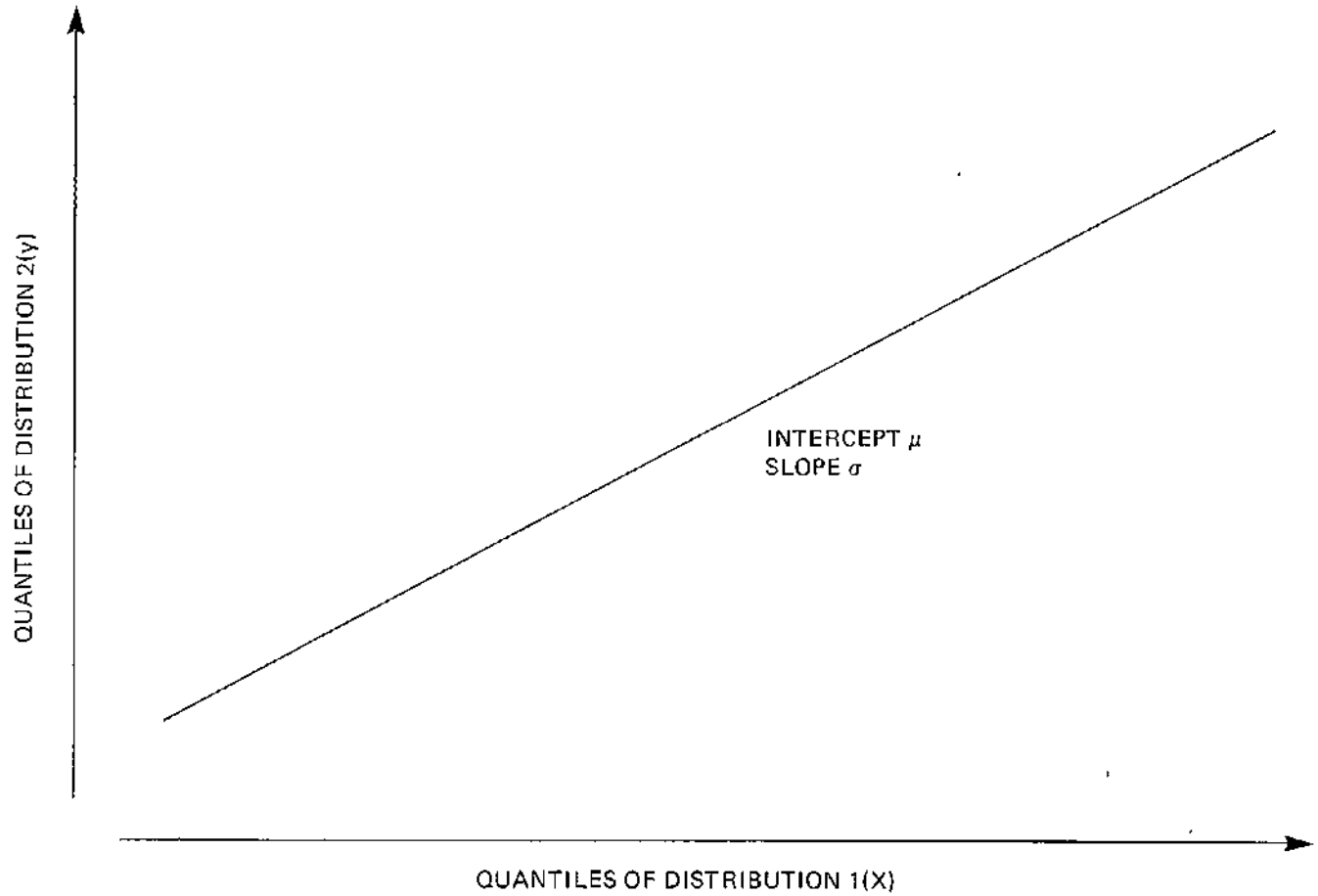
It is customary to attempt to describe distribution shape by giving numerical values of simple statistics which measure skewness (departure from symmetry about some center value) and kurtosis (a notion related to relative length of the tails, the parts of the distribution where observations become less and less likely), but the usual statistics, calculated from sample moments, are quite sensitive to the presence of outlying data values. The graphical techniques of probability plotting avoid this undue sensitivity and are generally more informative. Wilk and Gnanadesikan (1968) and Gnanadesikan (1977) discuss a number of probability plotting methods and their application in data analysis. To compare the shapes of two data distributions or to compare a set of data and a theoretical distribution, an appropriate technique is the Q-Q plot, which uses the vertical axis for the quantiles of one distribution and the horizontal axis for the corresponding quantiles of the other distribution.[1] For two distributions which have the same shape, the Q-Q plot takes the form of a straight line, whose intercept reflects their difference in centering and whose slope reflects their relative scale (as sketched in Figure V-1).

In the usual Q-Q plot the quantiles are just the observations themselves, ordered from smallest to largest. When the sample size is large, however, using all the data offers very little advantage over a properly chosen subset of quantiles. A good choice for this purpose is the "letter values" (Tukey, 1977), selected quantiles which begin at the median and move outward to the minimum and maximum by successively halving the fraction remaining in the tail; the percentage values for the selected quantiles are..., 12.5, 25, 50, 75, 87.5, ... The greater emphasis on the tails is justified because tail behavior contributes very

---

[1] The terms "p-th quantile" and "100p-th percentile" are synonymous and identify the point x_p such that 100p percent of the data lies to the left of x_p. In the case of a distribution, the probability is p that an observation will lie to the left of x_p; in terms of the cumulative distribution function F, $F(x_p) = p$.

FIGURE V-1
IDEAL APPEARANCE OF A Q-Q PLOT
$(y = \mu + \sigma X)$



substantially to the shape of a distribution and because departures from regular behavior in the middle of a distribution are rather rare.

Comparisons Between Sites and Over Time

For annual reporting error in total verifiable income at enrollment, Figure V-2 plots the letter values for Phoenix against those for Pittsburgh; thus, for example, the middle point is (-24, -2), the two medians. Table V-1 gives both sets of letter values.) The pattern is rather close to a straight line. The departures around the center reflect the presence of somewhat more small errors in Pittsburgh (as is evident in Figure 3-1). The three points at each end should be expected to be less stable because they include the minimum and maximum and involve only about 0.5 percent of the data. At reverification the corresponding Q-Q plot is shown in Figure V-3. Again, agreement on a straight line is good, and the slope of the line through the middle indicates that Phoenix is more variable than Pittsburgh (roughly in the ratio of 10 to 9, somewhat less than would be suggested by comparing interquartile ranges in Table 3-1).

Comparisons between reverification and enrollment are not as satisfactory as those between sites, as Figures V-4 and V-5 show. Both Pittsburgh and Phoenix have some tendency to curvature on both sides of the center, suggesting that underreporting is shorter-tailed at reverification, while overreporting is longer-tailed at reverification. Also quite evident is the flatness just to the right of zero. A partial explanation is the substantially larger fraction of households which reported without error at reverification (see Table 3-1), but removing the exact zero errors does not entirely eliminate this pattern. Allowing for these irregularities, the rough overall slopes of these two plots give an indication of the variability of reporting errors at reverification relative to enrollment. Thus monthly reporting error at reverification is approximately one-fifth as variable as annual reporting error at enrollment, except for under-reporting in Phoenix, where the factor is about one-fourth.

In order to pursue this comparison of enrollment and reverification further, it would be necessary to develop and test probabilistic models for the behavior of monthly reporting errors. The indication (discussed in Section 3.2) that a household's reporting error in the reverification month

FIGURE V-2
Q-Q PLOT FOR DISTRIBUTION OF REPORTING ERROR
IN TOTAL VERIFIABLE INCOME AT ENROLLMENT

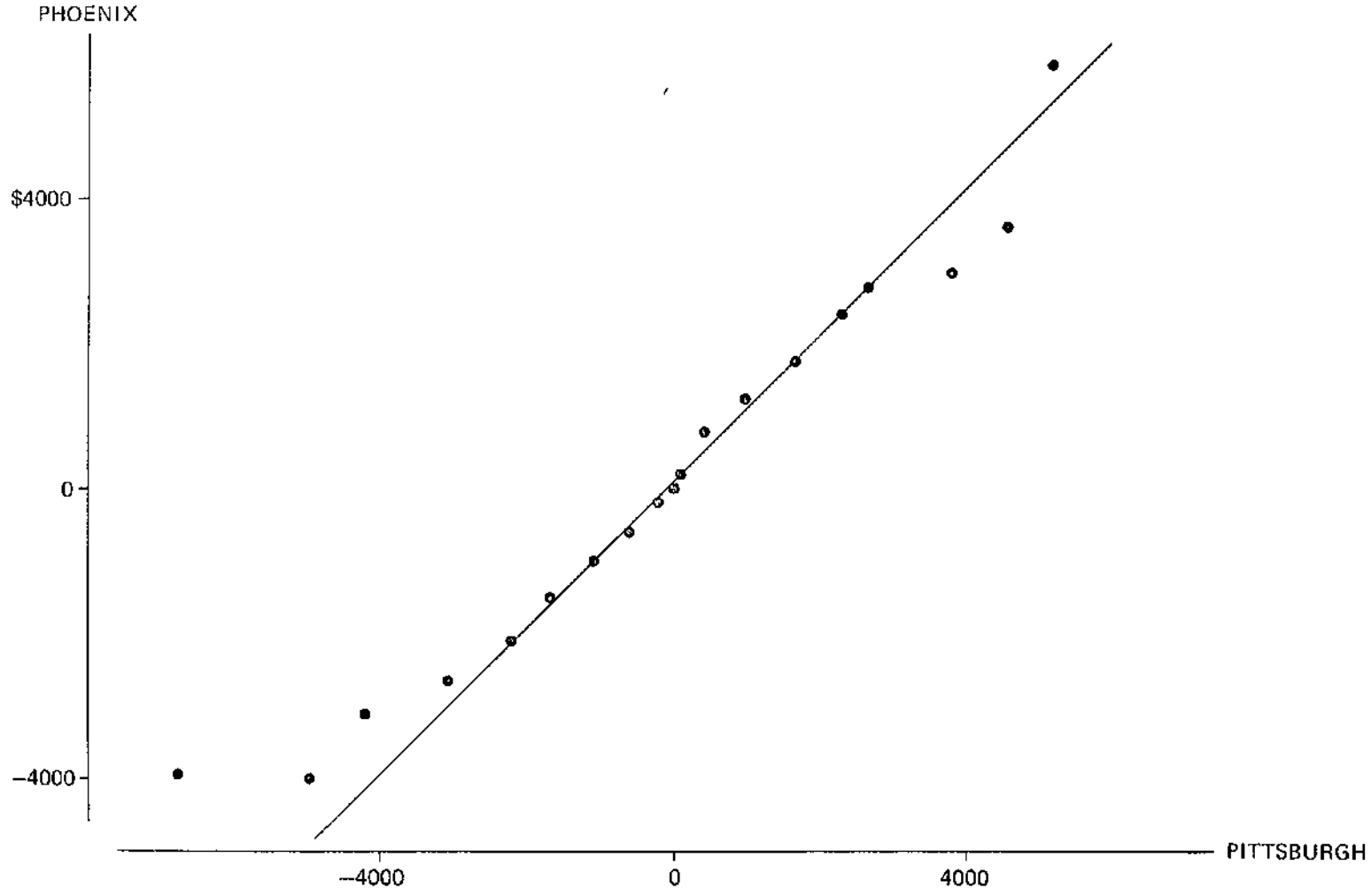


Table V-1

LETTER VALUES FOR REPORTING ERROR IN TOTAL VERIFIABLE INCOME AT ENROLLMENT (DOLLARS PER YEAR)

FRACTION	PITTSBURGH	PHOENIX
(Minimum)	-$6,739	-$3,940
1/512	-4,947	-3,938
1/256	-4,197	-3,116
1/128	-3,070	-2,644
1/64	-2,232	-2,099
1/32	-1,669	-1,493
1/16	-1,099	-1,008
1/8	-613	-595
1/4	-204	-216
1/2	-24	-2
3/4	63	239
7/8	416	780
15/16	981	1,262
31/32	1,664	1,772
63/64	2,292	2,409
127/128	2,640	2,787
255/256	3,824	2,978
511/512	4,550	3,633
(Maximum)	5,159	5,874
SAMPLE TOTAL	(961)	(600)

SAMPLE: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

FIGURE V-3
Q-Q PLOT FOR DISTRIBUTIONS OF REPORTING ERROR IN TOTAL VERIFIABLE INCOME AT REVERIFICATION

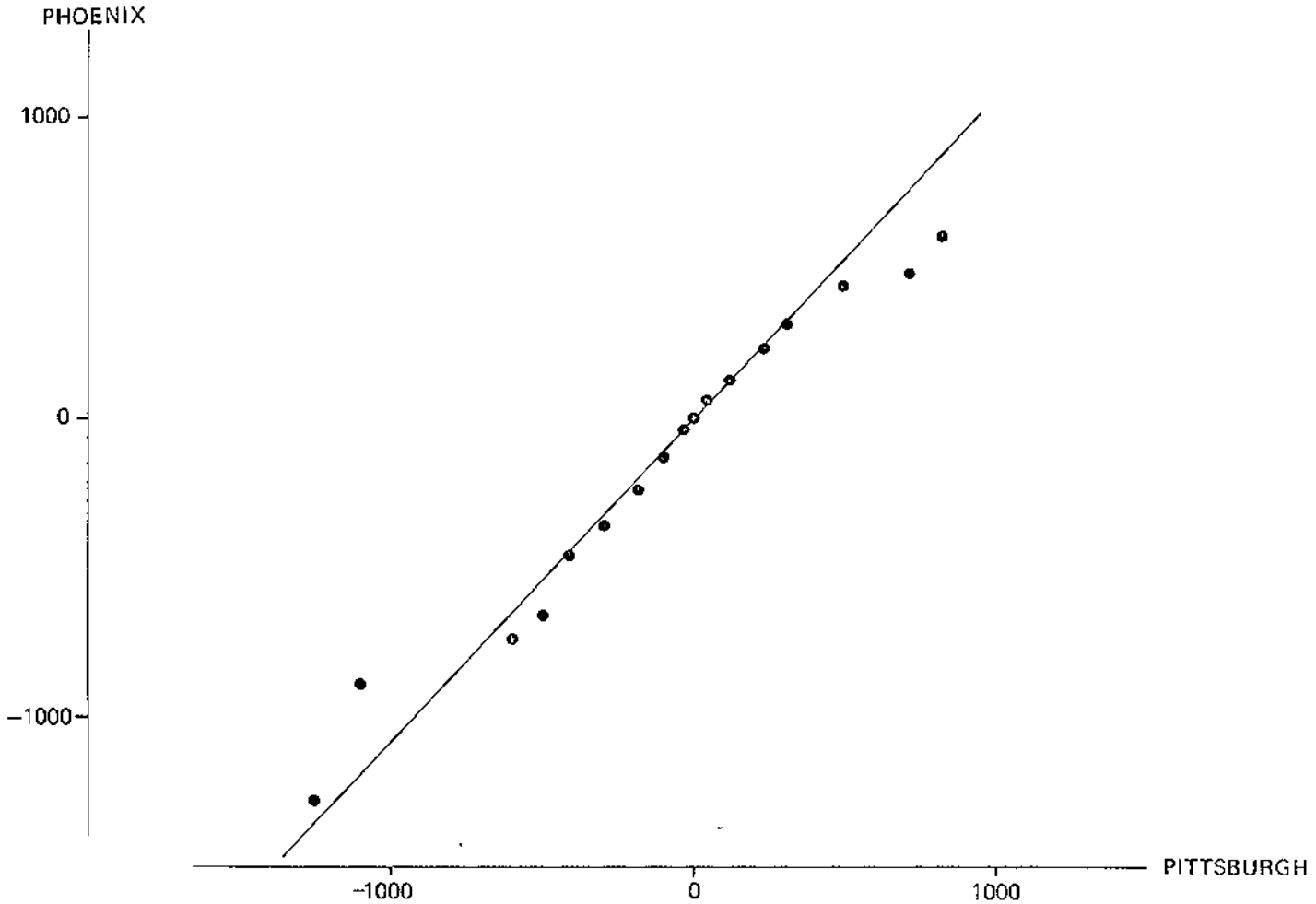


FIGURE V-4
REPORTING ERRORS AT ENROLLMENT AND REVERIFICATION IN PITTSBURGH

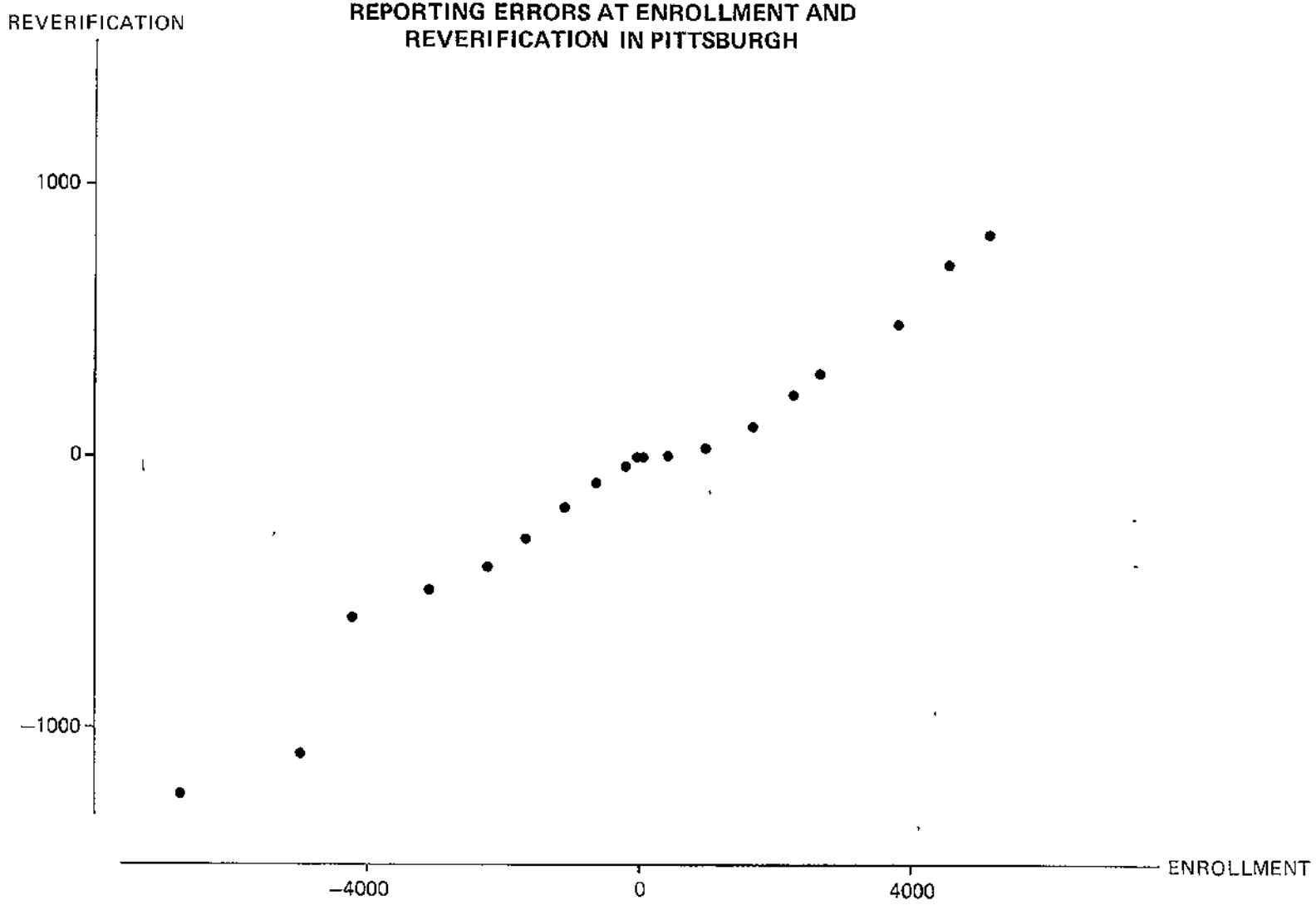
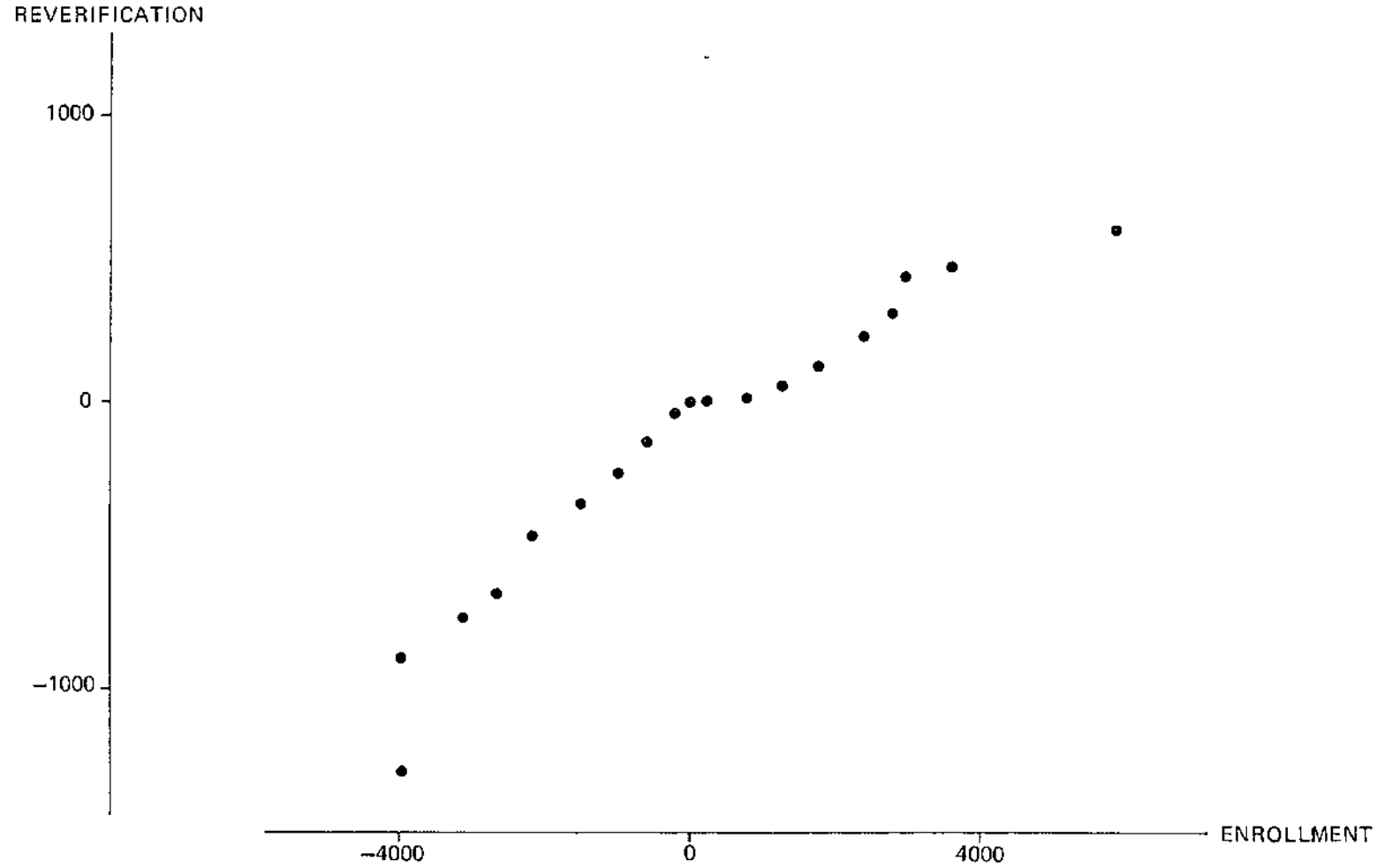


FIGURE V-5
REPORTING ERRORS AT ENROLLMENT AND
REVERIFICATION IN PHOENIX



does not provide an effective basis for predicting its errors in preceding months suggests that monthly errors might be described as independent and equally variable from month to month. If this model were appropriate, the standard deviation of annual errors at enrollment might be expected to be close to $\sqrt{12} \approx 3.5$ times that of the monthly errors at reverification. In fact, the standard deviations at both sites at enrollment (Table 3-1) are nearly twice this large. On the other hand, the approximate slopes in Figures V-4 and V-5 are not far from the value, $1/\sqrt{12} \approx .29$, which would be predicted by the ratio of standard deviations in the simple model of independent errors. The slope of a Q-Q plot, however, reflects the ratio of the standard deviations of two distributions only if they have the same shape. In fact, the shapes of the error distributions at enrollment and reverification appear to be somewhat different, as already mentioned. (Indeed, since, as discussed in the next section, reporting errors do not follow a normal distribution at all closely, there is no reason to assume that the distribution of the sum of independent errors would have the same shape as the distribution of one error without further investigation of the exact distribution involved.)

Comparisons With the Normal Distribution

To compare a distribution of data to a normal distribution, one often draws a histogram for the data and superimposes a fitted normal frequency curve on this picture. Figure V-6 does this for the Pittsburgh data on errors in total verifiable income at enrollment, choosing the normal distribution which has the same lower and upper quartiles as the data (the histogram appeared earlier in Figure 3-1). While it is possible to draw some overall impressions from this sort of display, and to see that in this case the fit is none too close, a Q-Q plot offers a much more effective means of comparison (because, for example, the ideal pattern is simply a straight line, not a set of bars which come close enough to following a peaked curve). In comparing a distribution of reporting errors to the normal distribution, it is only necessary to use the letter values of a normal distribution as the horizontal plotting coordinate. Table V-2 gives the numerical values, and Figure V-7 shows this Q-Q plot for the annual reporting errors in total verifiable income in Pittsburgh at enrollment.

FIGURE V-6
HISTOGRAM FOR REPORTING ERROR IN TOTAL VERIFIABLE INCOME
IN PITTSBURGH AT ENROLLMENT WITH FITTED NORMAL FREQUENCY CURVE

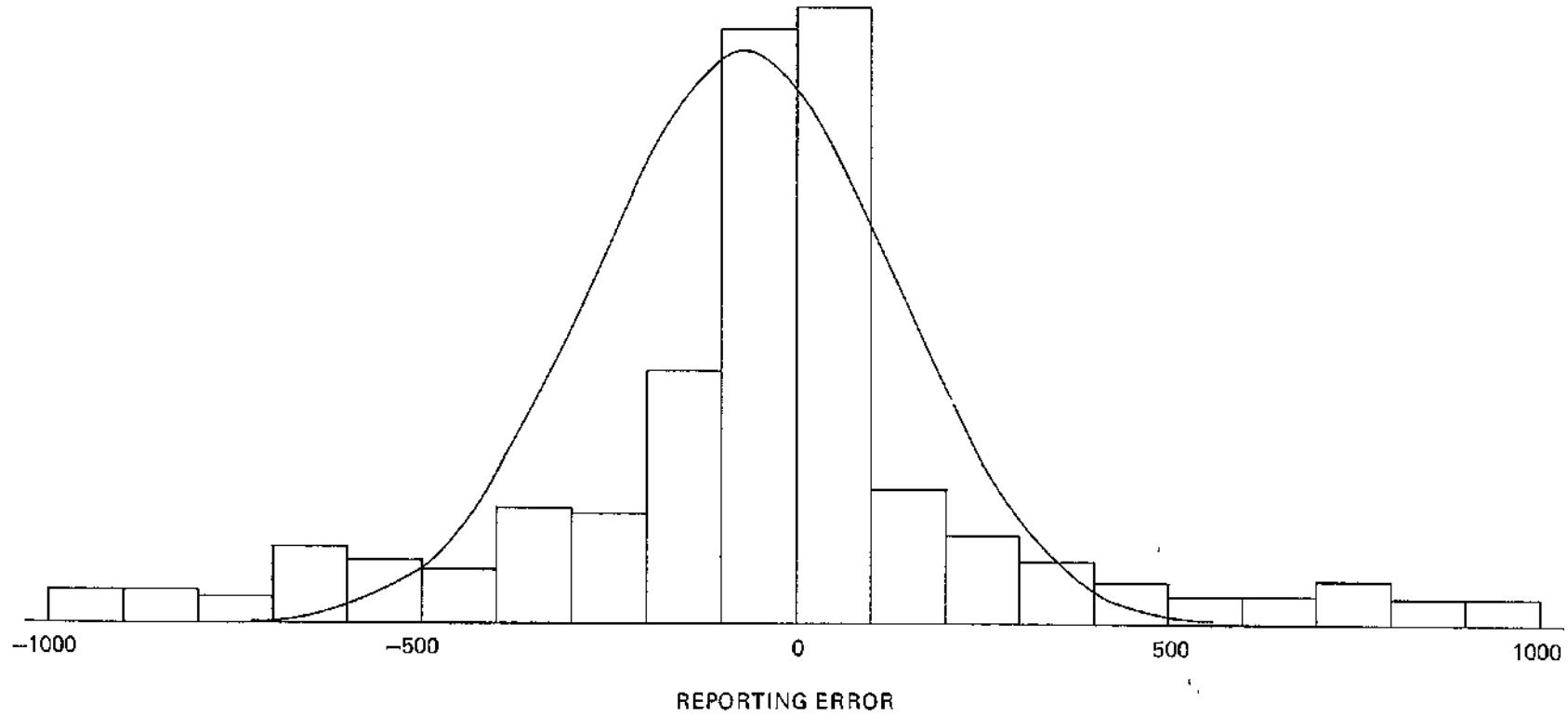


Table V-2

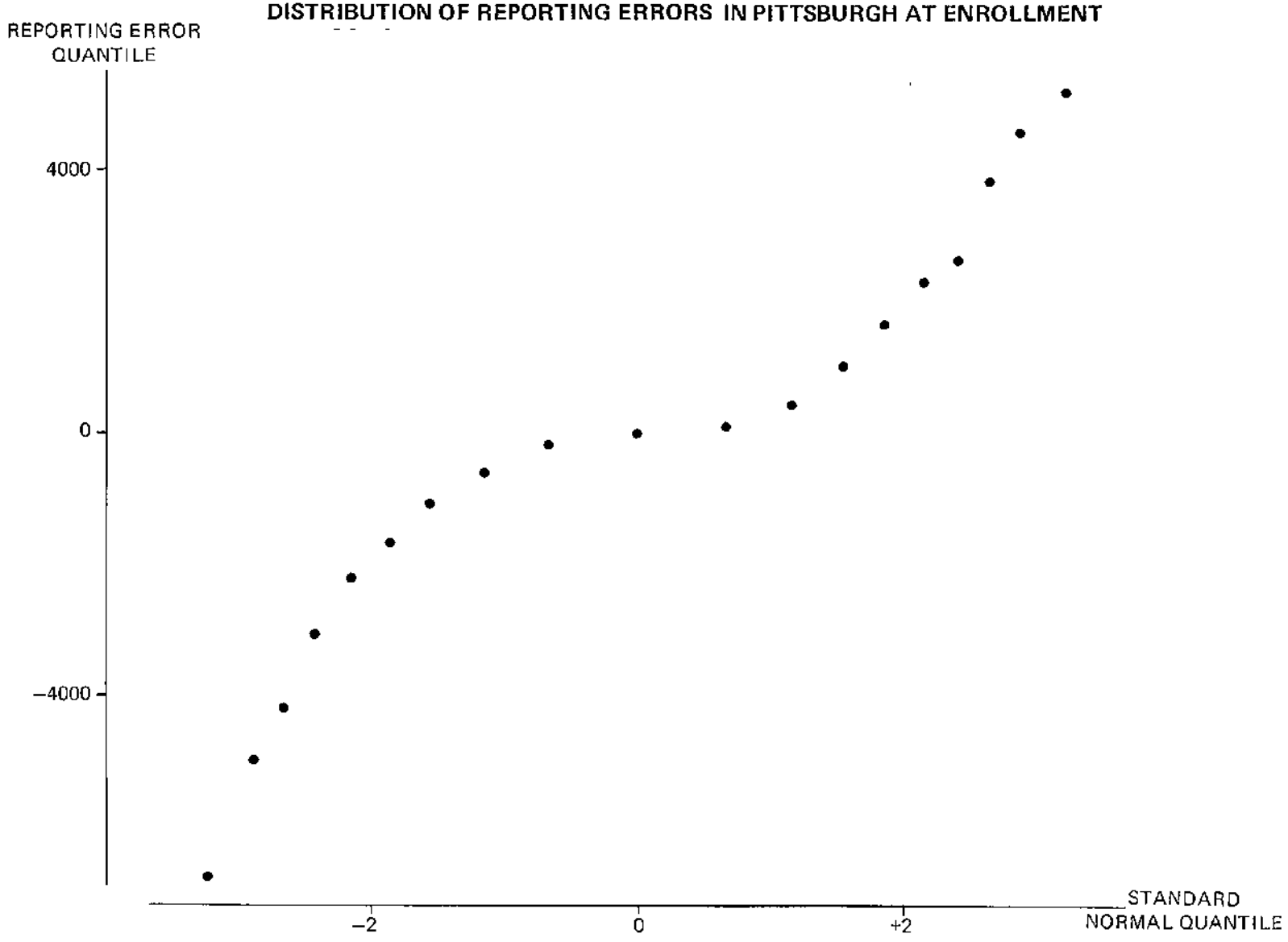
COORDINATES FOR NORMAL Q-Q PLOT OF REPORTING ERROR IN TOTAL VERIFIABLE INCOME IN PITTSBURGH AT ENROLLMENT

FRACTION	STANDARD NORMAL QUANTILE	QUANTILE FOR REPORTING ERROR IN PITTSBURGH
(Minimum)	-3.23	-$6,739
1/512	-2.88	-4,947
1/256	-2.66	-4,197
1/128	-2.42	-3,070
1/64	-2.16	-2,232
1/32	-1.86	-1,669
1/16	-1.54	-1,099
1/8	-1.15	-613
1/4	-0.67	-204
1/2	0	-24
3/4	0.67	63
7/8	1.15	416
15/16	1.54	981
31/32	1.86	1,664
63/64	2.16	2,292
127/128	2.42	2,640
255/256	2.66	3,824
511/512	2.88	4,550
(Maximum)	3.23	5,159
SAMPLE TOTAL		(961)

SAMPLE: All enrolled households whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

FIGURE V-7
DISTRIBUTION OF REPORTING ERRORS IN PITTSBURGH AT ENROLLMENT



The systematic departures from a straight line make it quite evident that these errors do not resemble a normal distribution. In fact, since the data values in the tails rapidly become more extreme than is possible for a normal distribution, it is proper to characterize this distribution of reporting errors as long-tailed. The implication of the straight-line pattern in Figure V-2 is that the distribution for Phoenix is long-tailed as well, and the same holds for both Pittsburgh and Phoenix at reverification. Furthermore, the smooth pattern in Figure V-7 shows clearly that the most extreme reporting errors are not isolated stray values.

One might try to approximate the overall pattern in Figure V-7 by drawing a straight line, perhaps passing close to the middle point and the third point from each end, but the corresponding normal distribution would be inadequate for inferences and prediction in two important ways. It would predict too few small errors and too few large errors. More suitable distributional models remain to be developed.

Data on income are often modeled by using the log-normal distribution. This suggests that it might be more appropriate to analyze reporting error in a logarithmic scale. Specifically, the measure of error would be

log(declared income) - log(verified income)

instead of

(declared income) - (verified income).

Examination of the present data on declared income and verified income, however, has revealed that, while log-normal distributions are at least passable approximations for the income data, the logarithmic difference defined above is still very much longer-tailed than would be consistent with a normal distribution. As a consequence the analyses in this report have been based on the simple arithmetic differences between declared and verified income; this measure at least has a direct interpretation. If analyses of relative reporting error were desired (so that summaries could be stated in percentage terms), the logarithmic measure would be suitable.

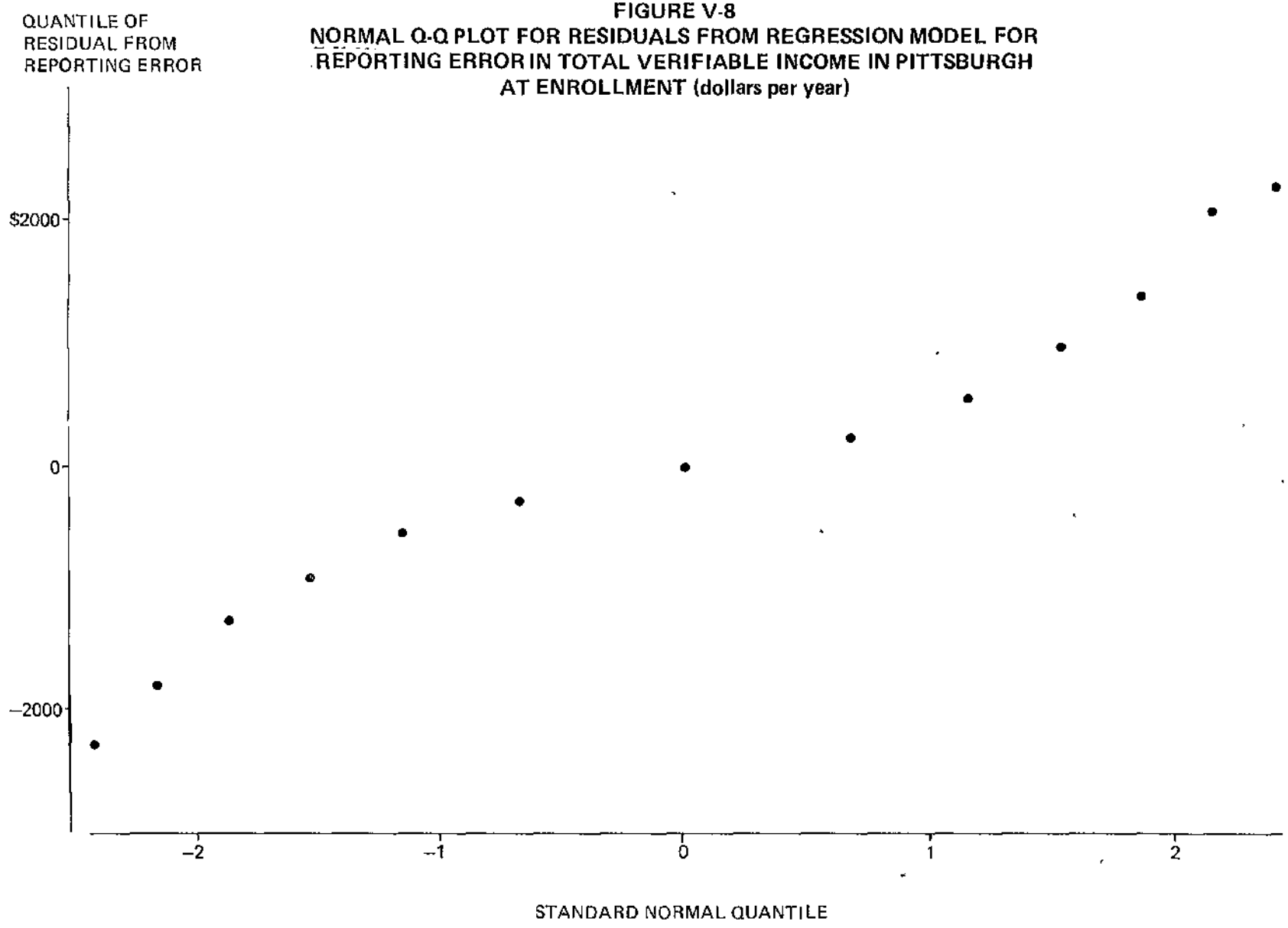
The failure of reporting errors to follow a normal distribution with any degree of closeness underlies the greater emphasis placed (in Tables 3-1 and 3-3 and in Appendix VI) on summary values which are less sensitive to the behavior of a few observations than are the mean and the standard

deviation. In regression analyses the problem of systematically handling deviant observations or allowing for a long-tailed distribution of disturbances (the disturbance term ε in the model $Y = X\beta + \varepsilon$ is customarily treated as coming from a normal distribution with mean 0 and variance σ^2) is more difficult. Some techniques for robust fitting have been proposed (for example, Beaton and Tukey, 1974, and Mosteller and Tukey, 1977), but the corresponding inference procedures are not yet well-developed, and efficient computer software for large-scale robust regression is not yet readily available. Accordingly, the regression analyses in Chapter 4 have used the familiar technique of ordinary least squares.

Finally, it is possible that the distributions of reporting errors appear long-tailed because they involve a mixture of several different distributions or, more generally, because they combine fluctuations and the effects of various explanatory variables. If this is the case, the residuals from a regression model which accounts for these explanatory variables should more closely resemble a sample of fluctuations drawn from a normal distribution. Examination of the residuals from the regression models discussed in Chapter 4 (see Table 4-3), however, revealed that their distributions were still rather long-tailed in shape. The picture for reporting error in total verifiable income in Pittsburgh at enrollment (Figure V-8) is representative: While the letter values in this plot go out only as far as a tail area of 1/128, the systematic curvature is quite evident. This reinforces the impression throughout this section that errors in the reporting of household income are a phenomenon which follows a distribution with longer-than-normal tails.

In summary, the distributions of reporting errors at enrollment and at reverification were quite similar in shape at the two sites, so that there is at least some justification for using this distributional information more generally. At each site the distributions at enrollment and reverification are less similar, but basic differences in the data collected at the two times make interpretation of this information more difficult. Using Q-Q plots to compare distribution shape permits more insightful comparison of relative spread in the distributions than is possible from the interquartile range or the standard deviation alone. Because the distributions of reporting errors show substantial departures from a normal

FIGURE V-8
NORMAL Q-Q PLOT FOR RESIDUALS FROM REGRESSION MODEL FOR REPORTING ERROR IN TOTAL VERIFIABLE INCOME IN PITTSBURGH AT ENROLLMENT (dollars per year)



distribution, it would be inadvisable to use that convenient distributional model as a basis for calculating such quantities as the likelihood of misreporting by more than a given amount. Further, the role of normal-theory distributional assumptions in the maximum-likelihood calculations required to handle truncation at enrollment (Appendix VII) should be carefully examined.

REFERENCES

Beaton, A.E. and J.W. Tukey, "The Fitting of Power Series, Meaning Polynomials, Illustrated on Band-Spectroscopic Data," Technometrics, vol. 16, 1974, pp. 147-185.

Gnanadesikan, R., Methods for Statistical Data Analysis of Multivariate Observations, New York, John Wiley and Sons, 1977.

Mosteller, F. and J.W. Tukey, Data Analysis and Regression, Reading, Mass., Addison-Wesley, 1977.

Tukey, John W., Exploratory Data Analysis, Reading, Mass., Addison-Wesley, 1977.

Wilk, M.B. and R. Gnanadesikan, "Probability Plotting Methods for the Analysis of Data," Biometrika, vol. 55, 1968, pp. 1-17.

APPENDIX VI

SELECTED SUMMARY STATISTICS FOR REPORTED INCOME AND INCOME REPORTING ERROR BY INCOME TYPE

For reference, this appendix presents summary statistics for reported income and for income reporting errors in more detail than is convenient in Tables 2-4 and 3-3. The samples consist of completely verified households, for which reporting error in total verifiable income could be calculated and analyzed. The summary statistics include the sample mean and standard deviation, but more emphasis is given to selected percentiles (specifically, the lower quartile, the median, and the upper quartile) which are much less affected by the presence of unusually extreme values in the data. The minimum and maximum values in the sample are also included to indicate the range of the data. The interquartile range, an alternative measure of spread to the standard deviation, is given because it is less sensitive to extreme values. The summary tables for reported income include a count of the number of households that reported zero income of that type in the reverification month but had been receiving that type of income regularly during preceding months and hence had it verified in the process of reverification. Finally, the summary tables for reporting error show the percentage of households that reported that type of income without error.

Table VI-1

SELECTED SUMMARY VALUES FOR REPORTED WAGE INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$10,224	$15,992	$ 852	$ 1,333	$ 1,825	$ 2,078
Upper quartile	6,336	7,621	528	635	830	750
Median	4,582	5,775	382	481	600	553
Lower quartile	1,920	4,136	160	345	369	406
Minimum	48	25	4	2	0	0
Interquartile range	4,416	3,485	368	290	461	344
Mean	4,273	5,801	356	483	622	608
Standard deviation	2,552	2,770	213	231	338	329
Number of zero values	---	---	---	---	3	8
SAMPLE SIZE	(358)	(384)	(358)	(384)	(284)	(359)

SAMPLE: Enrollment Sample: All enrolled households with wage income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households with wage income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-2

SELECTED SUMMARY VALUES FOR REPORTED SOCIAL SECURITY INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 6,060	$ 4,560	$ 505	$ 380	$ 770	$ 538
Upper quartile	2,556	2,472	213	206	251	246
Median	2,042	1,800	170	150	206	190
Lower quartile	1,512	1,250	126	104	153	145
Minimum	89	87	7	7	56	0
Interquartile range	1,044	1,222	87	102	98	101
Mean	2,121	2,002	177	167	218	203
Standard deviation	971	935	81	78	93	93
Number of zero values	---	---	---	---	0	3
SAMPLE SIZE	(306)	(161)	(306)	(161)	(234)	(175)

SAMPLE: Enrollment Sample: All enrolled households with Social Security income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households with Social Security income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-3

SELECTED SUMMARY VALUES FOR REPORTED SUPPLEMENTAL SECURITY INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 3,719	$ 2,268	$ 310	$ 189	$ 385	$ 300
Upper quartile	1,632	1,560	136	130	166	146
Median	1,596	828	133	69	97	77
Lower quartile	745	588	62	49	59	44
Minimum	122	24	10	2	0	0
Interquartile range	887	972	74	81	107	102
Mean	1,348	994	112	83	119	94
Standard deviation	774	589	64	49	81	66
Number of zero values	---	---	---	---	5	2
SAMPLE SIZE	(25)	(61)	(25)	(61)	(57)	(48)

SAMPLE: Enrollment Sample: All enrolled households with Supplemental Security Income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households with Supplemental Security Income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-4

SELECTED SUMMARY VALUES FOR REPORTED WELFARE INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 6,396	$ 3,984	$ 533	$ 332	$ 614	$ 359
Upper quartile	3,270	2,208	272	184	331	188
Median	2,472	1,614	206	134	256	158
Lower quartile	1,632	1,053	136	88	181	116
Minimum	41	116	3	10	0	0
Interquartile range	1,638	1,155	136	96	150	72
Mean	2,554	1,648	213	137	254	153
Standard deviation	1,280	913	107	76	109	71
Number of zero values	---	---	---	---	3	3
SAMPLE SIZE	(495)	(105)	(495)	(105)	(307)	(100)

SAMPLE: Enrollment Sample: All enrolled households with welfare income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported verifiable income. Reverification Sample: All enrolled households with welfare income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-5

SELECTED SUMMARY VALUES FOR REPORTED PENSION INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 4,800	$ 6,488	$ 400	$ 541	$ 535	$ 661
Upper quartile	1,920	2,064	160	172	170	200
Median	1,092	1,201	91	100	108	100
Lower quartile	618	636	52	53	57	59
Minimum	120	30	10	2	0	0
Interquartile range	1,302	1,428	108	119	113	141
Mean	1,396	1,526	116	127	127	141
Standard deviation	998	1,391	83	116	97	141
Number of zero values	---	---	---	---	2	1
SAMPLE SIZE	(107)	(45)	(107)	(45)	(95)	(58)

SAMPLE: Enrollment Sample: All enrolled households with pension income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported income. Reverification Sample: All enrolled households with pension income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-6

SELECTED SUMMARY VALUES FOR REPORTED UNEMPLOYMENT COMPENSATION INCOME
(monthly data at reverification only)

SUMMARY VALUE	PITTSBURGH	PHOENIX
Maximum	$ 476	$ 556
Upper quartile	454	312
Median	392	260
Lower quartile	222	175
Minimum	0	0
Interquartile range	232	137
Mean	323	249
Standard deviation	146	102
Number of zero values	1	2
SAMPLE SIZE	(27)	(64)

SAMPLE: Reverification Sample: All enrolled households with Unemployment Compensation income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Household Report Form, Income Reverification Form.

Table VI-7

SELECTED SUMMARY VALUES FOR REPORTING ERROR IN WAGE INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 5,159	$ 5,874	$ 430	$ 490	$ 825	$ 742
Upper quartile	283	428	24	36	1	1
Median	-15	-4	-1	0	0	-2
Lower quartile	-422	-354	-35	-30	-108	-104
Minimum	-6,739	-3,940	-562	-328	-1,246	-1,280
Interquartile range	705	782	59	65	109	105
Mean	-49	36	-4	3	-52	-56
Standard deviation	1,170	985	98	82	198	177
Frequency of exact zero	3.6%	2.3%	3.6%	2.3%	23.6%	22.3%
SAMPLE SIZE	(358)	(384)	(358)	(384)	(254)	(359)

SAMPLE: Enrollment Sample: All enrolled households with wage income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported income. Reverification Sample: All enrolled households with wage income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-8

SELECTED SUMMARY VALUES FOR REPORTING ERROR
IN SOCIAL SECURITY INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUES	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 4,197	$ 2,418	$ 350	$ 202	$ 82	$ 36
Upper quartile	0	0	0	0	-1	0
Median	-72	-54	-6	-4	-7	-2
Lower quartile	-96	-84	-8	-7	-14	-14
Minimum	-1,908	-1,450	-159	-121	-448	-232
Interquartile range	96	84	8	7	13	14
Mean	-8	21	-1	2	-11	-11
Standard deviation	482	418	40	35	35	29
Frequency of exact zero	7.8%	18.0%	7.8%	18.0%	18.4%	30.3%
SAMPLE SIZE	(306)	(161)	(306)	(161)	(234)	(175)

SAMPLE: Enrollment Sample: All enrolled households with Social Security income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported income. Reverification Sample: All enrolled households with Social Security income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-9

SELECTED SUMMARY VALUES FOR REPORTING ERROR
IN SUPPLEMENTAL SECURITY INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 1,632	$ 1,560	$ 136	$ 130	$ 12	$ 300
Upper quartile	72	34	6	3	0	0
Median	0	0	0	0	0	0
Lower quartile	-18	-4	-2	0	-10	-1
Minimum	-811	-816	-68	-68	-93	-114
Interquartile range	90	38	8	3	10	1
Mean	-43	46	-4	4	-13	3
Standard deviation	230	263	19	22	27	47
Frequency of exact zero	36.0%	29.5%	36.0%	29.5%	49.1%	50.0%
SAMPLE SIZE	(25)	(61)	(25)	(61)	(57)	(48)

SAMPLE: Enrollment Sample: All enrolled households with Supplemental Security Income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported income. Reverification Sample: All enrolled households with Supplemental Security Income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-10

SELECTED SUMMARY VALUES FOR REPORTING ERROR IN WELFARE INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 2,426	$ 1,960	$ 202	$ 163	$ 250	$ 183
Upper quartile	34	42	3	4	0	0
Median	0	0	0	0	0	0
Lower quartile	-126	-90	-10	-8	-1	-2
Minimum	-2,247	-1,297	-187	-108	-301	-300
Interquartile range	160	132	13	11	1	2
Mean	-80	43	-7	4	-10	-5
Standard deviation	477	392	40	33	47	51
Frequency of exact zero	22.4%	22.9%	22.4%	22.9%	59.3%	54.0%
SAMPLE SIZE	(495)	(105)	(495)	(105)	(307)	(100)

SAMPLE: Enrollment Sample: All enrolled households with welfare income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported income. Reverification Sample: All enrolled households with welfare income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-11

SELECTED SUMMARY VALUES FOR REPORTING ERROR
IN PENSION INCOME

	ENROLLMENT				REVERIFICATION	
	ANNUAL		MONTHLY		MONTHLY	
SUMMARY VALUE	Pittsburgh	Phoenix	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Maximum	$ 2,292	$ 700	$ 191	$ 58	$ 11	$ 75
Upper quartile	0	7	0	1	0	0
Median	-4	0	0	0	-1	0
Lower quartile	-39	-24	-3	-2	-8	-1
Minimum	-1,193	-2,286	-99	-190	-93	-124
Interquartile range	39	31	3	3	8	1
Mean	-10	-77	-1	-6	-8	-5
Standard deviation	347	388	29	32	17	30
Frequency of exact zero	30.8%	22.2%	30.8%	22.2%	43.2%	50.0%
SAMPLE SIZE	(107)	(45)	(107)	(45)	(95)	(58)

SAMPLE: Enrollment Sample: All enrolled households with pension income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, those with data problems, and those with missing values for any reported income. Reverification Sample: All enrolled households with pension income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Initial and monthly Household Report Forms, Income Verification and Reverification Forms.

Table VI-12

SELECTED SUMMARY VALUES FOR REPORTING ERROR IN UNEMPLOYMENT COMPENSATION INCOME
(monthly data at reverification only)

SUMMARY VALUE	PITTSBURGH	PHOENIX
Maximum	$ 357	$ 200
Upper quartile	0	0
Median	0	0
Lower quartile	-99	-65
Minimum	-308	-251
Interquartile range	99	65
Mean	-10	-25
Standard deviation	126	64
Frequency of exact zero	44.4%	48.4%
SAMPLE SIZE	(27)	(64)

SAMPLE: Reverification Sample: All enrolled households with Unemployment Compensation income whose income was completely verified, excluding those with enrollment incomes above the eligibility limits, and those with data problems.

DATA SOURCES: Household Report Form, Income Reverification Form.

APPENDIX VII

INCOME ELIGIBILITY LIMITATIONS AND SOME CONSEQUENCES

Eligibility for the Demand Experiment and the amounts of payments under the Housing Gap formula were determined by a household's net income. This appendix reviews the definition of net household income used for these purposes and examines some of the analytic consequences of restricting income in this way. For example, the exclusion of households with reported net income above the appropriate limit means that large reporting errors in the direction of overreporting cannot be observed if the true (verified) net income was only slightly below the eligibility limit. Consequently, in the regression equations of Section 4.2, the coefficient for total income could reflect this constraint on the sample and not an actual tendency to underreport.

Net Income for Eligibility

The definition of income used in determining eligibility must be easily and accurately measurable, and it must also be as equitable as possible for households that receive their income in different combinations of types. Table VII-1 lists the components of net income used for determining eligibility and calculating payments in the Demand Experiment. Except for imputed income from assets, the types of income have been discussed in Chapter 2 and Appendix VI. Assets form a part of a household's resources, and the inclusion of imputed asset income was intended to provide for a reasonable drawdown of assets into income.[1] The definition of net income also recognizes that one dollar of earned income (given associated expenses for transportation, work clothing, child care, or other specific expenses) may not yield disposable income equivalent to one dollar of transfer income. Thus the

[1] Lower rates were used in imputing income to the assets of elderly households (that is, those with age of head $\geq$ 62) because this may be their major income source. Thus elderly participants could have somewhat larger asset holdings. (This is common practice in income-conditioned transfer programs.)

Table VII-1

COMPONENTS OF ANNUAL NET HOUSEHOLD
INCOME FOR ELIGIBILITY

GROSS INCOME

Wages and Salaries

Self-employment Income

Welfare (AFDC, General Assistance, Other Welfare)

Pensions

Social Security

Supplemental Security Income

Unemployment Compensation

Workmen's Compensation

Alimony Received

Other Income (Education Grants, Regular Cash Payments, Other Regular Income)

Imputed Income from Assets

GROSS EXPENSES

Federal Tax Withheld

State Tax Withheld

FICA Tax Withheld

Home Care of the Sick

Alimony Paid

Major Medical Expenses (> $500)

Work-related Expense

Child Care Expense

definition makes approximate allowances for work-related expenses so that households with earned incomes received subsidies based on their real needs and consistent with subsidies received by households that had transfer incomes. The deduction for extraordinary medical expenses is typical in federal income-conditioned programs, in which the motivation in defining income is to be as sensitive as possible to current household needs.

The determination of a household's eligibility was based on the verified amounts for those types of income which were verified and on the declared amounts for other income types and for assets and expenses. The upper limit, beyond which a household was not eligible for participation in the experiment, varied according to site, household size, and the particular treatment group to which the household had been assigned. Except for Control households and one treatment group under the Percent of Rent formula, the eligibility limit was defined as that annual net income at which the monthly subsidy calculated by the Housing Gap formula would be $10. In deciding whether a household would be verified, a $500 margin of error was allowed; any household whose declared net income exceeded the eligibility limit by more than $500 was excluded as ineligible without any attempt at verification.[1]

Impact on Reporting Errors[2]

While income eligibility limits are clearly a part of the definition of a low-income household, they have the consequence that, the higher a household's income, the smaller the maximum error which it could make in reporting its income and still be included in the sample of households whose incomes were verified. Specifically, its error in reporting annual net income could not exceed $500 plus the difference between its net income and its eligibility limit. Because the range of possible errors was

---

[1] These limits are given in Table III-2.

[2] The maximum-likelihood procedure described in this section was developed by Joseph Friedman, who, together with Howard Chernick, carried out the analyses on which Table VII-2 is based.

Table VII-2

COEFFICIENTS OF ORDINARY LEAST SQUARES AND MAXIMUM-LIKELIHOOD MODELS RELATING DECLARED AND VERIFIED INCOME (STANDARD ERROR IN PARENTHESES)

	ORDINARY LEAST SQUARES		MAXIMUM-LIKELIHOOD	
COEFFICIENT	Pittsburgh	Phoenix	Pittsburgh	Phoenix
Constant	837 (84.4)	275 (94.9)	54.7 (86.4)	-555 (93.6)
Housing Gap (HG)	-409 (116)	273 (128)	-1,096 (120)	467 (105)
Verified Income (Y_V)	.758 (.0168)	.965 (.0164)	.993 (.0114)	1.170 (.0110)
$HG \cdot Y_V$	.113 (.0254)	-.0902 (.0225)	.321 (.0161)	-.1221 (.0103)
$\hat{\sigma}$	862	815	919	740
R^2	.81	.92		
SAMPLE TOTAL	(993)	(607)	(993)	(607)

SAMPLE: All enrolled households whose income was completely verified, excluding those with data problems, those with missing values for any reported verifiable income, and those with zero total reported verifiable income or zero total verified income.

DATA SOURCES: Initial Household Report Form, Income Verification Form.

truncated in this way and the level of truncation varied with household income, the coefficient of verified income in a regression model which relates declared income or income reporting error to verified income may be biased downward.[1] This could have the effect of making higher-income households appear to underreport to a greater extent than they actually did.[2]

Also, because total verifiable income cannot be negative, large errors in the direction of underreporting could not be observed at the low-income end of the income range. This truncation would tend to reinforce the effects of the first one.

It is important to examine the effect of truncations on such regression equations as

$$(1) \qquad Y_D = \alpha_0 + \alpha_1(HG) + \beta_0 Y_V + \beta_1(HG)Y_V + U \quad ,$$

where

Y_D is a household's declared verifiable income,

Y_V is its verified income,

HG is a dummy variable indicating membership in a Housing Gap treatment group, and

U is a random fluctuation or disturbance term.

This regression equation is intended to summarize the relationship between declared and verified income (only the total of verifiable types of income), allowing for the possibility that Housing Gap households, whose payments were determined by income, might have underreported by a different average amount from other households or might have underreported differently in relation to their income. It is readily translated into a summary of reporting error by recalling that reporting error is simply $Y_D - Y_V$ and subtracting Y_V from both sides of the equation. Since the truncation affects Y_D, however, it is simplest to write the relationship

---

[1] A discussion of this and more complicated truncation problems appears in Hausman and Wise (1976).

[2] Another truncation also affected the sample available for analysis. A household's declared income may have been below the eligibility limit; but if its verified income exceeded that limit, it would have been ineligible and would not have been enrolled. Such households were not included in the sample for the analysis of verification.

as in Equation (1). To incorporate the eligibility limits into the equation, it is necessary to use the definition of net income for eligibility (see Table VII-1):

$$Y_{NIE} = Y_D + Y_U + Y_A - Y_X \tag{2}$$

where

Y_U is "unverifiable" income (see Appendix IV),
Y_A is imputed asset income, and
Y_X is gross expenses.

Then the limit in deciding whether a household's income would be verified was $Y_{NIE} \leq Y_{EL} + \$500$, and the equivalent limit on declared income was

$$Y_D \leq Y_{EL} + Y_X - Y_U - Y_A + \$500,$$

where Y_{EL} is the applicable eligibility limit.

The limit on Y_D is equivalent to a limit on the fluctuation term, U, in Equation (1). If ordinary-least-squares regression is used to estimate the coefficients in Equation (1), the result will be a downward bias in the estimates of β_0 and β_1. One way to correct for this bias is to use the method of maximum-likelihood. As is customary, the disturbance term is assumed to follow a normal distribution with mean 0 and variance σ^2, that is, $U \sim N(0,\sigma^2)$.[1] Writing the regression equation in vector form as

$$y_i = x_i\beta$$

with $i = 1,\ldots,N$ indexing households, the constraint on y_i is $l_i \leq y_i \leq h_i$, where h_i is the limit on Y_D implied by the eligibility limits and l_i is a lower limit which arises because total verifiable income cannot be negative and because an annual net income below \$1,000 was treated as missing. The original probability density function for y_i must be renormalized to reflect the constraint, and the result is

$$(2\pi\sigma^2)^{-\frac{1}{2}} \exp\left\{-\tfrac{1}{2}[(y_i-x_i\beta)/\sigma]^2\right\} \Big/ \left\{\Phi[(h_i-x_i\beta)/\sigma] - \Phi[(l_i-x_i\beta)/\sigma]\right\},$$

---

[1] While this assumption is almost universal in such models, the distributional shape of reporting errors is rather clearly longer-tailed than normal (see Appendix V), so the assumption of normality is of questionable validity. This is discussed further below.

where Φ is the standard normal cumulative distribution function. Thus the log-likelihood function, to be maximized with respect to β and σ, is

$$(3) \qquad L = -N\ln(\sqrt{2\pi}\sigma) - \tfrac{1}{2}\sum_{i=1}^{N}[(y_i - x_i\beta)/\sigma]^2 - \sum_{i=1}^{N}\ln\left[\Phi\left(\frac{h_i - x_i\beta}{\sigma}\right) - \Phi\left(\frac{l_i - x_i\beta}{\sigma}\right)\right].$$

If no truncations were involved, the last term would vanish, and the maximum-likelihood estimates for the regression coefficients would be identical to the least-squares estimates.

To determine the effects of including truncation limits in Equation (1), both ordinary-least-squares estimates and maximum-likelihood estimates were calculated. Table VII-2 shows them, along with their estimated standard errors. Of particular interest is the comparison between the estimates of the coefficient of Y_V, both for non-Housing Gap households and for Housing Gap households (the coefficient of the interaction term $HG \cdot Y_V$ is the difference between the Housing Gap value and the non-Housing Gap value). In all cases the maximum-likelihood estimate is larger than the ordinary-least-squares estimate, indicating that truncation did bias the coefficient of Y_V downward. In examining overreporting and underreporting more closely, the fitted summary lines combine the information of both slope and intercept. Figures VII-1 and VII-2 show the maximum-likelihood lines (non-Housing Gap and Housing Gap) for Pittsburgh and Phoenix, respectively. In all four cases the tendency is for overreporting over most of the range of verified incomes, and only non-Housing Gap households in Pittsburgh show a tendency to underreport on the average for larger verified incomes. Thus the conclusion for this simple equation is that underreporting is not a serious problem. The regression equations for reporting error at enrollment discussed in Section 4.2 could be fitted by maximum-likelihood to take truncation as well as household characteristics into account. This step has not been taken because of the doubtfulness of the normality assumption on the disturbance term. Even though the simple model incorporates upper and lower limits on declared income about the regression equation, it is likely that the non-normal shape of the distribution of reporting errors would have a substantial adverse effect on maximum-likelihood fitting which utilizes the normal distribution. An adequate exploration of the direction and extent of these effects would require

FIGURE VII-1
MAXIMUM-LIKELIHOOD SUMMARY LINES FOR PITTSBURGH
(HG = HOUSING GAP)

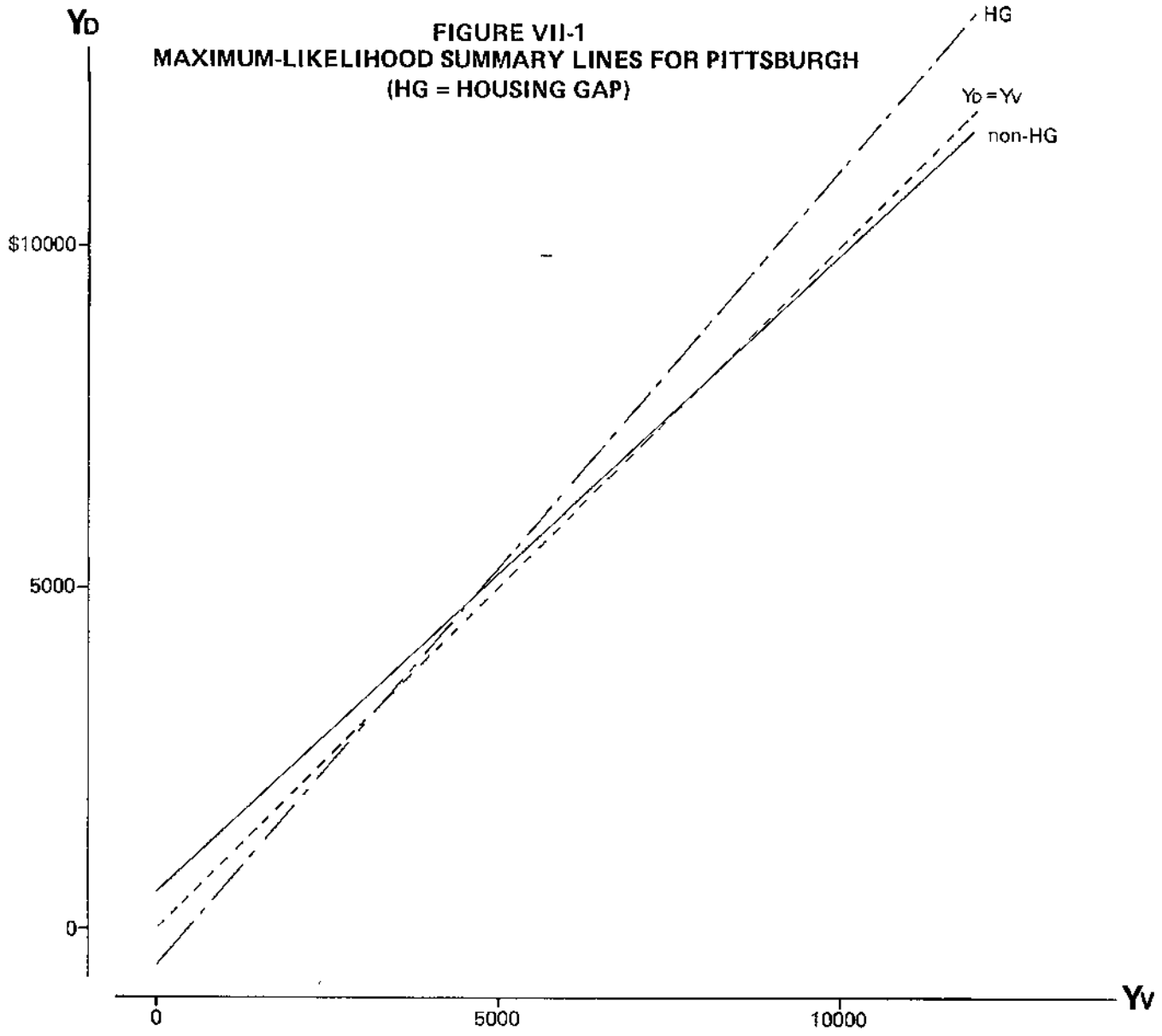
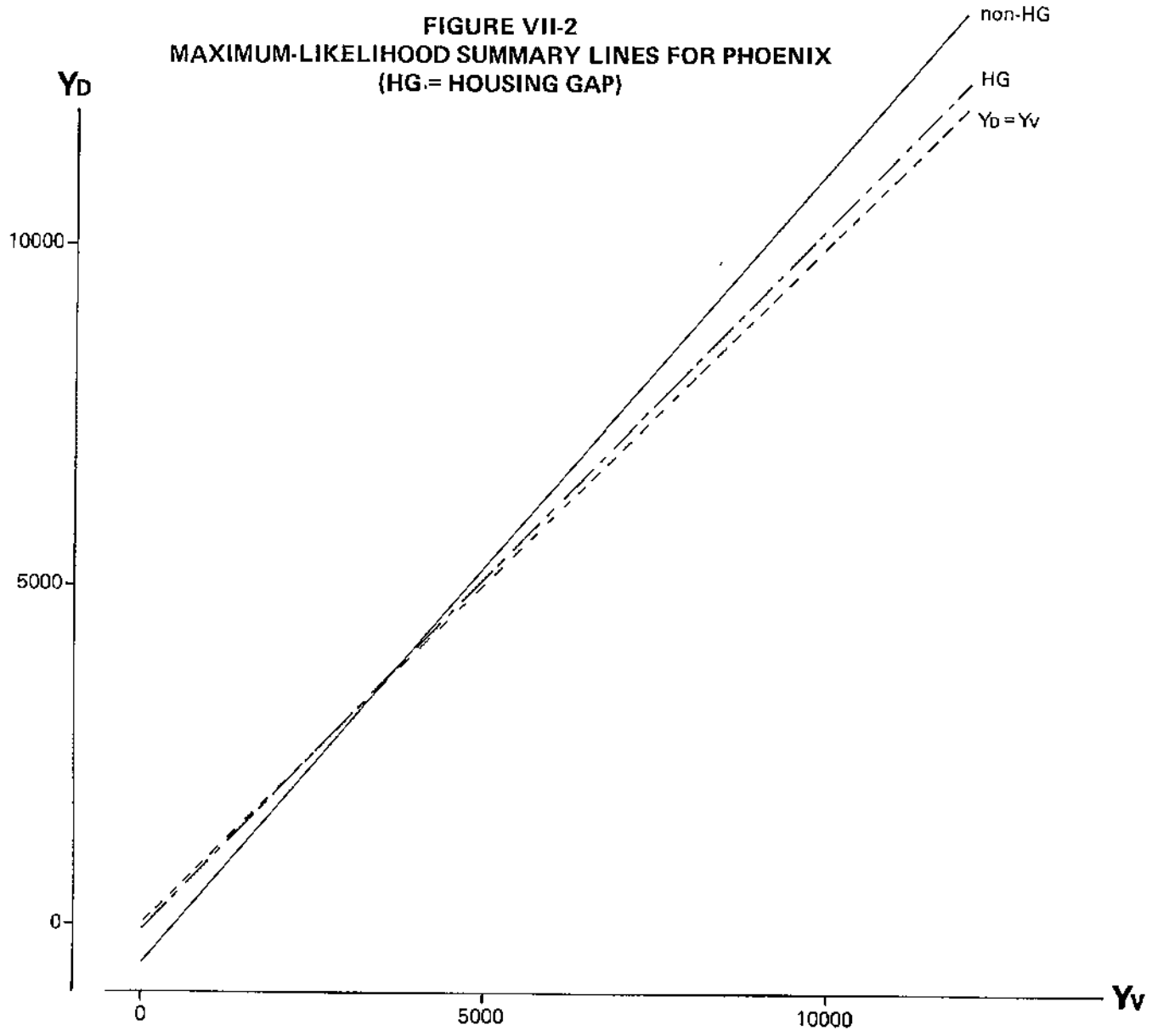


FIGURE VII-2
MAXIMUM-LIKELIHOOD SUMMARY LINES FOR PHOENIX
(HG.= HOUSING GAP)



a family of distributional models which includes the normal distribution as a special case, is convenient for maximum-likelihood calculations, and provides a range of long-tailed specifications. Unfortunately, no such family is now available.

Because there was no question of eligibility at reverification, there was no upper limit on a household's declared verifiable income and hence no upper limit on the disturbance in Equation (1). The fact that total verifiable income could not be negative, however, implies that the lower limit could still have an effect. Thus the last term in Equation (3) would not vanish. It is possible that this continuing truncation may account in part for the negative sign on the coefficient for total income in the regression equations fitted at reverification (Tables 4-4 and 4-13). The evidence that reporting error showed very little tendency to persist from enrollment to reverification suggests that this truncation may not be a serious problem. Because the assumption that fluctuations in Equation (1) follow a normal distribution is in sharp disagreement with the evidence of Appendix V, maximum-likelihood analyses were not attempted for the reverification data.

REFERENCES

Hausman, Jerry A. and David A. Wise, "The Evaluation of Results from Truncated Samples: The New Jersey Income Maintenance Experiment," Annals of Economic and Social Measurement, vol. 5, no. 4, 1976.

APPENDIX VIII

STANDARD FORMS USED
FOR THE VERIFICATION PROCESS

This appendix contains copies of the forms used to collect reported and verified income information. A brief explanation accompanies each form.

VIII.1 THE INITIAL HOUSEHOLD REPORT FORM

The Initial Household Report Form was used to collect income, expenditures, rent, and demographic data for each household prior to enrollment. A copy of the section in which verifiable income for each household member 18 years of age or older was reported is contained on the following pages.

During the Enrollment Interview, households were asked to complete the Initial Household Report Form, with the aid of an enroller. Upon completion, the head of household or spouse was required to sign a statement attesting to the accuracy of all information disclosed. Household members that reported verifiable income were then requested to sign waiver forms allowing income sources to disclose information to Demand Experiment personnel (see Section VIII.2).

Experimental Housing Allowance Program
1242 East McDowell
Phoenix, Arizona 85006
23 April 1973

O.M.B. No. 63-R-1403
Approval Expires March 1977

EXPERIMENTAL HOUSING ALLOWANCE PROGRAM

INITIAL HOUSEHOLD REPORT FORM—PART II

INCOME FOR INDIVIDUAL HOUSEHOLD MEMBERS

AGE 18 AND OLDER

Household Identification Number

1-8- | | | | | | | | |

Household Member Number

9-11- | | | |

12/13-(06)
CARD 1
14/15-(01)

16-39-

Name of Household Member _____
First Middle Initial Last

40-63-

Name of Respondent _____
First Middle Initial Last

INSTRUCTIONS TO HOUSEHOLD

☐ This form will be picked up by the Enroller

☐ Complete the items which the enroller has marked in red pen

☐ Please mail this form back to our offices as soon as you have completed it Return form by

_____
(date)

Our office is located at

_____

_____

_____

If you need additional information, please call _____

at # 258-8461 or # _____ between _____ a m & _____ p m

FOR OFFICE USE

Contact Data
Enroller _____
Date of First Visit _____
Date of Second Visit _____
Date of Subsequent Visit _____
Received _____

Ver
Cert
Pmts
Other

H-1-4
HUD Approval Date 16 April 1973

CARD 2
14/15-(02)

THE PURPOSE OF THE PART II BOOKLETS IS TO ESTABLISH YOUR HOUSEHOLD'S INCOME ONE OF THESE BOOKLETS MUST BE COMPLETED FOR EVERY MEMBER OF YOUR HOUSEHOLD WHO IS EIGHTEEN YEARS OF AGE OR OLDER

THIS BOOKLET IS DIVIDED INTO THREE PARTS, ONE FOR EACH OF THREE TYPES OF INCOME

PART A — ASKS ABOUT INCOME FROM WAGES AND SALARIES

PART B — ASKS ABOUT INCOME FROM THE GOVERNMENT AND OTHER SOURCES

PART C — ASKS ABOUT INCOME FROM A BUSINESS WHICH YOU OWN ALL OR A PART OF

First, I need to find out which of these parts, if any, you will need to answer

1 Did you receive any earnings from salaries and/or wages during the past twelve months? We include here any income from tips, commissions and bonuses. We mean only income you yourself have earned, do not include income earned by other members of your household.

Yes ( ) 16-1 → BE SURE TO COMPLETE SECTION A

No ( ) -2 → (ENROLLER CHECK BOX FOR NO EARNED INCOME IN SECTION A)

HAND CARD TO RESPONDENT

2 Here is a list of some other sources of income Please look it over and tell me if you yourself received any money from any of these sources in the past twelve months.

Yes ( ) 17-1 → BE SURE TO COMPLETE SECTION B

No ( ) -2 → (ENROLLER CHECK BOX FOR NO INCOME FROM THESE GOVERNMENTAL AND OTHER SOURCES IN SECTION B)

TAKE CARD BACK FROM RESPONDENT

3. Did you receive any income from a business or any other self-employed work of your own? We mean here a business which you own all or a part of and which you run or help to run We don't mean here just owning a few shares of stock

Yes ( ) 18-1 → BE SURE TO COMPLETE SECTION C

No ( ) -2 → (ENROLLER CHECK BOX FOR NO SELF-EMPLOYMENT BUSINESS INCOME IN SECTION C)

OTHER SOURCES OF INCOME

SOCIAL SECURITY

WELFARE OR PUBLIC ASSISTANCE PAYMENT, LIKE

- AID TO FAMILIES WITH DEPENDENT CHILDREN
- OLD AGE ASSISTANCE
- AID TO THE BLIND
- AID TO THE DISABLED
- GENERAL ASSISTANCE

UNEMPLOYMENT BENEFITS

WORKMEN'S COMPENSATION, ILLNESS OR ACCIDENT BENEFITS

PENSIONS FOR GOVERNMENT EMPLOYEES OR MILITARY PERSONNEL

PENSIONS FROM PRIVATE EMPLOYERS

VETERANS DISABILITY PAYMENTS OR PENSIONS

ALIMONY AND CHILD SUPPORT

EDUCATION—MONEY FROM SCHOLARSHIPS, GRANTS, FELLOWSHIPS OR GI BENEFITS TO HELP WITH LIVING EXPENSES, ETC WHILE YOU WERE IN SCHOOL

CASH FROM PEOPLE NOT LIVING IN YOUR HOUSEHOLD OR FROM PRIVATE CHARITIES

FOOD STAMPS

ANY OTHER REGULAR SOURCE OF INCOME BESIDES WAGES AND SALARIES (SUCH AS PAYMENTS FOR FOSTER CHILDREN STRIKE BENEFITS OR MILITARY ALLOTMENTS)

CARD 2
CONT

19. _____

SECTION A — WAGES, SALARIES, ETC.

NOTE THIS SECTION IS TO BE FILLED OUT ONLY IF THE HOUSEHOLD MEMBER EARNED INCOME FROM WAGES, SALARIES, TIPS, BONUSES, COMMISSIONS, ETC. DURING THE PAST TWELVE MONTHS DO NOT DUPLICATE INFORMATION GIVEN BY OTHER HOUSEHOLD MEMBERS. IF THE HOUSEHOLD MEMBER HAD NO EARNED INCOME FOR THE PAST TWELVE MONTHS, CHECK THIS BOX AND GO ON TO PART B

☐ NO EARNED INCOME

INSTRUCTIONS. FIRST FILL IN THE NAMES OF THE MONTHS. START WITH LAST MONTH AS MONTH ONE. TWO MONTHS AGO AS MONTH TWO AND SO ON THROUGH MONTH TWELVE (FOR TWELVE MONTHS AGO)

THEN, FOR EACH MONTH, FILL IN THE INFORMATION REQUESTED. REMEMBER TO LIST TOTAL EARNINGS BEFORE TAXES OR OTHER DEDUCTIONS.

IMPORTANT IF THE HOUSEHOLD MEMBER HELD MORE THAN ONE JOB AT ANY ONE TIME, FILL OUT A SEPARATE SHEET FOR EACH JOB. DO NOT INCLUDE ANY SELF-EMPLOYMENT BUSINESS INCOME ON THIS PAGE

INDICATE NUMBER OF SEPARATE SHEETS ATTACHED # _____

A-91

	WRITE IN MONTH	FOR OFFICE USE	TOTAL GROSS EARNINGS before taxes or other deductions to nearest dollar	NUMBER OF HOURS WORKED EACH MONTH	JOB TITLE	NAME OF COMPANY	ADDRESS AND TELEPHONE NUMBER OF COMPANY
1 Mo. Ago	21-24-	25/26 (01)	27-30-	31-33-			
2 Mos Ago		34/35-(02)	36-39-	40-42-			
3 Mos Ago		43/44-(03)	45 48-	49-51-			
4 Mos. Ago		52/53-(04)	54-57-	58-60-			
5 Mos Ago		61/62-(05)	63-66-	67-69-			
6 Mos Ago		14/15-(03) 16/17-(06)	18-21-	22-24-			
7 Mos Ago		25/26 (07)	27-30-	31-33-			
8 Mos Ago		34/35-(08)	36-39-	40-42-			
9 Mos Ago		43/44-(09)	45-48-	49-51-			
10 Mos Ago		52/53-(10)	54-57-	58 60-			
11 Mos Ago		61/62-(11)	63-66-	67-69-			
12 Mos Ago		70/71-(12)	72-75-	76-78-			

CARD 4
14/15-(04)

SECTION B

THIS SECTION SHOULD BE FILLED OUT ONLY IF THE HOUSEHOLD MEMBER RECEIVED ANY MONEY FROM SOURCES OTHER THAN WAGES, SALARIES, ETC. AND OTHER THAN SELF-EMPLOYMENT BUSINESS INCOME IN THE PAST TWELVE MONTHS

IF NO SUCH EARNINGS WERE RECEIVED IN THE PAST TWELVE MONTHS, CHECK THIS BOX AND GO ON TO SECTION C. ☐ NO INCOME FROM GOVERNMENT AND OTHER SOURCES LISTED 16- _____

DO NOT DUPLICATE INFORMATION GIVEN BY OTHER HOUSEHOLD MEMBERS. IF A PARTICULAR TYPE OF INCOME IS RECEIVED ON BEHALF OF THE ENTIRE HOUSEHOLD, THIS SECTION SHOULD BE LISTED BY THE HEAD OF THE HOUSEHOLD ONLY.

You mentioned earlier that you have received money from sources other than wages and salaries and other than self-employment business income in the past twelve months I'm going to ask you about several different sources of income and how much, if anything, you have received from each one in the last year

1 First, have you received any money from Social Security?

Yes ( ) 17-1 No ( ) -2→ SKIP TO Q. 2

↓

How much did you receive . .	WRITE IN MONTH		AMOUNT RECEIVED
			$
Last Month?	18-21-	22/23-(01)	24-27-
Two Months Ago?	_____	28/29-(02)	30-33-
Three Months Ago?	_____	34/35-(03)	36-39-
Four Months Ago?	_____	40/41-(04)	42-45-
Five Months Ago?	_____	46/47-(05)	48-51-
Six Months Ago?	_____	52/53-(06)	54-57-
Seven Months Ago?	_____	58/59-(07)	60-63-
Eight Months Ago?	_____	64/65-(08)	66-69-
		14/15-(05)	
Nine Months Ago?	_____	16/17-(09)	18-21-
Ten Months Ago?	_____	22/23-(10)	24-27-
Eleven Months Ago?	_____	28/29-(11)	30-33-
Twelve Months Ago?	_____	34/35-(12)	36-39-

40-44-

45-49-

2 During the past twelve months, have you received any money from welfare?

CARD 5 CONT

Yes ( ) 50-1 No ( ) -2→SKIP TO QUESTION 3

↓

IF YES, Was it (READ LIST AND CHECK ALL THAT APPLY)

Aid to families with dependent children (AFDC)	( ) 51-1
Old Age Assistance (OAA)	( ) 52-1
Aid to the Blind	( ) 53-1
Aid to the Disabled	( ) 54-1
General Assistance	( ) 55-1
Other public assistance from the Department of Welfare (SPECIFY) _____	( ) 56-1

FOR EACH TYPE CHECKED ABOVE, FILL IN THE AMOUNT RECEIVED EACH MONTH IN THE SPACES PROVIDED BELOW FIRST FILL IN THE NAMES OF THE MONTHS START WITH LAST MONTH AS MONTH ONE, TWO MONTHS AGO AS MONTH TWO, AND SO ON THROUGH MONTH TWELVE (FOR TWELVE MONTHS AGO)

CARD 6 14/15-(06)

THEN, FOR EACH TYPE OF WELFARE RECEIVED, FILL IN THE AMOUNT RECEIVED FOR EACH OF THE PAST TWELVE MONTHS

	WRITE IN MONTH	AFDC	OAA	AID TO THE BLIND	AID TO THE DISABLED	GENERAL ASSISTANCE	OTHER	
1 Mo Ago								
16-19-	20/21-(01)	22-25-	26-29-	30-33	34-37	38-41-	42-45-	
2 Mos Ago								
	46/47-(02)	48-51-	52-55-	56-59-	60-63-	64-67-	68-71-	CARD 7 14/15-(07
3 Mos. Ago								
	16/17-(03)	18-21-	22-25-	26-29-	30-33-	34-37-	38-41-	
4 Mos Ago								
	42/43-(04)	44-47-	48-51-	52-55-	56-59-	60-63-	64-67-	CARD 8 14/15-(08)
5 Mos Ago								
	16/17-(05)	18-21-	22-25-	26-29-	30-33-	34-37-	38-41-	
6 Mos Ago								
	42/43-(06)	44-47-	48-51-	52-55-	56-59-	60-63-	64-67-	CARD 9 14/15-(09)
7 Mos Ago								
	16/17-(07)	18-21-	22-25-	26-29-	30-33-	34-37-	38-41-	
8 Mos. Ago								
	42/43-(08)	44-47-	48-51-	52-55-	56-59-	60-63-	64-67-	CARD 10 14/15-(10)
9 Mos Ago								
	16/17-(09)	18-21-	22-25-	26-29-	30-33-	34-37-	38-41-	
10 Mos Ago								
	42/43-(10)	44-47-	48-51-	52-55-	56-59-	60-63-	64-67-	CARD 11 14/15-(11)
11 Mos Ago								
	16/17-(11)	18-21-	22-25-	26-29-	30-33-	34-37-	38-41-	
12 Mos Ago								
	42/43-(12)	44-47-	48-51-	52-55-	56-59-	60-63-	64-67-	

CARD 16
14/15-(16)

5. During the past twelve months, have you received any money from pensions from retirement programs for government employees or military personnel?

Yes ( ) 16-1 No ( ) -2→SKIP TO QUESTION 6

↓

How much did you receive. .	WRITE IN MONTH		AMOUNT RECEIVED
			$
Last Month?	18-21-	22/23-(01)	24-27-
Two Months Ago?		28/29-(02)	30-33-
Three Months Ago?		34/35-(03)	36-39-
Four Months Ago?		40/41-(04)	42-45-
Five Months Ago?		46/47-(05)	48-51-
Six Months Ago?		52/53-(06)	54-57-
Seven Months Ago?		58/59-(07)	60-63-
Eight Months Ago?		64/65-(08)	66-69-
		14/15-(17)	
Nine Months Ago?		16/17-(09)	18-21-
Ten Months Ago?		22/23-(10)	24-27-
Eleven Months Ago?		28/29-(11)	30-33-
Twelve Months Ago?		34/35-(12)	36-39-

40-44-

45-49-

CARD 18
14/15-(18)

6 During the past twelve months, have you received any money from pensions from private employers?

Yes ( ) 16-1 No ( ) 2 → SKIP TO QUESTION 7

↓

How much did you receive .	WRITE IN MONTH	AMOUNT RECEIVED
Last Month?	18-21- ☐☐☐☐ 22/23-(01)	$ 24-27- ☐☐☐☐
Two Months Ago?	_____ 28/29-(02)	30-33- ☐☐☐☐
Three Months Ago?	_____ 34/35-(03)	36-39- ☐☐☐☐
Four Months Ago?	_____ 40/41-(04)	42-45- ☐☐☐☐
Five Months Ago?	_____ 46/47-(05)	48-51- ☐☐☐☐
Six Months Ago?	_____ 52/53-(06)	54-57- ☐☐☐☐
Seven Months Ago?	_____ 58/59-(07)	60-63- ☐☐☐☐
Eight Months Ago?	_____ 64/65-(08)	66-69- ☐☐☐☐
Nine Months Ago?	14/15-(19) _____ 16/17-(09)	18-21- ☐☐☐☐
Ten Months Ago?	_____ 22/23-(10)	24-27- ☐☐☐☐
Eleven Months Ago?	_____ 28/29-(11)	30-33- ☐☐☐☐
Twelve Months Ago?	_____ 34/35-(12)	36-39- ☐☐☐☐

40-44- ☐☐☐☐☐

45-49- ☐☐☐☐☐

15. THE HEAD OF THE HOUSEHOLD OR SPOUSE SHOULD CAREFULLY READ THE FOLLOWING SECTION BEFORE SIGNING

I certify that all information set forth in this form, including attachments, is full, accurate, and complete to the best of my knowledge The penalty for making false statements in this form is prescribed in 18 U.S C 1001 I realize I am applying for the Experimental Housing Allowance Program and that I will become a participant if my eligibility is confirmed by the information contained on this form

Date: _____ _____

Signature of head of household/Spouse

VIII.2 STANDARD INCOME VERIFICATION FORM

The standard Income Verification Form consisted of two sections: a waiver form signed by the household and an income information section that was completed by the income source. Separate verification forms were used for agencies and employers. Copies of both are contained on the following two pages.

Upon completion of the Initial Household Report Form, household members that reported any verifiable income were required to sign the waiver portion of the Verification Form for each source of verifiable income reported. The forms were then sent to all sources, who were instructed to complete the income information portion and return the forms to the site office. Sources could report total income paid during the twelve-month period for which information was requested, monthly income paid, or both.

For Office Use Only
ID No. _____

REQUEST FOR BENEFIT PAYMENT INFORMATION

Name of (Former) Recipient _____

Soc. Sec. No. _____ Address _____
Street

_____
City State Zip Code

Other Identification _____

I hereby request (agency name) _____
located at (agency address) _____,
in (city, state and zip code) _____,
to provide the following information concerning benefit payments I have received:

1. My total payments for each of the past twelve months, from _____ through _____.
month/year month/year
2. The length of time during the past twelve months that I have been receiving benefit payments from this agency.

Date _____ Signature _____

THIS PART TO BE COMPLETED BY AGENCY

For each month listed, please indicate (to the nearest dollar) this individual's total payments from your agency. Enter N/A in the amount column for month(s) which this individual did not receive benefit payments from your agency.

Month/Year	Amount	Month/Year	Amount
1. _____	$ _____	7. _____	$ _____
2. _____	$ _____	8. _____	$ _____
3. _____	$ _____	9. _____	$ _____
4. _____	$ _____	10. _____	$ _____
5. _____	$ _____	11. _____	$ _____
6. _____	$ _____	12. _____	$ _____

Total Payments for the Past Twelve Months $ _____

The length of time individual received benefit payments from your agency during the past twelve months, from _____ through _____.
month/year month/year

The above information is provided in strict confidence in response to your request.

Completed by _____ Job Title _____
Please Print Name

Date _____ Signature _____

Please mail the completed form in the attached postage-paid envelope. Thank you for your time and effort in providing this information.

For Office Use Only
ID No. _____

REQUEST FOR EMPLOYMENT INFORMATION

Name of (Former) Employee _____
Soc. Sec. No. _____ **Address** _____
Street

_____
City State Zip Code

I hereby request (company name) _____,
located at (company address) _____,
in (city, state and zip code) _____
to provide the following information concerning my employment with your firm:

1. My total earnings (including overtime, bonuses, etc.) for each of the past twelve months, from _____ through _____.
   month/year month/year
2. The length of time during the past twelve months that I have been employed by this company.

Date _____ Signature _____

THIS PART TO BE COMPLETED BY EMPLOYER

For each month listed, please indicate (to the nearest dollar) this individual's total earnings from your company. Enter N/A in the amount column for month(s) which this individual was not employed by your company.

Month/Year	Amount	Month/Year	Amount
1. _____	$ _____	7. _____	$ _____
2. _____	$ _____	8. _____	$ _____
3. _____	$ _____	9. _____	$ _____
4. _____	$ _____	10. _____	$ _____
5. _____	$ _____	11. _____	$ _____
6. _____	$ _____	12. _____	$ _____

Total Gross Earnings for the Past Twelve Months $ _____

The length of time individual was employed by your company during the past twelve months, from _____ through _____.
month/year month/year

The above information is provided in strict confidence in response to your request.

Completed by _____ Job Title _____

Please mail the completed form in the attached postage-paid envelope. Thank you for your time and effort in providing this information.

VIII.3 THE MONTHLY HOUSEHOLD REPORT FORM

During each month of participation in the Demand Experiment, households were required to complete a monthly Household Report Form, on which income, expenditures, rent, and demographic information for the previous month were reported. A copy of the section of the Household Report Form on which verifiable income was reported is contained on the following pages.

The monthly Household Report Form made use of exception reporting; that is, each HRF was preprinted before it was sent to the household. Each income section contained the names of household members that had reported income during the previous month and, for all income types except wages, the amount they had reported. Households were instructed to note changes to this information or to indicate (by checking a designated box) if the information was still correct for the current month.

SPECIAL INCOME REPORT

SPECIAL INCOME

27. Parts 1 & 2 below show several sources of income or programs that might have paid money to people in your household last month

Did anyone in your household receive money from any of these sources or programs during the month? ☐ NO ☐ YES

The names of people in your household who may have recently received money from these sources or programs are shown below, together with the amounts they received.

If the person received the amount as shown during the month, check the little box to the right of the amount.

If the person received a different amount, enter the correct amount received in the space provided. (If the person received no payment during the month, enter "none".)

If anyone else in your household received money from any of these programs or sources during the month,

a) Print the person's name
b) Fill in the amount received from each program or source

PART 1 NAME	SOCIAL SECURITY	GOVERNMENT PENSION	PRIVATE PENSION	VETERANS DISABILITY	UNEMPLOYMENT COMPENSATION
	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $
	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $
	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $
	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $
	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $
	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $	$ ☐ $

PART 2 NAME	AFDC OR ADC	SUPPLEMENTAL SECURITY INCOME	GENERAL ASSISTANCE AND OTHER
	$ ☐ $	$ ☐ $	$ ☐
	$ ☐ $	$ ☐ $	$ ☐
	$ ☐ $	$ ☐ $	$ ☐
	$ ☐ $	$ ☐ $	$ ☐
	$ ☐ $	$ ☐ $	$ ☐
	$ ☐ $	$ ☐ $	$ ☐

28. The answer to question 27 should now show the amounts of income received by any household member from these sources during Check here to show that it does ☐

29. Listed here are the names of your household members who have recently received money from alimony and/or child support, together with the amounts they received If the person received the amount as shown, check the little box to the right of the amount If the person received a different amount, enter the correct amount in the space provided (If the person received no payment during the month, cross out the amount printed and enter "none"). If anyone else in your household received money from alimony and/or child support, print the person's name and the amount of money received during the month

NAME	AMOUNT
	$ ☐ $
	$ ☐ $
	$ ☐ $

WAGE AND SALARY REPORT

30. This question asks for the wage and salary earnings and hours worked during   of all people in your household 18 and over. People who *only* work in their own business should not be listed here. (If a household member earned money during the month from his or her own business, he should be sure to answer question 32 and 33.) If a household member not only worked in his own business but also had another job he should list earnings from the other job here. If a household member received any tips, bonuses, or commissions, they should be included here.

A. Some of your household members are listed below. Complete all information for these persons. If any household member 18 or over, who worked during the month is not listed, write the person's name in line (A) in another box. Every household member 18 or over who earned money from wages or salaries during the month must be listed.

B. In column (B) for each box, check how often the person was paid during the month. If someone had more than one job during the month, check the pay period for the main job.

C. Check the actual number of times the person got a payment or a paycheck during the month. If someone had more than one job during the month, add all the payments for all jobs held.

D. Fill in the amount of gross pay (*before* taxes and deductions were taken out) for each paycheck received during the month. For example if someone was paid twice during the month, fill in two amounts. *If someone was paid by the day or received more than one payment a week, add up how much pay was received each week before any taxes or deductions were taken out and fill in these amounts.* Write the total amount paid before taxes and deductions during the month *in the box at the bottom.* If someone received no money from any job during the month, write "NONE" *in the box at the bottom.*

E. List the number of hours worked for each check or payment. If someone is paid more than once a week, add up the hours he worked each week and write them in. Add all hours worked last month and write the total in the box.

A			
B HOW OFTEN PAID	C NUMBER OF TIMES PAID	D AMOUNT PAID BEFORE TAXES	E HOURS WORKED
☐ BY THE DAY	5 OR MORE ☐	$	
☐ WEEKLY	4 ☐	$	
☐ EVERY 2 WEEKS	3 ☐	$	
☐ TWICE A MONTH	2 ☐	$	
☐ BY THE MONTH	1 ☐	$	
	TOTALS	$	

A			
B HOW OFTEN PAID	C NUMBER OF TIMES PAID	D AMOUNT PAID BEFORE TAXES	E HOURS WORKED
☐ BY THE DAY	5 OR MORE ☐	$	
☐ WEEKLY	4 ☐	$	
☐ EVERY 2 WEEKS	3 ☐	$	
☐ TWICE A MONTH	2 ☐	$	
☐ BY THE MONTH	1 ☐	$	
	TOTALS	$	

A			
B HOW OFTEN PAID	C NUMBER OF TIMES PAID	D AMOUNT PAID BEFORE TAXES	E HOURS WORKED
☐ BY THE DAY	5 OR MORE ☐	$	
☐ WEEKLY	4 ☐	$	
☐ EVERY 2 WEEKS	3 ☐	$	
☐ TWICE A MONTH	2 ☐	$	
☐ BY THE MONTH	1 ☐	$	
	TOTALS	$	

A			
B HOW OFTEN PAID	C NUMBER OF TIMES PAID	D AMOUNT PAID BEFORE TAXES	E HOURS WORKED
☐ BY THE DAY	5 OR MORE ☐	$	
☐ WEEKLY	4 ☐	$	
☐ EVERY 2 WEEKS	3 ☐	$	
☐ TWICE A MONTH	2 ☐	$	
☐ BY THE MONTH	1 ☐	$	
	TOTALS	$	

A			
B HOW OFTEN PAID	C NUMBER OF TIMES PAID	D AMOUNT PAID BEFORE TAXES	E HOURS WORKED
☐ BY THE DAY	5 OR MORE ☐	$	
☐ WEEKLY	4 ☐	$	
☐ EVERY 2 WEEKS	3 ☐	$	
☐ TWICE A MONTH	2 ☐	$	
☐ BY THE MONTH	1 ☐	$	
	TOTALS	$	

A			
B HOW OFTEN PAID	C NUMBER OF TIMES PAID	D AMOUNT PAID BEFORE TAXES	E HOURS WORKED
☐ BY THE DAY	5 OR MORE ☐	$	
☐ WEEKLY	4 ☐	$	
☐ EVERY 2 WEEKS	3 ☐	$	
☐ TWICE A MONTH	2 ☐	$	
☐ BY THE MONTH	1 ☐	$	
	TOTALS	$	

WAGE AND SALARY REPORT

31. The list in question 30 should now show all the wages and salaries for **every** household member who worked during   Check here to show that it does ☐

VIII.4 STANDARD INCOME REVERIFICATION FORM

Like the standard Income Verification Form, the Income Reverification Form consisted of a waiver section and an income information section. Separate forms were designed for agencies and employers. Copies of both appear on the following pages.

Unlike the Verification Form, the Reverification Form contained the precise time periods for which income information was requested. Before sending the forms to households or sources, Demand Experiment personnel completed all boxes in which dates were to be specified so that households and sources understood the exact reporting period that was to be verified. Household members were requested to complete the first page of each Reverification Form by listing the name and address of each source of verifiable income (reported on the monthly Household Report Form) and by signing the waiver form. When income information was received by site office personnel (on these forms, source forms, by telephone contacts, or other methods) a work-sheet was attached on which the method of verification was recorded and the income reported on the monthly Household Report Form was compared to the income reported by sources.

ABT ASSOCIATES INC.
REQUEST FOR EMPLOYMENT INFORMATION

FOR OFFICE USE ONLY

CARD 1

ID # [ ] [ ][ ][ ][ ] [ ][ ] [ ]
1/8

Household Member # [ ][ ][ ]
9/11

NAME: _____

ADDRESS: _____

CITY/STATE/ZIP CODE: _____

SOCIAL SECURITY NO.: _____

Indicate which type of income is being confirmed (CHECK ONLY ONE):

12/13-08 ( ) Wages and Salaries
-09 ( ) Self-Employment
-10 ( ) Other (Explain) _____
-11 ( )
-12 ( )
-13 ( )
-14 ( )

[8][8][0][1]
14/17

Did you have any employers in _____ or _____ that you did not have in _____?

18-1 ( ) Yes
-2 ( ) No

I hereby request (Employer's name) _____

at (Company name) _____

in (City, State, Zip Code) _____

to provide the following information concerning my employment with your firm:

My total gross earnings (including overtime, bonuses, tips, commissions, etc.) for the past three months of _____

That is from: Month [ ][ ] Year [ ][ ] through Month [ ][ ] Year [ ][ ]
19/22 23/26

Date _____ Signature _____

Analyst _____

63-1 ( )
-2 ( )
-3 ( )

8/75

THIS PART TO BE COMPLETED BY EMPLOYER

For each month listed, please indicate (to the nearest gross dollar) this individual's total payments from your company. For example, if a person received $226.45 from your company during January, 1975 the boxes should read as follows:

Month		Year			Amount				
0	1	7	5	$	0	2	2	6	.

If this individual did not receive payments from your company please enter "0000" in the amount boxes.

1. Month Year $ Amount .
   27/30 31/34

2. Month Year $ Amount .
   35/38 39/42

3. Month Year $ Amount .
   43/46 47/50

The above information is provided in strict confidence in response to your request.

Completed by _____ Job Title _____
PLEASE PRINT NAME

DATE Month Day Year
51/56

Signature _____

PLEASE MAIL THE COMPLETED FORM IN THE ATTACHED POSTAGE-PAID ENVELOPE. THANK YOU FOR YOUR TIME AND EFFORT IN PROVIDING THIS INFORMATION.

I.D.# _____

Household Member # _____

FOR OFFICE USE ONLY

Date Received Month Day Year
57/62

Analyst Initials _____

ABT ASSOCIATES INC.
REQUEST FOR BENEFIT PAYMENT INFORMATION

FOR OFFICE USE ONLY

CARD 1

ID # [ ] [ ][ ][ ][ ] [ ][ ] [ ]
1/8

Household Member # [ ][ ][ ]
9/11

NAME: _____

ADDRESS: _____

CITY/STATE/ZIP CODE: _____

SOCIAL SECURITY NO.: _____

OTHER IDENTIFICATION (IF ANY): _____

Indicate which type of benefit is being confirmed (CHECK ONLY ONE):

12/13-01 ( ) Social Security
-02 ( ) Supplemental Security Income (SSI)
-03 ( ) AFDC
-04 ( ) General Assistance (GA)
-05 ( ) Government Pension
-06 ( ) Veterans Pension
-07 ( ) Private Pension
-08 ( ) Other (Explain)_____
-09 ( ) Unemployment

If Social Security, Supplemental Security Income, or AFDC, my case worker's name is _____.

[8][7][0][1]
14/17

I hereby request (agency name) _____
located at (agency office address that you go to) _____
_____
in (city, state, zip code) _____
to provide the following information concerning benefit payments I have received:

My total payments for each of the past twelve months, from

Month Year [ ][ ][ ][ ] 18/21 through Month Year [ ][ ][ ][ ] 22/25

Date _____ Signature _____

FOR OFFICE USE ONLY

26-1 ( )
-2 ( )
-3 ( )

Analyst _____

8/75

THIS PART TO BE COMPLETED BY AGENCY

For each month listed, please indicate (to the nearest gross dollar) this individual's total payments from your agency. For example, if a person received $226.45 from your agency during January, 1975 the boxes should read as follows:

Month	Year		Amount			
0	1	7	5	$ 0	2	2	6 .

If this individual did not received benefit payments from your agency please enter "0000" in the amount boxes.

Card 2 | 8 | 7 | 0 | 2 | 14/17

	Month	Year		Amount				
1.				$				.
	27/30			31/34				
2.				$				.
	35/38			39/42				
3.				$				.
	43/46			47/50				
4.				$				.
	51/54			55/58				
5.				$				.
	59/62			63/66				
6.				$				.
	67/70			71/74				
7.				$				.
	18/21			22/25				
8.				$				.
	26/29			30/33				
9.				$				.
	34/37			38/41				
10.				$				.
	42/45			46/49				
11.				$				.
	50/53			54/57				
12.				$				.
	58/61			62/65				

The above information is provided in strict confidence in response to your request.

Completed by _____ Job Title _____
PLEASE PRINT NAME

Date Month Day Year | | | | | | | 66/71 Signature _____

Please mail both the completed form along with the waiver form in the attached postage-paid envelope. Thank you for your time and effort in providing this information.

I.D.# _____

Household Member # _____

Analyst _____

FOR OFFICE USE ONLY

Date Received Month Day Year | | | | | | | 72/77

APPENDIX IX

HOUSEHOLD SIZE

As mentioned in Chapter 1, payments to households under the Housing Gap allowance formula depended on household size as well as on income. Further, eligibility limits on income at enrollment (Table III-2), to which all households were subject, varied with household size in the Housing Gap and Percent of Rent treatment groups. Unlike income, however, household size was not subjected to verification. Reasons for this included operational difficulties (the lack, for example, of any routinely identifiable third party for verification) and the hostility aroused in the past by attempts to use unannounced visits in discovering household members who had not been reported to public welfare agencies. Data on household size were collected on the Initial Household Report Form and the monthly Household Report Form (see Appendix III, especially Table III-3). This appendix briefly describes several analyses of these data. Particular attention is given to the distributions of household size and of changes in household size during the first or second year after enrollment.[1]

The sample of households on which these analyses are based consists of those households that were active after two years of participation in the program. Because it is substantially larger than the samples of households whose income was completely verified at enrollment and at reverification, it can provide more information on changes in household size.

In these analyses the definition of household size is the program definition used in determining eligibility and payments. Under this definition, a household includes the head of household, the spouse of the head, all persons related to the head of household, and all persons unrelated to the head of household except roomers, boarders, and lodgers. It differs from the Census definition, which counts all persons living in the dwelling unit and thus includes roomers, boarders, and lodgers. In interpreting relationships between house-

[1] The age of the head of household, and its relationship to household size and to changes in household size, is the only demographic variable examined in this appendix; this relationship has been found to be important in past studies concerned with similar issues. Other demographic variables such as race/ethnicity and income have not been analyzed.

hold size and payments, it is desirable to keep in mind a payment rule which smoothed out short-term changes in household size. A household member's absence was not taken into account in calculating payments until that member had been absent for at least 90 days. Similarly, a new household member (except for a child of the head, a new spouse and children, a separated spouse, or a relative returning from a hospital or prison) was not counted for payment purposes until 90 days of residence had passed.

IX.1 DISTRIBUTION OF HOUSEHOLD SIZE

Table IX-1 provides a basic indication of the range and relative frequency of household sizes at enrollment. The mean number of members per household, 3.13 in Pittsburgh and 3.38 in Phoenix, indicates that households were slightly larger in Phoenix.

Because changes in household size (to be analyzed later in this appendix) may follow different patterns in different age groups, it is desirable to partition the sample according to the age of the head of the household. The analyses of this appendix use three broad groupings of age: 18 to 29, 30 to 61, and 62 to 90. The break between ages 61 and 62 coincides with the age at which one can normally begin to receive retirement benefits under Social Security. In addition, program rules confined participation by single-person households to persons over 61 years of age, with rare exceptions. The break between 29 and 30 is convenient but arbitrary.

Table IX-2 presents information on the distribution of household size by age group in the two sites.[1] Households were generally larger in Phoenix, but the difference is most substantial in the 30 to 61 age group, where the mean size

---

[1]Except for the facts that a household size of zero is not meaningful and that only handicapped individuals were enrolled as single-person households outside the 62 to 90 age group, the distribution of household size at enrollment within each age group is well approximated by a Poisson distribution. In this one-parameter family of discrete distributions, probabilities are given by

$$p_\lambda(k) = \frac{e^{-\lambda}\lambda^k}{k!}, \quad k = 0, 1, 2, \ldots$$

The best-fitting value of the parameter λ naturally varies with site and age group. The truncation that eliminates k=0 and (usually) k=1 complicates the problem of estimating λ, so this line of analysis is not pursued further here. (The mean of the distribution truncated to eliminate k=0, for example, is $\lambda/(1-e^{-\lambda})$, which has no closed-form solution for λ.) The complications are not

(footnote continues on page A-113)

Table IX-1

DISTRIBUTION OF HOUSEHOLD SIZE AT ENROLLMENT

HOUSEHOLD SIZE	PITTSBURGH		PHOENIX	
	NUMBER	PERCENT	NUMBER	PERCENT
1	210	16.9%	159	15.9%
2	315	25.4	256	25.6
3	292	23.6	204	20.4
4	176	14.2	146	14.6
5	125	10.1	92	9.2
6	57	4.6	55	5.5
7	38	3.1	36	3.6
8	18	1.5	25	2.5
9	6	0.5	18	1.8
10	1	0.1	5	0.5
11	0	0	3	0.3
12	1	0.1	0	0
13	0	0	1	0.1
14	0	0	1	0.1
SAMPLE SIZE	(1239)		(1001)	
MEAN SIZE	3.13		3.38	

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCE: Initial Household Report Forms.

Table IX-2

HOUSEHOLD SIZE AT ENROLLMENT, BY AGE GROUPS

HOUSEHOLD SIZE	AGE OF THE HEAD OF HOUSEHOLD					
	18-29		30-61		62-90	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
			PITTSBURGH			
1	0	0%	2	0.4%	208	66.5%
2	70	20.1	157	27.2	88	28.1
3	159	45.7	124	21.5	9	2.9
4	77	22.1	98	17.0	1	0.3
5	25	7.2	96	16.6	4	1.3
6	13	3.7	42	7.3	2	0.6
7	4	1.1	33	5.7	1	0.3
8	0	0	18	3.1	0	0
9+	0	0	8	1.4	0	0
SAMPLE SIZE	(348)	(28.1)	(578)	(46.7)	(313)	(25.3)
MEAN SIZE	3.32		3.92		1.45	
			PHOENIX			
1	0	0%	2	0.5%	157	66.5%
2	101	29.4	101	24.0	54	22.9
3	107	31.1	84	20.0	13	5.5
4	79	23.0	63	15.0	4	1.7
5	29	8.4	58	13.8	5	2.1
6	15	4.4	39	9.3	1	0.4
7	7	2.0	27	6.4	2	0.8
8	4	1.2	21	5.0	0	0
9+	2	0.6	26	6.2	0	0
SAMPLE SIZE	(344)	(34.4)	(421)	(42.1)	(236)	(23.6)
MEAN SIZE	3.42		4.37		1.55	

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCE: Initial Household Report Forms.

was 3.92 members per household in Pittsburgh and 4.37 in Phoenix. In more detail, the percentages show that larger households in this age group are considerably more common in Phoenix. Among households in the 62 to 90 age group, Phoenix shows a shift, relative to Pittsburgh, from two-person households into three- and four-person households. And in the 18 to 29 age group, the pattern is somewhat reversed: Phoenix shows a shift away from three-person households and primarily toward two-person households. In using these three groups to summarize the age distribution in the two sites, it is interesting to note that households in the 18 to 29 age group are somewhat more common in Phoenix (34.4 percent versus 28.1 percent), while both of the other age groups are less common.

IX.2 CHANGES IN HOUSEHOLD SIZE

A general examination of changes in household size provides the necessary background for the subsequent discussion of possible relationships between a household's treatment group and its change in household size. The most detailed information on changes in household size comes from tabulating households according to the number of members at the beginning and at the end of some specified interval of time. An interval one year in length offers a reasonable compromise between sampling so frequently that few households will have changed size and sampling often enough to capture changes rather than long-term trends. The present analyses of change in household size are based on data at enrollment and at one and two years after enrollment.

Comparison of household size after two years with household size at enrollment (Tables IX-3 and IX-4) shows the extent of changes experienced by participating households as a whole over the duration of the experiment. A few isolated large changes are evident, but almost all the data fall in a diagonal band dominated by the diagonal entries of the tables (that is, those for which household size after two years equals housheols size at enrollment), indicating that only a moderate fraction of the households changed in size and that the changes for those households were generally small.

(footnote continued from page A-110)

extreme, however, and it would be possible to simplify comparisons and predictions of household size distributions under various circumstances by using such Poisson models. A simple graphical technique for checking agreement between an observed frequency distribution and the Poisson distribution has been described in D.C. Hoaglin, "A Poissonness Plot," The American Statistician, Vol. 34, 1980, pp. 146-149.

Table IX-3

HOUSEHOLD SIZE IN PITTSBURGH, AT ENROLLMENT AND AFTER TWO YEARS

HOUSEHOLD SIZE AT ENROLLMENT	HOUSEHOLD SIZE AFTER TWO YEARS												
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1:	201	8	1										210
2:	39	244	24	4	3	1							315
3:	7	29	194	48	10	2	2						292
4:	3	8	15	128	20	2							176
5:	1		3	26	80	12	2	1					125
6:		1	2	4	9	34	7						57
7:					5	8	23	2					38
8:		1				1	4	9	3				18
9:							1	1	3		1		6
10:											1		1
11:													0
12:										1			1
TOTAL:	251	291	239	210	127	60	39	13	6	1	2	0	1239

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Initial and monthly Household Report Forms.

Table IX-4

HOUSEHOLD SIZE IN PHOENIX, AT ENROLLMENT AND AFTER TWO YEARS

HOUSEHOLD SIZE AT ENROLLMENT	HOUSEHOLD SIZE AFTER TWO YEARS													
	1	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL
1:	157	2												159
2:	27	177	43	7	2									256
3:	6	31	120	37	6	2	1	1						204
4:	4	11	25	79	20	5	2							146
5:		1	3	12	56	9	5	2	2	1		1		92
6:		1	3	7	11	24	7	2						55
7:			1	3	3	10	14	5						36
8:					1	1	2	14	6	1				25
9:				2	1	1	6	4	3	1				18
10:						1		1	1	2				5
11:								1		1		1		3
12:														0
13:												1		1
14:													1	1
TOTAL:	194	223	195	147	100	53	37	30	12	6	0	3	1	1001

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Initial and monthly Household Report Forms.

From the point of view of the experiment as a whole, the marginal totals of these tables--that is, the overall distributions of household size--reflect the net effect of all the fluctuations in household size. The principal changes are a decrease in two- and three-person households and an increase in single-person households in both sites and an increase in four-person households in Pittsburgh. The mean household size fell very slightly in both Pittsburgh and Phoenix.

For a more detailed examination of the distributions, Table IX-5 decomposes them into the three age groups. Pursuing the changes noted previously, the decrease in two-person households is fairly well spread across age groups in Pittsburgh but concentrated in the 18 to 29 age group in Phoenix. In contrast, most of the decrease in three-person households in Pittsburgh occurred in the 18 to 29 age group, as did the increase in four-person households. The 30 to 61 age group contributed the major share of the increase in single-person households in both sites. Part of the reason for this last change is that single-person households were enrolled, as a rule, only in the 62 to 90 age group. On the whole, households in the 18 to 29 age group shifted toward larger sizes, while those in the 30 to 61 age group shifted toward smaller sizes, and households in the 62 to 90 age group showed only rather slight changes. All these patterns are reflected quite directly in the mean values.

From an examination of the information in Tables IX-3 and IX-4, broken down by age group, it is evident that more Phoenix households in the 18 to 29 and 30 to 61 age groups experienced changes in size than did their counterparts in Pittsburgh. To provide quantitative detail on this point, Table IX-6 shows the relative frequency of changes by size of change (in five categories: decrease of more than one, decrease of one, no change, increase of one, and increase of more than one), household size at enrollment, and age group in the two sites. As observed in Tables IX-3 and IX-4, "no change" accounts for the experience of the vast majority of households over this two-year period. Changes by more than one member are not especially frequent, but they do play a more noticeable role among larger households in the 30 to 61 age group in both sites and larger households in the 18 to 29 age group in Phoenix. Figures IX-1, IX-2, and IX-3 display this information by plotting percent changed, percent increased, and percent decreased against household size at enrollment for the three age groups.

Table IX-5

HOUSEHOLD SIZE AT ENROLLMENT AND AFTER TWO YEARS, BY AGE GROUPS

HOUSEHOLD SIZE	AGE OF THE HEAD OF HOUSEHOLD					
	18-29		30-61		62-90	
	ENROLL-MENT	TWO YEARS	ENROLL-MENT	TWO YEARS	ENROLL-MENT	TWO YEARS
			PITTSBURGH			
1	0	2	2	35	208	214
2	70	61	157	146	88	84
3	159	124	124	111	9	4
4	77	100	98	106	1	4
5	25	36	96	87	4	4
6	13	17	42	41	2	2
7	4	8	33	30	1	1
8	0	0	18	13	0	0
9+	0	0	8	9	0	0
SAMPLE SIZE	(348)	(348)	(578)	(578)	(313)	(313)
MEAN SIZE	3.32	3.55	3.92	3.75	1.45	1.43
			PHOENIX			
1	0	6	2	21	157	167
2	101	77	101	96	54	50
3	107	102	84	85	13	8
4	79	79	63	65	4	3
5	29	40	58	56	5	4
6	15	20	39	32	1	1
7	7	7	27	28	2	2
8	4	7	21	23	0	0
9+	2	6	26	15	0	1
SAMPLE SIZE	(344)	(344)	(421)	(421)	(236)	(236)
MEAN SIZE	3.42	3.68	4.37	4.11	1.55	1.49

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Initial and monthly Household Report Forms.

Table IX-6

RELATIVE FREQUENCY OF CHANGES IN HOUSEHOLD SIZE BETWEEN ENROLLMENT AND TWO YEARS, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(Percent)

CHANGE	HOUSEHOLD SIZE AT ENROLLMENT						
	1	2	3	4	5	6	7+
			PITTSBURGH				
			18-29 AGE GROUP				
>+1		4.3	6.3	2.6	0	0	0
+1		24.3	23.3	16.9	20.0	15.4	0
0		70.0	62.9	71.4	56.0	76.9	100.0
-1		1.4	6.9	7.8	24.0	0	0
<-1			0.6	1.3	0	7.7	0
SAMPLE SIZE	(0)	(70)	(159)	(77)	(25)	(13)	(4)
			30-61 AGE GROUP				
>+1	0	1.9	3.2	0	3.1	0	1.7
+1	0	4.5	8.1	6.1	7.3	11.9	10.2
0	100.0	77.7	73.4	74.5	66.7	54.8	50.8
-1		15.9	12.1	9.2	18.8	19.0	22.0
<-1			3.2	10.2	4.1	14.3	15.3
SAMPLE SIZE	(2)	(157)	(124)	(98)	(96)	(42)	(59)
			62-90 AGE GROUP				
>+1	0.5	2.2	0	0	0	0	0
+1	3.8	0	11.1	100.0	0	0	0
0	95.7	83.0	33.3	0	50.0	50.0	100.0
-1		14.8	33.3	0	50.0	50.0	0
<-1			22.2	0	0	0	0
SAMPLE SIZE	(208)	(88)	(9)	(1)	(4)	(2)	(1)

Table IX-6 (continued)

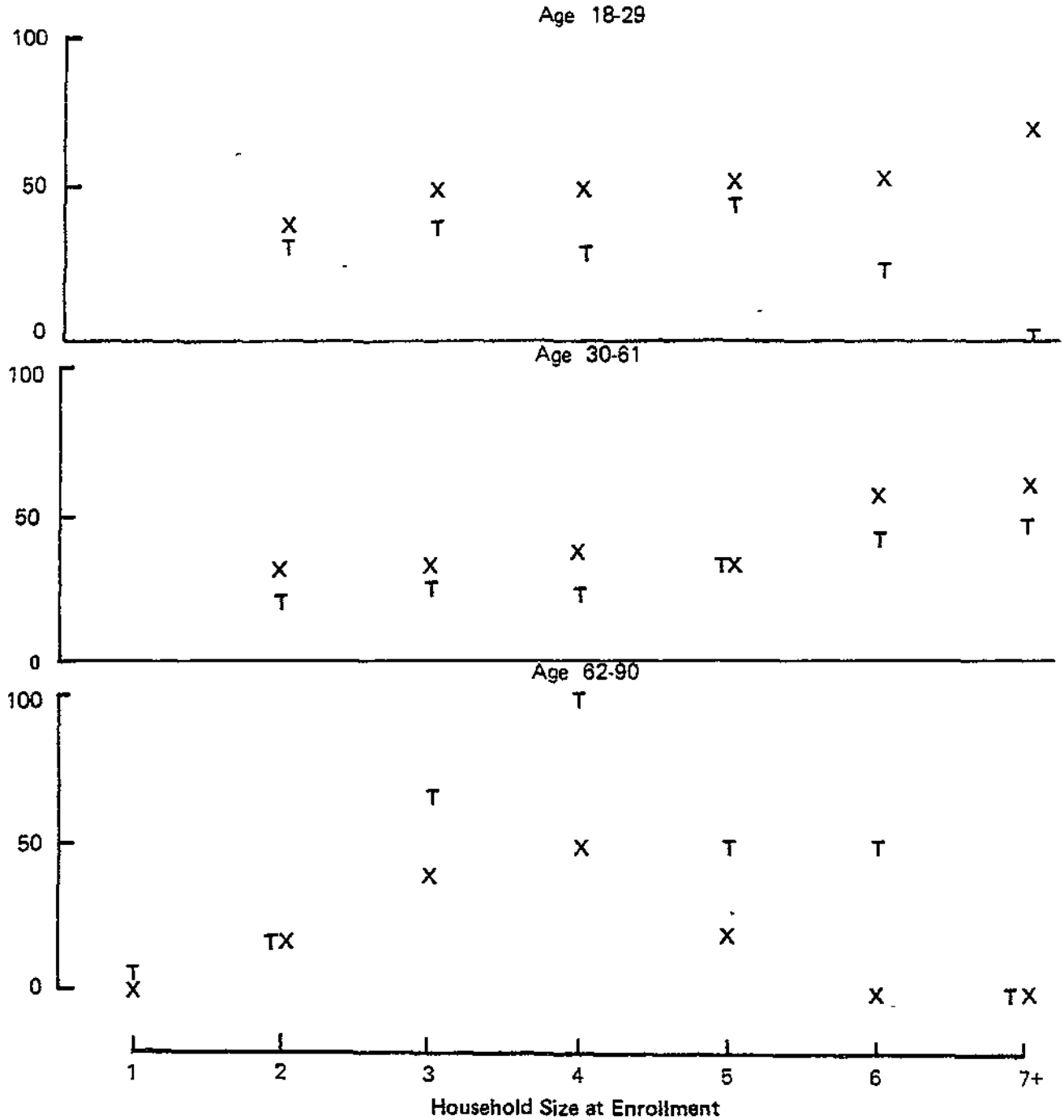
RELATIVE FREQUENCY OF CHANGES IN HOUSEHOLD SIZE BETWEEN ENROLLMENT AND TWO YEARS, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(Percent)

CHANGE	HOUSEHOLD SIZE AT ENROLLMENT						
	1	2	3	4	5	6	7+
			PHOENIX				
			18-29 AGE GROUP				
>+1		7.0	8.4	6.3	20.7	6.7	0
+1		27.7	27.1	19.0	17.2	20.0	30.8
0		63.4	52.3	49.4	48.3	46.7	30.8
-1		2.0	9.3	20.3	10.3	6.7	15.4
<-1			2.8	5.1	3.4	20.0	23.1
SAMPLE SIZE	(0)	(101)	(107)	(79)	(29)	(15)	(13)
			30-61 AGE GROUP				
>+1	0	2.0	1.2	3.2	6.9	2.6	1.4
+1	0	14.9	8.3	7.9	6.9	10.3	12.2
0	100.0	67.3	66.7	60.3	65.5	41.0	36.5
-1		15.8	21.4	14.3	15.5	25.6	24.3
<-1			2.4	14.3	5.1	20.5	25.7
SAMPLE SIZE	(2)	(101)	(84)	(63)	(58)	(39)	(74)
			62-90 AGE GROUP				
>+1	0	0	0	0	20.0	0	0
+1	1.3	0	7.7	0	0	0	0
0	98.7	83.3	61.5	50.0	80.0	100.0	100.0
-1		16.7	23.1	0	0	0	0
<-1			7.7	50.0	0	0	0
SAMPLE SIZE	(157)	(54)	(13)	(4)	(5)	(1)	(2)

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.
DATA SOURCES: Initial and monthly Household Report Forms.

FIGURE IX-1

PERCENT OF HOUSEHOLDS WHOSE SIZE AFTER TWO YEARS
DIFFERED FROM THAT AT ENROLLMENT, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(T = Pittsburgh, X = Phoenix)

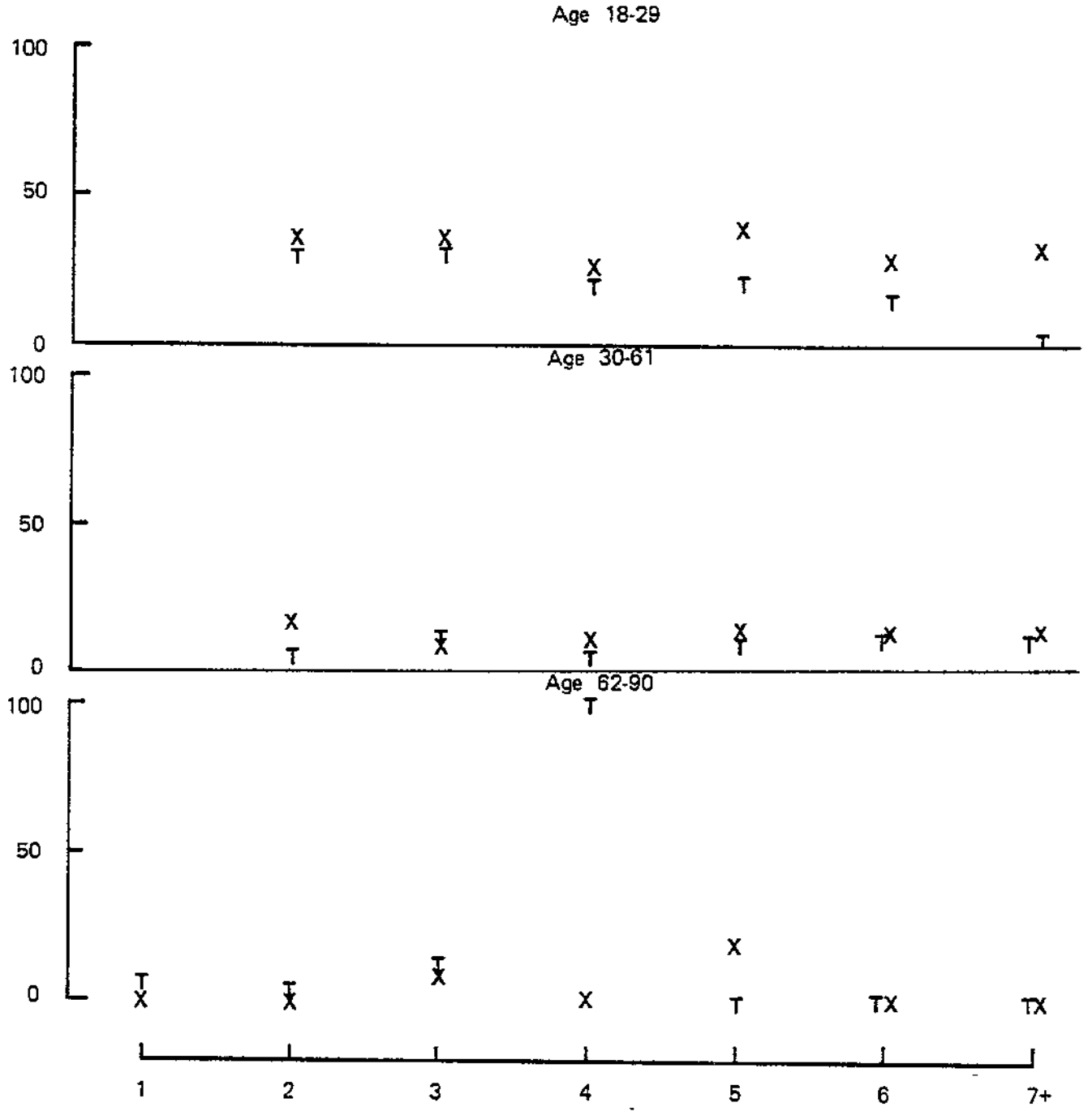


SAMPLE Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing

DATA SOURCES. Initial and monthly Household Report Forms.

FIGURE IX-2

PERCENT OF HOUSEHOLDS WHOSE SIZE INCREASED FROM ENROLLMENT TO TWO YEARS, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(T = Pittsburgh, X = Phoenix)

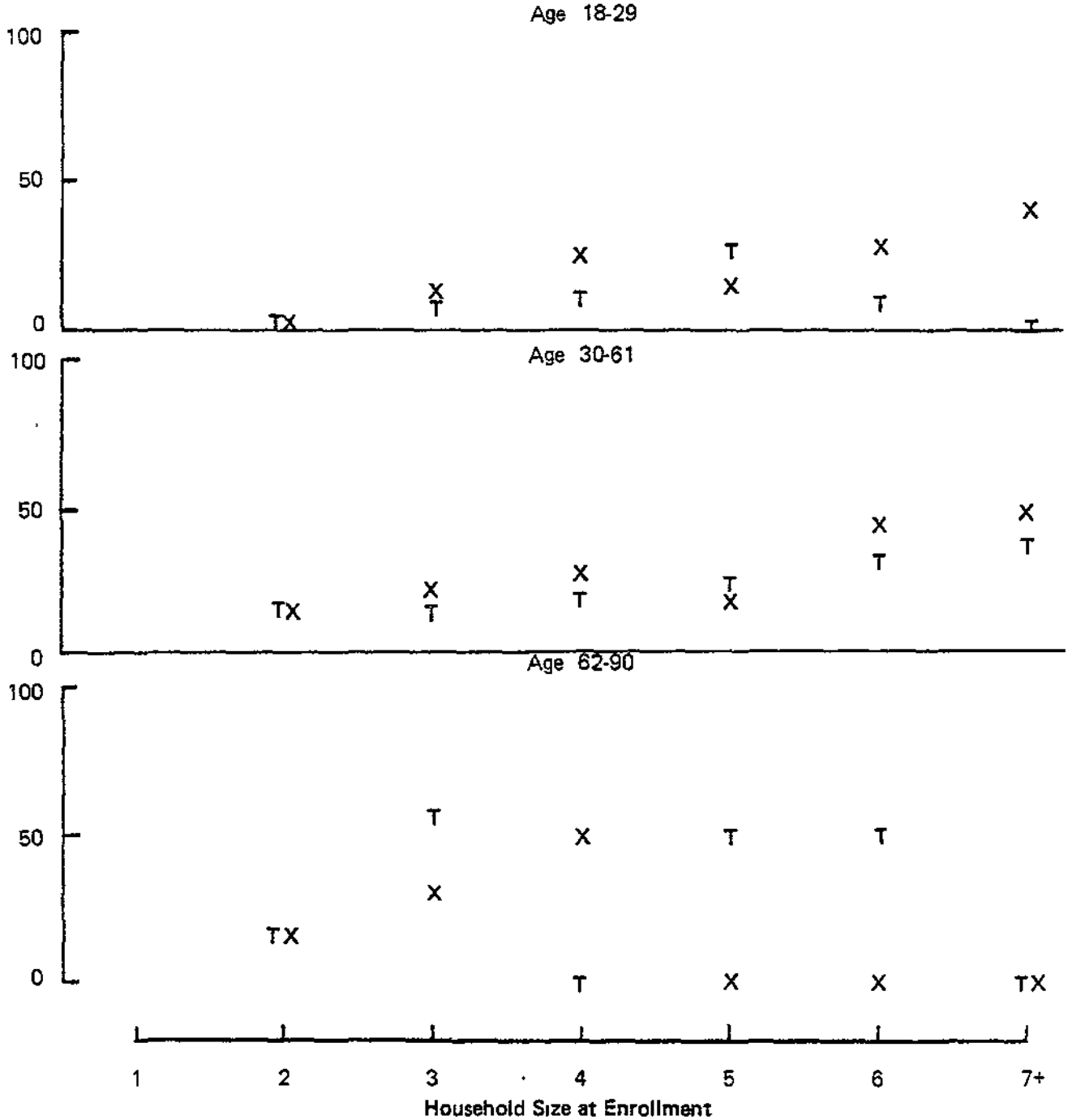


SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing

DATA SOURCES Initial and monthly Household Report Forms

FIGURE IX-3

PERCENT OF HOUSEHOLDS WHOSE SIZE DECREASED FROM ENROLLMENT TO TWO YEARS, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(T = Pittsburgh, X = Phoenix)



SAMPLE Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing

DATA SOURCES: Initial and monthly Household Report Forms.

Except for the 62 to 90 age group, all three percentages are somewhat higher in Phoenix, commonly by about 10 percentage points. In the 62 to 90 age group there is little difference for one- and two-person households, and there are so few larger households that the indications are not reliable. Except for Pittsburgh households in the 18 to 29 age group, percent changed tends to increase with household size (as might be expected). The primary contributor to this appearance in Figure IX-1 is percent decreased, as Figures IX-2 and IX-3 reveal. Percent increased shows very little trend against household size (except perhaps for an irregular decline among Pittsburgh households in the 18 to 29 age group), while percent decreased shows a reasonably steady upward trend. It is reasonable to expect a generally greater level of percent increased in the 18 to 29 age group as a result of marriages and births. Both in this age group and in the others, a possible explanation for the behavior of percent decreased is that larger households are more likely to be extended families and hence are more likely to decrease in size (for example, through death or the departure of a sub-unit).

The data on household size after one year of participation make it possible to compare changes during the first year with changes during the second year and thus to obtain some indication of relative stability in changes over time. Tables IX-7 and IX-8 give the relative frequency of changes during the first and second years, respectively (in the same format as Table IX-6). Figure IX-4 compares the extent of change during the two years; specifically, it uses the relative frequency of change during the second year minus the relative frequency of change during the first year and plots this difference against household size (at the start of the year) for the three age groups. The general picture is one of little difference between the two years. The points that deviate from the horizontal line representing no difference are based on small numbers of households. Also, there seems to be no systematic relationship between household size and the difference in percent changed. Thus, the annual variations in household size during a household's two years of participation can be treated as unrelated, and no further year-by-year analyses are indicated.

Another source of information on household size is the Baseline Interview, administered before offers to enroll in the program were made (see Sections I.2 and III.2). Because the Baseline Interview preceded the Enrollment Interview by two to three months, comparing these two values of household size could

Table IX-7

RELATIVE FREQUENCY OF CHANGES IN HOUSEHOLD SIZE BETWEEN ENROLLMENT AND ONE YEAR, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(Percent)

CHANGE	HOUSEHOLD SIZE AT ENROLLMENT						
	1	2	3	4	5	6	7+
			PITTSBURGH				
			18-29 AGE GROUP				
>+1		0	1.9	0	0	0	0
+1		27.1	11.3	14.3	12.0	0	25.0
0		72.9	78.0	79.2	72.0	92.3	75.0
-1		0	8.2	5.2	16.0	0	0
<-1			0.6	1.3	0	7.7	0
SAMPLE SIZE	(0)	(70)	(159)	(77)	(25)	(13)	(4)
			30-61 AGE GROUP				
>+1	0	0.6	0.8	0	2.1	4.8	0
+1	0	4.5	7.3	5.1	4.2	7.1	8.5
0	100.0	87.3	75.8	78.6	77.1	64.3	69.5
-1		7.6	13.7	11.2	14.6	16.7	15.2
<-1			2.4	5.1	2.1	7.1	6.8
SAMPLE SIZE	(2)	(157)	(124)	(98)	(96)	(42)	(59)
			62-90 AGE GROUP				
>+1	0	2.3	0	0	0	0	0
+1	3.4	0	11.1	0	0	0	0
0	96.6	90.9	33.3	0	75.0	100.0	100.0
-1		6.8	33.3	100.0	0	0	0
<-1			22.2	0	25.0	0	0
SAMPLE SIZE	(208)	(88)	(9)	(1)	(4)	(2)	(1)

Table IX-7 (continued)

RELATIVE FREQUENCY OF CHANGES IN HOUSEHOLD SIZE BETWEEN ENROLLMENT AND ONE YEAR, BY AGE GROUP AND HOUSEHOLD SIZE AT ENROLLMENT
(Percent)

CHANGE	HOUSEHOLD SIZE AT ENROLLMENT						
	1	2	3	4	5	6	7+
			PHOENIX				
			18-29 AGE GROUP				
>+1		3.0	1.9	1.3	13.8	6.7	0
+1		24.8	22.4	17.7	20.7	6.7	15.4
0		70.3	68.2	59.5	48.3	80.0	30.8
-1		2.0	5.6	19.0	13.8	0	23.1
<-1			1.9	2.6	3.4	6.7	30.8
SAMPLE SIZE	(0)	(101)	(107)	(79)	(29)	(15)	(13)
			30-61 AGE GROUP				
>+1	0	2.0	2.4	1.6	6.8	2.6	0
+1	0	11.9	8.3	7.9	12.1	7.7	12.2
0	100.0	74.3	67.9	69.8	60.3	61.5	58.1
-1		11.9	20.2	19.0	19.0	12.8	14.9
<-1			1.2	1.6	1.7	15.4	14.9
SAMPLE SIZE	(2)	(101)	(84)	(63)	(58)	(39)	(74)
			62-90 AGE GROUP				
>+1	0	0	0	0	20.0	0	0
+1	0.6	1.9	7.7	0	0	0	0
0	99.4	90.7	76.9	50.0	60.0	100.0	100.0
-1		7.4	15.4	0	0	0	0
<-1			0	50.0	20.0	0	0
SAMPLE SIZE	(157)	(54)	(13)	(4)	(5)	(1)	(2)

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.
DATA SOURCES: Initial and monthly Household Report Forms.

Table IX-8

RELATIVE FREQUENCY OF CHANGES IN HOUSEHOLD SIZE BETWEEN ONE YEAR AND TWO YEARS, BY AGE GROUP AND HOUSEHOLD SIZE AT ONE YEAR

CHANGE	HOUSEHOLD SIZE AT ONE YEAR						
	1	2	3	4	5	6	7+
			PITTSBURGH 18-29 AGE GROUP				
>+1	0	4.6	2.7	0	0	0	0
+1	0	13.8	15.6	11.9	12.9	18.8	0
0	100.0	80.0	75.5	83.3	67.7	81.3	75.0
-1		1.5	6.1	4.8	19.4	0	25.0
<-1			0	0	0	0	0
SAMPLE SIZE	(1)	(65)	(147)	(84)	(31)	(16)	(4)
			30-61 AGE GROUP				
>+1	0	1.9	1.7	1.9	1.1	2.7	1.7
+1	21.1	7.0	6.1	4.9	8.0	2.7	5.2
0	78.9	80.4	80.0	84.5	79.5	64.9	63.8
-1		10.8	10.4	6.8	10.2	21.6	22.4
<-1			1.7	1.9	1.1	8.1	6.9
SAMPLE SIZE	(19)	(158)	(115)	(103)	(88)	(37)	(58)
			62-90 AGE GROUP				
>+1	1.0	1.1	25.0	0	0	0	0
+1	1.4	1.1	0	0	25.0	0	0
0	97.6	88.9	50.0	50.0	25.0	50.0	100.0
-1		8.9	25.0	0	50.0	50.0	0
<-1			0	50.0	0	0	0
SAMPLE SIZE	(210)	(90)	(4)	(2)	(4)	(2)	(1)

Table IX-8 (continued)

RELATIVE FREQUENCY OF CHANGES IN HOUSEHOLD SIZE BETWEEN ONE YEAR AND TWO YEARS, BY AGE GROUP AND HOUSEHOLD SIZE AT ONE YEAR

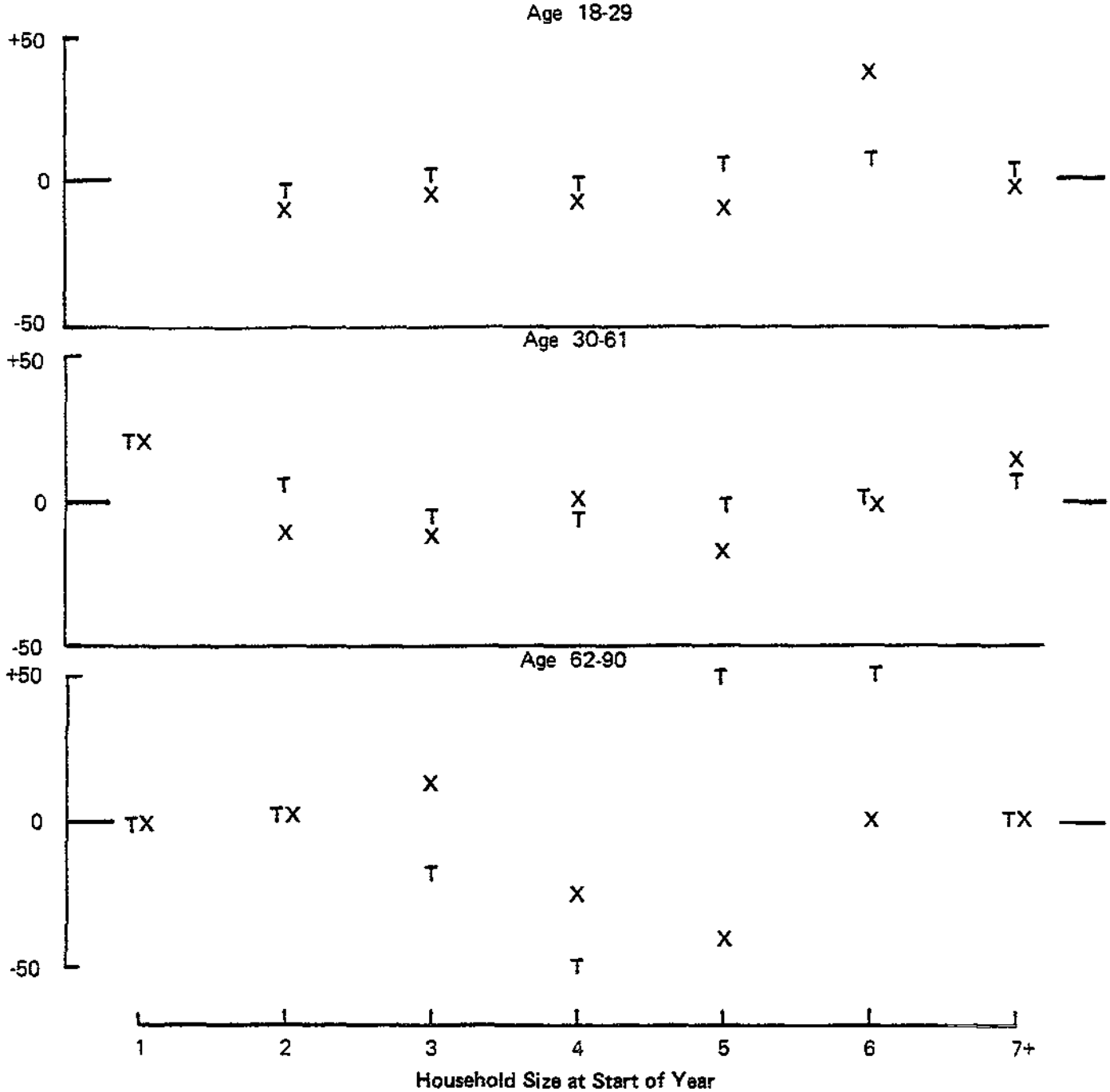
CHANGE	HOUSEHOLD SIZE AT ONE YEAR						
	1	2	3	4	5	6	7+
				PHOENIX			
				18-29 AGE GROUP			
>+1	20.0	2.6	1.7	3.9	6.4	13.0	0
+1	40.0	14.1	18.3	18.2	16.1	17.4	26.7
0	40.0	79.5	73.0	66.2	58.1	43.5	33.3
-1		3.8	7.0	6.5	9.7	17.4	26.7
<-1			0	5.2	9.7	8.7	13.3
SAMPLE SIZE	(5)	(78)	(115)	(77)	(31)	(23)	(15)
				30-61 AGE GROUP			
>+1	13.3	0	1.2	5.6	1.9	0	1.4
+1	6.7	8.6	4.8	6.9	0	11.1	11.6
0	80.0	84.9	79.8	72.2	78.8	63.9	44.9
-1		6.5	11.9	9.7	9.6	19.4	24.6
<-1			2.4	5.6	9.6	5.6	17.4
SAMPLE SIZE	(15)	(93)	(84)	(72)	(52)	(36)	(69)
				62-90 AGE GROUP			
>+1	0	0	9.1	0	0	0	0
+1	0.6	1.9	0	0	0	0	0
0	99.4	88.5	63.6	75.0	100.0	100.0	100.0
-1		9.6	18.2	0	0	0	0
<-1			9.1	25.0	0	0	0
SAMPLE SIZE	(162)	(52)	(11)	(4)	(3)	(1)	(3)

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCE: Monthly Household Report Forms.

FIGURE IX 4

DIFFERENCE BETWEEN RELATIVE FREQUENCY OF CHANGE IN HOUSEHOLD SIZE DURING FIRST YEAR AND SECOND YEAR, BY AGE GROUP AT START OF YEAR AND HOUSEHOLD SIZE
(T = Pittsburgh, X = Phoenix)



SAMPLE. Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES Initial and monthly Household Report Forms.

give an indication of variations in household size over a much shorter interval of time. Further, at the time of the Baseline Interview, households had no information on the allowance plan that they would be offered, so that some information on treatment effects may be available. However, the definition of "household member" employed in the Baseline Interview differed in some respects from that used at enrollment, with the consequence that a difference in the two values of the size of a household could arise from either a change in the actual household or the difference in the definitions.[1] For this reason Baseline data will not be introduced until the next section, where Experimental and Control groups will be compared in a way which is not affected by the difference in definitions.

IX.3 RELATION OF HOUSEHOLD SIZE CHANGES TO TREATMENT GROUPS

Because allowance payments under the Housing Gap formula depended on household size as well as on income,[2] it is possible that Housing Gap households tended to misreport their size in order to gain a larger allowance payment.[3] House-

---

[1]Both definitions included the head, the spouse of the head, and all persons related to the head. To this the Baseline definition added only unrelated children, while the definition used at enrollment (and subsequently) added all persons unrelated to the head except roomers, boarders, and lodgers.

[2]The Housing Gap allowance formula is $P = C - bY$, where C is a multiple of C*, the basic payment level, and b is the tax rate. Both the value of b and the multiplier relating C to C* depended on the treatment group (as indicated in Table I-1), and C* also varied with site and household size (in a stepped fashion with five levels of household size: 1, 2, 3 or 4, 5 or 6, and 7 or more). Except for one group of households that were not subject to any housing requirements, the allowance payment was not permitted to exceed the household's rent. (For further detail, see Appendix I.)

[3]The incentives to misreport, however, were complicated. Changes in payments due to changes in household size took effect only if the household met housing requirements, which also varied with household size. Under Minimum Standards requirements, the household had to live in a unit with (among other things) a minimum number of adequate bedrooms per person. Under Minimum Rent requirements, a household had to spend at least a minimum amount for rent. The minimum was set as a fraction of C* (.7 if Minimum Rent Low, .9 if Minimum Rent High), so that it varied with household size.

In general, a household that met requirements and changed its size received payments based on its new household size only if it met the housing requirements for that size (this would automatically be true for reduced sizes). Thus, there would be no incentive to overreport household size unless the household would meet the requirements for a larger size. On the other hand, households that did not meet requirements might receive payments by reporting a smaller household size if they met the lower requirement imposed for this size.

hold size was not verified, so it is not possible to examine the possibility of misreporting directly, but it is straightforward to compare the treatment groups and determine whether membership in a particular treatment group may have influenced changes in household size.

For an initial comparison of household size at enrollment and after two years, the data are derived by separating Tables IX-3 and IX-4 into Housing Gap, Percent of Rent, and Control households and simultaneously into the three age groups. The resulting sample sizes, together with the average household size at the Baseline Interview, at enrollment, after one year, and after two years, are given in Tables IX-9, IX-10, and IX-11. As a preliminary indication, these averages suggest that differences between the treatment groups are not substantial. Statistical techniques for contingency tables can be used to obtain more comprehensive comparisons.[1] Three variables are involved in these analyses: household size at enrollment, household size after two years, and treatment group. For the third variable, the treatment groups are taken in pairs to provide three comparisons: Housing Gap versus Control, Percent of Rent versus Control, and Housing Gap versus the combination of Percent of Rent and Control. The analysis makes no assumptions about the relationship between the two household-size variables and simply asks whether this pattern fits both of the treatment groups being compared.[2] Thus, if the distribution of

[1] See, for example, Y.M.M. Bishop, S.E. Fienberg, and P.W. Holland, Discrete Multivariate Analysis, MIT Press, Cambridge, Mass., 1975.

[2] In terms of contingency tables, the model is one of "partial independence": variables 1 and 2 (household size at enrollment and household size after two years, respectively), taken together, are independent of variable 3 (the treatment group). In one common notation the observed data are x_{ijk} ($i=1,\ldots I$; $j=1,\ldots J$; $k=1,\ldots K$), and the corresponding fitted values under the above model of partial independence are

$$\hat{x}_{ijk} = \frac{x_{ij+}\, x_{++k}}{x_{+++}}$$

where replacing a subscript by a plus sign indicates that data values are to be summed across all values of that subscript (for example, x_{32+} is the number of households that consisted of three members at enrollment and two members after two years, and x_{++1} is the number of households in the treatment group). The adequacy of this model can be assessed by calculating the Pearson goodness-of-fit statistic

$$x^2 = \sum_{i,j,k} \frac{\left(x_{ijk} - \hat{x}_{ijk}\right)^2}{\hat{x}_{ijk}}$$

and referring it to a chi-squared distribution on $(IJ-1)(K-1)$ degrees of freedom.

Table IX-9

AVERAGE HOUSEHOLD SIZE IN THE 18 TO 29 AGE GROUP,
BY TREATMENT GROUP AND TIME PERIOD

TIME PERIOD	HOUSING GAP	PERCENT OF RENT	CONTROL
	PITTSBURGH		
Baseline[a]	3.26	3.22	3.41
Enrollment	3.30	3.23	3.48
One Year	3.40	3.27	3.62
Two Years	3.52	3.39	3.80
SAMPLE SIZE	(145)	(115)	(88)
	PHOENIX		
Baseline[a]	3.45	3.27	3.37
Enrollment	3.40	3.31	3.54
One Year	3.76	3.39	3.56
Two Years	3.86	3.49	3.64
SAMPLE SIZE	(136)	(108)	(100)

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Baseline Interviews, Initial and monthly Household Report Forms.

a. The Baseline definition of household size differs from that used at enrollment and subsequently.

Table IX-10

AVERAGE HOUSEHOLD SIZE IN THE 30 TO 61 AGE GROUP,
BY TREATMENT GROUP AND TIME PERIOD

TIME PERIOD	HOUSING GAP	PERCENT OF RENT	CONTROL
	PITTSBURGH		
Baseline[a]	4.04	3.78	4.06
Enrollment	3.94	3.77	4.04
One Year	3.82	3.63	3.98
Two Years	3.76	3.63	3.85
SAMPLE SIZE	(232)	(181)	(165)
	PHOENIX		
Baseline[a]	4.36	4.40	4.44
Enrollment	4.36	4.35	4.42
One Year	4.20	4.18	4.36
Two Years	4.02	4.29	4.05
SAMPLE SIZE	(176)	(121)	(124)

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Baseline Interviews, Initial and monthly Household Report Forms.

a. The Baseline definition of household size differs from that used at enrollment and subsequently.

Table IX-11

AVERAGE HOUSEHOLD SIZE IN THE 62 TO 90 AGE GROUP, BY TREATMENT GROUP AND TIME PERIOD

TIME PERIOD	HOUSING GAP	PERCENT OF RENT	CONTROL
	PITTSBURGH		
Baseline[a]	1.54	1.39	1.54
Enrollment	1.47	1.39	1.51
One Year	1.47	1.36	1.48
Two Years	1.49	1.34	1.49
SAMPLE SIZE	(135)	(110)	(68)
	PHOENIX		
Baseline[a]	1.53	1.49	1.60
Enrollment	1.53	1.52	1.60
One Year	1.49	1.52	1.59
Two Years	1.47	1.42	1.62
SAMPLE SIZE	(109)	(69)	(58)

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Baseline Interviews, Initial and monthly Household Report Forms.

a. The Baseline definition of household size differs from that used at enrollment and subsequently.

either household-size variable differs between the two treatment groups, or if the pattern of changes in household size differs, a lack of fit (measured by the chi-squared goodness-of-fit statistic, X^2) will be observed.

Altogether, 18 such analyses are required: three treatment-group comparisons within each of three age groups at each site. Table IX-12 presents the resulting values of the chi-squared statistic and its number of degrees of freedom.[1] In only two cases were the two treatment groups significantly different--Percent of Rent and Control in the 30 to 61 age group in Pittsburgh and in the 62 to 90 age group in Phoenix. Both of these were significant only at the 0.1 level and, at this level, one would expect by chance roughly two significant results among 18. Furthermore, neither of the significant differences involves the Housing Gap treatment group. From this result the immediate conclusion is that patterns of change in household size between enrollment and two years were not, on the whole, related to treatment group.

As mentioned in the previous section, enrollment data can be compared with data from the Baseline Interview to determine whether changes in household size over this shorter period of time are related to treatment group. For example, households in the Housing Gap group might have tended to misreport their size at enrollment. By fitting the model of partial independence, which was just used in comparing treatment groups in terms of their joint distribution of household sizes at enrollment and after two years, it is possible to avoid the difficulty introduced by the difference between the definitions of household size at Baseline and at enrollment. This difference is separated from the comparison between treatment groups. Table IX-13 shows the value and number of degrees of freedom for the chi-squared goodness-of-fit statistic for this model. Only one comparison, Percent of Rent versus Control in the 18 to 29 age group in Pittsburgh, is significant at the 0.1 level, and this is no more than one would expect by chance. Further, it does not involve the Housing Gap treatment group. Thus, there is no evidence that the pattern of changes in household size between the Baseline Interview and enrollment is related to the treatment group to which the household was assigned.

---

[1] Within the combination of age group and site, the number of degrees of freedom may vary because adjustments must be made for varying numbers of household size combinations that were not observed in either of the treatment groups being compared. For a general discussion of these considerations, see Bishop, Fienberg, and Holland, pp. 115-119.

Table IX-12

COMPARISON OF THE JOINT DISTRIBUTION OF HOUSEHOLD SIZE AT ENROLLMENT AND HOUSEHOLD SIZE AT TWO YEARS BETWEEN PAIRS OF TREATMENT GROUPS, BY AGE GROUP[a]

TREATMENT GROUP COMPARISON	AGE GROUP 18-29 X^2	df	30-61 X^2	df	62-90 X^2	df
			PITTSBURGH			
Housing Gap vs. Control	13.42	14	27.66	25	6.13	6
Percent of Rent vs. Control	17.42	12	29.25†	20	4.12	7
Housing Gap vs. Percent of Rent and Control	7.41	14	27.65	25	8.80	8
			PHOENIX			
Housing Gap vs. Control	9.65	14	23.97	23	4.74	6
Percent of Rent vs. Control	15.58	14	16.59	21	12.32†	6
Housing Gap vs. Percent of Rent and Control	10.61	14	23.37	24	3.22	6

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Initial and monthly Household Report Forms.

a. X^2 is the Pearson chi-squared statistic (with df degrees of freedom) for the model under which the joint distribution of household sizes is independent of the treatment group.

† Significant at the 0.10 level.

Table IX-13

COMPARISON OF THE JOINT DISTRIBUTION OF HOUSEHOLD SIZE AT BASELINE AND HOUSEHOLD SIZE AT ENROLLMENT BETWEEN PAIRS OF TREATMENT GROUPS, BY AGE GROUP[a]

TREATMENT GROUP COMPARISON	AGE GROUP 18-29 X^2	df	30-61 X^2	df	62-90 X^2	df
PITTSBURGH						
Housing Gap vs. Control	10.35	7	11.06	11	3.12	3
Percent of Rent vs. Control	12.10~	7	10.29	10	1.53	3
Housing Gap vs. Percent of Rent and Control	3.31	7	15.50	11	4.20	3
PHOENIX						
Housing Gap vs. Control	6.15	8	10.52	10	2.90	3
Percent of Rent vs. Control	6.48	8	9.29	10	5.32	3
Housing Gap vs. Percent of Rent and Control	3.88	8	7.81	10	3.98	3

SAMPLE: Experimental and Control households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Baseline Interviews, Initial Household Report Forms.

a. X^2 is the Pearson chi-squared statistic (with df degrees of freedom) for the model under which the joint distribution of household sizes is independent of the treatment group.

~ Significant at the 0.10 level.

Within the Housing Gap group it is possible to take account of whether a household received a full allowance payment upon enrollment and thus to examine whether this possible incentive may have influenced the reporting of household size. In order to receive a full payment, a household had to occupy a dwelling unit which met certain housing requirements. The two types of housing requirements used, Minimum Standards and Minimum Rent, are described in Section I.3. Within each of three Housing Gap subgroups--Minimum Standards, Minimum Rent Low, and Minimum Rent High--three sets of households can readily be compared with the households in the Control group: all households in the subgroup, those that met the requirement at enrollment, and those that did not meet the requirement at enrollment.[1] This comparison is the third variable in the partial independence model, and the household sizes at enrollment and after two years again serve as the first two variables. For this analysis households are not further separated according to age group because several of the resulting sample sizes would be too small. The results of fitting this model will indicate whether changes in household size over the course of the experiment are related to membership in any particular subgroups. The goodness-of-fit statistics, along with their degrees of freedom, appear in Table IX-14. In Pittsburgh the households that met the Minimum Standards requirement differ significantly (at the 0.1 level) from the Control households that would have met this requirement. A closer examination of the contribution made by each cell to the chi-squared statistic reveals that more than half of the lack of fit is due to the fact that too few two-person households in the Control group maintained their size from enrollment to two years. No other groups differed significantly from the corresponding Control households, even at the 0.1 level, and it seems reasonable to conclude that changes in household size are not influenced by treatment-group effects.

---

[1] The latter two comparisons are between the households that met the requirement (did not meet the requirement) and those Control housenolds that would have met the requirement (would not have met the requirement).

Table IX-14

COMPARISON OF THE JOINT DISTRIBUTION OF HOUSEHOLD SIZE AT ENROLLMENT AND HOUSEHOLD SIZE AT TWO YEARS BETWEEN GROUPS OF HOUSING GAP HOUSEHOLDS AND CORRESPONDING CONTROL HOUSEHOLDS, BY WHETHER HOUSING REQUIREMENTS WERE MET[a]

	ALL HOUSEHOLDS		HOUSEHOLDS THAT MET REQUIREMENTS[b]		HOUSEHOLDS THAT DID NOT MEET REQUIREMENTS[c]	
TREATMENT GROUP	X^2	df	X^2	df	X^2	df
			PITTSBURGH			
Minimum Standards	22.68	21	19.00†	12	19.12	20
Minimum Rent Low	21.00	19	14.19	17	14.38	15
Minimum Rent High	24.34	19	17.28	14	12.78	18
			PHOENIX			
Minimum Standards	26.39	19	9.73	13	24.75	19
Minimum Rent Low	22.86	19	15.59	15	22.98	18
Minimum Rent High	20.06	19	12.85	14	17.00	17

SAMPLE: Minimum Standards and Minimum Rent households active at two years after enrollment, excluding those with enrollment incomes over the eligibility limits and those living in their own homes or in subsidized housing.

DATA SOURCES: Initial and monthly Household Report Forms, Housing Evaluation Forms.

a. X^2 is the Pearson chi-squared statistic (with df degrees of freedom) for the model under which the joint distribution of household sizes is independent of the treatment group or subgroup.

b. The comparison group consists of Control households that would have met the corresponding housing requirements at enrollment.

c. The comparison group consists of Control households that would not have met the corresponding housing requirements at enrollment.

† Significant at the 0.10 level.