FIVE THOUSAND AMERICAN FAMILIES— PATTERNS OF ECONOMIC PROGRESS

VOLUME II

Special Studies of the First Five Years of the Panel Study of Income Dynamics

Edited by James N. Morgan

With Contributions by Elizabeth Roistacher, John Goodman, Martha Hill, Martin David, Greg Duncan, Thad Mirer, Robin Barlow, Richard Coe, Saul Hymans, Harold Shapiro, James Cramer, Russell Hill, and Frank Stafford

Conducted Under Contracts with the Office of Economic Opportunity
(Responsibility for this project has been transferred to the Office of the Assistant Secretary for Planning and Evaluation, Department of Health Education, and Welfare)

ISR
SURVEY RESEARCH CENTER
INSTITUTE FOR SOCIAL RESEARCH
THE UNIVERSITY OF MICHIGAN

ISR Code No. 3568

Five Thousand American Families—Patterns of Economic Progress, Volumes I and II
Library of Congress Catalog Card No. 74-62002
ISBN 0-87944-153-4 paperbound
ISBN 0-87944-154-2 clothbound

Published by the Institute for Social Research
The University of Michigan, Ann Arbor, Michigan 48106

First Published 1974
Third Printing 1975
Manufactured in the United States of America

CONTENTS

PREFACE

The first of these two volumes of analysis is concerned with topics relevant to the major purposes of the study -- the examination of what determines the economic fortunes of families, particularly the poor. Inevitably, the rich matrix of data allows further policy relevant analysis. We are indebted to the Office of Economic Opportunity for additional funding which has allowed us to support some special studies. These are included in this volume along with contributions from the staff of the Economic Behavior Program and others. The authors and their present positions are listed below.

Elizabeth Roistacher, Study Director, Survey Research Center, and Assistant Professor of Economics, University of Michigan.

John Goodman, PhD Candidate, Economics, University of Michigan.

Martha Hill, PhD Candidate, Economics, University of Michigan.

Martin David, Professor of Economics, University of Wisconsin; formerly Program Director, Survey Research Center, and Professor of Economics, University of Michigan.

Greg Duncan, Assistant Study Director, Survey Research Center, and PhD Candidate, Economics, University of Michigan.

Thad Mirer, Assistant Professor of Economics, State University of New York at Albany; formerly with Institute for Research on Poverty, University of Wisconsin.

Robin Barlow, Professor of Economics, University of Michigan.

Richard Coe, factory worker; formerly PhD Candidate, Economics, University of Michigan.

Saul Hymans, Professor of Economics, University of Michigan, and Co-Director, Research Seminar in Quantitative Economics.

Harold Shapiro, Professor of Economics, University of Michigan.

James Cramer, Assistant Professor of Sociology, University of California, Davis; PhD Candidate, Sociology, University of Michigan.

Frank Stafford, Visiting Professor at Stanford, 1973-74; Associate Professor of Economics, University of Michigan.

C. Russell Hill, Assistant Professor of Economics and Research Associate, Institute of Public Policy Studies, University of Michigan.

In addition to the supporting staff mentioned in the Preface to Volume I,

there are two other assistants who helped with the computer work for this volume: Michael Conte and Jay Cherlow. Editorial suggestions were made by Doug Truax, Linda Stafford, Joan Brinser, and Mary Coombs. Susan Finlayson, Priscilla Hildebrandt, and Wanda Lemon helped prepare the final manuscript.

Chapter 1

HOUSING AND HOMEOWNERSHIP

INTRODUCTION

Housing represents the largest single component of a family's consumption and is a good indication of its economic well-being. Housing not only reflects a family's well-being, it contributes to it because of the amount of time family members spend at home and in the neighborhood and because location determines accessibility to goods and services, such as schooling, shopping, and recreation, which are available in the community.

Although many families select a residence near to where they work, some families may have employment opportunities restricted by housing location. Lower income families without access to automobiles or adequate public transportation may find themselves unable to reach jobs and unable to move within reach of jobs, especially with the suburbanization of industry.

In addition to being the major consumption outlay of a family, housing is also the major form of savings for those who own their homes, so that while the family consumes the services of its house, it is also building up equity which can be converted into other goods and services at some point in the future.

Housing affects the economic well-being not only of the individual but of society as a whole. When neighborhoods decay due to inadequate incomes relative to the cost of providing and maintaining housing, they create an unsatisfactory environment for all inhabitants of the community. Whether public concern is motivated by altruism or by a fear that such problems will extend beyond neighborhood boundaries, a good deal of government policy has been directed toward solving the problem of providing adequate housing for lower income families. These efforts have historically been directed toward the supply side of the market: public housing, urban renewal, and FHA-subsidized mortgages for rehabilitation and construction of low income housing. Other policies, however, have been directed toward the demand side. The government has taken part in subsidizing low income housing through welfare payments, a relatively large portion of which go to housing. In addition, FHA programs also included mortgage subsidies for low income owners and rent subsidies which were linked to FHA rehabilitation and construction programs. Currently, the federal government is considering a rent subsidy

program in which lower income families will be given rent certificates to increase their buying power in the housing market. The success of such a program depends on the absence of housing market segregation and on the sensitivity of short run supply to increases in housing demand.

Government policy in the civil rights area has been concerned with breaking down segregation in housing markets. Blacks are restricted from schools, job opportunities, and a broad choice of housing opportunities when they are denied access to certain neighborhoods.

A final area of government activity is the encouragement of homeownership through tax benefits; this is a policy which benefits those who are able to enter the owners' sector regardless of income level. Indeed, given the progressive nature of the tax system, the higher a family's income is the greater are these benefits.

In this chapter we examine who owns homes and recent trends in the pattern of homeownership. We also examine the level of housing consumption and how it has been changing. In particular, we are concerned with the position of lower income and black households in the housing market--two intersecting groups which are targets of housing market policy. Such descriptions of how the housing market is currently functioning are necessary inputs into the determination of future housing policy. The Panel study allows us to observe housing consumption over a five-year period so that we can see how rising incomes contribute to changes in housing consumption. This type of information is important input into a policy directed at subsidizing lower income families either through rent certificate programs or through more general income maintenance programs.

ANALYSIS

I. Determinants of Homeownership

Homeownership is desired by a majority of families for a number of reasons. First, equity in owned housing is a major form of saving--indeed, *the* major form--for most American families. Rather than paying out rent, a family can buy a house which will grow in value over time, acting as a protection against inflation. Second, there are certain tax benefits which are extended to homeowners: deduction of mortgage interest payments and property tax payments. These benefits reduce the effective cost of housing. Offsetting the savings component and the tax benefits are the real costs of bearing the responsibility for maintenance of the dwelling unit as well as selling the dwelling when the family decides to move. There is also an opportunity cost to tying up savings in a home, which

can be measured by the rate of interest on savings accounts. In addition, there is the cost of reduced liquidity associated with a long-term commitment such as homeownership.[1]

In addition to all these cost-related reasons, another reason for buying a home is that the rental market may not provide a dwelling unit with the specifications desired by the family--including not only such things as the size of the dwelling and the availability of a backyard, but also the mix of public services that a family consumes along with its housing. These local public services include, in particular, schools and public transportation.

Although some renters may actively decide to become owners, others passively choose ownership because the kind of housing they want is not available in rental form or because they live in an area with few rental units.

In the Panel data, we observe families for the period 1968 through 1972. At the beginning of the period, 62% of the families owned their own homes, and by 1972, 72% of families were owners. Most of the new families that were formed during the sample period became and remained renters (see Table 1.1).

The characteristics of owners, renters and those who neither own nor rent[2] are displayed in Table 1.2. Owners tend to be older, have larger families, and have higher incomes, reflecting the importance of the life cycle in homeownership. Homeownership is a commitment to settling down in one place, usually while children grow up, employment is stable, and income is rising until retirement age. The use of multivariate analyses in the next sections will help sort out those family characteristics which make the strongest independent contributions to predicting homeownership.

---

[1] A thorough consideration of these costs and benefits can be found in John P. Shelton, "The Cost of Renting Versus Owning A Home," Land Economics, February 1968, pp 59-72. Whether or not it is less costly to own rather than rent depends on the length of tenure. Taking into account foregone interest, loss of liquidity, tax benefits, transactions costs, and maintenance costs, he concludes that it pays to become a homeowner for tenures of five years or more.

[2] Families who neither own nor rent may be receiving housing in return for services provided to the property owner; they may, as is the case with some domestic and agricultural workers, receive housing as part of their wage; or they may simply be living rent free in housing owned by a friend or relative.

TABLE 1.1

Ownership Rates for 1968 and 1972

	Original Families		Families Formed During Sample	All Families
	1968	1972	1972	1972
Own	61.5	71.9	22.5	62.3
Rent	34.7	24.7	67.3	33.1
Neither own nor rent	3.8	3.4	10.2	4.6
Total	100.0	100.0	100.0	100.0

TABLE 1.2

Income and Demographics of Owners, Renters and Those Who Neither Own Nor Rent, 1972

	Percent Of All Families	1972 Income	5-Year Income	Number In Family Unit	Age of Head	Percent Black	Percent Female	Percent On Welfare Sometime
Owners	62.3	$12,711	$11,230	3.3	50.3	7.5	17.6	5.9
Renters	33.1	8,161	8,265	2.5	39.4	18.0	37.3	19.6
Neither own nor rent	4.6	5,864	6,404	2.4	38.9	14.8	29.9	17.8
All families	100.0	10,891	10,027	3.0	46.2	11.3	24.7	11.0

MTR 2285, 2290

MULTIVARIATE ANALYSIS OF HOMEOWNERSHIP

We have run two Multiple Classification Analyses[1] to examine the characteristics of owners versus renters. The first model looks at all owners and renters in 1972 and compares their characteristics. It incorporates results of all past home purchases, so that age can be expected to dominate the relationship. The other model is restricted to those families who rented in 1968 and looks for the characteristics which distinguish those who have become owners over the five years from those who have remained renters. By limiting the analysis to initial renters we have reduced the age span of the population being considered, so that other variables should now become more important. This second switching approach allows us to consider recent developments in homeownership.

Using Multiple Classification Analysis, we can see what variables help to explain homeownership both before and after taking into account their intercorrelations with the other independent variables. For example, we can see whether age, income, and family size make separate contributions to predicting homeownership or whether they all explain the same part of the variance.

For each of our models, the dependent variable is equal to unity if the family owns in 1972 and is equal to zero if the family rents in 1972.[2] For the owners and renters model, the mean value of the dependent variable is the percent of families who own in 1972. For the switching model, the mean is equal to the percentage who own in 1972 among those families who were renters in 1968. The independent variables are similar for the two analyses, with some change variables included in the switching model. A list of the independent variables which are used to predict the probabilities of homeownership and switching and their gross and net explanatory power appears in Tables 1.3 and 1.5.[3]

The results of the Multiple Classification Analysis for predicting 1972 homeownership in terms of a family's income and other characteristics appear on

---

[1] See Appendix C for a description of Multiple Classification Analysis. This is a multivariate technique which allows for nonlinear relationships between the dependent variable and the independent variable but restricts the relationship among independent variables to an additive form.

[2] The 4.6% of families who neither owned nor rented in 1972 are excluded from the multivariate analysis of homeownership and of sector switching.

[3] The gross explanatory power is measured by the eta-squared statistic; eta-squared is the ratio of the variation explained by one independent variable to the total variation about the mean of the dependent variable. Beta-squared measures the relationship between an independent variable and a dependent variable controlling for all other independent variables.

TABLE 1.3

Gross and Net Explanatory Power of Independent Variables Used to Predict Whether Family Owns or Rents, 1972

Predictor	Eta^2	$Beta^2$
Age of head	.150	.170
5-Year Average Family Money Income	.053	.019
Family size	.084	.083
Welfare sometime	.042	.013
Race	.030	.005
Sex of head	.051	.004
Education of head	.003	.003
Size of largest city in SMSA (1968)	.031	.027

R^2 (adjusted)	.32
Number of cases (unweighted)	4691
Mean of dependent variable	.66
Standard deviation of dependent variable	.47

MTR 2254

TABLE 1.4

Unadjusted and Adjusted Homeownership Rates for All Families from a Regression Used to Predict Whether Family Owns or Rents, 1972

Predictor	Unweighted N	Weighted %	Unadjusted Mean	Adjusted Mean
Age of head				
<25	656	10.1	.17	.27
25-34	1019	19.9	.54	.49
35-44	909	18.3	.72	.61
45-54	885	18.4	.78	.72
55-64	665	14.9	.75	.80
65 or older	557	18.3	.78	.93
5-Year average $ income				
<$3000	571	9.0	.59	.62
$3000-4999	826	12.2	.51	.57
$5000-7499	1015	17.7	.54	.58
$7500-9999	809	17.4	.62	.64
$10,000-14,999	925	25.6	.72	.69
$15,000 or more	545	18.0	.84	.76
Family size				
1	811	21.2	.41	.44
2	1132	27.7	.69	.60
3	842	16.6	.67	.71
4	657	14.6	.79	.81
5	492	9.6	.79	.83
6	310	5.1	.76	.78
7 or more	447	5.1	.72	.77
Race				
White	2936	86.2	.69	.67
Black	1605	11.0	.44	.57
Other	150	2.8	.47	.57
Sex of head				
Male	3358	75.9	.72	.67
Female	1333	24.1	.47	.60
Welfare sometime				
No	3752	89.5	.69	.67
Yes	939	10.5	.37	.50
Size of largest city in SMSA				
500,000 or more	1855	34.5	.56	.56
100,000-499,999	996	22.2	.69	.70
50,000-99,999	513	11.9	.65	.65
25,000-49,999	278	7.1	.69	.68
10,000-24,999	377	9.4	.71	.71
<10.000	665	14.8	.79	.78
Not ascertained	7	.1	--	--
Number of cases	4691			
Mean of dependent variable	.66			

MTR 2254

TABLE 1.5

Gross and Net Explanatory Power of Independent Variables
Used to Predict Whether Renters Will Become Homeowners 1968-1972
(families with same head all five years)

Predictor	Eta^2	$Beta^2$
5-Year Average Money Income	.098	.033
Family size (1968)	.055	.032
Race	.007	.000
Welfare sometime	.018	.002
Age of head (1972)	.066	.015
Sex of head	.077	.008
Change in income ($)	.069	.008
Change in family size	.050	.017
Education of head	.024	.007
Size of largest city in SMSA (1968)	.023	.017

R^2 (adjusted)	.20
Number of cases (unweighted)	1505
Mean of dependent variable	.30
Standard deviation of dependent variable	.45

Table 1.4. The results for the switching model appear on Table 1.6. These results are unadjusted and adjusted probabilities for each category of each dependent variable. Adjusted probabilities "correct" for differences which can be explained by the other independent variables. Only the results for those variables which make an important contribution to the analysis are displayed.

OWNING VERSUS RENTING, 1972

Looking at all the families who either own or rent in 1972, the strongest predictors of homeownership are age and family size. City size is quite powerful in accounting for differences in homeownership rates. This variable is included as a measure of supply factors which put limits on homeownership. That is, large cities are likely to have a higher percentage of rental units than do small cities or towns. This would reduce the probability of a resident of a small town or city being a homeowner, all other things being equal.

The probability of homeownership increases dramatically with the age of the head of household. This is a life cycle effect; as a family reaches its maximum family size and job stability, homeownership becomes increasingly desirable. A person with a stable job can expect to stay in the same area for a number of years so that homeownership will probably be more economical than renting, and more likely to provide amenities such as space for a growing family or a backyard. Neighborhoods where homes are owned may also have better schools since residents stay longer and are more likely to approve taxes for high quality public services. Although the probability of homeownership increases at a decreasing rate before controlling for income, family size, and other variables, once differences in the distributions of other variables are taken into account, the positive relationship between age and ownership increases at a steadier rate. The probabilities of owning for the youngest families and for the oldest families increase once we allow for the fact that both of these groups have few children (at home, in the case of the elderly) and relatively low incomes.

Both before and after adjustment for other family characteristics, there is a strong relationship between homeownership and family size. The probability of homeownership increases with family size at a decreasing rate. The probability of a family owning its home actually declines slightly for large families --six or more persons; adjusting for income and age differences, this decline is still evident but somewhat reduced. This may reflect large, lower-income urban families who are restricted to a rental housing market; the control for income and city size may not have been adequate to account for lower ownership rates among these urban dwellers.

TABLE 1.6

Unadjusted and Adjusted Probabilities of Renters Becoming Homeowners, 1968-1972

Predictor	Unweighted N	Weighted %	Unadjusted Mean	Adjusted Mean
5-Year average money income				
<$3000	273	11.8	.11	.26
$3000-4999	343	16.8	.09	.18
$5000-7499	346	20.1	.29	.26
$7500-9999	264	20.1	.39	.30
$10,000-14,999	211	21.6	.40	.34
$15,000 or more	68	9.6	.53	.50
Family size				
1	267	22.0	.10	.16
2	269	25.6	.32	.30
3	238	17.3	.36	.31
4	201	12.9	.40	.37
5	192	9.4	.35	.35
6	121	5.1	.27	.36
7 or more	217	7.6	.40	.43
Race				
White	627	73.9	.32	.30
Black	801	20.5	.22	.28
Other	77	5.6	.30	.28
Welfare sometime				
No	1047	82.9	.32	.30
Yes	458	17.1	.16	.25
Number of cases	1505			
Mean of dependent variable	.30			

The relationship between homeownership and income is quite strong in a bivariate context. However, once differences in the age of the head of household and in family size are taken into account, family income adds very little explanatory power to the model. Income, age, and family size are all interrelated over the life cycle, so it is not surprising to find that income does not make an independent contribution.

Whether or not a family is on welfare is not a powerful predictor of whether the family will be a homeowner because such a small fraction of families are welfare recipients.[1] However, having received welfare does significantly reduce the probability that the family will own its home, even having taken into account the low incomes of these families.[2] Only 37% of the families who have received welfare were homeowners. Even after adjusting for their low incomes, their homeownership rate is still 16 points below the average probability of 66% for all families. An approximate test indicates that welfare status is significant at a 95% level in accounting for differences in ownership rates. This may indicate that welfare recipients are unable to become homeowners because of an unwillingness of banks to finance them. It may also be a function of market conditions; if welfare recipients are primarily in metropolitan areas, they may be restricted to markets which are predominantly rental, such as New York City. Although their adjusted ownership rate does include a correction for city size, this may not be an adequate correction.

The relationship between race and homeownership is largely explained by other demographic variables. Sixty-nine percent of whites are owners while only 44% of blacks are owners. Once income, age and family size differences are taken into account, all of which are relatively highly correlated with race, the black rate is only 10 points less than for whites. This difference could be a taste difference or it could represent the exclusion of blacks from the owners' market because of segregated housing markets or discrimination in mortgage markets.[3] As was the case for welfare families, the explanatory power is low, but it does make a statistically significant difference.

---

[1] A family is categorized as a welfare recipient if it received welfare payments at any time during the period 1968 to 1972.

[2] A variable which is not powerful in predicting may still be statistically significant. Using an approximate F-test (we assume that beta-squared approximates the partial R-squared and ignore the clustered nature of our sampling procedure), the welfare variable is statistically significant at a 95% confidence level. See the Glossary for a description of statistical significance.

[3] The city size variable should control for some market supply differences.

Differences in homeownership rates for female-headed and male-headed families can also be explained primarily in terms of income, family size, and age differences for these groups. However, even adjusting for these differences, female-headed families have ownership rates of 60% compared to 67% for male-headed families.[1] Women may also face discrimination in mortgage markets which reduces their probability of being homeowners.

SWITCHING FROM RENTING TO OWNING

By limiting the analysis to families who were renters in 1968, the demographic characteristics which determine whether or not a family will switch to the owners' sector can be elucidated. The results of this Multiple Classification Analysis are in Tables 1.5 and 1.6. Restricting the population to those families renting in 1968 reduces the variation in age, income, and family size, the primary characteristics which distinguished renters from owners. In this multivariate model age is not important in predicting whether a family will become a homeowner. However, despite the reduction in the variations in family size and income, the probability that a family will become a homeowner is best explained by these two variables. The higher the family income and the larger the family, the greater is the probability that it will become a homeowner.

As in the model which predicted whether or not a family would be a renter or an owner, city size has been included as a market variable to account for the fact that certain housing markets tend to have a smaller percentage of their units available for owner-occupancy. Again, this variable is quite powerful in explaining differences in ownership rates--in this case differences in the rate with which renters switch to owning their homes.

Thirty-two percent of white families who rented in 1968 had become owners by 1972, while only 22% of black renters had become owners. These differences can be accounted for by differences in income and the other demographic characteristics of black and white families. After adjustment for those differences, the switching rate for whites falls to 30% and that for blacks rises to 28%.

Perhaps the most interesting difference between the model which predicts homeownership and the model which predicts sector switching is the change in the importance of the race variable. Looking at differences between renters and owners as of 1972, there was a significant difference in ownership rates among blacks and whites. However, race has virtually no power in predicting whether

---

[1] An approximate test indicates that this difference is statistically significant.

a family will switch sectors. Whether a family owns or rents is heavily weighted by history, while change in that status depends on recent trends in homeownership. The decline in importance of race as a predictor of homeownership suggests that not only have black incomes risen in recent years, but that housing market segregation and mortgage market discrimination have been reduced. An alternative explanation for the decline in the importance of race differences is that blacks have had an increasing preference to become homeowners and have been more willing to move into neighborhoods which are predominantly white. That is, neighborhoods may have been segregated because of black desires not to live in white neighborhoods as well as white desires to exclude blacks. Both of these attitudes may be changing.

Whether a family is on welfare helps predict whether it is a renter or an owner. However, it seems to make almost no difference in whether or not the family switched from renting to owning. We also find that the differences in male-headed and female-headed households disappear in our model once differences in income and family size are taken into account, which could indicate a reduction in mortgage discrimination against women in recent years.

OTHER TENURE CHANGES AND FAMILIES WHO NEITHER OWN NOR RENT

Only 21% of the families moving between 1968 and 1972 actually changed from renting to owning. Thirty-three percent of the moves were adjustments by owners within the owners' sector, and 30% of the moves were within the rental sector. A small portion of the moves involved families who neither owned nor rented in either 1968 or 1972, and a somewhat smaller portion involved families who actually switched from owning to renting. Selected family characteristics of these groups of movers are displayed in Table 1.7.

Those families moving within the owners' sector had the highest incomes, but those switching from renting to owning had the greatest percentage increase in income--65% (before adjusting for inflation). Families switching from owning to renting had an overall decline in income of 8%. This decline is even greater if inflation is taken into account: the 21% increase in the Consumer Price Index from 1967 to 1971 (the period for which our income change is measured) suggests a decline in real income of almost 30% for this group. The income decline is probably due to the high proportion of retirees among those who switch from owning to renting. Both those moving within the rental sector and those switching from owning to renting had declines in family size, with the declines being greatest for the latter group.

TABLE 1.7

Characteristics of Movers According to Sector Change 1968-1972
(half sample same heads all five years)

	1967 Family Money Income	1971 Family Money Income	Percent Change in Income	Real Percent Change* in Income	1968 Family Size	1972 Family Size	Percent Nonwhite	Percent with Female Head	1972 Age of Head	Weighted Percent	Unweighted N
Rent-Rent	6170	8611	+39.5	+18.5	3.11	3.03	27.5	26.8	42	29.9	308
Rent-Own	8322	13710	+64.7	+43.7	3.32	3.84	20.6	7.4	37	21.0	161
Own-Own	10736	14394	+34.1	+13.1	3.55	3.60	7.5	7.2	47	33.5	162
Own-Rent	8240	7550	- 8.4	-29.4	3.12	2.13	10.1	34.4	52	7.2	45
Other	4442	5793	+30.4	+ 9.4	3.48	3.12	14.6	9.9	43	8.4	77
All Movers	8155	11304	+38.6	+17.6	3.33	3.33	17.0	15.3	43	100.0	753

*All figures are adjusted downward by 21%, the increase in all items in the Consumer Price Index from 1967 to 1971.

The low incomes of families who neither owned nor rented in one of the periods is balanced to some extent by their housing being provided free. If this were imputed as a part of income, it would not, however, bring the family income near the mean for all families. If we assume annual value of housing to be equal to the mean rental cost for 1971 of $1427, then 1971 income for those who neither own nor rent would be brought up to $5869,[1] while the mean for all renters is $8161.

II. Expenditures on Housing

In the previous section we have examined the determinants of homeownership. Having distinguished renters from owners, in this section we explain the determinants of housing expenditures for each of these groups.

The average American family spends more than 20% of its income for housing. The cost of a family's housing reflects the total quantity and quality of that housing, including the quality of the neighborhood and of local public services such as schools and public transportation.[2] Housing expenditure, then is a measure of housing consumption, except if price differences exist across geographic or temporal markets. A price difference is a difference in the cost of a homogeneous bundle of housing; that is, differences in cost which cannot be accounted for by differences in qualitative or quantitative characteristics of a dwelling unit and its neighborhood. The following analysis of housing demand measured by housing expenditure assumes that, although housing prices are not uniform across the country, price differences are distributed independently of the variables which determine housing demand.

A family's demand for housing is determined by its income and tastes as well as by the price of housing relative to other goods and services. It is assumed that a family's characteristics such as education and sex of head and family size are the factors which shape tastes. The family's estimation of

---

[1] This is a slight over-estimate since we have added 1971 housing cost to five year average income.

[2] House values net of property taxes do not reflect the value of public services. Areas with a high level of public services will also have high tax rates. If public services are efficiently provided, these taxes are capitalized into the market value of the housing so that they just offset the value of the services which positively affect house value. In this situation two houses with identical characteristics but in different neighborhoods with different taxes and levels of public service will have the same price. The full cost of housing must include property taxes to reflect the full bundle of services. Our measure of annual housing cost does include property taxes of homeowners, and it is assumed that annual rents are set by the landlord to cover property taxes.

"needs" is subsumed in its taste; it is difficult to separate that part of housing consumption (or of any consumption) which is necessity from that which is not.

For families owning their homes, we define annual housing cost[1] as the sum of annual property taxes, utilities, amount reported saved on additions and repairs,[2] and 6% of house value as estimated by the owner.[3] Annual housing cost for renters is equal to annual rent plus annual utility payments. Housing expenditures of owners and renters are analyzed separately.[4]

A MULTIVARIATE ANALYSIS OF HOUSING EXPENDITURES

Owners have an average annual housing expenditure of $2170 while average annual housing cost for renters is $1427.[5] We are able to explain 42% of the variations in expenditures for owners but only 34% for renters, probably because there is greater variation in the supply and therefore in the costs of owner-occupied housing. A list of the independent variables and their gross and net correlations with annual housing costs of renters and owners appears in Table 1.8. The detailed results for the important explanatory variables appear in Table 1.9.

The most important determinants of housing expenditures for owners and renters are family income and education of head. In both models, family size is

---

[1] The terms annual housing cost and housing expenditure are used interchangeably throughout.

[2] Ideally we would have wanted amount spent on additions since this represents net investment in housing.

[3] For a discussion of bias in such estimates of house value, see John Kain and John Quigley, "Note on Owner's Estimate of Housing Value," Journal of the American Statistical Association, December 1972, pp 803-06; and Leslie Kish and John B. Lansing, "Response Errors in Estimating the Value of Homes," Journal of the American Statistical Association, September 1954, pp 520-38. Both articles conclude that there seems to be no systematic bias to estimates of house value made by the occupants.

[4] Although we have attempted to devise a variable which would convert house value into an annual cost of housing so that it becomes analagous to annual rent, including utilities, it is difficult to know whether one dollar of housing cost is actually the same as one dollar of rent. Differences in the nature of housing demand for renters and owners is indicated by an AID analysis in which we searched for variables with different regression lines for annual housing cost as a function of five-year income. The variable accounting for the greatest variation in the housing-income relationship is ownership status.

[5] Families who neither own nor rent are omitted from the analysis of housing expenditures and changes in housing expenditures.

TABLE 1.8

Gross and Net Explanatory Power of Independent Variables
From Regression of Annual Housing Expenditure on Income and Demographics
(renters and owners, 1972)

Predictor	Owners		Renters	
	eta^2	$beta^2$	eta^2	$beta^2$
5-Year average family money income	.348	.246	.301	.241
Family size	.073	.019	.044	.015
Education of head	.214	.059	.092	.032
Welfare sometime	.029	.000	.026	.000
Age of head	.073	.017	.035	.009
Race	.029	.005	.033	.005
Sex of head	.029	.003	.014	.009
Relative income instability	.027	.009	.013	.002
Trend in income	.018	.016	.004	.006
R^2 (adjusted)	.418		.340	
Number of cases (unweighted)	2601		2175	
Mean of dependent variable	$2170		$1427	
Standard deviation of dependent variable	$1278		$766	

TABLE 1.9

Unadjusted and Adjusted Annual Housing Expenditures for Owners and Renters from a Regression on Income and Demographic Characteristics, 1972

Predictor	Owners: Unadjusted Mean	Owners: Adjusted Mean	Owners: Weighted %	Owners: Unweighted N	Renters: Unadjusted Mean	Renters: Adjusted Mean	Renters: Weighted %	Renters: Unweighted N
5-Year Average $ Income								
<$3000	$ 995	$ 1111	8.9	249	$ 881	$ 951	16.3	450
$3000-4999	1448	1557	9.6	290	1107	1152	18.7	493
$5000-7499	1596	1691	14.5	470	1326	1328	22.1	496
$7500-9999	1771	1856	15.9	459	1591	1552	16.7	337
$10,000-14,999	2348	2356	27.6	651	1774	1728	18.0	296
$15,000 or more	3324	3109	23.5	482	2422	2349	8.1	103
Family size								
1	1618	2089	13.1	278	1222	1316	36.6	546
2	1956	2000	29.2	658	1533	1442	25.0	496
3	2143	2093	16.9	460	1594	1552	15.9	399
4	2403	2246	17.6	434	1598	1522	8.9	232
5	2754	2522	11.5	314	1487	1485	5.8	183
6	2703	2478	6.0	190	1473	1469	3.6	127
7 or more	2157	2200	5.6	267	1472	1542	4.2	192
Education								
8th grade or less	1485	1855	24.1	724	1093	1222	20.9	531
9-11 grades	1828	1967	16.3	469	1244	1326	18.8	548
12 grades	2076	2074	19.6	514	1533	1458	19.6	445
12+ nonacademic	2396	2244	10.1	234	1524	1521	8.6	159
College, no degree	2561	2416	14.7	330	1587	1593	16.9	273
College degree	3227	2731	9.2	196	1720	1569	9.0	123
College, advanced or professional degree	3497	2890	4.9	100	1925	1527	3.5	39
Not ascertained	1993	2001	1.2	34	1596	1571	2.7	57

TABLE 1.9 (continued)

Predictor	Owners: Unadjusted Mean	Adjusted Mean	Weighted %	Unweighted N	Renters: Unadjusted Mean	Adjusted Mean	Weighted %	Unweighted N
Welfare sometime								
No	2225	2176	94.1	2357	1487	1423	80.4	1452
Yes	1309	2070	5.9	244	1179	1438	19.6	723
Age of head								
<25	1343	1745	2.7	113	1317	1361	24.7	560
25-34	2155	1965	16.3	462	1536	1391	26.6	578
35-44	2553	2114	20.3	563	1674	1521	14.7	363
45-54	2470	2111	22.0	589	1383	1397	11.7	311
55-64	2086	2269	16.9	435	1322	1425	10.9	239
65 or older	1690	2409	21.8	439	1239	1567	11.4	124
Race								
White	2231	2195	90.4	1962	1499	1449	77.9	1022
Black	1407	1852	70.5	576	1139	1318	18.0	1062
Other	2266	2219	2.1	63	1324	1477	4.1	91
Overall Mean	2170		100.0	2601	1427		100.0	2175

MTR 2281

a surprisingly weak predictor of housing demand. Age is important in explaining differences for owners but not for renters once other variables are taken into account.

HOUSING AND INCOME

As income increases, the amount spent on housing also increases, but the proportion of income spent on housing declines. Using the unadjusted means of housing expenditure for each income group, we have calculated the income elasticity by income group for owners and renters, as displayed in Table 1.10.

Income elasticity measures the sensitivity of housing demand to changes in income. Elasticities calculated from cross-sectional data are assumed to represent long run behavior; that is, they tell how a family responds to change in income after it has had a sufficient time to adjust. Long run estimates should be higher than short run estimates since more families are able to move in the long run. Our results indicate that housing expenditures are highly insensitive to changes in income. Before adjusting for characteristics other than income, for all groups except highest income owners, demand is inelastic. Once we adjust the means for differences in the distributions of other variables, elasticities fall for every group, so that even the highest income owners have inelastic demand.

We have calculated an alternative set of income elasticities using data on changes in income and changes in housing expenditure for families who have moved over the five years. These results appear in Table 1.11. Again for all but the highest income group, demand is inelastic. These estimates are upward-biased since they do not include the families who have not moved and who have therefore had no change in real housing consumption (ignoring additions to their existing dwelling units) despite real increases in income for many of these nonmovers.

Many estimates of income elasticities have been published, falling anywhere from a low of .4 to a high of 2.0.[1] Our findings tend to support the lower estimates. These estimates have an important policy implication. If housing demand is inelastic, a general income maintenance program which allows the family to allocate its income as it wants will be less effective in increasing housing consumption than a program of specific transfer in the form of housing or in

---

[1]For a comprehensive summary of these results, see Frank de Leeuw, "The Demand for Housing: A Review of the Cross-Section Evidence," The Review of Economics and Statistics, February 1971, pp 1-10.

TABLE 1.10

Cross-Sectional Estimates of Income Elasticities* of Housing Expenditure, 1972
(for owners and renters by income group)

5-Year Family Money Income	Owners: Elasticity		Renters: Elasticity	
	Unadjusted	Adjusted	Unadjusted	Adjusted
$2000-4000	.56	.50	.34	.29
$4000-6250	.22	.18	.41	.32
$6250-8750	.31	.28	.54	.46
$8750-12,500	.79	.68	.31	.30
$12,500-17,500	1.03	.83	.93	.91

*Elasticities were computed from the midpoint of one income group to the midpoint of the next income group, with the groups as specified in Table 1.9.

Adjusted rates are based on adjusted housing expenditures by income group in Table 1.9.

TABLE 1.11

Percent Changes in Housing Expenditures, Percent Changes in Income and Panel Estimates of Income Elasticities of Housing Expenditure (by income group for families who moved, 1968-1972)

Five-Year Average Family Money Income	% Change in Housing Expenditure	% Change in Income	Deflated % Change in Housing Expenditure*	Deflated % Change in Income**	Elasticity
<$2000	31	36	2	15	.13
$2000-2999	38	83	9	62	.15
$3000-3999	44	45	15	24	.63
$4000-4999	43	64	14	43	.33
$5000-7499	45	63	16	42	.38
$7500-9999	55	73	26	52	.50
$10,000-14,999	65	62	36	41	.88
$15,000 or more	81	57	52	36	1.44
All Movers	57	63	28	42	.67

*All groups deflated by 29%, the increase in the shelter component of the Consumer Price Index from 1967 to 1971.

**All groups deflated by 21%, the increase in all items in the Consumer Price Index from 1967 to 1971.

MTR 2252

the form of cash grants restricted to housing.[1] If policy makers assume that increasing the housing consumption of the poor benefits society as a whole as well as the particular families subsidized,[2] then our findings suggest an approach other than income maintenance. For the lower income families who are likely to be the target population of such programs, the renter elasticities are in the range of .3, that is a 10% increase in income would lead to only a 3% increase in housing expenditure.

FAMILY SIZE AND HOUSING EXPENDITURES: EVIDENCE OF ECONOMIES IN HOUSING CONSUMPTION

After accounting for differences in family incomes and education of the head, family size is the most important determinant of housing expenditures for both owners and renters. Before taking account of any other variables, housing expenditures rise with family size and then eventually begin to fall off. We had expected the adjustment for income to lead to a steady monotonic relationship between annual housing cost and family size. However, even with this correction, the total outlay on housing falls for owners with large families. (See Figure 1.1 for the adjusted and unadjusted relationships.) This suggests that it is necessary to cut back on housing substantially in order to supply the family with goods which are not characterized by economies in consumption[3] or for which joint consumption is restricted or impossible.

In order to account for the economies in consumption, we reran the relationship between housing and family characteristics replacing income with

---

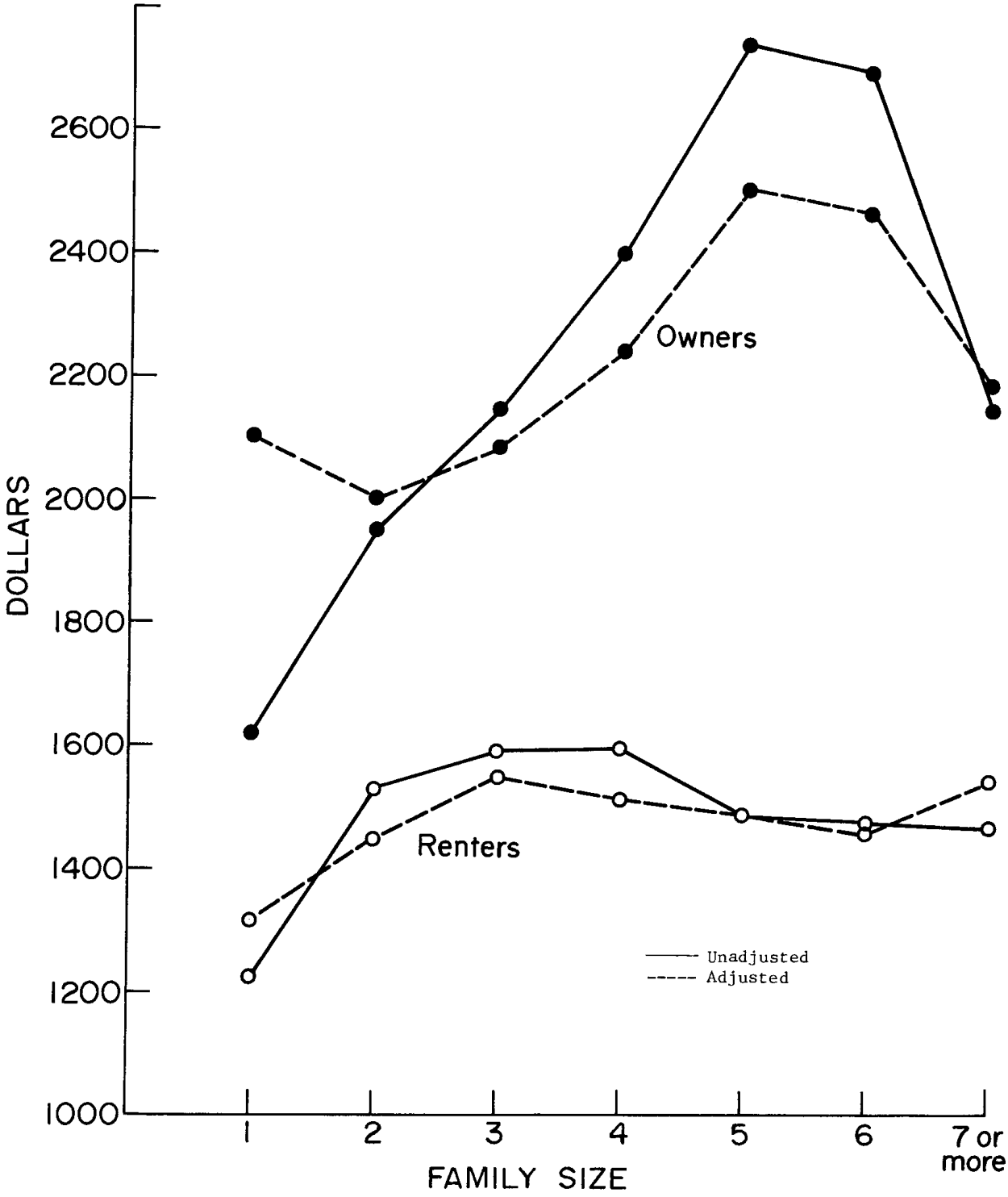
[1] Cash grants which are restricted to housing can work, to some extent, like unrestricted grants. If the family can replace each dollar of its own income previously spent on housing with a dollar of the restricted grant, then it can increase its consumption of nonhousing goods instead of increasing housing consumption. See E. O. Olsen, "Some Theorems in the Theory of Efficient Transfers," Journal of Political Economy, January/February 1971, pp 166-76, for a discussion of alternative forms of rent certificates and other restricted grant programs.

[2] See Eugene Smolensky and J. Douglas Gurnery, "The Urban Problem as an Exercise in the Theory of Efficient Transfers," Regional Science Perspectives, Vol. 2 (1972), pp 1972-188, for a discussion of negative externalities associated with the housing of lower income families.

[3] By economies in consumption we mean that the quantity of housing per person falls as family size increases.

FIGURE 1.1

Unadjusted and Adjusted Annual Housing Cost
by Family Size of Renters and Owners, 1972



income/needs and replacing family size with the required number of rooms.[1] The income/needs variable should correct for economies in consumption of all goods, while required number of rooms should account for the economies in housing consumption given the age and sex distributions of the family.[2] These needs standards are always somewhat arbitrary, but we have included them in our analysis in order to see if they can help us explain the downturn in the relationship between housing expenditures and family size. If we properly account for the economies of size in consumption for both housing and the total family consumption, then the relationship between housing expenditure and required number of rooms should approximate a straight line. The results for both owners and renters are graphed on Figure 1.2. For both owners and renters, before we adjust for differences in needs, there is a decline in housing expenditures when families require a relatively large amount of space; but once the adjustments for differences in needs are made, the decline disappears *completely* for renters and almost completely for owners.

The success of these adjustments for economies gives us increased confidence in the assumption upon which our needs and space standards are constructed. They are better indicators of behavior than income or family size by themselves.

OTHER VARIABLES WHICH EXPLAIN HOUSING EXPENDITURE

Education of head is a relatively strong predictor of a family's housing expenditure. Before adjusting for the differences in the distribution of income and the other variables included in the analysis, there is a positive relationship between education and housing expenditures, but the adjustment dramatically reduces the steepness of this relationship. This indicates that a good deal of the relationship is explained by the correlation between income and education but that there is still a net positive effect of education on housing expenditure.

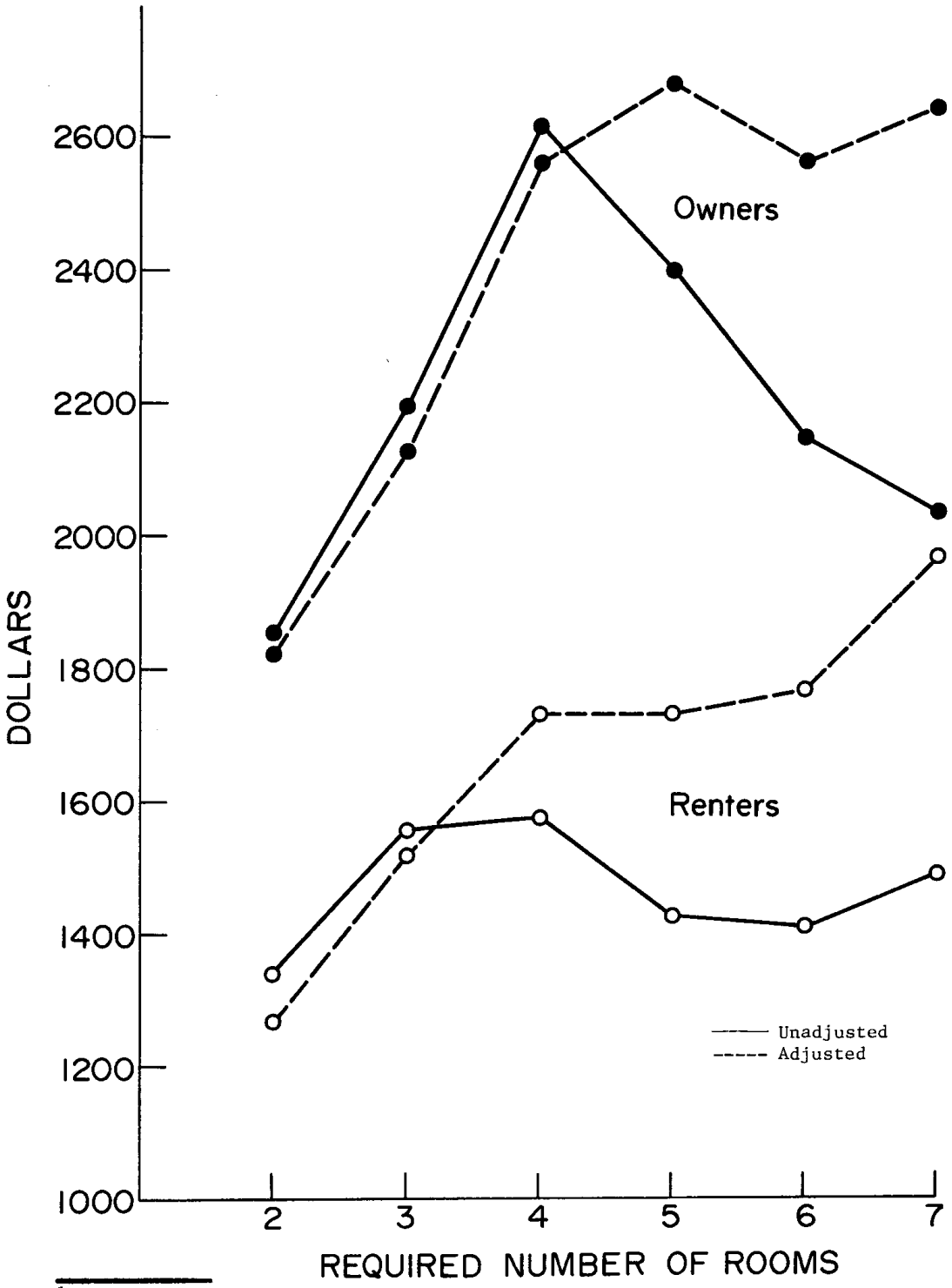
---

[1] See Glossary for a discussion of the needs standard. Required number of rooms is defined as: two for head of the family with or without wife, one more for each additional married couple or single person 18 or over, one more for each set of two girls aged 10 to 18, plus one more for each set of two boys aged 10 to 18, plus one more for each set of two children under 10, regardless of sex.

[2] An analysis in which we retain income but replace family size with required number of rooms results in decline in adjusted housing expenditures when the required number of rooms exceeds four. Hence, the adjustment embodied in our needs standard is vital in accounting for economies in housing consumption.

FIGURE 1.2

Unadjusted and Adjusted Annual Housing Cost
by Required Number of Rooms for Renters and Owners, 1972[1]



[1]Adjusted results are from a regression equation employing income/needs as an independent variable. Family size is omitted as a separate independent variable.

More highly educated families seem to have a relative preference for housing over nonhousing goods. The education variable may be acting to some extent as a proxy for income stability, which is likely to have a positive effect on housing consumption.

We have included a variable for whether or not the family received welfare at some time in the past five years to see if this has an effect on the amount spent on housing independent of income and race characteristics of this group. In some welfare programs housing payments are separate from other welfare payments so that the family does not make the determination of how to allocate its income over housing and nonhousing goods;[1] also, the payment for housing may be shaped by legislated schedules which are a function of the family size. Differences in amounts spent by welfare families could reflect differences in the housing needs standard as determined by the welfare department versus the standard selected by a household allocating its income between housing and nonhousing goods at its own discretion. Our empirical results indicate, however, that once income differences are taken into account, there is no difference between the amount spent on housing by welfare and nonwelfare families.

Housing expenditures rise until the time that the head is in his late forties or early fifties, and then begin to fall. However, once income, education, and family size differences are taken into account, the relationship between income and age increases monotonically for owners and, with the exception of those between the ages of 35 and 45, increases monotonically for renters. The high adjusted mean for the oldest homeowners suggests that this group may prefer not to move out of an established home from which children have left and which has therefore become large relative to current needs.

BLACKS AND HOUSING MARKET SEGREGATION

Black families spend significantly less for housing than do white families, but this can be explained to a large extent by their low incomes. Once income has been taken into account, however, blacks still spend 16% less than whites on

---

[1] This is the case in New York City. Shelter guidelines exist, but in general payment is based on the rent for any unit which a recipient occupies.

owned housing and 9% less on rental housing. These lower expenditures could indicate that blacks are segregated to a portion of the housing market in which the quality of housing is poor; in this case they may be trading off housing consumption for other goods and services whose quality is not restricted. Of course, lower expenditures could reflect a lower preference for housing, even in the absence of a segregated market.

If blacks are segregated, they could be paying more or less than whites for equivalent housing as we discussed earlier. This could depend on the relative supply and demand for housing in the two portions of the market.[1] However, we have not as yet accounted for qualitative or quantitative differences in housing.

In order to determine whether black families pay more or less than white families for equivalent housing, we have estimated a model which explains housing expenditures in terms of the qualitative and quantitative characteristics of housing which have been collected in the Study of Family Income Dynamics. In addition to these variables, a race variable is included to see whether the differences in expenditures not accounted for by quality or quantity can be accounted for by race.[2] Table 1.12 lists the variables included and their gross and net ability to explain variations in annual housing cost. The unadjusted and adjusted annual housing expenditures by race are included in Table 1.13.

Having accounted for differences in the quality and quantity of housing, we find that the housing consumed by blacks is still less costly than that of whites. Homeowning blacks pay 29% less and black renters pay 16% less. Instead of finding that the difference in black and white housing costs is reduced by accounting for quality differences, it is actually increased.[3] The unexplained

---

[1] See Martin J. Bailey, "A Note on the Economics of Residential Zoning and Urban Renewal," Land Economics, August 1959, pp 288-92, for a model of housing market segregation.

[2] Previous testing indicated a constant difference regardless of the number of rooms consumed by the black family; since a price difference can be expected to be most evident for the rooms variable, we have decided no interaction is necessary between race and any housing characteristics term.

[3] One might argue analagously for or against including family size to account for possible differences in the cost of supplying housing service to large and small families. Hence, we have not pursued this course. This may be because the income variable in the first model was acting not only as a demand variable, but also as a proxy for housing quality. We could include income in our second model to serve this function, but there would be no way of knowing whether its explanatory power is properly attributed to supply or demand.

TABLE 1.12

Gross and Net Explanatory Power of Race and Characteristics of Housing Used in Regression Model to Test for Price Discrimination in Rental and Owner-Occupied Housing (1972)

Predictor	Owners		Renters	
	eta^2	$beta^2$	eta^2	$beta^2$
Number of rooms	.28	.18	.077	.110
Distance to center of SMSA	.09	.02	.066	.012
Structure type	.070	.016	.069	.049
Neighborhood density	.057	.019	.072	.035
Size of largest city in SMSA	.139	.137	.079	.023
Region	.093	.020	.055	.012
Inside toilet?	.015	.000	.018	.002
Running water?	.011	.000	.016	.000
Dwelling needs repairs?	.043	.013	.054	.009
Public housing?	.000	.000	.025	.027
Race	.029	.017	.033	.016
R^2 (adjusted)	.46		.32	
Number of cases (unweighted)	2604		2180	
Mean of dependent variable	$2168		$1426	
Standard deviation of dependent variable	$1278		$766	

TABLE 1.13

Unadjusted and Adjusted Mean Annual Expenditure on Housing
by Race for Renters and Owners, 1972

	Owners:				Renters:			
	Unadjusted Mean	Adjusted Mean	Weighted %	Unweighted N	Unadjusted Mean	Adjusted Mean	Weighted %	Unweighted N
Race								
White	$2229	$2217	90.5	1965	$1498	$1479	77.8	1023
Black	1407	1580	7.5	576	1138	1242	18.0	1066
Other	2266	2171	2.1	63	1325	1285	4.2	91
Mean of dependent variable	$2168				$1426			

MTR 2283

differences that we have observed in both our models suggest:

a) blacks live in a segregated portion of the market with a lower price because of relatively lower demand,

or b) blacks consume housing of a lower quality which is not accounted for in our attempted control for housing quality,

or c) a combination of the above two situations.

The results of other research in this area are quite mixed; some have found no significant difference[1] in prices paid by blacks and whites; others have found that blacks pay less;[2] and still others have found that blacks pay more for equivalent housing.[3]

RENT-INCOME AND HOUSING-INCOME RATIOS

Rent-income ratios are frequently used as an indicator of a family's ability to pay for housing and as a guideline for certain government housing programs. For example, rent subsidies which were tied to FHA rehabilitation programs specified that the family pay a certain percentage of its income toward rent and that the government would pay the difference between this amount and the actual rent on the dwelling (subject to certain limits set by FHA). The rent-income ratio is a crude guideline of ability to pay since housing expenditure does not rise as quickly as income. A 25% rent-income ratio for a very poor family may leave too little income for nonhousing goods which do not lend themselves to joint consumption as does housing. A family with a relatively high

---

[1] Richard Muth, Cities and Housing, 1969, pp 239-40, using Census tract data for Chicago's South Side in 1960, found a small premium which he said represented higher costs of supply rather than price discrimination. Victoria Lapham, "Do Blacks Pay More for Housing?" Journal of Political Economy, Nov./Dec. 1971, used 1960 multiple listing service and Census tract data and found no significant difference in price for housing in black and white neighborhoods.

[2] Martin J. Bailey used 1950 Census tract data for Chicago and found that housing in non-Caucasian neighborhoods was less costly than equivalent housing in white neighborhoods. See "Effects of Race and Other Demographic Factors on Single-Family Homes," Land Economics, May 1966, pp 215-20.

[3] John Kain and John Quigley have shown an 8% discrimination premium paid by blacks in St. Louis. Their data is exceptional in its detailed description of housing and neighborhood quality. See "Measuring the Value of Housing Quality," Journal of the American Statistical Association, June 1970, pp 532-48. Thomas King and Peter Mieszkowski found a significant discrimination premium for blacks in the New Haven housing market using 1968-69 multiple listing service data for 220 rental units. See "Racial Discrimination, Segregation, and the Price of Housing," Journal of Political Economy, May/June 1973, pp 590-606.

income can "afford" to spend 25% or more on housing and have more than enough left for other goods and services, but unless the family has extremely high preferences for housing versus other goods or is in a market where the relative price of housing is extremely high, it will probably spend less than the average percent on housing. This is supported by the income elasticity estimates presented earlier in this chapter. As incomes rise, housing expenditures rise, but proportionately less than income.

On Table 1.14 we display ratios of annual housing cost to 1972 family income for renters and owners.[1] Usual rules of thumb suggest that families spend 20% to 25% of income for rent or two to two and a half times yearly income on the purchase of a home. These rules suggest that house value can be converted into an annual rent flow by dividing it by 10. Our calculation of annual housing cost is somewhat more complex than this, since it takes into account utilities, mortgage payments, and property taxes, as well as a 6% discount rate.

Table 1.14 is presented without further discussion. The reader is referred to our preceding discussion of the relationship between housing expenditure itself and a family's income and demographic characteristics.

III. Changes in Housing Expenditures Over Five Years

During the course of our panel study approximately 37% of families with the same head over the five years changed their residence, with 44% of these having moved more than once.[2] Those who move have increases in annual housing cost which reflect not only inflation over the period but also the changes in the quality and quantity of housing. Changes in housing expenditure should be reactions to changes in housing demand; that is, increases in family size or income would encourage a family to increase its housing consumption.[3] If family

---

[1] If families actually make decisions about how much to spend on housing according to such percentage rules of thumb, then a demand model with housing cost to income ratio as the dependent variable is suggested. We believe, however, that this is not the appropriate specification of the demand model. Sometimes housing cost/income is used as a dependent variable in housing demand models to remove a problem of heteroskedasticity: the variance of housing expenditures rises with the level of income. However, if this is the reason for using a ratio rather than a level, it is appropriate to divide the independent variables by income as well. This type of model is used by Ira S. Lowry, Joseph de Salvo, and Barbara Woodfill, Rental Housing in New York City, Volume II, New York City Rand Institute, 1971, p. 237.

[2] See Chapters 2 and 3 of this volume for a detailed discussion of residential mobility.

[3] Some families may upgrade or enlarge an existing home rather than move; insufficient data on additions and repairs precludes our taking into account such increases in housing consumption.

TABLE 1.14

Ratios of Annual Housing Cost to Income for Owners and Renters According to Income and Demographic Characteristics, 1972

Predictor	Owners	Renters
5-Year family money income		
<$3000	.50	.38
$3000-4999	.34	.28
$5000-7499	.27	.25
$7500-9999	.20	.23
$10,000-14,999	.18	.17
$15,000 or more	.15	.17
Race		
White	.23	.24
Black	.24	.27
Other	.21	.25
Age of head		
<25	.18	.30
25-34	.18	.20
35-44	.18	.19
45-54	.18	.21
55-64	.26	.24
65 or older	.36	.34
Sex of head		
Male	.20	.20
Female	.39	.32
Family size		
1	.45	.30
2	.24	.22
3	.18	.22
4	.18	.19
5	.18	.20
6	.18	.21
7	.16	.19
Welfare sometime?		
No	.23	.23
Yes	.28	.31
Mean of dependent variable	.23	.24

MTR 2278

size increases, an increased demand for space may induce a family to move to a larger house. If income increases, then the family might want to increase the quality of its housing; this could mean a house with more amenities including spaciousness. Rather than predicting changes in quantity and quality separately, we predict their product, changes in housing expenditure:

$$\text{Rooms} \times (\text{housing cost/room}) = \text{housing cost}$$

where the quality of the dwelling unit is measured on a per room basis.

Our model of changes in housing expenditure assumes that families who move are adjusting their housing consumption to changes in variables which shape demand. Even if families do not move primarily for the purpose of housing adjustment, if, say, they moved because of a new job, they will always attempt to adjust their new housing outlays to any changes in income or family size which have occurred since the last move, with one source of income change possibly being the new job to which they are moving.

Between 1968 and 1972 housing expenditure for movers increased by an average of 57%. Given a 29% rise in the shelter component of the Consumer Price Index between 1967 and 1971, the years for which we measure annual housing consumption, this indicates an increase in real housing consumption of 28%.[1]

A MULTIVARIATE ANALYSIS OF CHANGES IN EXPENDITURES

The dependent variable in our Multiple Classification Analysis is the percentage change in housing expenditure between 1967 and 1971. Only families who have moved during the period are included in the analysis and are omitted completely because their move is likely to be motivated by noneconomic factors. The change in housing expenditure for each household is calculated as:

$$\frac{HC_{1972} - HC_{1968}}{HC_{1968}}$$

where HC represents annual housing cost. Because many moves involve changes in tenure, we have included renters and owners within one analysis. Annual housing

[1] As an alternative estimate of the inflationary increase in housing, we have calculated the percentage increase in housing expenditures for stayers (those families who have not moved over the five years). Although it was expected that this would underestimate the rate of inflation in housing because rent increases for long term tenants do not usually rise as fast as rents for new tenants, it turns out that this rate of increase is indeed a good estimate of inflation; it is equal to 28%, almost identical to the change in the shelter component of the Consumer Price Index for that same period.

cost for renters and owners was defined in the previous section on housing expenditures.

The independent variables and their gross and net explanatory power are listed in Table 1.15, while the adjusted and unadjusted means for important independent variables appear in Table 1.16. The percentage change in income is the most powerful variable in explaining changes in housing expenditure before taking account of the explanatory power of other variables. However, in the multivariate context, the level of five-year average income is even more important than the percentage change in income.[1] Age, education, and the change in family size are also as or more important than income level in a bivariate context, but become much less powerful in the multivariate context.

Also quite important in predicting changes in housing expenditure are changes in family size. Declines in family size are associated with declines in housing expenditure before taking account of other variables. The adjusted change in housing expenditure is positive but small--9%. This 9% increase, however, does not represent a net increase in housing consumption since it is more than offset by the rate of inflation for shelter. So, in real terms, this group consumes less housing. For those families with increases in size, housing expenditures rise correspondingly; and in every instance the increase in housing expenditures is far greater than the amount of inflation in housing, so these families have all increased housing consumption either in terms of space or quality or both.

There is a steady rise in the percentage increase in housing expenditure as income rises, and this relationship becomes steeper when we take account of differences in the distributions of the other independent variables. Rather than finding that the power of income is reduced when the percentage change in income is accounted for, it actually becomes more important. Although income affects the level of housing demand, in this model it may be working as a proxy for income changes prior to 1967 and is therefore influencing changes in housing demand. Housing adjustments are made quite infrequently because of the high moving and transaction costs involved, so adjustments made between 1968 and 1972 could be responses to income changes in earlier years. Age has a strong negative relationship with the percentage change in housing expenditures both before and after adjusting for the other independent variables. Families with older

---

[1] The correlation between change in housing expenditures and change in income does not reflect inflation since correlations are based on deviations about mean values. We assume that the rate of inflation in incomes and housing costs is the same for all movers.

TABLE 1.15

Gross and Net Explanatory Power of Independent Variables in Regression to Explain Change in Housing Consumption 1968-1972
(movers only with same head all years)

Predictor	Eta^2	$Beta^2$
Percent change in income	.059	.031
Change in family size	.035	.021
5-Year average family money income	.025	.053
Age of head (1972)	.039	.020
Family size (1968)	.004	.010
Race	.001	.002
Sex of head	.009	.000
Education of head	.025	.014
Welfare sometime	.002	.002
Housing status (1968)	.003	.003

R^2 (adjusted)	.12
Number of cases (unweighted)	1432
Mean of dependent variable	.57
Standard deviation of dependent variable	.89

MTR 2282

TABLE 1.16

Unadjusted and Adjusted Percentage Changes in Annual Housing Expenditures for Families Moving between 1968 and 1972
(same head all five years)

Predictor	Unweighted N	Weighted %	Unadjusted Mean	Adjusted Mean
Percentage change in income				
<0	303	24.4	.28	.38
0-9	66	4.7	.51	.52
10-19	86	5.8	.57	.61
20-29	105	7.8	.54	.54
30-39	96	7.1	.46	.43
40-49	78	6.0	.37	.41
50-74	192	14.4	.66	.62
75-99	134	8.9	.74	.68
100 or more	372	20.8	.88	.80
Change in family size				
-3 or less	71	4.7	.14	.18
-2 or -1	267	18.2	.33	.42
0-2	1059	75.6	.64	.62
3 or more	35	1.6	1.04	.90
5-Year average money income				
<$3000	201	9.1	.36	.24
$3000-4999	259	12.2	.44	.39
$5000-7499	317	18.3	.45	.43
$7500-9999	262	19.3	.55	.52
$10,000-14,999	257	24.7	.65	.69
$15,000 or more	136	16.3	.81	.92
Age of head				
<25	54	4.0	.99	.89
25-34	468	32.9	.70	.69
35-44	334	22.1	.64	.56
45-54	291	18.6	.43	.48
55-64	190	11.4	.34	.39
65 or older	95	10.9	.32	.43

Number of cases 1432

Mean of dependent variable .57

heads have higher probabilities of being owners initially so that their unadjusted increases are likely to be smaller than families who started the period as renters. Although they are likely to have declining family sizes, they do have minimal increases in real housing costs, both before and after adjustment. Age is probably working as a proxy for changing preferences for housing over the life cycle.

Family size, tenure status, education, sex, race, and whether on welfare are not important in explaining changes in housing expenditure. Since these are variables which predict the level of housing demand rather than changes in housing demand, this result is expected.

Our model reinforces what demand theory suggests: that changes in income and changes in family size are both powerful determinants of the change in housing expenditure and the change in real housing consumption.

SUMMARY

In this chapter we have examined the characteristics which determine homeownership and expenditure on housing and have found the following:

RATES OF HOMEOWNERSHIP

1) In 1972 62% of families were renters, 33% were owners, and 5% neither owned nor rented. The strongest predictors of homeownership are income, age of head of household, and family size, all of which are correlated with the life-cycle stage of the family.

2) Black and female-headed families have lower rates of homeownership than can be explained by differences in income, family size,city size, and other demographic characteristics. This suggests that either these families have different tastes for housing or that there are barriers to entry into mortgage and housing markets for such families.

3) Between 1968 and 1972, 30% of the families (with the same head over all five years of our study) who were renters in 1968 became homeowners. Income and family size are the strongest predictors that a family will move from the rental to the owner sector.

4) An analysis of families switching from renting to owning between 1968 and 1972 indicates that income differences totally account for the smaller percentage gains of black families.

ANNUAL HOUSING COSTS OF OWNERS AND RENTERS

5) In 1972 the average annual expenditure on housing for renters was $1427. Owners had an estimated annual housing cost of $2170. The primary determinants of housing expenditure for owners and renters are income and education. The contribution of education is positive and strong even after accounting for its correlation with income.

6) Both cross-sectional and panel data indicate that expenditure on housing rises less than proportionally with income. Given this relative insensitivity of changes in housing consumption to changes in income, we conclude that an income maintenance program will be relatively ineffective in increasing housing consumption.

7) Controlling for differences in income, larger families tend to economize on housing expenditures per person in order to provide for consumption of other goods and services, such as food and clothing, which do not lend themselves to joint consumption, as does housing.

8) Renters spend on the average 24% of annual income on housing; the annual figure for owners is 23%. Renters with incomes below $5000 spend on the average more than 30% of their income on rent. Families with incomes of $15,000 or more who are renting spend an average of 17% of income on rent. Lower income owners have a housing cost-to-income ratio in excess of 35%; the average ratio for high income owners is 15%.

9) Over the five years families who moved increased expenditure on housing by 57%. Given the 29% rise in the shelter component of the Consumer Price Index over this period, real housing consumption rose for this group by only 28%. Families who did not move had annual increases in housing expenditure (either rent increases or increases in house value) of 29%. The fact that this is the same as the rise in the shelter component of the Consumer Price Index indicates that the increases in housing cost for nonmovers is not an unsatisfactory way of estimating the rate of inflation in the housing sector.

10) Changes in income and changes in family size are good indicators of changes in housing consumption, as demand theory suggests.

References

Bailey, Martin, "Effects of Race and Other Demographic Factors on Single-Family Homes," Land Economics, May 1966, pp 215-20.

Bailey, Martin, "A Note on the Economics of Residential Zoning and Urban Renewal," Land Economics, August 1959, pp 288-92.

de Leeuw, Frank, "The Demand for Housing: A Review of the Cross-section Evidence," The Review of Economics and Statistics, February 1971, pp 1-10.

Kain, John and Quigley, John, "Note on Owner's Estimate of Housing Value," Journal of the American Statistical Association, December 1972, pp 803-06.

King, Thomas and Mieszkowski, Peter, "Racial Discrimination, Segregation, and the Price of Housing," Journal of Political Economy, May/June 1973, pp 590-606.

Kish, Leslie and Lansing, John B., "Response Errors in Estimating the Value of Homes," Journal of the American Statistical Association, September 1954, pp 520-38.

Lapham, Victoria, "Do Blacks Pay More for Housing?" Journal of Political Economy, Nov./Dec. 1971, pp 1244-57.

Lowry, Ira S., de Salvo, Joseph and Woodfill, Barbara, Rental Housing in New York City, Volume II, New York City, Rand Institute, 1971.

Muth, Richard, Cities and Housing, University of Chicago Press, 1969.

Olsen, E. O., "Some Theorems in the Theory of Efficient Transfers," Journal of Political Economy, Jan./Feb. 1971, pp 166-76.

Shelton, John B., "The Cost of Renting Versus Owning a Home," Land Economics, February 1968, pp 59-72.

Smolensky, Eugene and Gurnery, J. Douglas, "The Urban Problem as an Exercise in the Theory of Efficient Transfers," Regional Science Perspectives, Vol. 2, 1972, pp 172-88.

Chapter 2

RESIDENTIAL MOBILITY

INTRODUCTION

Families move for a variety of reasons. Changes in income and family composition may prompt families to alter the quality or spaciousness of their housing. A move may also be motivated by a need to be closer to either a new job or an existing one. Voluntary mobility can be viewed as a means of increasing economic well-being. Even families who are reducing consumption because of reduced incomes increase their well-being if they bring housing consumption more in line with a new set of economic constraints.

Each year one in seven families who move does so involuntarily. A family may have to move due to housing problems or personal ones such as health. For whatever reason, if the move is not discretionary, there is no reason to expect a family to be better off because of it. Indeed, a family forced to move on very short notice may not have time to find satisfactory accommodations.

In this chapter we look at various aspects of why people move: Do they move involuntarily or voluntarily? If they move voluntarily, do they move for housing or job-related reasons? Does overcrowding or poor quality housing cause mobility and, if so, does mobility alleviate these problems?

ANALYSIS

I. The Population to be Considered

We will analyze movers over the four-year period 1968 to 1972. Within a one-year period, only about 20% of families move; if we observe for five years (four opportunities to observe a move), the percentage of families moving increases to 35%. A sixth year (knowing who moved in the year prior to our first interview) increases movers only marginally to 37%. Thus, included in the 35% of families who moved during that period, are many families who have moved more than once as well as families who are likely to move again.

The Panel Study of Income Dynamics provides information not only on actual moves over the five years but also on plans for moves. For both actual moves and planned moves, the respondents were asked the reason for moving and

these have been classified into four categories: productive or job related moves (moving to a new job, transferring, moving closer to an existing job), consumption related moves (to increase or decrease space consumption or housing quality or to become a homeowner), involuntary moves (dwelling unit coming down, eviction, health problem), and moves for mixed or ambiguous reasons. In our subsequent analysis we examine the reasons given by movers to see if we can distinguish involuntary movers from voluntary movers, and then job related movers from housing related movers. Because of a high correlation between plans for moving and actual moves, we have limited our more detailed multivariate analysis to actual moves and reasons for these moves. However, we do give summary results about moving plans in a later section.

We have restricted our analysis of mobility to those families who have had no change in the head of household over the five years of the panel. Families in which the head has changed fall into two categories. The first of these is new family formation--a son or daughter leaving home. The other involves a woman gaining or losing a husband. Because the mobility of these families with a change in the head is likely to be dominated by noneconomic factors, we feel that they should be considered in a separate analysis which gives greater attention to sociological variables.[1] Table 2.1 displays the overall mobility of families with different family composition changes. Families in which the head changes account for only 24% of all families but for 42% of the movers. This is because new family formation, according to our definition, requires a move.[2] Wives who gain or lose spouses have a higher mobility rate than those families with the same head. Marriage often involves a move regardless of whether there is a change in economic status, although the gain (or loss) of a husband can alter dramatically the economic circumstances of the family, so that some of these moves could be motivated primarily by economic considerations.

---

[1] See Oliver Moles, Chapter 12, Volume II. Also see Chapter 2, Volume I on those leaving low income homes.

[2] A son or daughter who marries and stays at home does not form a new family, and there is no change in head. Only if a son or daughter or other individual moves out (whether or not a marriage is involved) is there a change in head and new family formation. Not all families in the category " someone other than head or wife becomes head" move. This is because there could be the death of a parent or parents, leaving another individual as head. Also the main family could split off from some individual, in which case the individual becomes head but does not move.

TABLE 2.1

Mobility Rates for Families
according to Change in Family Composition 1968-1972

Change in Family Composition	% of All Families	% of Movers	% Who Moved	Unweighted N
Same head all five years	76.0	57.6	35.1	3568
Someone other than head or wife becomes head (primarily new family formation)	15.7	31.9	94.3	1026
Wife gains or loses a spouse	8.2	10.4	44.0	466
All Families	100.0	100.0	46.0	5060

II. Implementation of Moving Plans

Of all families who had plans to move in 1968, 73% of them had actually moved by 1972. Most of these families (53%) made their planned move within the first year. This suggests that planning horizons are relatively short and moving plans have a high probability of fulfillment (see Table 2.2).

If we look at families who gave different reasons for a planned move, we find that of those saying they wanted to move for a job related reason, 71% moved by the end of the period; of those giving consumption reasons, 74% had moved; of those expecting involuntary moves, a somewhat lower proportion, 68%, had moved. Thus, some families who thought they would be forced to move found that they did not have to move after all. If the family had to make the involuntary move, then it is likely to have been made more quickly than a voluntary move. But surprisingly, of those families who said they had to move involuntarily and who actually did move, only 44% moved in the first year, while on average, 53% of the planned and implemented moves occurred in the first year.

Although planning to move is a good predictor of mobility, the reason the family gives prior to the move is not a good predictor of the reason it gives after the move. In order to examine the consistency of reasons for moving given before and after the move, we look only at the moves over a one-year period, 1971-72. This is necessary because many families move more than once in four years, so that we cannot expect the reason stated prior to the first move to coincide with the reason given after the final one. If we restrict the time period to one year, we find that only 51% of the families gave the same reason before and after the move. This could be because they really had mixed motivations for moving; it could be outright inconsistency; it could be a coding problem; or the initial reason could have disappeared and a new one arisen.

Families who had no plans to move in the initial year of our study very rarely ended up moving over the life of the panel. In 1968, 65% of the families said they had no plans to move. By 1972, only 32% of these families had changed residence. The distribution of those families who did move is quite even over the four years, although it was expected that the percentage of movers would increase each year. As time passes, families with no plans to move initially are likely to find themselves with altered housing and employment circumstances necessitating or inducing a move.

In summary, there is not a strong correspondence between the reasons that people give when planning to move and the reason that they give after the move; but whether a family has plans to move is a good predictor of whether it will

TABLE 2.2

Implementation of Moving Plans
(families with same head all five years)

Plans to Move for:	% of Those Who Plan	% of All Families	% Moved: 1968-69	1969-70	1970-71	1971-72	% Moved 1968-72	Did Not Move 1968-72	Total	% Who Moved 1st Year (1968-69) Of Those Who Planned To and *Did* Move 1968-72
Productive reasons	15.1	5.3	38.6	18.9	8.0	5.9	71.4	28.6	100.0	54.1
Consumption reasons	55.8	19.6	40.0	17.2	9.6	6.8	73.6	26.4	100.0	54.3
Involuntary reasons	17.7	6.2	29.9	14.0	14.8	9.6	68.3	31.7	100.0	43.8
Ambiguous	11.4	4.0	44.1	20.8	10.2	2.7	77.8	22.2	100.0	56.7
All who plan to move	100.0	35.1	38.4	16.9	10.5	6.9	72.7	27.3	100.0	52.8
No plans to move	--	64.9	6.8	8.9	8.8	7.1	31.7	68.3	100.0	
Total (all families)	--	100.0	18.2	11.8	9.4	7.1	46.4	53.6	100.0	

MTR 2207

move. This suggests that we are as well off analyzing only one of the two possible dependent variables, "plan to move" or "moved." We have selected to study the actual move and the reason given after the move is completed on the grounds that these responses are less subjective.[1]

III. Correspondence between Changes in County and Reasons for Move

It is frequently assumed that long distance moves are job related while short distance moves are housing related. This categorization is not entirely true because many families move to be closer to work within the same labor market. (Fifty-four percent of productive moves are intracounty; see Table 2.3.)

We have used intercounty mobility as a proxy for long distance mobility and intracounty mobility as the proxy for short distance mobility. Ideally we would like to distinguish between mobility within and between labor markets and would have preferred to use Standard Metropolitan Statistical Areas (SMSA) as a better proxy for a unified labor market. Many SMSA's encompass several counties so that an intercounty move may really be a short distance move.[2] Despite this problem, the comparison between reason for move and whether or not the mover changed county is quite useful.

---

[1] Some research suggests certain types of subjective data may be better indicators than objective data of the *desire* to move. Research now in progress at the Survey Research Center by Dr. Sandra Newman based on a 1971-72 National Quality of Life Survey relates objective characteristics and subjective respondents' assessments of housing, neighborhood, and community to a family's desire to move. Dr. Newman has offered the following tentative conclusions:

1) Subjective assessments are more powerful than objective characteristics in explaining the desire to move.

2) However, the explanatory power of these subjective assessments decreases as one proceeds from satisfaction with house to satisfaction with neighborhood and then community. In particular, dissatisfaction with community public services such as schools and police protection are only weakly related to a desire to move.

The Panel Study of Income Dynamics does not contain information on satisfaction with housing except to the extent that people have plans to move for housing related reasons. If there is equivalence between *desires* to move and *plans* to move, then Newman's findings suggest that we should increase our efforts to collect subjective information in order to predict mobility, given the strong correlation we have found between plans and actual moves. In addition, one should not ignore the policy implications of desire to move without ability to do so because of socioeconomic circumstances.

[2] In his study of local mobility between 1969 and 1971, John Goodman (see Chapter 3, Volume II) found that 71 out of 487 unweighted intercounty moves were actually moves within the same SMSA.

TABLE 2.3

Intracounty and Intercounty Mobility
by Reason for Move 1971-1972
(families with the same head all five years)

Reason for Move	Same County	Different County	All Moves	Distribution By Reason For Move	Unweighted N
Productive moves	54.1	45.9	100.0	18.1	190
Consumption related moves	82.5	17.5	100.0	49.1	733
Involuntary moves	65.9	34.1	100.0	13.9	199
Ambiguous, not ascertained	72.7	27.3	100.0	18.9	226
All Moves	73.2	26.8	100.0	100.0	1348
Unweighted N	1033	315	1348		

As indicated in Table 2.3, consumption related moves are four times as likely to be within counties as between counties, and job related moves are almost equally as likely to be within as between counties. Because families may move within the same area to be closer to an existing job or, in a few instances, to be closer to a new job within the same metropolitan area, job related moves are not overwhelmingly intercounty. Consumption related moves can be intercounty when a family stays within the same large metropolitan area.

Involuntary moves are twice as likely to be intracounty as intercounty. One would expect people who move involuntarily, because they are evicted or because the building they live in is torn down, to stay in the same local area.

A correspondence between job related mobility and intercounty mobility, on the one hand, and consumption related and intracounty mobility, on the other hand, is suggested by Table 2.4 which categorizes movers by whether or not they changed county and by whether or not they moved more than once in the five years of the panel. Of all families who moved intercounty the probability is two to one that they will make a second move and, if they do make a second move, the probability is close to two to one that the second move will be within the same county.[1] Given that the intercounty move precedes the intracounty one,[2] we may assume the following two-stage moving process: in the first stage a move is made to relocate for a new job or a job transfer within a new metropolitan area or labor market. This move may have been made quite quickly, so that the family's selection of housing is not optimal. The second move, which is within the area, is made after having the chance to survey the housing market for a longer period of time in order to find a more suitable dwelling.[3]

In our subsequent analysis of voluntary movers, we assume this two-stage process as the basis of letting a job related move take precedence over a housing related move for families who are multiple movers; if we did not follow this priority, then we would mask the characteristics of job related movers by confounding them with the housing related movers.

---

[1] The reader is cautioned that we are looking at probabilities for a relatively small number of households by the time we limit ourselves to families who move intercounty and move more than once.

[2] We are not sure of this sequence of the intercounty and intracounty move; it is possible that the intracounty move could have preceded the move between counties.

[3] Sometimes the two stages are subsumed within one move, while at other times two moves are required since a family may be moving to a new area and not have sufficient time to observe the housing market and select a unit satisfying its housing needs.

TABLE 2.4a

Frequency of Intercounty and Intracounty Mobility, 1968-1972
(for families with the same head over all five years)

	% of All Families	% of Movers	1972 Mean Age	Five Year Average Total Money Income	% Nonwhite	Unweighted N
Families with no moves in the past ten years	43.7		58	10,507	10.5	1359
Families with no moves in the past five years	19.7		47	10,982	12.6	688
Families with one intracounty move in the past five years	17.2	46.9	47	10,393	20.7	754
Families with more than one intra-county move in the past five years	9.1	24.8	40	8,406	19.8	92
Families with one intercounty move in the past five years	3.4	9.3	50	11,294	8.6	425
Families with more than one move who moved intercounty in the past five years	7.0	19.1	37	10,046	5.5	237
Total	100.0	100.0	50	10,383	13.1	3555
Eta^2			.21	.009	.02	

TABLE 2.4b

Families with More Than One Move Who Moved Intercounty

	% of All Families	% of Movers	Unweighted N
One change in county	4.5	64.3	153
More than one change in county	2.5	35.7	84
Total	7.0	100.0	237

IV. Who Moves?

The probability that a family will have moved between 1968 and 1972 is analyzed with respect to the income and demographics of the family, including changes in family size and income, which are forces likely to generate a need or desire for adjustment in housing. The dependent variable is equal to unity if the family moved between 1968 and 1972 and is equal to zero otherwise. The full list of independent variables as well as their gross and net power in predicting mobility appears in Table 2.5. The unadjusted and adjusted moving rates for the important independent variables in our multiple classification analysis appear in Table 2.6.[1]

The strongest predictors of mobility are age and initial ownership status. Although these two variables are strongly correlated, controlling for one does not completely remove the importance of the other, so that they do indeed have independent effects on mobility. Movers are likely to be the young, selecting homes, mates, and jobs, all three of which are searches that tend to settle down with age, as indicated on Figure 2.1. Families with older heads are less likely to move because they have reached a stage of stability in family size and employment. The fact that a family owns a home is to a great extent a statement of its commitment to maintaining its present employment and housing for a long period of time; hence, homeownership may be viewed as the result of other forces which discourage mobility. Homeownership also discourages mobility because of the high transaction costs involved in selling a home relative to those for leaving a rental unit.

Income and changes in income are equally important in explaining mobility prior to adjustment for other variables, although neither of these variables has a very strong gross or net effect in explaining mobility. There is a U-shaped relationship between income change and mobility: those with the most extreme changes--the biggest increases or decreases in income--are more likely to move than those with more moderate changes. This supports the idea that mobility is a means by which families adjust housing consumption to fit an altered economic status. If incomes drop, people may adjust their housing accordingly. With income gains, they can now afford more for housing.

Both initial family size and changes in family size are important in predicting mobility. The expected relationship prevails for changes in family size: families with the greatest changes in income have the highest probability of moving. It is interesting to note that families which decline in size are about as

[1] See Appendix C for a discussion of Multiple Classification Analysis.

TABLE 2.5

Gross and Net Explanatory Power of Independent Variables Used to Predict Whether a Family Moved, 1968-1972 (same head all five years)

Predictors	Eta^2	$Beta^2$
Age of head	.141	.088
Housing status (1968)	.170	.109
5 year average family money income	.012	.005
Change in income ($)	.012	.010
Family size	.002	.008
Change in family size	.004	.008
Race	.004	.001
Sex of head	.001	.003
Education of head	.011	.004
Welfare sometime	.002	.000
Employment status	.030	.004
Test score	.001	.003
Motivation	.006	.002
Size of largest city in SMSA (1968)	.006	.003

R^2 (adjusted) .26

Number of cases (unweighted) 3541

Mean of dependent variable = .35

Standard deviation of dependent variable = .48

TABLE 2.6

Unadjusted and Adjusted Mobility Rates for Selected Independent Variables from the Regression which Predicts Whether a Family Moved, 1968-1972

Predictor	Unweighted N	Weighted %	Unadjusted Mean	Adjusted Mean
Age of head				
<25	62	1.5	.94	.66
25-34	671	17.5	.67	.58
35-44	820	21.1	.37	.41
45-54	840	21.3	.30	.34
55-64	639	17.4	.23	.24
65 or older	509	21.2	.18	.18
Housing status				
Own	1870	65.6	.21	.24
Rent	1505	30.8	.63	.57
Neither	166	3.6	.50	.49
5-Year average income				
<$3000	524	10.8	.29	.40
$3000-4999	601	12.2	.35	.37
$5000-7499	675	15.7	.41	.38
$7500-9999	576	16.0	.43	.37
$10,000-14,999	711	25.6	.33	.31
$15,000 or more	454	19.7	.29	.32
Change in income				
<$0 (decline in income)	724	22.0	.38	.40
$0-999	512	13.0	.26	.28
$1000-1999	470	11.8	.27	.28
$2000-2999	415	11.2	.33	.28
$3000-4999	554	15.4	.38	.31
$5000 or more	866	26.7	.39	.35
Change in family size				
<-2 (decline of 3 or more)	149	3.4	.46	.50
-2 to -1 (declines of 1 or 2)	711	18.9	.33	.41
0-2	2618	76.6	.35	.33
3 or more	63	1.0	.53	.36
Family size				
1	506	15.2	.36	.40
2	769	27.9	.33	.39
3-4	1081	32.0	.38	.33
5 or more	1185	24.9	.33	.29

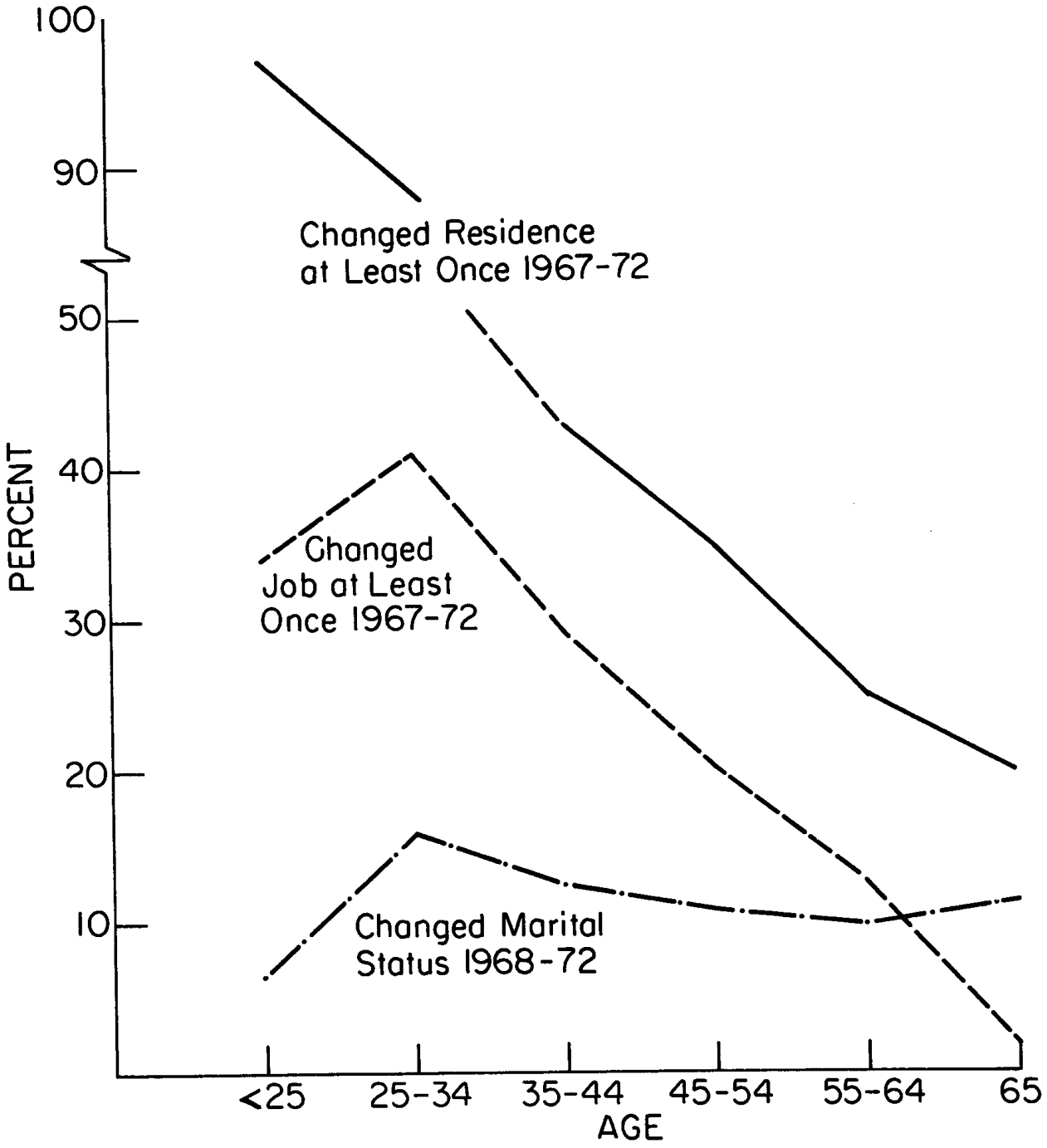
Number of cases 3541

Mean of dependent variable .35

MTR 2267

FIGURE 2.1

Five-Year Changes in Residence, Employment, and Marital Status by Age of Head



likely to move as those which increase, a finding which refutes the hypothesis that families are more sensitive to increases in family size than they are to decreases.

All the other variables included in our analysis are insignificant in predicting whether or not the family would move. These unimportant variables are race, sex of head, whether welfare was received,[1] education, motivation, test score, and employment status. Although these variables are not important in determining who moves, most of them do become important when we look within the group of movers to see why they move.

The overall picture of mobility seems to be dominated, as anticipated, by housing adjustment due to changes in family size or income. Job related mobility is not significant enough to show up in these results. Next we will look within the group of movers to see if we can distinguish voluntary from involuntary movers and then productive from consumption related movers.

V. Characteristics of Different Types of Movers

In the first section of this chapter we examined the characteristics of all movers over a four-year period. In this section we first compare involuntary movers to voluntary movers, and then, within the voluntary category, compare families moving for consumption related reasons to those moving for job related reasons.

Before going into a multivariate analysis of different types of movers, it is useful to compare their overall characteristics. Table 2.7 gives the distribution of families by the reason for their move for the years 1968 through 1972. Because a high proportion of families move more than once and because they are likely to move for different reasons each time they move, some families are counted twice in this table.[2] Almost 70% of the movers are concerned with adjusting housing consumption, while only one-quarter of them move primarily for job related reasons. Only 6% of families--17% of movers--move involuntarily. The fact that moves related to housing consumption are so predominant is consistent with our findings that changes in income and family size are good predictors of mobility. This is also consistent with a preponderance of mobility being local rather than long distance.

---

[1] The welfare variable used throughout this chapter is a dummy variable equal to unity if the family received public assistance payments in any of the years of the panel, and equal to zero otherwise.

[2] Note that 35% of families have moved, and yet the sum of productive, consumptive, and involuntary moves exceeds 35%. This is the case even though we have omitted families who gave a mixed or ambiguous reason for their move.

TABLE 2.7

Reasons for Move
For Families Moving between 1968 and 1972*
(families with same head all five years)

Reason for Move	% of All Families	% of Movers	Unweighted N
All movers	35.0	100.0	1444
Productive	8.8	25.1	294
Consumption	24.2	69.2	1020
Involuntary	5.9	16.8	294

*Some families move for reasons which were unable to be classified into one of the three reasons categories.

Families who moved more than once may be included in the above reasons tables more than once if they reported different reasons for the moves.

For both of these reasons the sum of productive, consumption, and involuntary moves does not equal 100% of all families who moved.

Calculated from MTR 2235, 2238, 2239 and 2267, 2264.

Table 2.8 gives average incomes and age of head as well as percent on welfare, percent black, and percent with a female head for all movers and for groups according to reasons for move. Each category is also subdivided into those movers falling into the target population and all other movers.[1] There is virtually no difference in the average age of movers for the target population and for the population as a whole, and this is true within each category of reason for move. However, there are discernible age differences by reason for moving. Productive movers tend to be younger than both consumption and involuntary movers, indicating that job decisions are completed before a family has satisfied itself with housing.

Involuntary movers have the lowest five-year average incomes, while productive movers have the highest. It is interesting to note that, for the population as a whole, five-year average income rises with age through 50 years,[2] but that the productive movers are actually younger and have higher incomes than the consumption movers.

Involuntary movers are more likely to be female headed or minority families or to be on welfare. These characteristics, however, are correlated with the income status of a family. The subsequent multivariate analysis will determine whether the differences between voluntary and involuntary movers are explained entirely by income or whether differences in age, welfare status, race, and sex of head increase the probability of involuntary mobility independent of income differences.

VI. Predicting Whether a Household Will Move Involuntarily

Table 2.8 suggested that involuntary movers have lower incomes and higher probabilities of being black, on welfare, and female headed. Within the context of a multivariate analysis, we can determine whether these demographic differences have any independent effect after income differences are accounted for, and whether any other variables seem to differentiate involuntary movers from voluntary movers. The dependent variable in this analysis is equal to unity if the household moved involuntarily between 1968 and 1972 and is equal to zero otherwise. Only movers are included in the analysis. The results of the Multiple Classification Analysis appear in Tables 2.9 and 2.10.

---

[1] The target population is defined as those families who fall into the lowest 20% of the population according to income to needs in any one of the five years.

[2] Income peaks after 30 years of work experience. See Chapter 6, Volume I.

TABLE 2.8

Income and Demographics of Movers
by Reason for Move 1968-1972
(families with same head all five years)

	5 Year Average Family Money Income	1972 Age of Head	% on Welfare Some Time	% Black	% Female Head	Unweighted N
All Movers						
Target population	$ 5,103	45	28	24	31	742
Other families	12,378	42	2	7	11	702
All movers	9,979	43	11	12	18	1444
Productive Movers						
Target population	5,476	35	16	9	17	127
Other families	13,154	38	0	2	7	167
All productive movers	10,537	37	6	4	10	294
Consumption Movers						
Target population	5,408	43	29	25	29	521
Other families	12,181	41	2	8	11	499
All productive movers	10,040	42	11	13	16	1020
Involuntary Movers						
Target population	4,236	46	38	30	40	191
Other families	10,928	43	4	11	12	103
All involuntary movers	7,958	44	20	19	25	294
Nonmovers						
Target population	4,269	61	25	21	36	905
Other families	13,025	52	1	5	13	1219
All	10,616	54	8	9	20	2124

MTR 2276, 2264

TABLE 2.9

Gross and Net Explanatory Power of Independent Variables
Used to Predict Whether a Family Has Moved Involuntarily, 1968-1972
(movers only - same head all five years)

Predictors	Eta^2	$Beta^2$
5 year average family money income	.035	.018
Race	.008	.002
Sex of head	.010	.001
Welfare sometime	.017	.003
Housing status	.018	.012
Age of head	.006	.009
Education of head	.005	.001
Change in income ($)	.012	.005
Family size	.005	.007
Change in family size	.005	.008
Employment status (1968)	.013	.003
Test score	.018	.008
Motivation	.013	.006
Size of largest city in SMSA (1968)	.005	.005

R^2 (adjusted) .05

Number of cases (unweighted) 1327

Mean of dependent variable = .18

Standard deviation of dependent variable = .39

TABLE 2.10

Unadjusted and Adjusted Rates of Involuntary Mobility from the Regression for Families Who Moved, 1968-1972

	Unadjusted Mean	Adjusted Mean	Weighted %	Unweighted N
Overall Mean	.18		100.0	2431
5 Year Average $ Income				
<$3000	.35	.29	12.1	388
$3000-4999	.29	.26	12.7	414
$5000-7499	.13	.18	14.7	435
$7500-9999	.14	.15	14.2	363
$10,000-14,999	.16	.18	25.9	496
$15,000 or more	.09	.11	20.4	335
Race				
White	.17	.19	87.4	1593
Black	.27	.19	10.1	762
Other	.15	.09	2.4	76
Sex of Head				
Male	.16	.19	79.9	1795
Female	.27	.16	20.1	636
Housing Status				
Owns	.11	.13	75.1	1540
Rents	.22	.21	21.8	784
Neither	.24	.21	3.2	107

The power of our model in explaining differences between involuntary and voluntary movers is relatively low because involuntary mobility is a low probability event: only 18% of the movers move involuntarily.[1] However, there are a few important characteristics which can be used to predict involuntary mobility.

Although a family's income is not an important predictor of whether or not a family will move, it is important in determining whether a move is involuntary. The lower the family income, the higher is the probability that its move will be involuntary. The relationship is quite strong when no other variables are taken into account, and even in a multivariate context the decline in involuntary mobility as income rises is significant. The differences in race, sex of head, and welfare status become relatively minor once income differences are taken into account, as evidenced by the shift from unadjusted to adjusted rates and by the low net explanatory power of these variables.

Renters who move are significantly more likely to move involuntarily than are owners who move, even controlling for differences in income and demographics. Renters have less control over their tenure and housing quality than do owners. A landlord may be able to evict a tenant because of nonpayment of rent or because of planned renovation or demolition. Other evictions may be the result of government action because the dwelling unit violates health and safety codes.

Within the framework of a multivariate analysis, no other variables are important in distinguishing involuntary from voluntary movers; only income and renter status are characteristics of movers which predict whether a family is likely to have moved involuntarily.

VII. Do Involuntary Movers Pay a Premium for Housing?

Because involuntary movers have less flexibility in planning their moves, we can expect that they will not be able to shop around for new housing as carefully as productive and consumption related movers. If this is the case, they

---

[1] The R-squared is a measure of deviation about the mean of the dependent variable. If an event has a probability of occurring 50% of the time, then even if we always guess yes (that the event will happen) we will be correct half the time. The R-squared of a model with a 50% probability tells us how much better we can do using our knowledge of the independent variables rather than a rule which says "guess yes every time." We expect R-squared to be relatively high for such models. But if the probability of the event is either very high or very low (82% or 18%--it makes no difference which), then if we use a rule to guess yes (no) all the time, we can be right about 82% of the time, and it is very difficult to improve on this. See Appendix E on dummy variable regression.

are likely to pay more for an equivalent bundle of housing than other families. Within the rental market we can expect all movers to pay more for housing than those who have not moved. This is true because what movers pay reflects the actual market, while what nonmovers pay is lower than market, either because leases have not been recently renewed or because landlords are likely to increase rents for existing tenants by smaller amounts than they do for a new tenant.[1]

We have attempted to test whether involuntary movers pay more than other movers and whether movers pay more than nonmovers through the use of a multivariate analysis of annual housing cost on the characteristics of housing, including a dummy variable for the reason the family moved. The housing characteristics are included to control for differences in the quality and quantity of housing. The results of this regression appear in Table 2.11. We present only the adjusted housing costs, but a full list of the included housing characteristics can be found in Table 1.12 of this volume.

The results of our analysis indicate that productive movers tend to pay more for equivalent housing than either consumptive or involuntary movers, while involuntary movers pay more than consumptive movers, but these differences are not statistically significant. The weakness of these results may be due to inadequate adjustments for the quality and quantity of housing.

VIII. Voluntary Movers: Job-Related vs. Housing-Related Mobility

In this section we use a dummy variable regression to look within the class of voluntary movers and contrast families moving for housing related reasons with those moving for job related reasons.[2] The dependent variable is equal to unity if the family moved for a job related reason during the five years and is equal to zero otherwise. Multiple movers making both housing and job related moves are included as job related movers. There are two reasons for this. First, a

---

[1] In terms of owners' market, our figures for annual housing cost depend upon the estimate of the homeowner himself for families who have not moved recently, while for recent movers the estimate is likely to be the purchase price, which reflects the current market. If some owners overestimate the current value of their homes, while others underestimate it, then we can expect that there is no difference between what movers pay for owned housing and the annual housing cost calculated from estimated house value by owners. See Kish and Lansing, (1954), and Kain and Quigley, "Note on Owner's Estimate of Housing Value," (1972)

[2] We have excluded only those involuntary movers who have not made a voluntary move during the period of observation. Since there are many multiple movers, there are some families reporting a move for an involuntary reason as well as a move for a voluntary reason. As long as a family makes at least one voluntary move, it is included in this analysis.

TABLE 2.11

Adjusted Annual Housing Costs by Moving Status and Reason for Move, 1972

	1972 Adjusted* Annual Housing Cost	Weighted %	Unweighted N
Nonmovers**	$1873	77.9	1846
Productive movers	1936	3.7	91
Consumptive movers	1892	10.9	369
Involuntary movers	1912	3.3	107
Mixed or ambiguous	1856	3.5	93
Not ascertained	--	.7	21
Overall mean (unadjusted)	1875	100.0	2527

$Eta^2 = .028$

$Beta^2 = .001$

R^2 adjusted = .46

Standard deviation of dependent variable = $1219

*These numbers are adjusted to take into account differences in the quality and quantity of housing. They are the adjusted means for a multiple classification analysis, the other independent variables of which are listed on Table 1.12 of Chapter 1. Since only one regression was run for renters and owners, we have also included ownership status as an independent variable.

The families who are classified as movers are only those who moved between 1971 and 1972. The regression is based on a 1972 cross-section of families.

**Families who have not changed residence between 1971 and 1972 interviews are classified as nonmovers.

job related move dominates in the hierarchy of mobility; generally, a family first chooses the area it is going to work in and then maximizes housing consumption within that geographic area.[1] Second, job related moves are less frequent so that we get a better distribution by letting this take precedence.

Table 2.12 reports the gross and net explanatory power of the independent variables. The adjusted and unadjusted percentages of voluntary movers who moved for job related reasons appear in Table 2.13 for those independent variables which play an important role in the analysis. Income, age, ownership, employment status, race, education, and city size are important in distinguishing whether a family has moved for a job related reason or not.[2]

Age is the most powerful variable in distinguishing job related movers from housing related movers. Both before and after controlling for other family characteristics, the probability that a family will move for a job related reason decreases with the age of the head of household, although the rate of decrease is diminished when the other variables are taken into account. (Since we have excluded nonmovers from the analysis, we are not picking up an age difference between movers and nonmovers.) In a bivariate context this represents to some extent the negative relationship between age and education, education being a factor which increases a person's labor market opportunities. However, since education is included in the multivariate analysis, age has an independent effect on job related mobility: families with younger heads are less settled in their way of life and less resistant to change so that they are more likely to move for a new job.

The size of largest city in the SMSA (1968) is almost as powerful as age in explaining job related mobility. This variable, however, is included as a control for differences in market supply rather than as a family characteristic. The lower rates for large cities and the higher rates for small cities indicate that families are leaving smaller labor markets to seek job opportunities elsewhere, and probably in larger cities.

---

[1] This two-stage procedure may involve two or more moves, or both stages may be involved in one move to a new labor market. Some families passively choose the labor market by remaining in the same area in which they have always lived.

[2] Although many families who move for job related reasons also move for housing related reasons within the period of observation (113 out of 601 unweighted cases moving more than once between 1968 and 1972 gave reasons classified as housing related and job related for two of their moves), our analysis assumes that families moving for a job related reason, even if they also make housing related moves, have different characteristics from families who do not ever, during the period of observation, make job related moves. If this were not the case, then the explanatory power of our model would be much lower than it is.

TABLE 2.12

Gross and Net Explanatory Power of Independent Variables
Used to Predict a Job Related Move, 1968-1972
(voluntary movers only - same head all five years)

Predictor	Eta^2	$Beta^2$
Age of head	.053	.032
5 year average $ income	.004	.015
Employment status (1968)	.038	.008
Housing status (1968)	.026	.021
Race	.026	.013
Education of head	.034	.014
Size of largest city in SMSA (1968)	.053	.030
Change in income ($)	.009	.007
Family size	.003	.005
Change in family size	.002	.006
Sex of head	.008	.004
Welfare sometime	.006	.000
Test score	.017	.003
Motivation	.011	.005

R^2 (adjusted) .15

Number of cases (unweighted) 1180

Mean of dependent variable = .30

Standard deviation of dependent variable = .46

TABLE 2.13

Unadjusted and Adjusted Rates of Job Related Mobility from the Regression for Families Who Moved Voluntarily, 1968-1972

Predictor	Unweighted N	Weighted %	Unadjusted Mean	Adjusted Mean
Age of head				
<25	54	4.8	.59	.44
25-34	416	36.0	.33	.32
35-44	281	22.2	.34	.36
45-54	225	17.9	.29	.30
55-64	141	10.4	.20	.21
65 or older	63	8.7	.05	.08
5-Year family money income				
<$3000	146	7.5	.25	.40
$3000-4999	203	10.7	.35	.39
$5000-7499	264	18.8	.32	.33
$7500-9999	225	20.9	.29	.29
$10,000-14,999	225	25.3	.27	.24
$15,000 or more	117	16.7	.32	.25
Race				
White	687	84.6	.33	.32
Black	445	11.7	.11	.17
Other	48	3.8	.19	.19
Employment status				
Working now	919	82.7	.32	.30
Looking for work (unemployed)	40	2.5	.45	.42
Retired, permanently disabled	123	10.9	.09	.25
Housewife	85	2.7	.10	.25
Student	13	1.2	--	--
Housing status				
Own	327	39.3	.28	.29
Rent	789	56.5	.29	.28
Neither	64	4.1	.65	.61
Education				
8th grade or less	315	20.0	.22	.26
9th - 12th	455	34.6	.25	.26
High school plus non-academic training	115	11.6	.25	.28
Some college or college degree	241	26.8	.40	.34
College plus advanced training	54	7.0	.47	.45
Number of cases	1180			
Mean of dependent variable	.30			

MTR 2269

Income is also important in explaining job related mobility; higher income families are more likely to make job related moves. Higher income is a reflection of a head's desirability within the labor market. It is a sign not only of current job opportunities but also of past success in the labor market (see Table 2.14). The higher the family income, the greater is the probability that the family has either moved or refused to move for a job, both of which variables are measures of job opportunities. To some extent this income relationship is correlated with education, but as was the case with age of head, it is important even controlling for education. Income is a sign of past and future labor market viability.

Despite the positive relationship between income and job mobility, one small group of families has very low incomes but a high likelihood of moving for job related reasons: these are families in which the head is unemployed (currently not working but seeking work). Although employment status is a relatively powerful variable before taking account of the other characteristics of families included in the analysis, it is insignificant in a multivariate context. However, there is still a rather striking difference between the job mobility rate of the unemployed and all other categories (employed, retired, student, housewife). The unemployed who account for only 2.5% of voluntary movers have an unadjusted job mobility rate of 45% and a somewhat lower adjusted rate of 42%, while all other families average an adjusted rate in the high twenties.[1] Since the remaining 58% of families with unemployed heads move for a housing related reason, however, we can conclude that unemployment is more likely to induce a move to reduce housing consumption in accordance with a decline in income rather than a move to seek employment in another labor market.

Although ownership status is powerful in distinguishing between families moving for housing related and job related reasons, it is not the difference between owning and renting which is important, but between both of these groups and those who neither own nor rent. While only about 28% of the voluntary movers who initially owned or rented moved for job related reasons, 65% of those who neither owned nor rented moved for this reason, with the rate falling slightly to 61% when other characteristics of these families are taken into account. Since many families who fall into this category are receiving their housing in return for providing labor services to the owner, it is reasonable to find that a new job necessitates a move.

---

[1]The group of unemployed heads of household is too small to render the large difference in their rates and those of other families statistically significant.

TABLE 2.14

Percent of Families Who Ever Moved and Percent of Families Who Ever Refused to Move to Take a Job as of 1972 (same head all five years)

Income	Percent Who Moved To Take A Job	Percent Who Ever Refused To Move to Take A Job	Unweighted
Less than $1000	4.9	0.0	33
$1000-1999	3.8	1.0	199
$2000-2999	8.8	1.5	293
$3000-3999	10.2	1.6	315
$4000-4999	14.7	2.0	285
$5000-74999	16.9	7.0	682
$7500-9999	24.1	7.8	577
$10,000-14,999	27.8	10.3	716
$15,000 or more	36.4	12.2	456

Neither race nor education has much explanatory power in distinguishing job related movers from those moving for housing related reasons. However, both of these variables do pass an approximate test for statistical significance at a 95% confidence level.[1] As discussed earlier, education increases a worker's job opportunities, so that the probability of a job related move increases directly with education. Most of the power of education is removed when age is taken into account, but there is support for the hypothesis that education has an independent effect.

Blacks are half as likely as whites to make a job related move, even accounting for differences in their education and other family characteristics. This suggests that blacks either have fewer job opportunities or perceive that there are fewer job opportunities available to them elsewhere. (Job mobility may be to move to a new job or to move to another labor market in anticipation of a new job.)

IX. Mobility as a Function of Initial Housing Conditions: The Importance of Crowding

The previous sections have dealt with mobility in terms of the income and other characteristics of families. Age and housing status were the primary determinants of whether a family would move. In this section, rather than looking at the characteristics of the families who move and don't move, we examine whether there are characteristics of the housing which they initially occupied such as overcrowding, disrepair or transportation difficulties, which motivate families to move. These characteristics, then, should be more evident for movers who want to upgrade or adjust housing consumption than for involuntary or job related moves. However, to the extent that job related mobility allows a family to have increased income, upgrading in terms of space or quality can be expected for this group. Although many families with poor housing quality might desire to improve it, they may be unable to for the very reason that they faced these conditions initially, that is, they have insufficient income to pay for a higher quality dwelling unit.

We have run two analyses which predict mobility as a function of the initial characteristics of housing, one for all families and one for the target population. These multivariate analyses have very low overall explanatory power and indicate that the only important variable in predicting mobility for the population as a whole is persons per room (a measure of crowding), while for the target population persons per room, distance from center of largest city, and

---

[1] See Chapter 1, Volume II, p. 11.

the availability of public transportation are all significant. A list of all the independent variables included in the analysis and their gross and net explanatory power is presented in Table 2.15, while gross and adjusted moving rates for those variables which are important appear in Table 2.16.

As persons per room increases the probability that the family will move also increases. The same effect is somewhat stronger for the target population, where overcrowding is a more frequent problem. It is tempting to conclude that, if families who are more overcrowded have a higher probability of moving, then moving is a means by which crowding is reduced. If we look at the crowding situation of movers before and after the move, this result is not so clear.

Table 2.17 shows persons per room by income group before and after the move, as well as the direction of the change. An increase in persons per room indicates that the family is relatively more crowded in 1972 than it was in 1968. Movers as a whole are relatively more crowded while families who did not move are actually less crowded than they were before. This is because the stayers (nonmovers) are predominantly older homeowners who are in the stage of the life cycle in which family size is either stable or falling as children leave home. Movers, on the other hand, are younger and are likely to be increasing the size of their families; anticipating this increase, they may move before they are very crowded, but they end up with no more space per person. In addition, their moves may have been job related or involuntary so that space was not one of the objectives of the move.

Looking within the categories of movers, families who moved for housing related reasons do not increase space consumption, probably due to the growth of their families, as discussed above. Productive movers have even more space than before, while involuntary movers are more crowded. The reduced space consumption for involuntary movers can be explained by the fact that they had less opportunity to find new quarters, so that they may have had to sacrifice space consumption.

For productive movers who are members of the target population, space per person is reduced after the move, while it is increased for productive movers at higher income levels. The increased space is probably a result of increased income from a better job. The job may motivate the move, but an associated increase in income may allow the move to be an upgrading in space consumption.

Within the group of involuntary movers it is also the case that the target population becomes more crowded while the other higher income families become marginally less crowded. It is the relative importance of lower income families in this group as well as the magnitude of the change in their persons per room

TABLE 2.15

Gross and Net Explanatory Power of Independent Variables Used to Predict Whether a Family Moves as a Function of Initial Housing Conditions, 1969-1972* (same head all five years)

Predictor	Target Population		All Families	
	Eta^2	$Beta^2$	Eta^2	$Beta^2$
Persons per room	.041	.037	.021	.017
Repairs needed?	.010	.009	.007	.005
Distance to center of SMSA	.025	.020	.006	.006
Public transportation available?	.017	.015	.001	.000
Public housing?	.004	.002	.006	.005
Inside toilet?	.004	.003	.000	.002
Running water?	.002	.000	.001	.001
R^2 (adjusted)	.06		.03	
Number of cases (unweighted)	1647		3568	
Mean of dependent variable	.34		.29	
Standard deviation	.47		.45	

*Some characteristics of housing were not available for 1968, so we look only at families who moved between 1969 and 1972.

MTR 2258, 2261

TABLE 2.16

Unadjusted and Adjusted Mobility Rates from Regression Predicting Mobility as a Function of Initial Housing Conditions 1969-1972 (same head all five years)

	Target Population:				All Families:			
Predictor	Unadjusted	Adjusted	Weighted %	Unweighted N	Unadjusted	Adjusted	Weighted %	Unweighted N
Overall mean	.34				.29			
Persons Per Room								
0-.25	.26	.27	15.6	158	.24	.24	10.2	306
.26-.45	.18	.20	16.8	188	.19	.19	21.6	585
.46-.65	.38	.39	18.5	233	.31	.31	22.3	665
.66-.85	.35	.34	14.7	244	.31	.31	21.6	731
.86-1.25	.43	.42	19.7	437	.36	.36	16.2	767
1.26 or more	.45	.43	14.7	387	.38	.36	8.1	514
Dwelling Unit Needs Extensive Repairs?								
Yes	.42	.42	23.8	502				
No	.31	.31	66.0	922				
Not ascertained	--	--	10.2	223				
Distance to Center of SMSA								
Under 5 miles	.41	.41	24.5	512				
5-15 miles	.44	.43	20.8	436				
15-30 miles	.29	.29	13.0	182				
30-50 miles	.29	.28	9.5	119				
Over 50 miles	.27	.28	32.1	398				
Public Transportation Available?								
Yes	.37	.32	50.7	1034				
No	.30	.36	48.7	608				
Not ascertained	--	--	.6	5				

MTR 2258, 2261

TABLE 2.17

Changes in Persons Per Room For Movers, 1968-1972
(same head all five years)

	Persons Per Room			Unweighted
	1968	1972	Change	N
All Movers				
Target population	.96	1.13	+ [b]	742
Other families	.76	.74	- [a]	702
All movers	.83	.87	+ [a]	1444
Productive Movers				
Target population	1.01	1.13	+	127
Other families	.99	.83	-	167
All productive movers	.99	.93	-	294
Consumption Related Movers				
Target population	1.00	1.00	same	521
Other families	.70	.74	+	499
All consumption movers	.79	.82	+	1020
Involuntary Moves				
Target population	.84	1.48	+	191
Other families	.66	.61	-	103
All involuntary movers	.74	1.00	+	294
Nonmovers				
Target population	.81	.69	-	905
Other families	.78	.74	-	1219
All nonmovers	.79	.73	-	2124

[a] Insignificant difference between 1968 and 1972 at 95% confidence level.

[b] Significant difference between 1968 and 1972 at 95% confidence level (tests done only for all movers categories).

MTR 2276, 2264

that makes the overall result for involuntary movers an increase in crowding. Even when higher income families move involuntarily, their income level gives them a broader selection of dwellings, so that under a constrained search they are still able to maintain relatively generous space standards.

Whether the dwelling unit is in need of extensive repairs is not powerful in explaining mobility, but it is statistically significant. The rate of mobility among families living in poorer quality units is significantly higher than the rate for families whose housing does not seem to need repair. The question, as it was in the situation of crowding, is whether or not families who move from units in need of repair actually improve their situation. The figures in Table 2.18 suggest an answer to this question: as of 1968 29% of families who moved were living in units in need of extensive repair and, by 1972, 24% of these families were living in units in need of repair; this decline of 5 percentage points, however, is not quite significant at a 95% confidence level. Therefore, we can conclude that although poor housing quality may motivate mobility, mobility does not lead to any discernible upgrading of housing quality.

Within the reasons for moves categories, we find some interesting results. Families moving specifically for housing related reasons are only marginally less frequently in housing in need of repairs after the move, and the same is true for productive movers. However, within the group of involuntary movers, there is a significant reduction in the percentage of families who are living in housing in need of extensive repairs.[1] This reflects the fact that many involuntary moves are prompted by housing that is no longer habitable. Hence, families who leave this situation are likely to end up better off after the move than before.

Distance to the center of the nearest SMSA has some explanatory power in the analysis of the target population but is not important within the analysis for all families. It is included as a market control variable; that is, it reflects the supply of housing rather than demand for housing. Distance to center is a proxy for the degree of urbanization; as such it is correlated with such variables as the percentage of the housing stock which is rented rather than owned and the availability of public transportation, which is included in our analysis. The data indicate that the farther from the center of an SMSA that a lower

---

[1] Dwelling units are characterized as in need of extensive repair on the basis of observation by the interviewer. To check for possible bias in evaluation, we have compared interviewer evaluations in 1969 and 1972 for families who did not move and found that they reported that 10.2% of the families lived in units in need of repair in 1969 and 9.4% live in such housing in 1972. This insignificant difference over time could reflect to some extent true alterations in housing quality, but the fact that the 1969 and 1972 evaluations on the same housing are so similar does give us confidence in the interviewer evaluations for movers.

TABLE 2.18

1969 and 1972 Percent of Dwellings in Need of Extensive Repairs* and Percent of Families with No Public Transportation Available within Walking Distance
(movers only - same head all five years)

Reason for Move	% Need Extensive Repairs 1969	% Need Extensive Repairs 1972	% No Public Transportation 1969	% No Public Transportation 1972	Unweighted N
All Movers					
Target population	28.7	24.0[a]	43.1	48.9[b]	650
Other families	8.2	5.7[a]	39.7	47.6[b]	574
All families	15.4	12.1[b]	40.9	48.1[b]	1224
Productive Movers					
Target population	17.3	21.9	43.0	54.2	123
Other families	6.5	2.4	49.5	52.3	150
All productive movers	10.4	9.5	47.1	53.0	273
Consumptive Movers					
Target population	25.7	23.6	43.1	47.4	459
Other families	8.0	5.6	38.8	48.5	411
All consumptive movers	13.9	11.6	40.2	48.2	870
Involuntary Movers					
Target population	34.3	21.8	40.2	46.6	176
Other families	16.0	10.0	34.9	37.0	87
All involuntary movers	24.7	15.6	37.5	41.6	263

*Some characteristics of housing were not available for 1968, so we look only at families who moved between 1969 and 1972.

[a]Insignificant difference between 1969 and 1972 at 95% confidence.

[b]Significant difference between 1969 and 1972 at 95% confidence level (test done only for all movers categories).

MTR2287

income family lives, the lower is its probability of moving. The major difference is between families living less than 15 miles from the center and families living at greater distances. Those within 15 miles have a probability of moving greater than 40%, while those beyond 15 miles have a probability of moving less than 30%. Families within 15 miles of the center of an SMSA are living in an urban or suburban environment, while families beyond the 15 mile point are probably not living within a metropolitan area. Since less urbanized areas are likely to have smaller rental stocks and lower vacancy rates, and since most mobility is local adjustment, it follows that there will be less mobility beyond the urban or suburban fringe than within a metropolitan area. It is emphasized that these lower mobility rates reflect market conditions rather than the demand behavior of households.

The only other variable in our multivariate analysis which had any significance (but still had very low explanatory power) is the adequacy of public transportation. This, too, shows up only within the target population. Before taking account of crowding and of distance to the center of the nearest SMSA, families without public transportation have lower probabilities of moving than families with public transportation, but after adjusting for these other variables, families without public transportation have higher probabilities of moving.

If the lack of public transportation is an inducement for the family to move, then we would expect to find that families who do move are more likely to have accessibility to public transportation after the move than before the move. Table 2.18 indicates that this is not the case. In 1969, 43% of families in the target population who moved later reported that no public transportation was available within walking distance of their homes. By 1972, when these families had moved, 49% reported no public transportation available.[1] (This same phenomenon is observed for higher income families.) This suggests that the lack of transportation is not the motivation for the move but is correlated with some other variable explaining mobility among the target population. The unadjusted mobility rates, which indicate that the families who have public transportation available to them are more likely to move than those who do not, may give us a

---

[1] We ran a similar table for families who did not move and found that the percentage reporting the lack of public transportation within walking distance rose by 5 points between 1969 and 1972 for members of the target population, while the percentage stayed the same for higher income families. The significant change among the target population is more likely to reflect a re-evaluation of the availability of transportation than an actual reduction in transportation facilities. This could suggest an upward bias in the response to this question among movers as well.

more useful interpretation of behavior. Public transportation is available closer to the center of an SMSA; if target population families are participating in the suburbanization process (which is surely a strong force among middle income families), then we may be observing the suburbanization process through the public transportation variable. If distance to center is omitted from the analysis, then the adjusted rate for families without public transportation would be lower than that for families with public transportation. This supports the hypothesis that distance to center is serving as a proxy for degree of urbanization. Families without public transportation are more likely to be in the suburbs or rural areas so that they are less likely to move. Once we control for distance to center, we remove this effect, with the result that the lack of transportation actually increases the probability of moving. The suburbanization phenomenon is further suggested by the fact that after the move fewer families have accessibility to public transportation. By including distance to center in our analysis we have negated the relationship between public transportation and suburbanization.

SUMMARY

Between 1968 and 1972, 35% of the families with the same head for all five years changed their place of residence.[1] Forty-five percent of these families moved more than once; and families moving between counties (28% of the movers) actually had higher probabilities of being repeat movers than of moving only once.

People tend to be good predictors of their own mobility. In 1968, 35% of the families said they planned to move in the next few years, and by 1972, 73% of these families had actually moved. In addition, 68% of the families who said that they did not have plans to move had not done so by the end of the period.

Almost 70% of families that moved say they did so for reasons relating to housing consumption, that is, to increase or decrease space or quality or to become homeowners. Twenty-five percent of the movers report that they moved for job related reasons, that is, to be closer to an existing job, to move to a new job, or for a job transfer. Only 17% of movers say that they have moved involuntarily, for example, because the dwelling unit became uninhabitable, because they were evicted, or because of their own health problems.

---

[1] If we include those families who had changed heads, the overall rate is 46%, but most of the families with a change in head represent new family formation with a probability of moving of 100%.

Movers are best distinguished from nonmovers by their age and their ownership status: young renters are those who are most likely to move. Minorities, welfare families, and lower income families do not have moving rates which are unusually high, given their age and ownership status. Among the movers, involuntary movers are distinguished from voluntary movers (those moving for housing or job related reasons) by their lower incomes. Because involuntary mobility is frequently induced by poor housing quality, renters, who have less control over the quality of their housing, have significantly higher involuntary mobility rates, even taking into account income differences.

Within the category of voluntary movers, we can distinguish families moving for job related reasons from those moving for housing related reasons. (Many families made both housing and job related moves within the period of observation.) In general, families who make job related moves tend to have higher incomes and younger heads than families who make only housing related moves during the period. In addition, blacks move less for job related reasons even controlling for income and educational differences, suggesting that there are fewer actual or perceived job opportunities for blacks than for whites.

We are unable to show that movers in general or involuntary movers in particular pay more than nonmovers for housing of a given quality and size. Inadequate data on the characteristics of housing probably render our attempted statistical control for differences in housing quality relatively ineffective.

The initial housing circumstances of a family are at best weak predictors that the family will move. For lower income families, crowding and the need for extensive repairs have a small but significant relationship with mobility; for the population as a whole, crowding is a weak predictor of mobility. Moreover, once families have moved, there is very little tendency for them to have more generous space standards than they had initially. For lower income families, crowding actually increases, while for higher income families persons per room remains about the same. In addition, low income families are no less likely to live in dwellings in need of extensive repairs after they have moved than before they have moved. Low income families who are induced to move because of poor housing quality may find that they leave one undesirable situation behind only to find another one.

References

Kain, John and Quigley, John, "Note on Owner's Estimate of Housing Value," Journal of the American Statistical Association, December 1972, pp 803-06.

Kish, Leslie and Lansing, John B., "Response Errors in Estimating the Value of Homes," Journal of the American Statistical Association, September 1954, pp 520-38.

Chapter 3

LOCAL RESIDENTIAL MOBILITY AND FAMILY HOUSING ADJUSTMENTS

INTRODUCTION

In any twelve-month period approximately 20% of the U.S. population reports a change of residence. Close to 50% of the population lives at a different address at the end of a five-year period than it did at the beginning. Approximately a third of these moves are from one county to another, and the remaining two-thirds (involving 25 million people a year) are moves within a county.

Long distance migration and local mobility are related yet distinct phenomena. Their causes differ, as do their implications. Movement from one metropolitan area to another is more likely to be related to the employment situation of the mover than is local mobility, which would seem to be more related to consumption of housing services. The implications of research on population and labor migration between labor market areas have greatest relevance to regional planning and the solution of labor allocation problems. The findings of research on local mobility are of greatest use to city planners, community development agencies, and federal, state, and local housing authorities. Long distance migration has received the bulk of the research attention devoted to geographic mobility, and by comparison local mobility has been a neglected topic.

Prior research (Rossi(1955), Simmons (1968)) indicates that most local movers are motivated by a desire to adjust their housing to changing housing needs and financial capabilities over the family's life cycle. Changes in family income, number of children, and place of work within the labor market area may induce a disequilibrium situation in the family's housing consumption and result in change in residence.

This chapter has two interrelated parts. First, the characteristics of movers are compared with those of stayers. In this section we also try to pre-

dict local mobility by the "housing stress" a family experiences and by other variables. Special attention is given to the mobility of the poor. Different types of housing adjustments by movers are studied in the second section. If local moves are caused by housing consumption disequilibrium, then families should be nearer equilibrium in their consumption of housing after moving than before.

The longitudinal nature of the survey makes it an unusual and valuable data source for the study of geographic mobility. Standard data sources such as the U.S. Census have information about movers only after the move. Some other data sources, for example the 1966-67 Surveys of Economic Opportunity, lose respond ents who move, so that only family and housing unit characteristics before the move are available. The Panel Study of Income Dynamics, on the other hand, followed up movers and provides the requisite information for before-and-after-moving comparisons of family and housing characteristics.

Any operational distinction between local and long distance mobility is bound to be somewhat arbitrary. Lansing and Mueller (1967), in their major study of geographic labor mobility, defined labor market areas to coincide with the boundaries of Standard Metropolitan Statistical Areas (SMSA) or with county boundaries for non-metropolitan counties. A logical definition of local mobility is movement within a labor market area. We, therefore, define a local move as a move within an SMSA or, if the county is non-metropolitan, within the county. We will focus on mobility performance between the second and fourth interviews, i.e., between Spring 1969, and Spring 1971. Those families who did not move in this twenty-four month period will be referred to as stayers, and those who made one or more local moves will be called movers. All non-local movers are excluded from the sample in order to eliminate their distorting influence on mover-stayer comparisons.

ANALYSIS

I. Movers and Stayers

Splitoffs account for a significant proportion of total local mobility. Approximately 20% of the local moves between 1969 and 1971 were by individuals or family sub-groups leaving their original household to form or join another.

Over 90% of the splitoffs reported moving in the year of their split, which is not surprising given the definition of a splitoff. Most of the splitoffs result either from older children leaving their parents' home or from divorce or separation. We have excluded splitoffs occurring between the 1969 and 1971 interviews from all the the following analyses except that dealing with the estimation of housing expenditures by income and other family characteristics. Our interest here is with housing adjustment moves, and a residential change by a splitoff is nearly automatic. In addition, splitoffs receive considerable attention in other chapters of this volume.

Approximately 20% of the non-migrant, non-splitoff sample moved locally between 1969 and 1971. Age is a strong correlate of local mobility. Age of the household head is related to many household characteristics that determine family mobility propensity. Table 3.1 shows a nearly monotonically declining local mobility rate by age, with almost two-thirds of families with a household head under age 25 in 1969 moving by 1971, whereas only 4% of the households with head age 75 or older move in the same two year period. Marital status is also associated with differential mobility performance. While it might be expected that households with single heads are more mobile than the married and widowed, the divorced and separated are slightly more mobile still. Combining age of head, marital status, and parenthood status into a life cycle stage variable, the range in two year mobility rates extends from a high of 49% for young singles to a low of 5% for old singles.

It can be seen from Table 3.2 that households experiencing a life cycle stage change have a higher average probability of moving than households remaining in the same stage. Especially high mobility rates are associated with change from single to married status, and from married to divorced. Moves by these two types of marital status changers cannot justifiably be considered adjustment moves, since a move by at least one of the household members is implied by definition . But only 7% of all local moves by non-splitoffs were associated with such marital status changes.

There is no strong relationship between family income and mobility propensity (Table 3.3), except that families with the greatest income are slightly less likely to move than the rest of the population. But there is a substantial decline in mobility as the ratio of family net real income to income needs increases, which indicates that the poor are more likely to move than the nonpoor. (We will return to this issue shortly.) Occupation of household head discriminates between movers and stayers slightly better than does family money income. Farmers, the self-employed, and those not in the labor force all have relatively

TABLE 3.1

Mobility Rates by Age, Marital Status, and Life Cycle State of Household Head

1969 Age of Head	Percent Moving*	Number of Cases
<25	64	335
25-34	34	793
35-44	17	1046
45-54	17	936
55-64	11	638
65-74	09	280
75+	04	141
1969 Marital Status of Head		
Married	19	2775
Single	32	288
Widowed	15	487
Divorced	34	262
Separated	37	362
Life Cycle Stage		
Young (<45), single	49	200
Young, married, no children in residence	42	216
Young, married, young children	30	858
Young, married, old children	15	456
Old (≥45), married, children	11	553
Old, married, no children	10	689
Old, single	05	87
Divorced or separated, children	36	400
Divorced or separated, no children	35	222
Widowed, children	31	126
Widowed, no children	13	361

*Percent of households moving at least once between 1969 and 1971 interviews. All rates based on weighted observations; number of unweighted cases are presented to the right.

TABLE 3.2

Mobility Rates by 1969 and 1971 Life Cycle Stage

1969 Life Cycle	1971 Life Cycle										
	1	2	3	4	5	6	7	8	9	10	11
1. Young (<45), single	49%	84%	--*	--	--	--	--	--	--	--	--
2. Young, married, no children in residence	--	36	--	--	--	3	--	--	69%	--	--
3. Young, married, young children	--	--	33%	19%	13%	--	--	61%	--	--	--
4. Young, married, old children	--	18	14	14	21	--	--	27	--	--	--
5. Old (≥45), married, children	--	--	--	--	9	13	--	--	--	40%	--
6. Old, married no children	--	--	--	--	21	9	--	--	--	--	5%
7. Old, single	--	--	--	--	--	--	6%	--	--	--	--
8. Divorced or separated, children	--	--	--	76	--	--	--	33	37	--	--
9. Divorced or separated, no children	--	--	--	--	--	--	--	18	31	--	14
10. Widowed, children	--	--	--	--	--	--	--	--	--	31	27
11. Widowed, no children	--	--	--	--	--	--	--	--	--	23	11

*-- = fewer than 15 cases.

TABLE 3.3

Mobility Rates by Income, Occupation, and Location

	Percent Moving	Number of Cases
INCOME:		
1969 Family Money Income		
$0 - 2999	23	765
$3000 - 4999	20	759
$5000 - 7499	28	894
$7500 - 9999	24	609
$10,000 - 14,999	19	729
$15,000 or more	11	418
1969 Family Net Real Income/ Family Income Needs		
<.40	35	96
.40 - .79	29	525
.80 - 1.19	25	643
1.20 - 1.59	22	613
1.60 - 1.99	23	528
2.00 - 2.39	23	411
2.40 - 2.99	20	469
3.00 - 3.99	18	462
4.00 - 5.99	13	335
6.00 or more	13	93
1969 OCCUPATION GROUP OF HEAD:		
Professional or technical	21	364
Manager, official, or proprietor	17	244
Self-employed	14	142
Clerical or sales	24	412
Crafts or foremen	19	610
Operatives	25	693
Laborers, service workers, farm laborers	25	819
Farmers	15	121
Miscellaneous (armed services, protective workers, unemployed)	29	93
Not in labor force	15	676
SIZE OF LARGEST CITY IN LOCAL AREA:		
SMSA >500,000	21	1637
SMSA 100,000	23	825
SMSA 50,000	21	410
non-SMSA 25,000	20	251
non-SMSA 10,000	18	353
non-SMSA <10,000	17	694

low mobility rates. Farmers have obvious attachments to the place where they live. For many of the self-employed, their house may also serve as a shop or office. And many of those not in the labor force are retired, and we have already seen that the elderly are less mobile. Respondents in highly urbanized areas are not substantially more mobile than those in less urbanized areas.

Housing tenure is strongly associated with residential mobility (Table 3.4) Those renting in 1969 were over five times as likely to move as were owners. About 3% of the sample received housing free in 1969, and their mobility rate was intermediate between those of owners and renters. The transactions costs involved in moving are substantially greater for owners than for renters and are likely to be reflected in owners' low mobility rate. Families who anticipate a need to move in the near future may rent housing for temporary accomodation only.[1]

If local mobility does serve as a mechanism for adjusting housing to family housing needs, it might be expected that families with either too much or too little housing would be more likely to move than families with about the right amount of space. One indicator of the amount of internal space occupied by a family relative to its space needs is the difference between actual and required number of rooms in the family's housing unit. In computing required rooms, a base of two rooms (exclusive of bathrooms) was allowed for head and wife or for a single head. One additional room was allocated for each single person age 18 or above, one room for a married couple other than head and wife, and one room for every two children of the same sex under age 18. Children under age 10 were paired regardless of sex if this reduced the room requirements. The mobility rate declines as crowding decreases, except at the extremes of room deficits and surpluses, where there are relatively few observations. Mobility did not increase as room surplus increased. This is perhaps analogous to the "ratchet" effect in consumer theory -- that households easily adjust their consumption upward in response to increased income but are reluctatnt to adjust consumption downward if income decreases. Some of the households with substantial room surpluses were older couples or widows who maintained psychological attachments to their homes even though their children had grown and departed.

Change in household composition is another characteristic that might be expected to relate to residential mobility. Families experiencing either an increase or a decrease in number of resident members during a specified time period might be expected to be more likely to move during that period than would

---

[1]Evidence in support of this proposition is contained in John Lansing, Charles Clifton, and James Morgan (1969), A Study of Chains of Moves.

TABLE 3.4

Mobility Rates by 1969 Tenure Status, Crowding and Net Change in Number of Resident Household Members, 1969-71

1969 Tenure Status	Percent Moving	Number of Cases
Owners	9	2210
Renters	46	1767
Housing Free	28	197
Crowding & Change in Family Members (Actual - Required Rooms; 1969)		
-3	17	63
-2	32	126
-1	44	279
0	41	647
1	28	958
2	16	859
3	14	634
4	12	323
5+	7	167
Change in Household Members, 1968-71		
-4	41	42
-3 or -2	20	253
-1	18	625
0	15	2338
1	34	613
2 or 3	54	250
4+	46	53

families that did not change in size. We find that both net additions and net declines in family size over the observation period were associated with higher mobility rates than those for families that did not experience any net change in family size. Note also that a net increase in number of occupants was associated with a higher mobility rate than was a net decline of equal magnitude, perhaps indicating again that crowding presented a stronger stimulus for residential change than did surplus space.

A change in residence might be a response to a family's perception that they are paying too much for the housing services they receive, that their current housing is overpriced. This hypothesis would be supported if we were to find that families that paid more than the average amount for a certain bundle of housing services had a higher propensity to move than those families paying less for the same housing. Annual housing cost is defined as follows:

For Renters:
annual rent +
total utility payments in past year +
value of additions and repairs done by family in past years ($1000 maximum).

For Owners:
six percent of estimated house value (the sum of imputed return on equity and a 6% interest charge on the remaining mortgage principal) +
total utilities payments in past year (includes lot rental for trailer owners) +
value of additions and repairs done by family in past year ($1000 maximum) +
estimated annual property tax.

For Households that neither own nor rent:
annual rental value of occupied dwelling +
total utilities payments in past year +
value of additions and repairs done by family in past year ($1000 maximum).

This variable is only an imperfect measure of the annual financial burden of housing and is probably a better measure for renters than for owners.[1] The major

[1]There are some weaknesses with these measures of housing expenditure that should be noted. For homeowners, the 6% of equity is seen as the opportunity cost of having those funds tied up in homeownership . But ownership can itself represent an investment upon which a profit could be realized if the house were to be sold. Respondents were asked to estimate their utility payments for the past year, which in the case of movers may be partially determined by utility payments at their previous residence. The value of additions and repairs done by the family are included, whereas those done commercially are not. This should not represent a substantial distortion, since the vast majority of respondents reported no additions and repairs and if they did, the figure is truncated at $1000. Because the dependent variable for renters is not strictly comparable with that for owners, and because renters may be substantially different from owners in other ways, much of our analysis treats owners and renters separately. Those who receive housing free (3% of the sample) are included with renters.

TABLE 3.5

Mobility Rates by Time and Money Husband and Wife Spent Commuting to Work and by Mobility History

Annual Money Costs* of Commuting, 1969	Percent Moving	Number of Cases
$0	18	1358
$1 - 50	20	348
$51 - 100	22	376
$101 - 199	26	702
$200 - 299	22	501
$300 - 399	22	329
$400 +	18	490
Annual Hours Spent Commuting, 1969		
0	17	1031
1 - 40	16	185
41 - 100	23	572
101 - 300	23	1577
301 - 600	20	648
601 - 1500	12	161
Mobility Rates by Year of Most Recent Past Move		
1968	47	777
1967	33	592
1965-66	23	653
1959-64	12	978
Before 1959	7	1162

*$.10/mile is assumed for drivers.

TABLE 3.6

Mobility Rates by Plans to Move and Reason for Expected Move

Plans to Move	Percent Moving
Plan to move	57
Might move, not sure	38
No plans	9
Reason for Planning to Move	
No plans to move	9
Productive reasons (to take another job, to get nearer work)	46
Housing consumption reasons (more or less space, less rent, better neighborhood, want to own home, better house)	50
Response to outside events, involuntary reasons (dwelling unit coming down, being evicted, armed services)	40
Ambiguous or mixed reasons (to save money, all my old neighbors moved away)	46

Reasons for Planning to Move	Distribution by Percent
Productive reasons (162)	15
Consumptive reasons (982)	64
Outside events (173)	10
Ambiguous (105)	10

determinants of the market value of a housing unit include location, number of rooms, type of structure, neighborhood characteristics, local housing costs, and availability of public transportation. Additionally, if housing market segregation exists, there is likely to be a cost differential between white and non-white housing.

After controlling for the above mentioned housing characteristics, we found that movers, before moving (i.e., in 1969), do not on the average come from overpriced housing units. This does not imply that no moves are induced by the perception that one's housing is overpriced, but only that this effect is not strong enough to show up in the aggregation of all movers. A similar analysis for single family home residents by tenure status was undertaken to minimize the possibility of interactions clouding our findings. Once again we found no evidence that movers on the average pay more before moving than do stayers.

Workers weary of long hours and high costs of commuting might be inclined to move nearer their jobs, although previous research (Lansing and Barth (1964)) indicates that work place location is not a primary factor in residential site selection. In support of these earlier conclusions, we found (see Table 3.5) no significant tendency for families who spent more hours or greater sums of money on commuting to move more frequently than families who live nearer their work.

The family's mobility history is closely related to the probability of the family's moving between 1969 and 1971. (See VanArsdol (1968), Morrison (1971)). Nearly half of the families that moved in 1968 moved again in 1969-71, whereas only 7% of those households that had not moved in the 13 years prior to 1969 moved in the subsequent 24 months. At first glance this finding appears to refute the housing adjustment approach to local mobility, since those households that have not recently moved should be the most out of housing equilibrium and therefore the most likely to move again. Chronic mobility is consistent with the housing adjustment approach, however, if those families that move repeatedly do so in response to frequent changes in their housing needs.

Families are only moderately good at predicting their future mobility (see Table 3.6). Only 9% of the families who in 1969 did not plan to move "in the next couple of years" did move. Fifty-seven percent of those who expected to move did so.[1] Of those respondents who in 1969 planned to move or said they

[1]Since we have excluded all long distance movers from the sample and since the mobility plans questions did not distinguish between planned local and planned long distance moves, the 43% that planned to move but did not includes some respondents that had unfulfilled plans to migrate. Therefore the figure of 57% is biased downward.

might move, the majority gave housing adjustments of one sort or another as the reason. Those specifying housing related reasons for moving were the most accurate in assessing their future mobility. There do not exist very high correlations between the reasons movers gave for expecting to move and the *ex post facto* justification for the move, but this probably reflects more on the quality of the question than on the consistency of the response.

We cross-tabulated moving plans against many of the family characteristics mentioned earlier and found that, while families tend to move less than they had planned to, there are no striking differentials in this discrepancy across different types of families.

How well can we predict whether a family will move based on family and housing characteristics? And what are the independent influences of the different predictors, after the effects of the other predictors have been controlled? These questions can be answered by a Multiple Classification Analysis of mobility performance. When utilizing a 0-1 dependent variable, the equation estimates the probability of an event occuring -- in the present case, the probability of making a local residence change. The net effects can be interpreted as adjustments in the probability of moving attributable to the designated characteristic of the respondent household. (Appendix E discusses some statistical problems associated with 0-1 independent variables.)

Table 3.7 presents the results of the MCA of local mobility performance. A total of ten predictor variables was used. Variables 1-4 represent housing stress which might induce a move. Variable 1 is the ratio of actual to expected housing expenditures in 1969, where expected expenditures are based on family income. This will be explained more fully in the next section. These first four variables do a poor job of predicting who moves. Together they can explain only 6% of the variance in the dependent variable. When we add some of the strongest correlates of mobility performance to the predictor list (variables 5-8), the explanatory power is increased substantially, although we are still a long way from accurately predicting who will and who will not move. The gross effects for variables 9 and 10 indicate that the poor and nonwhites have above-average mobility rates. But the net effects imply that these families have higher than average mobility rates because they tend to be crowded, to rent, and to possess other characteristics associated with high mobility. There is nothing inherent about being poor or nonwhite that causes residential mobility.

TABLE 3.7

MCA of Mobility Performance
(Dependent variable: 1=move, 0=stay)

Independent Variable	Gross Effect	Net Effect	Unweighted n
1. Actual/expected housing expenditures			
.60	-.05	-.03	320
.61 - .85	.02	.00	931
.86 - 1.15	-.00	-.01	1186
1.16 - 1.40	-.02	.00	679
1.41 +	.01	.02	1048
2. Actual - required rooms			
-2	.05	.04	74
-1	.22	.10	146
0	.20	.11	401
1	.09	.01	870
2	-.05	-.04	975
3	-.07	-.02	838
4 +	-.10	-.02	726
NA	-.09	-.01	135
3. Annual hours spent commuting by husband and wife			
0	-.03	.08	1000
1 - 80	.01	-.01	580
81 - 250	.03	-.01	1647
251 - 9000	-.02	-.06	938
4. Annual money spent on commuting by husband and wife			
0	-.02	-.05	1250
1 - 99	.01	.01	763
100 - 199	.05	.02	695
200 - 299	.01	.02	491
300 +	-.02	.03	966
5. Housing tenure			
Own	-.12	-.08	2767
Rent	.24	.18	1398
6. Year of most recent past move			
1968	.26	.10	680
1967	.14	.06	547
1965-66	.03	-.00	603
1959-64	-.09	-.05	939
Before 1959	-.13	-.04	1397
7. Life cycle stage			
Young (<45), single	.28	-.06	151
Young, married, no children in residence	.21	.06	238
Young, married, young children	.11	.01	827
Young, married, old children	-.06	.02	494
Old (>45), married, children	-.10	-.02	529
Old, married, no children	-.11	-.01	927
Old, single	-.15	-.14	98
Divorced or separated, children	.15	.03	193
Divorced or separated, no children	.15	.04	157
Widowed, children	.10	.03	66
Widowed, no children	-.08	-.01	439

TABLE 3.7
(continued)

	Gross Effect	Net Effect	Unweighted n
8. Age of household head			
<25	.43	.23	272
25-34	.15	.07	731
35-44	-.04	-.04	925
45-54	-.04	.01	845
55-64	-.09	-.04	730
65-74	-.12	-.06	440
75 or over	-.17	-.11	224
9. Poor family?			
Yes	.05	-.01	1096
No	-.02	.01	3069
10. Race			
White	-.01	.00	3604
Nonwhite (primarily black)	.08	-.03	561

Mean value of dependent variable: .21

R^2 (adjusted) = .22

ETA:

expenditures	.04
crowding	.24
commuting hours	.06
commuting cost	.06
tenure	.38
mobility history	.34
life cycle stage	.28
age of head	.33
poor?	.07
race	.07

III. The Housing Adjustments of Local Movers

A principal cause of local residential mobility is the need and desire of families to adjust their housing expenditures to changing family income and other status changes over time. Many families move because they desire to either upgrade or downgrade their housing. Changes in housing quality as determined by location, internal space, external space, and quality of the structure itself are reflected in the housing unit's market value. Differentials in housing expenditures before and after moving indicate changes in some or all of these characteristics, and also indicate inflation increases.[1] Since our measure of housing costs is not strictly comparable for owners and renters, expenditures by movers before and after moving can be compared only for movers who did not change tenure status. For owners, annual housing expenditures were an average of 52% greater after moving than before. To control for the expected increase due to inflation, we should compare this change with the difference between 1969 and 1971 housing expenditures for owners that did not move. The average expenditure increase for this group was about 12%. For owners then, moves on the average represented a considerable upgrading in housing as measured by expenditures on housing. The results are quite similar for renters. Average rental costs were 47% greater after moving than before, while housing costs for renter-stayers increased 12% over the same period. The findings for poor families were almost identical.

If norm values of housing expenditures can be specified, based on relevant family economic, social, and demographic traits, then movers should generally adhere better to that norm after moving than before, if indeed residential mobility serves as an adjustment mechanism. Similarly, immediately prior to moving, movers are likely to be more out of equilibrium regarding housing expenditures than are families who do not move in the next two years and who apparently are not

---

[1] There are some possible distortions involved in these comparisons. Respondents may report the purchase price of their home as its current value, although the value is likely to have increased over time. Landlords often wait for a turnover in tenants before raising the rent. Therefore a 50% increase in housing expenditures after moving, even if controlled for inflation, probably does not represent a 50% increase in consumption of housing services.

experiencing severe housing stress. To test this hypothesis, housing expenditures were estimated based on family average annual income over a four year period, income trend, life cycle stage, head's occupation, local housing costs, required number of rooms, and race. We will not go into the details of this analysis, since housing expenditures receive ample attention elsewhere in this volume.

Although, generally speaking, R^2 worship is not an advisable religion, for our purposes emphasis on the percent of variance explained is appropriate since we are interested in measuring adherence to an estimated norm value, where the norm is based on the family characteristics specified in the list of independent variables. Table 3.8 gives the resulting R^2s from this MCA of housing expenditures. The findings are mixed in that owners adhere more closely to expected expenditures after moving than before, but renters adhere less closely after the move. For stayers, there is not any significant difference in the explanatory power of the model between 1969 and 1971.

The MCA analysis shows four-year average family money income to be the dominant determinant of family housing expenditures and its effect to be approximately linear. Believing in the virtue of simplicity, we attempted to estimate housing expenditures by average income alone, using a linear regression equation. We would expect the explanatory power of the regression equation to be less than that of the MCA analysis, since we exclude all but one of the independent variables. Partially offsetting this is the fact that by using a continuously measured income variable instead of the categorized version of the MCA, we retain the within-category variance of the income variable. The equation estimated was:

$$y_t = a + bx$$

y_t: annual housing expenditures in year t (1969 or 1971)

x: average annual family money income, 1969-71.

The regression was run on four sample subgroups at both the beginning and end of the moving period. The results are presented in Table 3.9. The R^2s are not adjusted for degrees of freedom, but the largest of these adjustments would result in a change of less than one percentage point in the R^2. For both mover and stayer homeowners, we lose little explanatory power by using this simple linear regression to estimate housing expenditures. For renters the loss of explanatory power is greater. These regression results are in keeping with those of the MCA analysis in that we do better at estimating after-the-move housing expenditures for homeowners than for renters.

Primarily because of our curious finding that renters adhere less to expected expenditures after moving than before, we decided to attempt to estimate

TABLE 3.8

R^2 Comparisons from MCA Analysis of Housing Expenditures

Subgroup	Before Moving (1969) R^2	After Moving (1971) R^2
Own + Move	.27 (261)	.50 (252)
Own + Stay	.44 (1547)	.43 (1558)
Rent + Move	.46 (399)	.34 (410)
Rent + Stay	.46 (403)	.44 (396)

Note: R^2 adjusted for degrees of freedom; number of cases in parentheses.

TABLE 3.9

R^2s from Regression of Housing Expenditures on Four Year Average Annual Income

Subgroup	Before Moving (1969) R^2	After Moving (1971) R^2
Own + Move	.25 (261)	.47 (252)
Own + Stay	.38 (1549)	.37 (1558)
Rent + Move	.35 (400)	.20 (409)
Rent + Stay	.38 (405)	.34 (396)

TABLE 3.10

R^2s from Regression of Housing Expenditures on Current Annual Income

Subgroup	Before Moving (1969) R^2	After Moving (1971) R^2
Own + Move	.26 (261)	.46 (252)
Own + Stay	.33 (1549)	.33 (1556)
Rent + Move	.24 (400)	.32 (409)
Rent + Stay	.40 (405)	.32 (396)

housing expenditures from current annual income. Four-year average income is highly correlated with income in each of the four years. (The simple correlation coefficient between average annual money income and 1969 money income is .94.) This correlation is not so high for movers, over 20% of whom are splitoff households whose income after moving may be drastically different from that of the family of origin. In addition, the move may be caused by change in income over the four-year period that would not be reflected in the average income variable. This is particularly the case since movers are concentrated at the younger ages where other major status changes tend to occur. For such households, current income might be a better indicator of the ability to pay for housing than four-year average income. Table 3.10 gives the results of these regressions. Only renter-movers show substantially different R^2s than in Table 3.9. And the direction of the changes adds credence to our speculation concerning the inapplicability of the average income figure to this subgroup.

The amount of space in the housing unit is an important consideration for most families. Many moves are probably precipitated by the need or desire to alter the amount of space the family occupies. This is particularly true if there are permanent changes in the number of household residents or if substantial changes in family income allow the family to afford a larger housing unit or force them to move to smaller, less expensive quarters.

The average crowding of movers was less after moving (in 1971) than before moving, with the mean room surplus (defined in Section II) increasing from 1.33 to 1.74. Forty-six percent of the moves resulted in a decrease in crowding, and 30% resulted in more crowding. But of those families that were relatively crowded before moving (fewer than two surplus rooms), 63% were less crowded after moving. Only 23% of the movers that had two or more "extra" rooms before moving were less crowded after moving.[1] The poor are considerably more crowded than the overall population, as might be expected. The average excess of actual over

---

[1]One must be extremely cautious in making inferences from these findings because of the artifact referred to as *statistical regression* or *regression toward the mean*. For any distribution of a sample by some ordinal or continuously measurable characteristic, if there is less than perfect correlation between an individual's score or category at the two points in time, then cases for which extreme scores (at either tail of the distribution) were recorded at the first observation will be expected on the average to be less extreme at the second observation. Therefore, households that were extremely crowded in 1969 would be expected to be less crowded on the average in 1971, even if housing change was not consciously undertaken as an adjustment mechamism. For a more complete treatment and additional references, see Campbell and Stanley (1966).

required rooms was .52 before moving. But, as with the total sample, the poor on the average decreased their crowding by moving, and the average room surplus after the move was .81 rooms. Forty-two percent of the poor were less crowded after moving, and 30% were more crowded. Of poor families with fewer than two extra rooms in 1969, 51% were less crowded after moving. Of poor families with two or more extra rooms in 1969, only 19% were less crowded in 1971. This evidence indicates that mobility and crowding interact in much the same way for the poor as for the population overall, after allowing for the fact that the poor are more crowded than the average household.

If some normative amount of internal space as measured by number of rooms could be specified, we would expect that movers before moving would adhere less closely to that norm than would stayers, and that after moving, movers would adhere considerably better to that norm. We specify the number of rooms occupied by the family as being determined by the required number of rooms based on the demographic composition of the family, and by family income. The findings of this analysis (see Table 3.11) are surprising for several reasons. First, for both movers and stayers, the ability to predict the number of rooms occupied by the family from the number of required rooms and the family income is rather low. Secondly, in 1969 (before moving) movers adhere substantially better to the predicted value for number of actual rooms than do stayers. And finally, although movers adhere slightly better to their expected number of rooms in 1971 (after moving) than in 1969, so do stayers! The low variance of required number of rooms might be partially responsible for the low R^2s, and there may be interactions omitted also. Since renters might be expected to be more closely attuned to their current space needs than owners, and since renters comprise a disproportionate share of total movers, we ran the analysis separately for owners and renters. The resulting R^2s (see Table 3.12) show that renters do in fact adhere more closely to the estimated value for number of rooms than do owners. For owners the results are as initially anticipated, that in 1969 movers are (admittedly only slightly) farther out of equilibrium with regard to number of rooms than stayers, and that after moving their actual number of rooms fits their needs and financial capabilities considerably better. But for renters the results continue to refute our hypothesis.

If families move to get nearer their work, we should find that movers spend less time and money commuting after the move than before. If anything, the opposite is the case (see Table 3.13). The average family spends slightly more time and money commuting after moving than before.[1] This is also true for the

[1]Since job change occurs about as frequently as residence change, it is possible that place of work adjusts in response to inaccessibility and not the place of residence.

TABLE 3.11

MCA of Determination of Number of Rooms in Housing Unit

Independent Variable	Movers, 1969 Gross Effect	Movers, 1969 Net Effect	Movers, 1969 N	Stayers, 1969 Gross Effect	Stayers, 1969 Net Effect	Stayers, 1969 N	Movers, 1971 Gross Effect	Movers, 1971 Net Effect	Movers, 1971 N	Stayers, 1971 Gross Effect	Stayers, 1971 Net Effect	Stayers, 1971 N
Required # Rooms												
2	-.9	-.8	198	-.6	-.4	732	-.9	-.8	277	-.6	-.4	780
3	.0	.0	208	.1	.1	511	.3	.3	233	.1	.0	519
4	.6	.4	109	.5	.3	386	1.1	.9	82	.6	.3	401
5	.9	.8	78	.6	.4	178	1.5	1.5	34	.7	.5	.50
6	.8	.9	34	.7	.5	48	1.9	1.7	15	1.0	.8	50
7	.1	.1	20	.7	.8	19	-.1	.2	10	.7	.9	8
8	.2	.0	2	-.1	-.1	6			0	-.2	-.3	3
9			0	.8	1.0	7			0	-.2	-.3	3
Family Annual Money Income												
<$4000	-.7	-.5	122	-.8	-.6	383	-1.0	-.9	99	-.9	-.6	359
$4000- 6999	-.3	-.2	142	-.4	-.3	352	-.4	-.3	154	-.5	-.4	303
$7000- 8999	-.2	-.2	106	-.1	-.1	239	-.2	-.2	97	-.2	-.2	209
$9000-10,999	.2	.1	85	.2	.1	252	.1	.1	87	.0	.0	217
$11,000-13,999	.4	.3	75	.3	.2	287	.4	.2	88	.3	.2	276
$14,000-19,999	.8	.6	80	.8	.7	264	.8	.8	88	.5	.4	351
$20,000 or more	.1	.8	38	.9	.8	110	1.5	1.4	38	1.1	.9	216
R^2 (adjusted)		.28			.19			.33			.23	
ETA:												
rooms		.48			.34			.48			.37	
income		.35			.38			.39			.42	
Mean number of actual rooms		4.8			5.5			4.7			5.5	

TABLE 3.12

R^2 from MCA of Number of Rooms in Housing Unit

Subgroup	1969	1971
Stay, own	.17 (2428)	.21 (2512)
Stay, rent	.23 (781)	.24 (767)
Move, own	.12 (237)	.30 (383)
Move, rent	.30 (605)	.34 (468)

TABLE 3.13

Mean Annual Commuting Costs and Hours for Husbands and Wives, Before and After Moving

Commuting	Before Moving (1969)	After Moving (1971)
Costs	184.9	214.5
Hours	167.5	172.3

poor, even though they tend to live nearer to their jobs than the population overall.

Several factors may influence the degree of accessibility of the work place to the place of residence. Muth (1969) offers a model of urban residential land use, one implication of which is that households with higher incomes tend to locate farther out from the center of the metropolitan area. If places of employment are concentrated at or near the city center, then higher income families would be expected to spend more time and money commuting. Urban congestion should also influence commuting. The more densely urbanized a given area, the less accessible might the average job site be. Work by Duncan (1956) indicates commuting differentials across occupational groups. Owners of single family homes should on the average commute greater distances than renters, since owner-occupied homes tend to be located farther from the city center than apartments and other rental housing.

While the results of Table 3.14 support our hypotheses about the effects of income and tenure status on commuting, the effect of area urbanization only partially supports our expectations. The largest SMSAs are characterized by longer than average hours of commuting, and residents of the most and least urbanized areas spend the most money commuting. There are also some differentials across occupation groups. As with the analysis of internal housing space, we have the unexpected result (Table 3.15) that, although we cannot explain much of the variance in the commuting variables, we can in 1969 explain twice as much of the variance for movers as we can for stayers. And movers show no significant tendency to adjust their commuting by moving so as to more closely adhere to norm values. Given the findings of previous studies that work place accessibility is not an important consideration in housing choice decisions, we should probably not be surprised by these results.

SUMMARY

About two-thirds of all residence changes in the United States involve local moves, and most geographic mobility that takes place within local labor market areas is related to housing adjustments, rather than to job changes or transfers. Nearly 25% of all local mobility is attributable to new family formation and other types of household splits. Mobility is concentrated among the young, renters of housing, and those with insufficient space in their housing unit. Families that have moved most recently are the most likely to move again.

TABLE 3.14

MCA of Commuting Costs and Hours, 1969* (movers and stayers combined)

Independent Variable	Annual Commuting Costs as Dependent Variable: Gross Effect	Annual Commuting Costs as Dependent Variable: Net Effect	Annual Commuting Hours as Dependent Variable: Gross Effect	Annual Commuting Hours as Dependent Variable: Net Effect	n
Family Money Income					
<$4000	-145	-140	-90	-84	215
$4000 - 6999	-59	-63	-32	-37	566
$7000 - 8999	-24	-23	- 4	- 4	455
$9000 -10,999	13	9	4	2	479
$11,000-13,999	13	16	18	21	531
$14,000-19,999	74	76	51	52	524
$20,000 or more	111	112	40	43	212
Size of Largest City in Area					
500,000 or more	34	20	42	32	1100
100,000-499,999	-20	-29	- 5	-10	689
50,000-99,999	-62	-54	-37	-32	335
25,000-49,999	-39	-30	-53	-46	173
10,000-24,999	0	19	-26	-14	273
Under 10,000	11	40	-31	-13	413
Occupation of Head					
Not in labor force	-127	-52	-92	-39	40
Professional, technical	- 3	-36	- 7	-32	449
Manager, proprietor	57	9	24	- 3	348
Self-employed	2	-16	- 3	-10	121
Clerical	- 6	8	- 5	- 2	412
Craftsman, foreman	31	25	25	20	648
Operative	-16	2	1	12	520
Laborer	-50	5	-24	9	329
Farmer, farm manager	-52	-25	-82	-39	44
Miscellaneous	-61	-61	-20	-25	71
Tenure status					
Own	19	5	1	- 5	2050
Rent	-41	-11	- 3	10	933
Mean value of dependent variable	$277		221 hours		
R^2	.07		.08		
ETA:					
income	.24		.22		
urbanization (lrgst.city in area)	.12		.19		
occupation	.13		.13		
tenure	.11		.01		

*For non-splitoff respondents who reported non-zero commuting costs and hours.

TABLE 3.15

R^2 (adjusted) from MCA of Commuting Costs and Hours

	1969	1971
Commuting costs		
movers	.12	.15
stayers	.06	.08
Commuting hours		
movers	.15	.15
stayers	.07	.09

We are unable to predict accurately who will move by the family's housing "stress" as measured by housing expenditures relative to income, by crowding, and by accessibility to the place of work.

There appears to be nothing unique about being poor or black that causes the higher than average mobility rates among these families. Rather, it is the result of certain characteristics associated with high mobility rates, found in all segments of the population but disproportionately among blacks and the poor.

Movers adjust their housing expenditures to income and other family characteristics. Average housing expenditures are 50% greater after moving than before. Movers adhere more closely to normative values of housing expenditures after moving than before, although the evidence for renters is ambiguous.

Moves tend to result in a less crowded family housing unit, for the sample overall and also for the poor, even though 30% of all moves result in more crowding. It is not possible to predict the number of rooms in a housing unit by the demographic characteristics and income of the resident family, either before or after moving.

Accessibility to the place of work is not a major factor in residential site selection. Respondents spending long hours or substantial sums of money on commuting do not have a significantly higher propensity to move than those nearer to the place of work. The average move is to a location slightly less accessible to the work place. There is no evidence that movers adjust to equilibrium commuting performance as estimated by income, occupation, urban density, or tenure status.

In conclusion, although two-thirds of all local movers explicitly indicate housing considerations as the motivation for their move, we have been less than completely successful in isolating the nature of those housing adjustments with these data.

References

Campbell, Donald T and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, Rand McNally, Chicago, 1966.

Duncan, Beverly, "Factors in Work-Residence Separation: Wage and Salary Workers, Chicago, 1951," American Sociological Review, Vol. 21 (1), 1956.

Lansing, John and Nancy Barth, Residential Location and Urban Mobility: A Multivariate Analysis, Institute for Social Research, Ann Arbor, 1964.

Lansing, John, Charles Clifton and James Morgan, New Homes and Poor People - A Study of Chains of Moves, Institute for Social Research, Ann Arbor, 1969.

Lansing, John and Eva Mueller, The Geographic Mobility of Labor, Institute for Social Research, Ann Arbor, 1967.

Morrison, Peter, "Chronic Movers and The Future Redistribution of Population," Demography, Vol. 8 (2), 1971.

Muth, Richard F., Cities and Housing: The Spatial Pattern of Urban Residential Use, University of Chicago Press, Chicago, 1969.

Rossi, Peter, Why Families Move, Free Press, Glencoe, Illinois, 1955.

Simmons, James W., "Changing Residence in the City: A Review of Intra-Urban Mobility," Geographic Review, Vol. 58, 1968.

Van Arsdol, Maurice, et al, "Retrospective and Subsequent Metropolitan Residential Mobility," Demography, Vol. 5 (1), 1968.

Chapter 4

MODES OF TRAVEL TO WORK

INTRODUCTION

Predictions that petroleum products will be in short supply for at least the next several years point to the need for using these resources wisely. Car travel to work consumes a lion's share of petroleum and here some conservation measures seem feasible. Considerable savings of gasoline -- accompanied by environmental improvements -- could be realized by diverting commuters from cars to mass transportation, persuading them to form car pools and, where possible, even encouraging them to walk. However, before trying to change people's commuting habits, it is important to understand the factors associated with their present choices of modes of travel to work.

Most studies concerning choice of transportation have been interested in the characteristics of the various travel modes such as cost, time involved, convenience, and comfort. This helps guide policy makers in their efforts to divert auto users to public transport by pointing out the needed changes in the modes, but it does nothing to inform them about the types of individuals using various means of transportation. The purpose of this study is to examine the characteristics of individuals and their environment which influence decisions about mode of travel to work and to explore possible behavioral hypotheses which would account for the observed relationships. This should help make policy makers more aware of which groups of individuals they must appeal to in order to change people's patterns of travel to and from work.

ANALYSIS

I. Data and Procedure

The data for the Panel Study of Income Dynamics provide a representative sample of heads of households who were in the labor force in 1972 and who reported on their mode of travel to work. The distribution of these individuals

by mode of travel to work is given in Table 4.1.

TABLE 4.1

Percent of Heads of Households Using Different Modes of Travel to Work in 1972

Mode	Percent
Driving	74.4
Public transportation	6.8
Walking	4.2
Car pooling	3.7
Doesn't travel to work	7.6
Other	3.4
	100.0

As expected, driving was the most popular mode; about three-quarters of all heads of households used a car to get to work. A substantial proportion, however, either took public transportation, walked, or rode in car pools. We eliminated all of the respondents giving "other" responses or reporting that they didn't travel to work (e.g., those who worked at home or travelled as a part of their work).

Choice of mode of travel to work is examined with respect to a set of independent variables measuring various characteristics of the head of the household and his or her family, plus measures of several environmental factors which can be expected to influence the travel mode choice. The environmental characteristics which reflect the *availability* of alternatives to driving are:

Whether public transportation was within walking distance of residence. (*Availability of public transportation*)

Whether public transportation was good enough to use to get to work. (*Public transportation good*)

Whether residence was located in New York City or its surrounding suburbs. (*Whether New York*)

Size of largest city in primary sampling unit. (*City size*)

Number of miles from residence to work. (*Miles to work*)

Distance from residence to center of nearest Standard Metropolitan Statistical Area. (*Distance to city*)

Residents in the New York metropolitan area were singled out because of their uniquely well-developed system of public transportation.

Several of these variables were also intended to represent the *desirability* of using modes other than driving because of congestion, parking costs, and inconvenience. Those variables serving this dual function were:

Whether New York

City Size

Distance to City

Several family and personal characteristics of the head of the family were

selected as factors affecting the desirability of the various modes. Many studies have shown that time aspects of each alternative mode are important in mode decisions and that time should be weighted by some fraction of average hourly earnings in order to derive the opportunity costs of time spent in travel. Since only the time involved with the chosen mode (and not its alternatives) was available, average hourly earnings (*wage*) was used as a proxy for the opportunity costs of time spent commuting to and from work. Use of cars should increase with increase in wage because driving is usually the fastest mode of travel.[1]

The decile of total family income to needs (*income/needs*) represents the ability of the family to pay for certain types of transportation, especially the ability to purchase a car. Since this variable includes labor, asset, and transfer income of all family members and a division by an index of family needs, it measures a concept sufficiently different from the wage rate so that both were included.

Several variables were included to represent the uses for the car which competed with travel to work. These variables were:

Whether wife, if present, worked. (*Wife present/worked*)

Number of children in family unit. (*Number of children*)

Number of adults, those aged 18 or older, in family. (*Number of adults*)

The role played by tastes and preferences in the decision about mode of travel was investigated through the inclusion of the following personal characteristics of the head of the household:

Age of head of household. (*Age*)

Sex of head of household. (*Sex*)

Race of head of household. (*Race*)

To examine the relationships of these variables to the choice of travel mode, a search algorithm for categorical dependent variables, THAID, was employed. THAID produces sequential binary splits on the given categorical predictors. Each predictor is split into two groups in a manner which maximizes the difference in the distribution of the dependent variable between those two groups. A more complete description of THAID is given in Appendix D.

II. Results

A search of the determinants of mode choice by THAID showed (not surprisingly) that a distance to work of two miles provided a useful division of the

---

[1] While information about the costs and time of the *chosen* mode of travel were available, neither was selected here because both are the *result* of mode choice and it could be circular to include them among the predictors. Such information about the alternative modes open to the individual was not available.

sample. Those living two or more miles away almost never walked to work: those within two miles of work very rarely had car pooling arrangements. Two different populations, then, were analyzed with two slightly different categorical dependent variables. The first was composed of those living two or more miles from work with the choices of 1) driving, 2) public transportation, and 3) car pooling. The second population was of those living within two miles of work with the choices of 1) driving, 2) public transportation, and 3) walking. The distribution of the sample by distance to work and these mode choices is given in Table 4.2.[1]

TABLE 4.2

Percent of Heads of Households Using Different Travel Modes, by Distance to Work

	Mode			
Distance to Work	Driving	Public Transportation	Car Pooling/ Walking	Number of Observations
Two miles or more	87%	9%	4%	1425
Less than two miles	69%	5%	26%	265

The extent to which predictors are able to divide the population in their distribution across travel modes is given by the delta statistic. It is analogous to chi-square although it is not squared and is constrained to vary between zero and unity. Predictors with large deltas are best able to differentiate the sample on the distribution of the categories of the dependent variable. The simple association between each predictor and the dependent variables as indicated by delta is given in Table 4.3.

TABLE 4.3

Association (delta) between Predictors and Modal Choice, for Those Living Less than Two Miles from Work and Two or More Miles from Work

	Delta	
Predictor	<2 miles and 1) driving, 2) public transportation, 3) walking	>2 miles and 1) driving, 2) public transportation, 3) car pooling
Availability of public transportation	.088	.182
Public transportation-good	.152	.273
Whether New York City	.058	.164
City size	.254	.230
Miles to work	.000	.111
Distance to city	.123	.113
Wage	.204	.170
Income/needs	.226	.150
Wife present/worked	.168	.233
Number of children	.097	.116
Number of adults	.137	.144
Age	.108	.084
Sex	.159	.202
Race	.141	.149

[1] Cases outside of the given groups of modes were rare and so were eliminated from the analysis.

The basic tool for the examination of the results of THAID will be a graph with triangular coordinates. The graph has three axes, each originating at a small letter (a, b, c) and terminating at the corresponding capital letter (A, B, C, respectively). The numbers along the axes represent percentages, each axis being numbered from 0 to 100 in intervals of five. Each triangular coordinate graph is used to demonstrate the effects of certain predictors on the choice of the three most prominent alternative modes. In the case of heads residing less than two miles from work, the graphs show the effects on driving, public transportation, and walking. For heads working two miles or more from their residence, the graphs display the effects on driving, public transportation, and car pooling. The predictors shown in the graphs are ones upon which the THAID program actually split; they are the predictors which produced the largest improvement in the delta criterion.

The two populations, heads living within two miles of work and those living two miles or more from work, are examined separately. To facilitate the reader's understanding of the triangular coordinate graph analysis we will first examine only one THAID split. This is shown in Figure 4.1. For those living less than two miles from work, city size made the most difference. The actual division of the sample was on whether the city size was larger or smaller than 500,000. Looking at Figure 4.1, we note that the distribution of the entire population with respect to mode of travel places it toward the right side in the upper part of the triangle. The axis for percentage driving is labeled cC; the axis for percentage using public transportation is labeled aA; the axis for percentage walking is labeled bB. Looking more carefully at the location of the entire population in relation to the triangular graph, we note that of the entire population about 69% drive, 5% use public transportation, and 26% walk. These numbers are identical to those shown in Table 4.2.

Above and to the right of the entire population is plotted the percentage of individuals living in medium to small cities (less than 500,000) that select the various travel modes. They were more likely than the entire population to drive (the percentage driving being 78%), less likely to take public transportation (1% using public transportation), and only slightly less likely to walk (21% walking). Below and also to the right of the entire population are the modal choices of those living in cities larger than 500,000. Heads of households located less than two miles from work in large cities were much less likely to drive than was the entire population (39% driving); they were considerably more likely to take public transportation to work (17% using public transportation); in addition, they were substantially more likely to walk (44% walking). Thus we

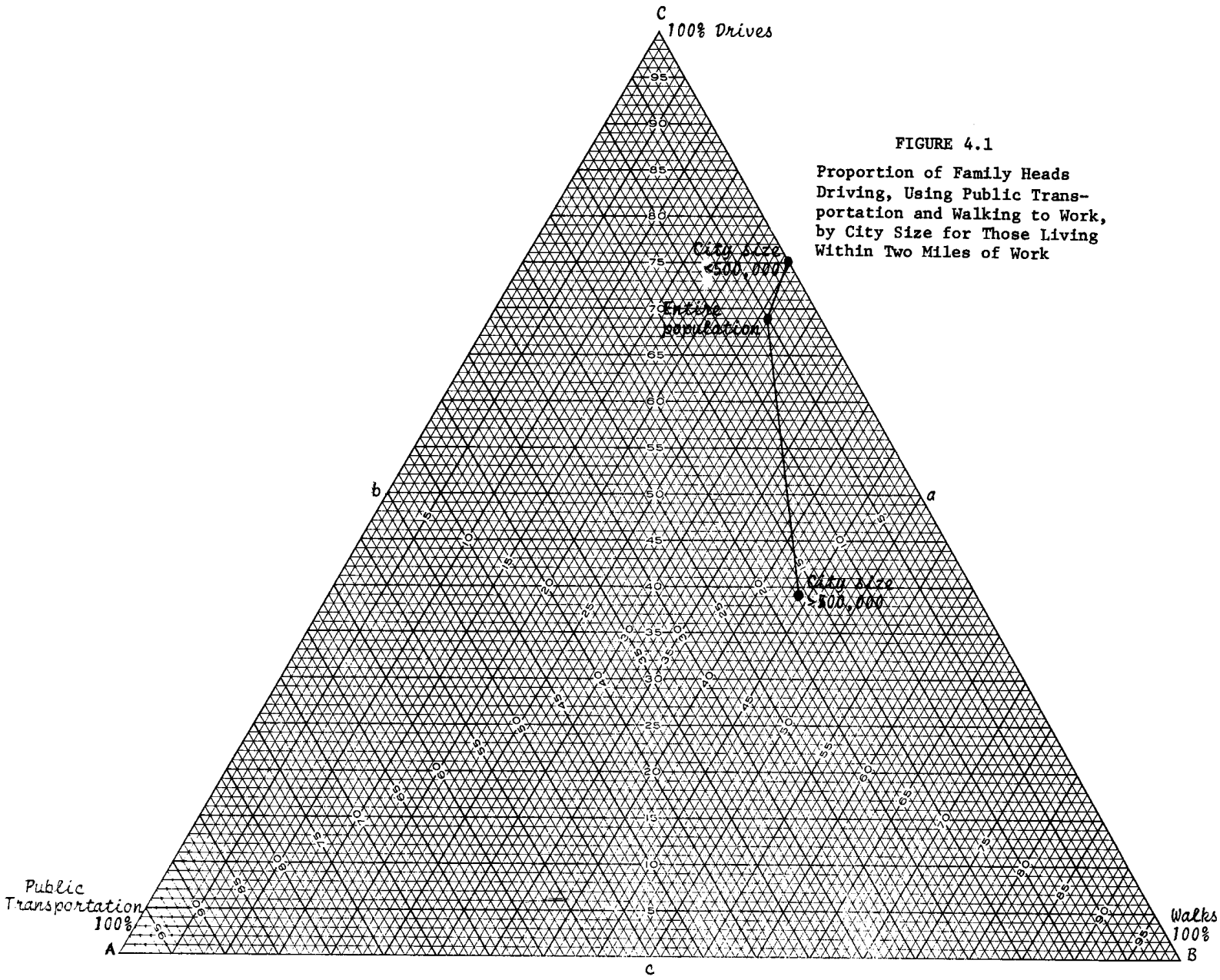


FIGURE 4.1

Proportion of Family Heads Driving, Using Public Transportation and Walking to Work, by City Size for Those Living Within Two Miles of Work

see that for this population city size had a substantial effect on mode of travel choice. Residing in a very large city had a strong positive effect on using public transportation and walking and a strong negative effect on driving; residing in a smaller city had just the opposite effect. Such results would tend to support one of two hypotheses -- that congestion along with parking costs and inconvenience are greater in large cities or that more alternatives to driving are available.

The full set of splits for those living within two miles of work is given in Figure 4.2. Note that the sequential split for large cities was on sex and that for smaller cities was on wage. In small cities higher wage earners were much more likely to drive and considerably less likely to walk; the likelihood of public transportation use was little affected by wage. Because congestion would generally be less in the smaller cities, the relative time advantage of driving may be greater than is the case for larger cities. Higher wage earners, with higher opportunity costs of time, would tend to take the fastest means of transportation. Family income/needs was a strong competitor for the wage split and demonstrated essentially the same results. The behavior of these two predictors suggests that in smaller cities, where alternatives to driving are likely to be less viable, the ability to purchase an automobile is important in mode of travel to work choice.

The sex split for large cities showed that female heads of households were much more likely than male heads to take public transportation, much less likely to walk, and slightly less likely to drive.[1] These findings suggest that females in large cities prefer to take public transportation rather than walk. This preference could be due to considerations of personal safety.

Race was a very strong competitor for this split on sex. Non-whites in large cities were much less likely to drive, much more likely to walk, and considerably more likely to take public transportation.

Figures 4.3, 4.4, and 4.5 concern heads who live at least two miles from work. As expected, availability of public transportation good enough for commuting use was important in the choice of mode of travel to work, use of the public transportation system being more frequent and driving less frequent. It also seems that the availability of a good public transportation system diverts commuters from car pooling. Car pooling and use of public transportation both involve waiting time and scheduling inconveniences. Public transportation, however, does not require the organization or the close relations necessary for the arrangement of a car pool.

Figure 4.3 shows that behavior differed between the sexes when public transportation was good enough to use to travel to work. Female heads were much more

[1]Only heads of households were used in this analysis. Thus throughout the paper "females" refers to female heads of households, who cannot be wives due to the definition of a household head.

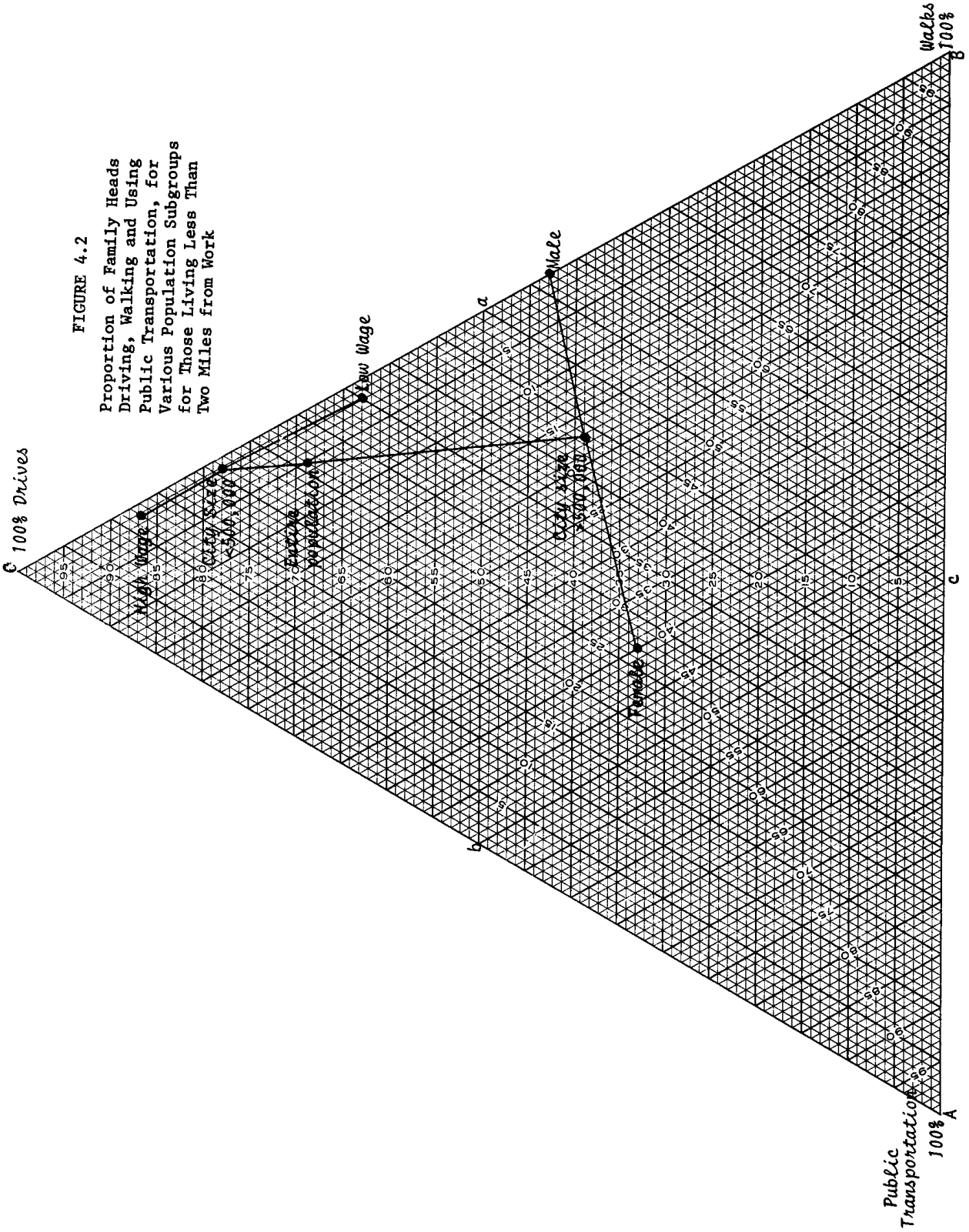


FIGURE 4.2
Proportion of Family Heads Driving, Walking and Using Public Transportation, for Various Population Subgroups for Those Living Less Than Two Miles from Work

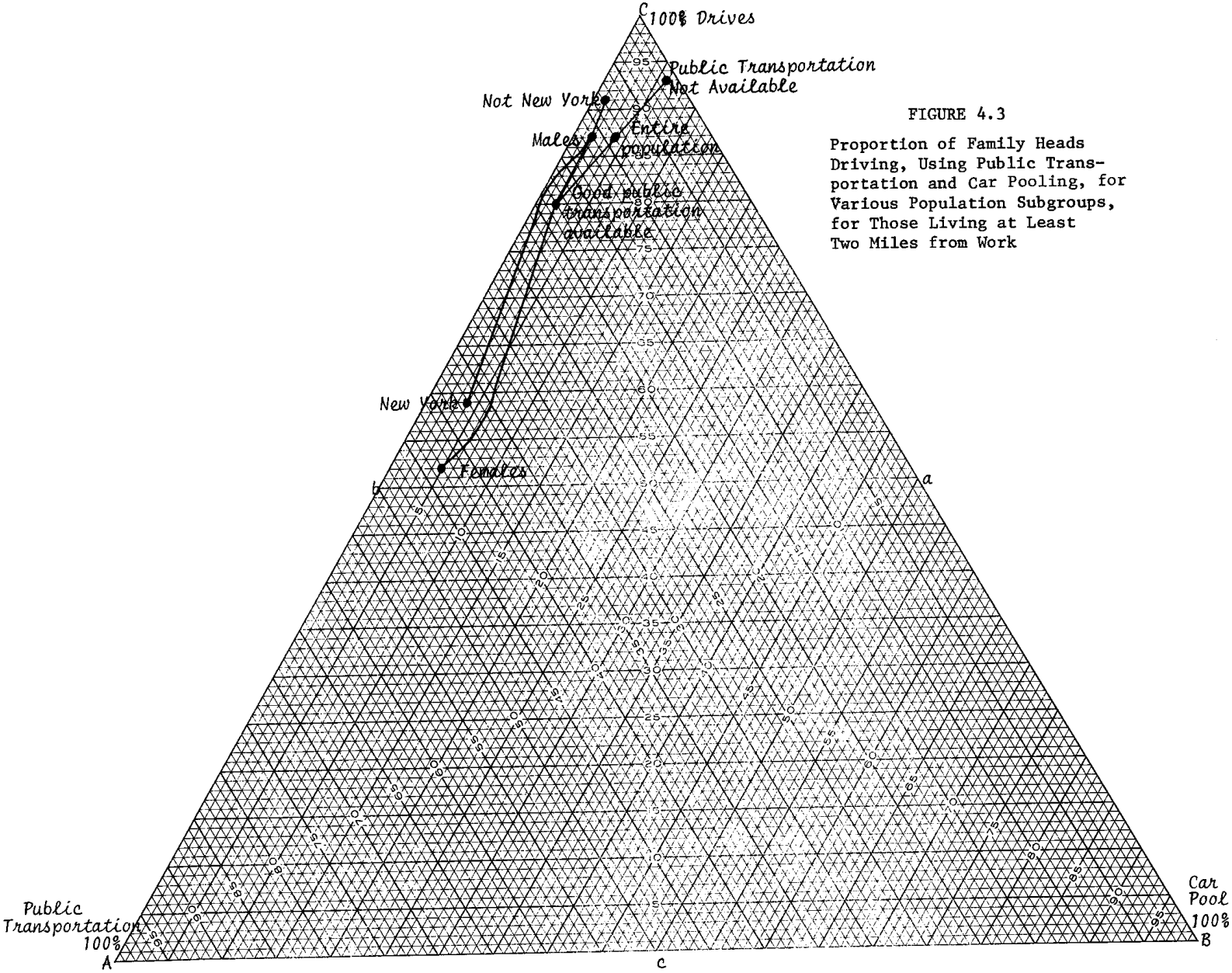


FIGURE 4.3

Proportion of Family Heads Driving, Using Public Transportation and Car Pooling, for Various Population Subgroups, for Those Living at Least Two Miles from Work

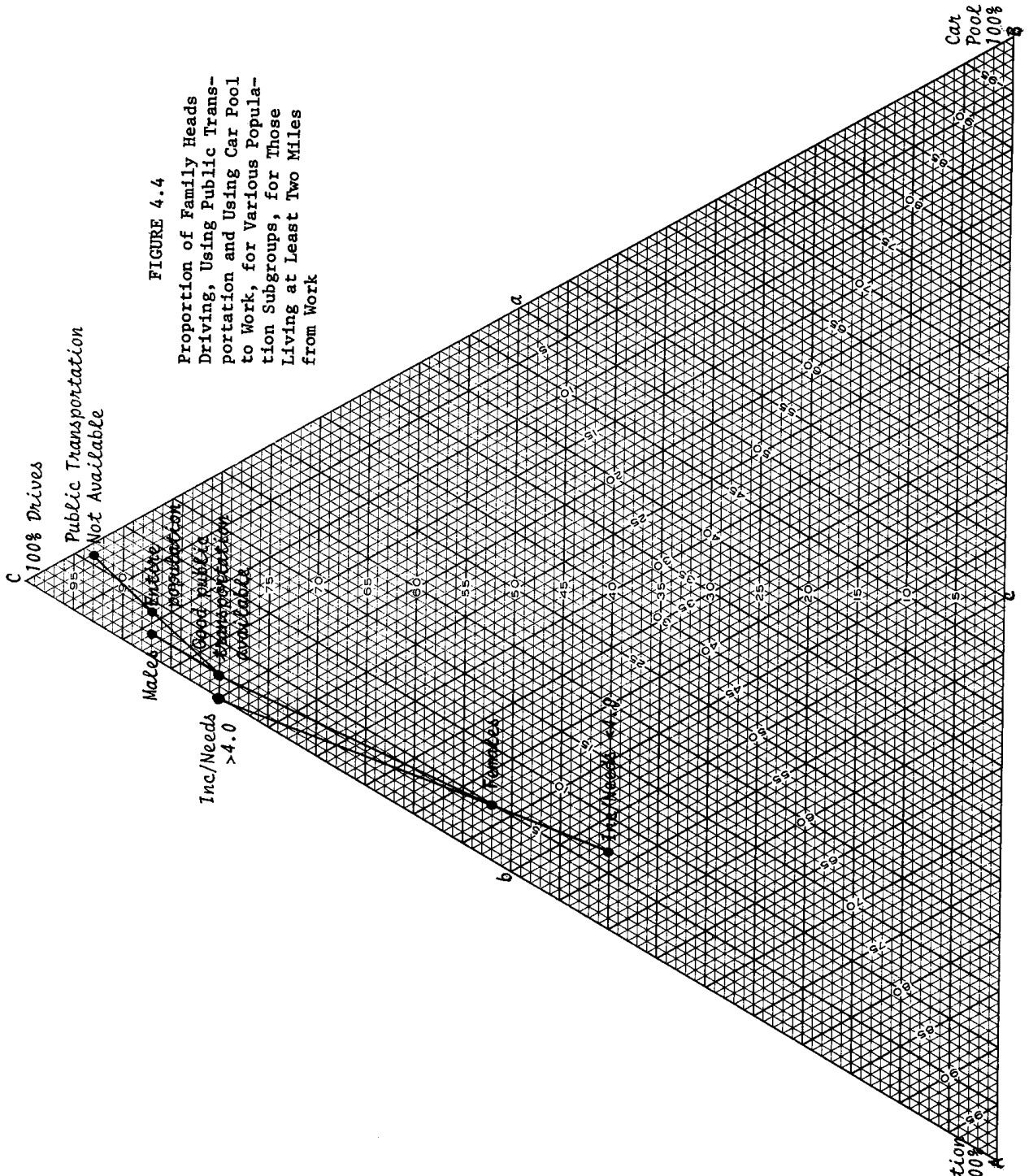


FIGURE 4.4

Proportion of Family Heads Driving, Using Public Transportation and Using Car Pool to Work, for Various Population Subgroups, for Those Living at Least Two Miles from Work

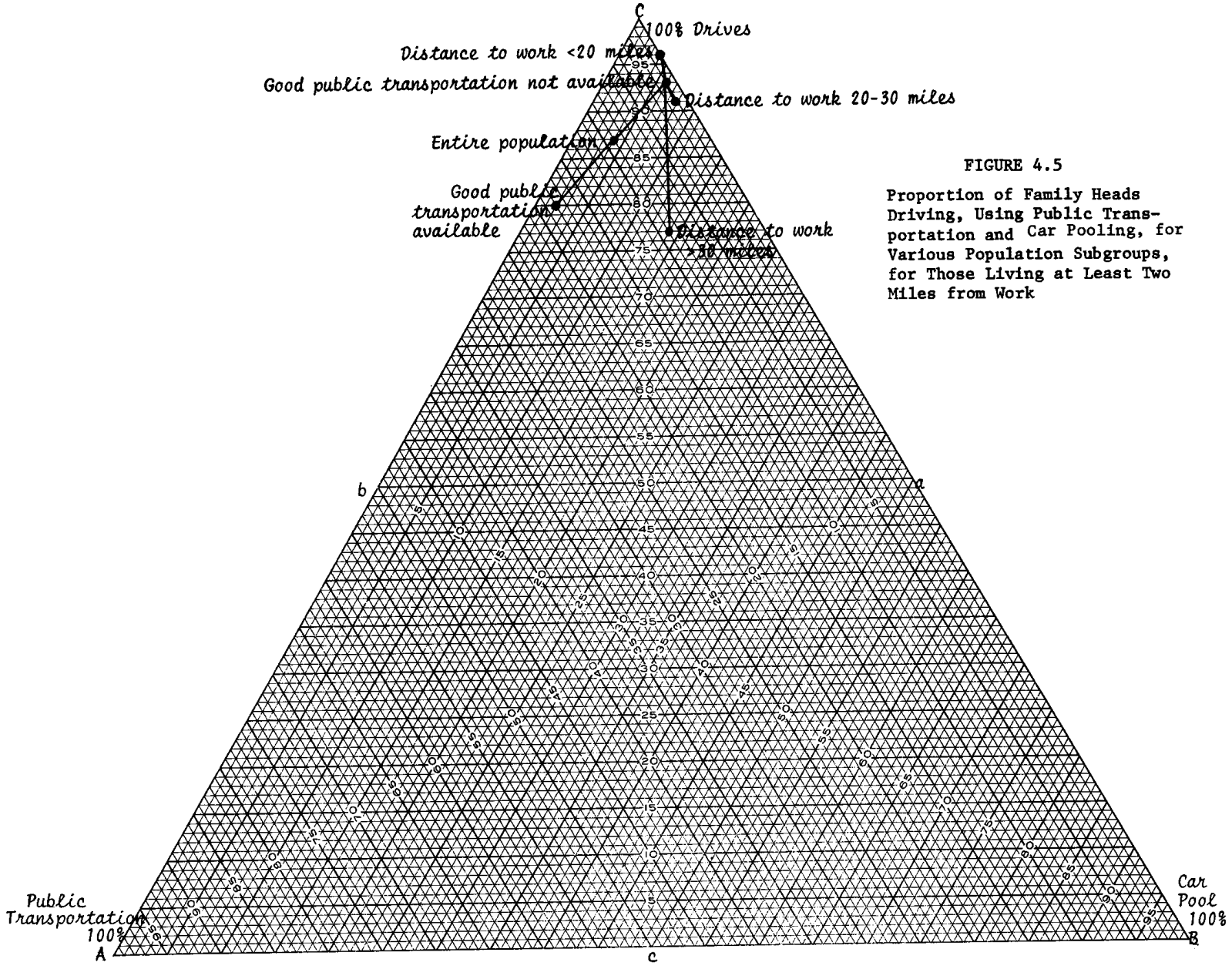


FIGURE 4.5

Proportion of Family Heads Driving, Using Public Transportation and Car Pooling, for Various Population Subgroups, for Those Living at Least Two Miles from Work

likely than male heads to take public transportation rather than drive to work. Figure 4.3 also shows the split for male heads with good public transportation available and Figure 4.4 shows the split for females. For males, residence in the New York City area greatly increased the use of public transportation. Congestion and parking scarcity in the New York City area make driving less convenient. For females, family income/needs was an important factor in the choice of mode of travel to work decision. Greater ability to purchase and maintain a car, as implied by a higher level of family income/needs, resulted in higher likelihood of driving. Higher income/needs female heads made car pooling arrangements less frequently than did lower income/needs females. Poorer heads of households would be expected to be more responsive to the economies of pooling driving costs.

Heads living further than two miles from work who reported lack of access to a good public transportation system are shown in Figure 4.5. For this group, length of distance traveled to work was important for the driving vs. car pooling decision. About 13% of heads living more than 30 miles from work used a car pool to travel to work, while only 4% of those within 20 miles of work car pooled. Physical stress and strain associated with the driving process increase with mileage traveled but so, too, do the economies of pooling automotive costs. A worker traveling a long distance to work may find car pools easier if other workers in his residential area also commute long distances to the same general work area. Suburban dwellers, in general, commute to work in the city. Suburban dwellers living far from the city may find making car pooling arrangements easier than do those living short distances from work.

In addition to pointing to important relationships, a general search process such as THAID also reveals which factors are unimportant. Of the hypothesized determinants of mode choice, only one type of factor appeared to lack substantial importance -- uses for the car which competed with travel to work. Neither the number of adults, the number of children, nor the labor force status of the wife made any appreciable difference in modal choice.

The results presented here were confirmed by a multiple regression type of analysis of mode of travel to work decisions.[1] Thus, the sequential (THAID) and the simultaneous (multiple regression) findings on mode of travel to work decisions were generally consistent, each lending support to the general findings

---

[1]Since the dependent variables, modes of travel to work, were categorical and not interval, the usual multiple regression analysis could not be used. Instead, a regression program for categorical dependent variables called MNA (see Andrews and Messenger, MNA) was used for the analysis. The predictors which did not appear completely unimportant in the THAID program and interactions of predictors suggested by THAID were used as determinants of mode of travel to work in the multiple regression analysis.

presented in this paper.

SUMMARY

1. The single most important factor affecting the choice of mode of travel to and from work was found to be distance from work to residence. Heads of households living more than two miles from work exhibited markedly different behavior with respect to mode choice from those living closer to the workplace.[1] In particular, the most frequently used modes of travel for heads of households living closer than two miles from work were driving, public transportation, and walking; the most frequently used modes for those living further from the workplace were driving, public transportation, and car pooling.

2. Congested streets and scarcity of parking facilities were important deterrents to driving, regardless of whether distance from residence to workplace is less than or greater than two miles.

3. Ability to purchase and maintain an automobile was a decisive factor in choice of mode of travel to work.

4. Personal safety seemed to be an important consideration in travel mode choice for female heads of households.

5. Time cost considerations were relevant to mode of travel to work decisions, greater opportunity cost of time corresponding to use of the fastest mode.

6. Availability of public transportation adequate for commuting use was of particular importance to heads of households living two or more miles from work. It was less important than congestion and parking costs for those within two miles of work.

7. Sex played a role in modal choice. When adequate public transportation was available, female heads of households were much more likely than male heads to make use of it rather than drive.

8. Distance to work was important with respect to the driving vs. car pooling decision. Greater commuting distances corresponded to greater likelihood of making car pool arrangements.

---

[1] This finding, in and of itself, has implications for the direction of future research. The important choice may not be the choice of mode but the choice of residence.

Chapter 5

THE DYNAMICS OF FAMILY LABOR SUPPLY DECISIONS: QUITTING AND RELOCATING AS FAMILY UNIT DECISIONS

INTRODUCTION

Changes in the earnings of family heads can be created by changes in hours or in wage rates, and these have already been studied. Much larger if less frequent changes can result from job changes. The analysis in this chapter focuses on the factors affecting changes in jobs, and related changes in residential location. The analysis model distinguishes those changes initiated by the worker from those initiated by the employer. The interaction between workers and employers in job transfer decisions is also considered.

ANALYSIS

I. The Conceptual Model

Holt and David (1966) have advanced the view that short-run labor supply must be conceptualized as a series of binary choices by the worker, not as a continuous response to remuneration offered by the market. In this framework a worker has the option of searching for employment or of quitting an existing employment. The employer has the choice of laying off workers, hiring new ones, or using overtime for the existing labor force.

Considerable credence has been given to this framework by the empirical work of Toikka (1971), Mattilla (1969), Schroeder (1971), Parsons (1973), and Holt, Macrae, and Smith (1971). Toikka (1971) investigated the relationship between aspiration wages and the process by which unemployed workers become hired; Mattilla (1969) investigated the cyclical variation in quit rates occasioned by workers' responses to high and low vacancy rates and the underlying business demand conditions. Schroeder (1971) expanded on these studies to deal with questions of change in occupation or location of employment as part of the search process. None of the foregoing studies had dealt specifically with the family characteristics of workers and how such characteristics influence choice.

None of these studies dealt in detail with the year-to-year dynamics of supply decisions and the corresponding dynamics of employment changes. The collection of data on a panel of families in the U.S. creates the possibility for investigating both the dependence of search and quit behavior on family characteristics and the structure of the relationship between past search, employer, and quit decisions and the decisions of the current year.

Figure 5.1 indicates the interrelationship of the decision variables that will be investigated. The right-hand side of the figure refers to choices made by the employer; the left-hand side to choices made by the worker. Solid arrows relate to affirmative choices, dashed arrows to negative choices. It is assumed that *quit* and *relocation* decisions are controlled by the worker. *Layoff* decisions are controlled by the employer. *Transfer* decisions require an agreement by the employer and the employee; otherwise the attempt to transfer by the employer may be frustrated by a refusal to move or a decision to quit on the part of the employee. The information reported by the head of the family unit is indicated by the categories labeled in capital letters. Each is referenced by a binary variable y_i, $i = 1 \ldots 9$.

The following identities relate the variables reported for an interval of time:

$$\begin{aligned} Y_1 + y_2 + y_3 &= 1 & y_8 + y_9 &= y_6 \\ y_4 + y_5 &= y_1 + y_2 & y_6 + y_7 &= y_3 \end{aligned} \qquad (1)$$

The identities imply that it is sufficient to study five decision variables in order to identify the behavior of the family unit and employers over a period of time. We will be able to study four decisions directly -- quits, layoffs, job-related moves, and transfer responses.[1] Information on choices in the dashed boxes in Figure 5.1, $y_6 - y_9$ must be inferred from a retrospective history of job choice.

Two observations should be made concerning the structure. First, only a part of the population is at risk with respect to the relocation decision, the transfer decision, and the transfer response. Estimates of behavioral equations must use only the relevant subgroup. Second, it is clear that relocation decisions are made by two disparate groups: the layoffs and the quits. The behavior of the two groups may differ and some adjustment in the behavioral relation should be made to take account of the fact that the family may be responding to

[1] In this analysis the unemployed are automatically classified as y_5. This defines the decision variable y_4 as relocations by those who have successfully become reemployed.

FIGURE 5.1

Structural Relationships Among Job-Related Decisions

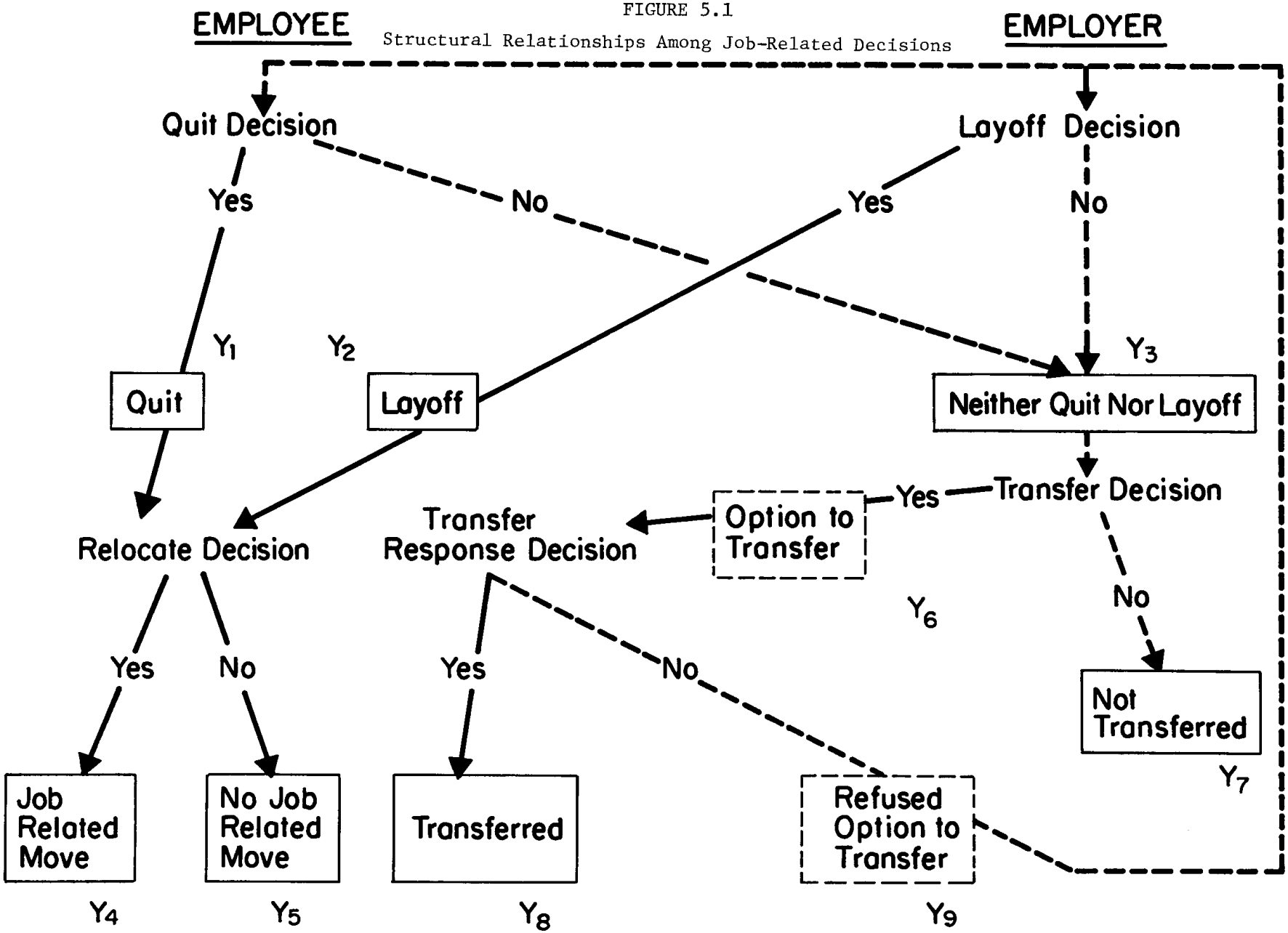


TABLE 5.1

Distribution of Quits and Layoffs in 1971

Percentage of All Family Units (FU) Currently (1971)		Percentage of FU's with same head 1970-71	
Employed	Unemployed		Reason
1.2	0.2		Company folded, changed hands, moved out of town; employer died, went out of business
0.1	0.0		Strike; lockout
2.5	1.1		Laid off; fired
0.5	0.2		Job completed; seasonal work
4.3	1.5	6.5	LAYOFF
6.5	0.6		Quit; resigned; retired; pregnant; needed more money; just wanted change in jobs; has taken second job
0.1	0.1		Was self-employed
6.6	0.7	7.3	QUIT
1.2	0.0		First full-time or permanent job; wasn't working before this
1.0	0.2		Other -- including drafted into service (or any mention of service)
0.6	0.0		Not ascertained, don't know
2.8	0.9	n.a.	OTHER

a situation forced by the employer or it may be taking the initiative in finding a new situation.

Several complications and qualifications must be made when we translate the decision structure into a set of observable variables. The diagram refers to decisions taken during a period of time. Ideally, this should not affect our estimates, but a moment's thought suggests that persons in the *process* of making a decision will be classified as not doing anything. The proportion of such people will decline as the period of observation is lengthened. At the same time, lengthening the period of observation increases the possibility that a family will cycle through the decision process more than once and experience both a quit and a layoff, two layoffs, or some other combination of job-related events.

The structure of the decision model indicates a feedback from transfer response decisions to quit and layoff decisions. If job search and related labor supply decisions are observed over a short period of time, the model may be regarded as sequential without feedback, and estimates of the structure obtained from ordinary least squares (OLS) regression on the decision variables $y_1 - y_9$ will be identical to the behavioral functions. Over a longer period the feedback becomes important. Then ordinary least squares estimates must be regarded as estimates of a mixture of underlying behavioral relationships. Since the feedback loops are closed, behavioral parameters can be obtained from simple assumptions about the nature of the feedback parameter. The lack of observations on y_6 and y_9 implies that we are unable to make any direct estimates of the structure from the reduced form estimates on the available four decision variables. However, some indirect evidence suggests orders of magnitude for the feedback, and we shall make some tentative estimates of the structure on that basis.

The data available give information on the reason for a job change for those persons who report they have held their current job for less than a year. The respondents' reasons were coded into the scale presented in Table 5.1.

The variables *quit* and *layoff* are defined by the categories shown in Table 5.1. The codes included in the layoff appear to be events that are largely outside the control of the family head. The codes corresponding to quits include voluntary changes in jobs initiated by the family head.

Five and one-half percent of the families reported that they had changed residence since the previous interview (a year earlier) for "purposive productive reasons: to take another job; to get nearer work." We refer to this as a relocation. *Transfers* are defined by the intersection of families who neither quit nor were laid off and families who relocated. *Job-related moves* are defined by the intersection of quits, layoffs, and relocations. Some relocations occur

within SMSA's and need not involve a change in geographic labor market. Nevertheless, the variable is useful as an indication of spatial difference in labor markets; the code implies that movement within the SMSA is motivated by the desire of the family head to move for work related reasons. The implication for local moves is that the subjective costs of commuting are greater than the substantial costs of moving a household.

To summarize, the four decision variables that we investigate -- *quits, layoffs, job-related moves, and transfers* -- are proxies for the categories labeled in Figure 5.1. Layoffs correspond most clearly to the concept of the diagram. It is possible that a bias in response motivates some persons to term an employer-initiated layoff a quit, but we are not able to ascertain the extent of such bias.

Finally, we note that quits and layoffs are mutually exclusive categories. No purpose is served, therefore, by including those who quit in a population used to estimate the layoff function. The decision involved in quits requires positive action by the family head and is deemed to be directly under his control; layoffs are determined by the employer. Hence we undertake analysis on the decision variables in the following order on the indicated populations:

I.	Quit	All family units with the same head in year t and t-1; head employed t-1, in the labor force in t.
II.	Layoffs	Population I, less quits during year t.
III.	Job-related moves	Families in population I whose heads changed jobs during year t.
IV.	Transfers	Population I, less family heads who did not change jobs.

II. Long-Term Dynamics of Job Change

The panel data and retrospective measures of job history allow one to reconstruct the cumulative impact of labor market behavior on the head of the family. One summary of that behavior is displayed in Table 5.2. One-third of those heads who were continuously in the labor force reported only one employer during the first four years of the panel and the ten prior years (A).

One-fifth of the current family heads experienced their last job change in the five years prior to the panel (1962-1967). This group is almost equally divided between quits (C) and the other reasons discussed above (D).

Just over one-third of the heads remaining in the panel experienced a job change during 1968-71, the period for which contemporaneous data on job changes are available. Out of that group more than one-third experienced more than one job change. To get some sense of the impact of all job changes on the family

TABLE 5.2

Some Dynamics of Job Changes*

Last Job Change	Nature of the Change		Percentage of Population with Same Head in Labor Force Four Years
Prior to Panel, more than 10 years ago	1 employer	A	34.8%
	2 or more employers in the 10-14 years prior to the panel	B	6.2
Prior to Panel, 4-9 years ago	Quit last job	C	11.8
	Other terminations	D	11.5
During Panel, 0-3 years ago	Job changes quit initiated	E	16.8
	Other terminations without adverse effects	F	17.5
	Other terminations with adverse effects	G	1.4
			100.0%
			N = 2353

*Measured cumulatively to the fourth panel interview in 1971.

during the period of the panel, heads reporting a change were subclassified according to categories E-G in Table 5.2. The job changers divide almost equally between those whose first reported change was a quit and those who gave other reasons (F-G). Very few experiencing involuntary changes reported that their situation was worse following the job change (G).[1]

Job changes often include simultaneous shifts in occupation or geographic labor markets. Tables 5.3 and 5.4 indicate how such changes relate to the cumulative history of job change displayed in Table 5.2. Table 5.3 reports the number of changes in occupation reported during the first four years of the panel. Some internal shifts in job responsibility result in occupation changes reported for those whose last reported change in jobs occurred prior to 1968, the first year of the panel.[2] The rate of occupational shifts was nearly twice as high for those who changed jobs during the panel.

Table 5.4 suggests moves between labor markets that may have occurred as a consequence of job changes. Of the individuals who changed jobs during 1968-1971 those who quit were significantly more likely to make interstate moves than those who left jobs involuntarily (E). Those workers who quit a job during 1964-1968 also reported more interstate mobility than others with equal job tenure. For those who did not quit jobs during this period, the move, if job related, can be interpreted as a transfer by a single employer.

III. One-Year Job Change and Work Experience During the Year

These global measures of cumulative job change history can be related to year-to-year changes in job, work experience, and location. Table 5.5 indicates an important difference between the principal variable of interest in this paper -- reported change in primary job -- and change in the supply of labor on all jobs.

Only three-fifths of those who had not changed their primary jobs since 1968 reported no change in second jobs or occupation. The remainder reported either a change in their second job or a change in the occupational category pertinent to the primary job. Second job changes include initiation and termination of such activity; change in primary occupation includes shifts from working for

---

[1] The question asked was: "On the whole would you say that your present job is better or worse than the one you had before?" Negative answers were included in G.

[2] To avoid apparent changes in occupation resulting from coding, a five-year check of occupation was undertaken. That check indicated that some of the changes reported here are indeed due to coder errors.

TABLE 5.3

Occupation Change within Last Job Change*

Last Job Change		Number of Year-to-Year Changes in 1-Digit Occupations, 1968-1971 None	1	2	3	Total	N
10+ years ago							
1 employer	A	72.2	13.7	11.0	3.1	100.0%	771
2 employers	B	73.9	14.1	10.3	1.7	100.0%	101
3+ employers	B	83.6	10.7	5.8	0.0	100.0%	49
4-9 years ago							
Quit	C	66.6	17.1	14.5	1.8	100.0%	305
Other	D	67.2	20.0	10.9	1.9	100.0%	285
During panel							
Quit initiated	E	37.5	28.1	4.5	4.7	100.0%	410
Other	F&G	41.6	32.7	18.6	7.1	100.0%	533
All Family Heads		60.0	20.6	15.6	3.8	100.0%	2581

*Same head continuously in the labor force 1968-1971.

TABLE 5.4

Change in Residence within Last Job Change*

Last Job Change		Geographical Mobility, 1968-1971				
			Moved During Four-Year Panel			
		No Change in Residence	Same County	Same State	Different State	Total (N)
10+ years ago						
1 employer	B	84.8	12.5	0.9	1.8	100.0%
2 employers	A	80.3	15.3	0.2	4.2	100.0%
3+ employers	A	62.3	35.3	0.0	2.4	100.0%
4-9 years ago						
Quit	C	64.8	26.9	6.0	4.8	100.0%
Other	D	64.2	32.5	1.8	1.5	100.0%
During panel						
Quit initiated	E	45.1	32.0	5.7	17.2	100.0%
Other	F&G	53.6	33.6	4.7	8.1	100.0%
All		67.0	24.6	3.0	5.4	100.0% (2581)

*Individuals continuously in the labor force 1968-71 and continuously family head from 1968-71.

TABLE 5.5

Year-to-Year Occupation and "Job" Changes within Last Job Change

Last Job Change		Change in Occupation and Second Job 1970-1971: No Change in Primary Occupation, Tenure > 1 Year, No Change in 2nd Occupation	Changed 2nd Occupation only	Tenure < 1 year; Changed "Job"*	Changed Primary Occupation: Tenure > 1 year; No Change in "Job"	Tenure < 1 year; Changed "Job"*	Total (N)
10+ years only							
1 employer	A	74.2	11.1	0.0	14.7	0.0	100.0%
2 employers	B	64.1	19.5	0.0	16.4	0.0	100.0%
3+ employers	B	78.1	21.0	0.0	0.9	0.0	100.0%
4-9 years ago							
Quit	C	64.4	19.2	0.0	16.4	0.0	100.0%
Other	D	69.1	16.9	0.0	13.9	0.0	100.0%
During panel, 1968-71							
Quit initiated	E	35.4	10.4	13.6	20.7	20.0	100.0%
Other	F&G	45.7	10.2	12.9	16.0	15.1	100.0%
All		60.7	13.1	5.4	15.0	5.9	100.0% (2581)

*When queried about job tenure, reported tenure was less than 12 months.

others to self-employment in a similar line of work. However we felt all of these changes in job structure are significant and deserve better understanding.

As a definitional matter, the proportion who report no change must be smaller for those who reported a job change during 1968-1971 (E-G) than for those who did not. If job changes are randomly distributed in time we would expect at least 25% of the group to have jobs of less than 12 months' tenure. The fact that 33.6% of the quit-initiated job changes (E) reported tenure of less than 12 months indicates multiple job changes during 1968-1971 for this group.

It is important to note that 15% of all workers report a change in occupational categorization without reporting that they had changed jobs in the last 12 months. (While a portion of that percentage may be measurement error, it is not totally spurious.) Such reports reflect reassignments of an employee by his employer. Most noteworthy in the table is the fact that the quit-initiated (E) differ from others (F-G) in their propensity to change primary occupational category.

It is natural to ask how job changes during the year relate to unemployment. Table 5.6 displays cumulative experience with unemployment during 1970 in relation to reasons given for job changes. Several aspects of job change are illustrated by the table:

1) The majority of quits experienced no unemployment. They are "conservative searchers" who secure new jobs prior to vacating old jobs.[1]

2) Only a small fraction of those who experienced involuntary unemployment changed jobs as a direct consequence. Three percent of the 15.6% who reported at least one week of unemployment during the year also reported a change in job due to a layoff.

IV. Plan of the Analysis

The analysis consists of linear regressions on the probability of labor market decisions reported in 1972 for the preceding 12 months. The population studied includes heads of families who were employed at the time of interview in 1971 and who were in the labor force in 1972.

A major interest in the analysis was to determine how attitudes and perceptions concerning the job held and search for better employment affect the four labor market decisions: *quits, layoffs, job-related moves, and transfers*. To understand the relationships of those variables to other explanatory variables we posit the general rubric shown in Figure 5.2. We comment briefly on the

---

[1]The term "conservative search" is Toikka's (1971).

TABLE 5.6

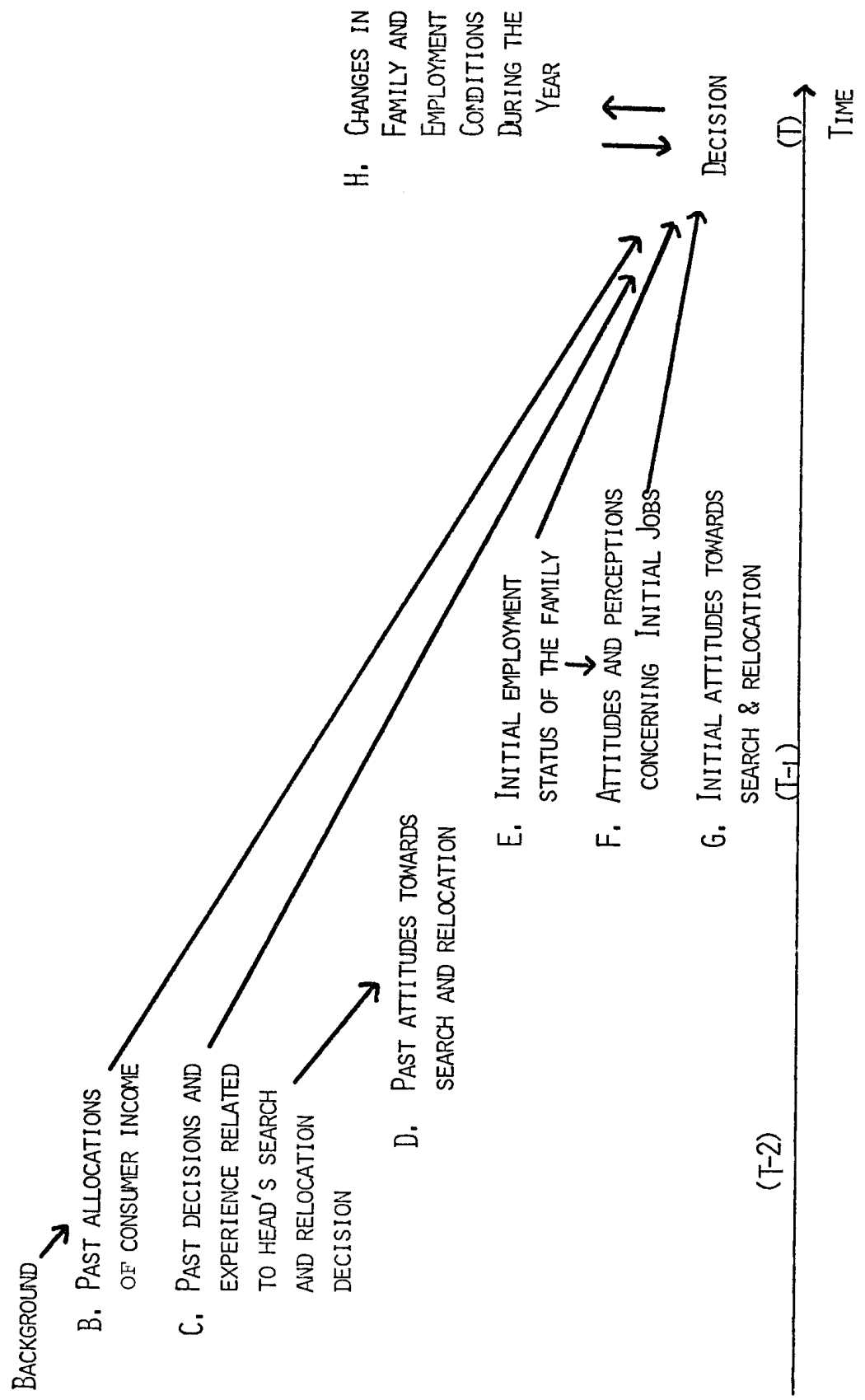
Distribution of Family Heads by Unemployment Experience and Job Change Reasons, 1970-1971*

Reason For Change In Job 1970-1971	Weeks Unemployed During 1970		
	None	Some	All
No change in job	76.7% (90.9)	9.6 (61.5)	86.3
Changed jobs due to:			
Quit	5.2 (6.2)	2.0 (12.8)	7.2
Layoff	1.9 (2.3)	3.0 (19.2)	4.9
Other	0.6 (0.7)	1.0 (6.4)	1.6
All	84.4 (100.0)	15.6 (100.0)	100.0
Number of cases			3138

*The population includes individuals who were the family head in 1970 and 1971, who were employed in early 1970, and who were in the labor force in 1971.

FIGURE 5.2

Causal Structure Assumed for Predetermined and Exogenous Variables



variables and the measures of those variables included in the 1971-72 analysis.

A. Background	Hypothesized Relationships[a] Quits	Layoffs	Job-Related Moves	Transfers
A1 Age (in years)	-	-	-	-
A2 $(\text{Age} - 42)^2$	+?	+?	0	0
A3 Education	-	-	+	+
A4 Sex (male = 1, female = 2)	-	-	*	*
A5 Race	*	+	+	-
A6 Test score	+	-	0	+
A7 Need achievement	+	-	+	+

[a] + = positive; - = negative; * = no hypothesis; 0 = null.

The group of background variables reflect early socialization of the family head and fixed demographic factors over which he or she has no control. Education is taken as a crude measure of initial investment in training. A principal motive for focusing on 1971-72 job changes is the fact that the test score and need achievement were not measured in earlier waves of the panel. Use of these measures in conjunction with job changes in other years is possible but requires continuity of the head from that time to 1972. The test score is the response to a simple word completion test (see Glossary). The need achievement score is based on responses to a verbal test designed by Veroff, et al.(1971) (see Appendix F).

B. Past Allocation of Consumer Income	Hypothesized Relationships Quits	Layoffs	Job-Related Moves	Transfers
B1 Amount of current income from rent, interest, and dividends (property income)	+	0	-	-
B2 Homeowner (yes = 1)	0	0	-	-
B3 Head formed new family unit, year t-1, t-2, (yes = 1)	+	+	*	*

This group of variables reflects the cumulative result of past decisions made with respect to allocation of full income. The amount of current income from property is the consequence of past savings choices. Shroeder (1971) discovered that rental property income is negatively correlated with geographic mobility in Wisconsin. To test that relationship on a national sample we included the property income variable; unfortunately, the variable includes non-rental income that does not bear on the hypothesis of interest. Measurement error is thus likely to obscure the relationship to be tested.

Homeownership reflects a minumum net worth associated with downpayments as well as a past portfolio decision. Formation of a family unit (B3) may produce a special set of consumption and allocation problems that affect search and relocation.

C. Past Decisions and Experience Related to Head's Search and Relocation Decisions	Hypothesized Relationships			
	Quits	Layoffs	Job-Related Moves	Transfers
C1 Ever took a job in another labor market	+	0	+	+
C2 Ever refused a job in another labor market	0	0	-	-
C3 Reciprocal of tenure on present job	+	+	+	*
C4 Number of employers, 1958-1971	+	+	*	*

The measures of past search and relocation decisions are more complex and interrelated. The reports of past responses to jobs outside the respondent's current community (C1, C2) relate to an indefinite past period.

Tenure in the present job is clearly the cumulative outcome of past quit and layoff decisions affecting the individual. Variable C3 may be regarded as a simple way of representing the cumulative job history of an individual (i.e., the lagged endogenous variables of the model we are investigating). The reciprocal of tenure is chosen as an explanatory variable on theoretical and pragmatic grounds. We hypothesize that matching workers to particular career lines in a specific employment involves "learning" and accomodation by the employee (and perhaps by the employer). Employees in poor situations will either accomodate or quit. In either case the probability of job change in a subsequent period is lower. However, this process of accomodation is rapid at first and slow in later years, so that increasing tenure is associated with smaller and smaller declines in the probability of changing jobs.

In exploratory work on quits and layoffs during 1969-70 and 1970-71 we observed the expected nonlinear attenuation of both probabilities with increasing tenure. Figures 5.3 and 5.4 illustrate the relationships observed for 1969-1970. The dashed lines are visual interpolations between the step function estimated from regression on job changes in 1969-1970. The figures suggest the possibility of an interaction between tenure and the reason for the previous job change in their effect on job change during the current period. In fact, such an interaction could not be detected when the reciprocal tenure was used as the regressor in place of the step functions displayed. Thus the reciprocal of tenure appears to be an economical proxy for the processes of accomodation that lead to reduced

FIGURE 5.3

The Probability of a Quit
1969-1970 Conditional On Job Tenure

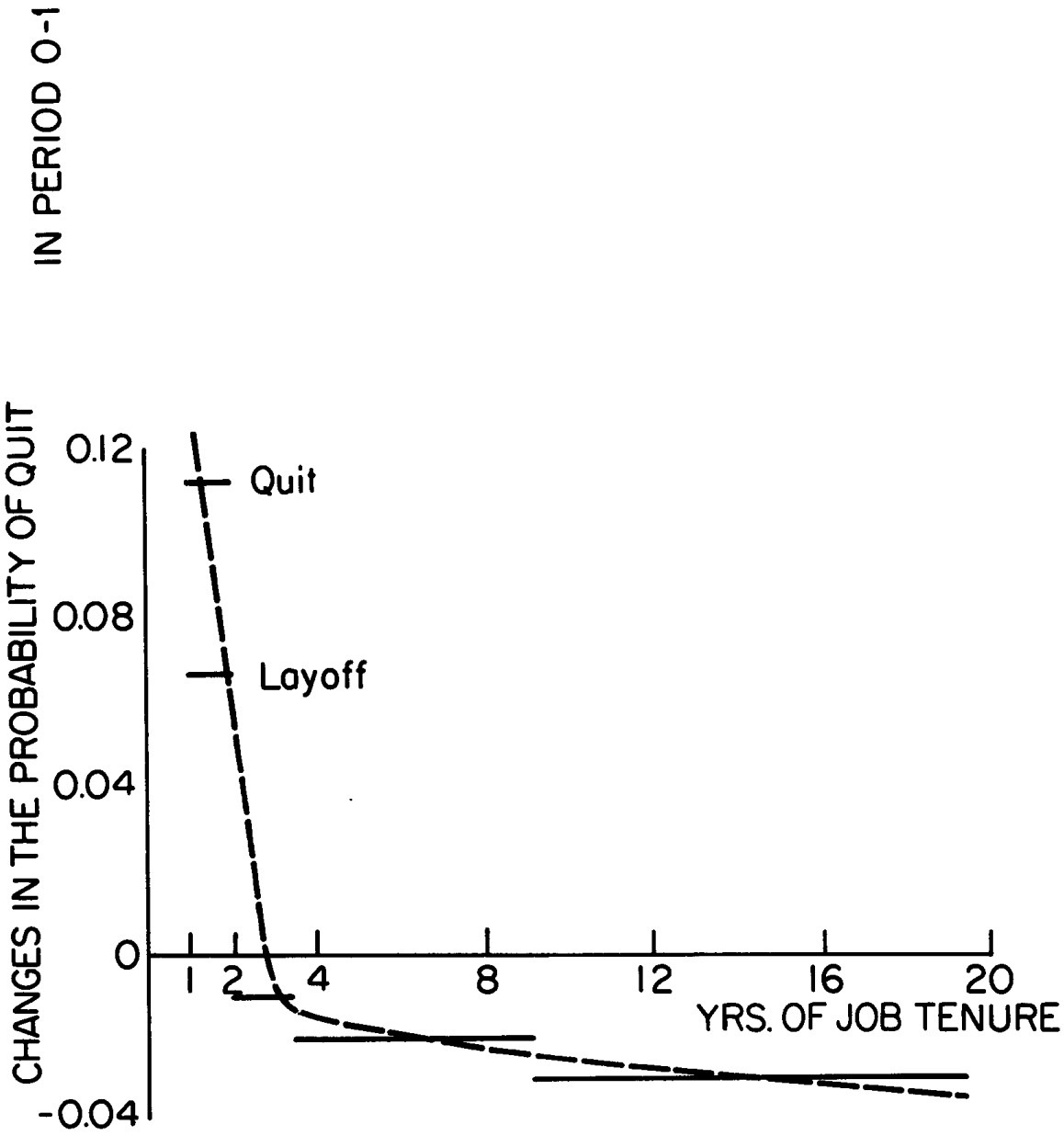
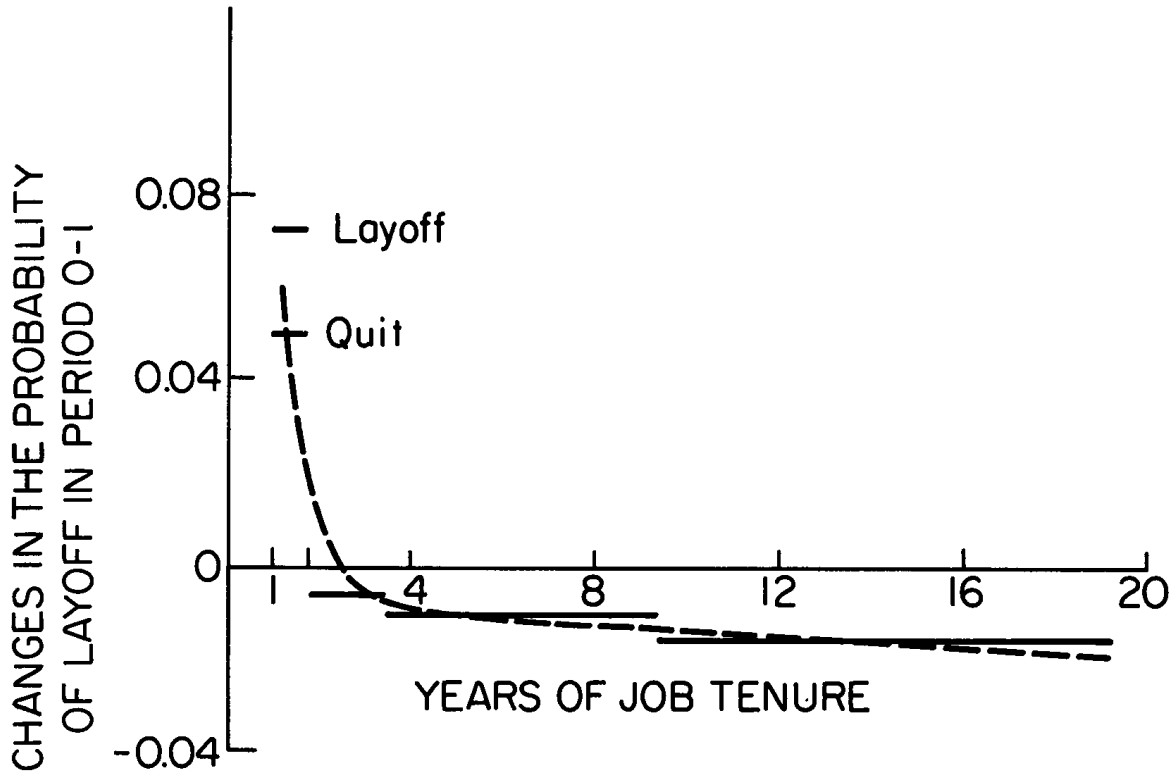


FIGURE 5.4

The Probability of a Layoff
1969-1970 Conditional On Job Tenure

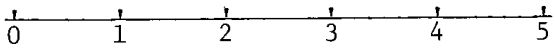


probabilities of job change.

If the tenure variable conveys information about accomodation on the present job, one may question what additional information is conveyed by the number of employers. As we have already seen in Table 5.2, for a third of the sample long tenure implies one employer. Conversely, individuals with short tenure may be prone to changing jobs or may work in industries or occupations with high turnover rates. Those individuals are differentiated from the remaining population by use of the employers (C4) variable.

The role of the number of employers variable as a proxy for forces leading persons to change jobs can be seen in the following simple example. The example is built on five assumptions:

1) There are five periods. Seen on a line, period 1 is from 0 to 1, period 2 from 1 to 2, etc.



2) Everyone has a job at 0 and holds it through the 1st period. At the end of the 1st period ("1" on the line graph above) workers decide to either terminate or remain. Similar decisions are made at "2," "3," or "4." "5" is not a decision point, therefore all people have at least one period of job tenure in their last job (as viewed from "5").

3) The probability of a termination = $\frac{c}{1+T}$ where T is the amount of time the job has been held, and c is some constant. At decision point "1," the probability of a quit = $\frac{c}{1+1} = \frac{c}{2}$.

4) The probability of staying = $1 - \frac{c}{1+T}$.

5) In the following table c = .5, as that value fits the observed distribution of job tenure. The entries indicate the joint distribution of job tenure and number of employers based on the simple model.

Tenure in Last Job	Number of Employers Over 10 Years							
	1	2	3	4	5	6	7	8
0-4 years	0	.131	.085	.046	.003	0	0	0
4-10 years	.492	.218	.026	0	0	0	0	0

The actual statistics (for the employed between ages 35 and 44, without a college diploma) were:

Tenure in Last Job	Number of Employers Over 10 Years							
	1	2	3	4	5	6	7	8
0-4 years	0*	.077	.054	.044	.036	.030	.031	.004
4-10 years	.47	.170	.035	.018	.005	.017	.010	.000

*The data actually had some cases in this cell. They were excluded on the grounds that only workers exposed to the market between 10 and 20 years were desired. Similarly, employees with the same job 20+ years were excluded.

The real world data indicate fewer people with short tenure and 2 or 3 employers and more people with 5 or more employers than can be explained by the simple model. This justifies simultaneous inclusion of C3 and C4 in our analysis.

D. Past Attitudes Toward Search and Relocation	Hypothesized Relationships			
	Quits	Layoffs	Job-Related Moves	Transfers
D1 Head thinking about new job, year t-2 (yes = 1)	+?	0	0	0

This variable is included primarily to measure the persistence of attitudes in affecting job change behavior. The attitude is measured at least 12 months prior to the period in which job change is studied. (Data are not available for those who are new heads, and the variable is identically zero for that group.)

E. Initial Employment Status	Hypothesized Relationships			
	Quits	Layoffs	Job-Related Moves	Transfers
E1 Head holds a second job (yes = 1)	+	0	-	-
E2 Wage rate	-	-	+?	+
E3 Union member (yes = 1)	0	-	0	0

These 3 variables describe employment conditions just prior to the year during which job changes are observed. Availability of a second job is hypothesized to reduce the economic cost of leaving a job before searching the market, thereby increasing the probability of quits. At the same time multiple connections to employment may make relocation more difficult.

The role of the wage rate in explaining job change variables is complex. We hypothesize that a worker whose wage is high relative to wages paid to others with his skills is less likely to change jobs. Since the employer values his skills he is more likely to be transferred. To the extent that expected wages are linear functions of background (A) and past job search (C) their effects are incorporated in coefficients estimated for these variables. We attempted to sort out wage related from non-wage related effects by computing an estimate of actual less expected wages, but that formulation did not provide insights or explanatory power beyond the results presented below.

Attitudes and perceptions concerning the job held at the beginning of the period studied were included to test whether the reactions of the worker to his work environment have an important bearing on the search and relocation.

The next set of variables (G1-G3) are included to measure the head's specific inclinations to relocate and search for new employment during the period in which quit and relocation behavior were observed. Willingness to move in response to an increase in earning rates is a crude proxy for the reservation price

of the worker.

		Hypothesized Relationships			
				Job-Related	
F.	Attitudes Toward Job	Quits	Layoffs	Moves	Transfers
F1	Head is frequently late (yes=1)	+	+	*	*
G.	Initial Attitudes toward Search and Relocation				
G1	Head plans to move for job-related reasons (yes=1)	+	0	+	*
G2	Head is thinking about finding another job (yes=1)	+	*	0	0
G3	Head's estimate of the wage that would be sufficient to induce relocation (see text)	+	0	0	0
H.	Changes in Family Status and Employment Conditions during the year (year t-1 to year t)				
H1	Wife died (yes=1)	*	*	+	*
H2	Got married (yes=1)	+	0	+	0
H3	Quit, year t (yes=1)	n	n[a]	+	n
H4	Wage for unskilled male workers in the area		*	+	0
H5	Shortage of unskilled male labor in the county	+	*	+	0
H6	Local area unemployment rate	-	+	+	0

[a] n=not relevant.

The last group of variables (H) includes those that are simultaneous with observed job changes. Current demographic changes (H1 and H2) were observed to affect mobility of workers in Wisconsin (Schroeder, 1971) and were included in the model for that reason. The inclusion of quit as an explanatory variable in explaining job related moves allows a different intercept for voluntary and involuntary moves.

Variables H4-H6 are measures of local labor markets. Each is coded on a 5-point scale for the primary sampling units of the sample (see Appendix 5.1) It was not always possible to obtain data on these measures, and about 15% of families live in areas for which the labor market data are not available. Although an effort was made to obtain data from counties wherever families moved in the U.S., there may be some bias against locational mobility in samples using the local labor market data.

In addition, a problem of simultaneity arises, as one-fifth of the unem-

ployed changed jobs during the year giving layoff as the reason for change (see Table 5.2). This implies a downward bias to ordinary least squares estimates of coefficients. The bias is less important for the measures of unskilled labor shortage and unskilled wage rates that do not affect most workers directly, but it remains an estimation problem for the local unemployment rate.

The explanatory variables used must be more carefully described and justified. Some pertain to constraints and limits, either on the efficacy of job search or on the ability to relocate the family. Others describe a disposition to move. A third group describes behavior that is likely to indicate dissatisfaction with the present performance of the worker on the job by his employer; the last group indicates dissatisfaction with the job by the employee.

The constraints include homeownership (B2), second job (E1), and rental income (B1), which are all viewed as limits on the ability to relocate. Schroeder (1971) found a strong inhibition of mobility with the level of rental income. From the employers' point of view we hypothesize that workers who are frequently late or absent will be more likely to be laid off than those who are not (F1).

The second group of variables pertain to disposition to search and relocate. Several direct questions were asked in this area. The head of the family was asked if he thought he might find another job (D1, G2). Affirmative answers to these questions should be positively related to quits. The head was also asked if he might move and if so for what reasons. Job-related plans to move (G1) include anticipating transfers by employers and voluntarily relocating to other labor markets. Hence both types of relocation should be positively related to the anticipation of a move. Finally, each family head was asked whether he would move in response to a higher wage. Positive answers to that question are hypothesized to be positvely related to both quit and relocation. Persons who responded positively were also asked "How much would a job have to pay for you to be willing to move?" In order to scale the responses in a manner consistent with those who categorically refused to consider a move and allow for differences in current wage levels, we constructed the following wage-aspiration variable:

$$G3 = 0 \quad \text{(if head would not move for more pay)}$$

$$G3 = \frac{\text{wage rate}}{\text{desired wage in new location}} \quad \text{(if head is willing to move)}$$

The ratio approaches unity as aspiration wages approach current wage levels. Hence the variable is viewed as positively related to actual job changes.

V. Linear Regression Results, 1971-1972

Because of bias introduced by restricting the sample to observations where labor market variables are available, the model was calculated without H4-H6 on a larger population. As the results are almost identical we present full sample results, except where labor market data proved significant in explaining the decision variable (see Table 5.7).

QUITS

Quit decisions were related significantly to 9 of the 25 variables included in the model.[1] The results are summarized below:

Negative Effect	Positive Effect
A1 Age (E)	C3 (Job tenure)$^{-1}$ (E)
A5 Race	C4 Number of employers (E)
B2 Homeowners (N)	G2 Think new job (E)
E2 Wage rate (E)	
E3 Union member (N)	
F1 Late (E)	

Six of the observed effects were as expected (E), and those account for most of the explained variance; two effects were contrary to the earlier stated hypotheses (N). The principal factors that affected quits appear to be a mechanical decline in quit propensity associated with aging and the process of adjustment associated with increasing tenure that was discussed earlier (if we are to judge by partial correlation coefficients). Interestingly, the attitude to seek a new job had a substantial partial correlation with the quit decision. It is not clear whether this was because the attitude is a proxy for quit-minded individuals or whether it reflects the first step in beginning a rational search of the opportunities available. High wages inhibited quits to a significant extent, perhaps for the reasons suggested earlier.

LAYOFFS

Layoffs were significantly related to 8 of the 27 variables tested. Results are summarized below:

Negative Effect	Positive Effect
	A5 Race (E)
	C1 Took new job (N)
	C2 Refused job (N)
	C3 (Job tenure)$^{-1}$ (E)
	C4 Number of employers (E)
	G2 Think new job
	G3 Wage/Wage aspiration (N)
	H6 Area unemployment rate (E)

[1] Since the estimation procedure is not efficient, standard errors of the variables are larger than would be the case with an efficient procedure.

TABLE 5.7

Linear Probability of the Decisions Related to Job Change, 1971-72

Variable	QUITS		LAYOFFS		JOB RELATED MOVES		TRANSFERS	
	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)
Background								
A1 Age of head	-.0015 (3.6598)	40	.00037 (.8984)	3	-.0012 (.6156)	12	.0001 (.320)	0
A2 Age squared	.0000 (1.0648)	3	.0000017 (.0696)	0	-.0001 (.5097)	8	.0000 (.267)	0
A3 Education	.0016 (.5547)	1	-.0032 (1.1025)	5	.0283 (2.3573)	173	.0037 (1.785)	11
A4 Sex	-.0237 (1.8753)	11	-.0181 (1.4258)	8	-.1344 (2.6438)	216	-.0110 (1.209)	5
A5 Race	-.0318 (2.3412)	17	.0304 (2.2889)	21	.1864 (3.4893)	371	-.0073 (.748)	2
A6 I.Q. Score	-.0007 (.3013)	0	-.00052 (.2200)	0	.0091 (1.0471)	35	-.0018 (1.051)	4
A7 Need Achievement	.0021 (1.2054)	4	.00089 (.5260)	1	.0070 (1.0045)	32	.0003 (.227)	0
Past Income Allocation								
B1 Property income	.0019 (.4890)	1	-.0044 (1.1211)	5	.0330 (1.5210)	73	-.0032 (1.173)	5
B2 Homeowner	-.0310 (3.0221)	28	.0053 (.5199)	1	-.0769 (1.8939)	112	-.0302 (4.082)	59
B3 New family	-.0099 (.5007)	1	.0230 (1.1407)	5	.0479 (.8619)	23	.0462 (3.00)	32
Past Search and Relocation								
C1 Ever took new job	.0020 (.2094)	0	.0198 (2.0333)	16	.0639 (1.7586)	97	-.0011 (.156)	0
C2 Ever refused job	.0138 (1.6131)	8	.0205 (2.4139)	23	-.0179 (.5127)	8	-.0018 (.293)	0
C3 (Job tenure)$^{-1}$	.0403 (5.7038)	98	.0702 (9.9034)	376	.0147 (.6067)	12	.0179 (3.376)	41
C4 Number of employers	.0033 (2.0895)	13	.0041 (2.4475)	24	.0047 (.8053)	20	.0016 (1.319)	6
Past Attitudes to Job Search								
D1 Lagged new job plan	.0053 (.3109)	0	-.0053 (.3088)	0	-.1110 (1.5171)	72	.0075 (.600)	1

TABLE 5.7
(continued)

Variable	QUITS		LAYOFFS		JOB RELATED MOVES		TRANSFERS	
	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)	Regression Coefficient (t-ratio)	Partial Correlation ($\times 10^{-4}$)
Initial Employment Status								
E1 Second job	-.0090 (.8572)	2	-.0087 (.8225)	3	-.0531 (1.3253)	5	.0092 (1.215)	5
E2 Wage rate	-.0048 (2.7768)	23	-.0016 (.9323)	3	-.0080 (.6887)	15	-.0018 (1.840)	12
E3 Union membership	-.0264 (2.6519)	21	-.00034 (.0327)	0	-.0579 (1.2499)	49	-.0143 (2.023)	15
Attitude Toward Job								
F1 Late	-.0092 (2.5473)	20	.0058 (1.5962)	10	.0073 (.5646)	10	.0064 (2.432)	21
Initial Attitudes to Job Search								
G1 Plans to move	.0009 (.0502)	0	-.0036 (.2801)	0	.1367 (2.5557)	203	.1525 (11.84)	479
G2 Think new job	.0686 (5.1327)	79	.0404 (2.9163)	34	-.0484 (1.2398)	48	.0190 (1.820)	12
G2 Wage/aspiration wage	-.0180 (.0591)	0	.5392 (2.0660)	17	.5605 (1.5042)	71	-.2346 (.284)	0
Current Changes in Status and Employment Conditions								
H1 Wife died, year t	-.0168 (.4730)	1	-.0244 (.6391)	2	-.1963 (1.2249)	47	-.0272 (1.017)	4
H2 Got married, year t	-.0143 (.3098)	0	.0564 (1.2493)	6	.1454 (1.1409)	41	.0682 (2.003)	14
H3 Quit, year					.1085 (3.137)	302		
H4 Male wage			-.0047 (1.087)	5	-.0023 (.1214)	0		
H5 Shortage male labor			.0022 (.4601)	1	-.0148 (.7441)	17		
H6 Unemployment rate			.0147 (2.7845)	31	.0121 (.5214)	9		
Constant	.18592		.061047		-.014842		.0678	
Standard Error of Estimate	.2434		.2085		.3039		.1597	
$\bar{R}^2$	.064		.0726		.150		.0964	
F	10.6		8.396		3.245		12.4	
Mean of Dependent Variable	.068		.049		.124		.029	
N	3224		2539		345		2810	

Four of the effects were anticipated: race, the inverse of job tenure, number of employers, and local labor market conditions are all indicators of employment instability that we would expect to produce layoffs. The tenure variable had a partial correlation that was much larger than any of the others. The race variable may capture a propensity of blacks to work in the layoff-prone industries. Alternatively, race may reflect discrimination in employment.

The effect of attitude toward getting a new job can be rationalized. The attitude variable may reflect anticipation of a need to find a new job based on known risks of being laid off.

The relationship between layoffs and past job seeking and acceptance was unanticipated and cannot be explained easily.

JOB-RELATED MOVES

The propensity to move for job reasons and change jobs was significantly related to 5 of the 29 variables studied.[1]

Negative Effect	Positive Effect
A4 Sex	A3 Education (E)
	A5 Race (E)
	G1 Plans to move (E)
	H3 Quit, year t (E)

Four effects observed were expected and demonstrate the mobility of more educated persons, blacks, those with positive plans to move, and those who change jobs for voluntary reasons.

TRANSFERS

The fourth relationship in our model explains job-related residential relocation without job change, 1971-1972. Of those who made such a move, just over half moved between counties, suggesting that it is reasonable to interpret the variable as a proxy for a move to a different labor market, rather than relocation within an SMSA. Seven of the twenty-five variables were significant:

Negative Effect	Positive Effect
B2 Homeowner (E)	B3 New head
E3 Union member (N)	C3 $(\text{Job tenure})^{-1}$
F1 Late	G1 Plans job-related move
	H2 Got married

Only one of the relationships was expected: homeowners showed less propensity to relocate, presumably because costs of relocation were more expensive.

The inverse of job tenure had the largest partial correlation with the dependent variable, suggesting that more offers of work at workplaces removed

[1] We present results for the full regression on the biased sample rather than for the full sample as H3 was omitted in those calculations.

from the original residence are extended to those who are recently employed, perhaps as part of an on-the-job training program.

Plans to move appear to reflect an attitude developed in anticipation of some real cues as to the realities of the job situation, just as "thinking of getting a new job" appeared to reflect the realities of layoffs for other workers.

The negative relationship of union membership to transfers probably reflects particular occupational skills that are widely available and do not provide employers with an addquate return on the costs of transfer.

The remaining variables were less clearly tied to transfers and we invite the reader to speculate on their role in the process.

DISCUSSION

The estimates fail to confirm many of the hypotheses developed earlier. Most disappointing in relation to the earlier literature by Holt and others is the failure of quits to respond to the measure of wage aspirations tested and to the measures of local area unemployment rates. The crudeness of the proxy variables and the use of an annual period over which attitudes and search behavior can change markedly both undoubtedly contributed to this negative finding.

Two other negative findings deserve some comment. There is no evidence of a nonlinear effect of age on any of these decisions. Furthermore the measures of cognitive ability and achievement motivation fail to make a marginal contribution to either quit or transfer behavior. Again, measurement error may obscure a chain of causation that exists, but one suspects that these effects cannot be captured by so simple a linear model as that used here.

Earlier work using a similar model was carried out on 1970-1971 data. The models used had different specifications from the model applied here to 1971-1972. The critical difference is that job tenure rather than its inverse was used as a regressor. In addition, number of employers was treated as a set of classes. Finally, the set of regressors differed over the two years:

Included in 1970-1971 Excluded in 1971-1972*		Included in 1971-1972 Excluded in 1970-1971	
B4	Residence tenure	A5	Race
B5	Family size	A6	Test score
E4	Employed wife (yes=1)	A7	Need achievement proxy
E5	Self-employed (yes=1)	D1	Lagged new job plans
F2	Control of effort on job (yes=1)	E2	Wage rate

*The questions and codes used for these variables are indicated below. Question numbers refer to the 1972 questionnaire.

F2 - Answers of yes to questiond D30 and D32; F4-D55 used as scaled.

F3 More discretion desired (yes=1, D56)
F4 Choice of method
F5 Absent from work frequently (yes=1, D44)
G4 Would move for more money (yes=1)
H7 Head was unemployed during year t
E3 Union membership
H3 Male wage
H5 Shortage of male labor
H6 Unemployment rate

The variables are numbered according to their place in the general rubric described in Figure 5.2. We comment on results from the earlier year for three reasons. First, many of the significant findings in 1971-1972 are sufficiently robust to be significant under the less well specified model used for 1970-1971. The results of that comparison are shown in Table 5.8. Of the 23 significant 1971-1972 effects that can be compared to the 1970-1971 effects, 14 were significant and of the same sign. One effect, that of being a new head, was significant in its effect on transfers in both years but the effects were in opposite directions.

The second reason for introducing the 1970-1971 findings is that they provide some insight into the causal structure suggested in Figure 5.2. Table 5.9 presents the analysis of variance in which each set of variables from A to H is sequentially added to the regression model for each decision. Conclusions must be qualified because the dichotomous dependent variable does not have a normal error distribution. Nonetheless, the F-statistic is reasonably robust under non-normality. In each group of variables there appears to be some marginal explanation, with exceptions. For quits nothing pertaining to the initial employment situation (E) or attitudes toward the job (F) appears important. As might be anticipated, allocations of income (B) did not affect layoffs, nor did the structure of family labor supply (E). Job related moves appear unaffected by any changes during the year (E), including the amount of unemployment. This negative finding suggests that relocation is neither more nor less likely for the worker who experiences unemployment during the year. (We cannot distinguish the effects of unemployment following a layoff from other unemployment.)

The third reason for mentioning the 1970-1971 results lies in the negative conclusions that we drew from that analysis. None of the variables included in the 1970-1971 and excluded in the 1971-1972 model were significantly different from zero in the earlier year. Thus whatever impact a worker's attitudes and perceptions of a job may have on quit behavior, they were not captured by variables F2-F5.

TABLE 5.8

Comparison of Significant Findings in 1970-71, 1971-72

Variable		Quit	Layoff	Job-Related Move	Transfer
A1	Age	⊖			
A3	Education			⊕	
A4	Sex			-	
A5	Race	-	+	+	
B2	Homeowner				⊖
B3	New family				⊞
C1	Ever took new job		+		
C2	Ever refused job		+		
C3	(Job tenure)$^{-1}$	⊕	⊕		+
C4	Number of employers	+	⊕		
E2	Wage rate	-			
E3	Union membership	-			-
F1	Late	-			-
G1	Plans to move			⊕	⊕
G2	Think new job	⊕	⊕		
G3	Wage/aspiration wage		+		
H2	Got married				⊕
H3	Quit			⊕	
H6	Unemployment rate		+		

⊖ significant effects in 1970-71 regressions, same sign as 1972.

___ variables not included in 1970-71 regressions.

⊞ significant effects in 1970-71 of opposite sign to 1971-72.

TABLE 5.9

Analysis of Variance on the Contribution of Variables to Explaining the Four Search and Relocation Decisions

Marginal Variables	QUITS ΔR^2	QUITS F ($F_{.01}$)	QUITS $\bar{R}^2$	LAYOFFS ΔR^2	LAYOFFS F ($F_{.01}$)	LAYOFFS $\bar{R}^2$	JOB RELATED MOVES ΔR^2	JOB RELATED MOVES F ($F_{.01}$)	JOB RELATED MOVES $\bar{R}^2$	TRANSFERS ΔR^2	TRANSFERS F ($F_{.01}$)	TRANSFERS $\bar{R}^2$
A1-4, B3	.0420	25.1 (2.8)	.0407	.0349	18.8 (2.8)	.0328	.0902	13.8* (2.8)	.0812	.013	6.2 (2.8)	.0114
B1-B5	.0051	3.866 (2.3)	.0444	.0031	2.104 (2.3)	.0351	.0179	2.493 (2.3)	.0920	.0140	8.494 (2.3)	.0234
C1-C4	.0186	19.26 (2.0)	.0621	.0294	27.19 (2.0)	.0635	.0517	10.15 (2.0)	.1395	.0054	4.283 (2.0)	.0278
E1, E4, E5	.0004	.3923 (2.0)	.0615	.0006	.4638 (2.0)	.0630	.0110	2.167 (2.0)	.1456	.0028	2.258 (2.0)	.0294
F1-F5	.0013	.8115 (1.9)	.0612	.0057	3.163 (1.9)	.0669	.0243	2.93 (1.9)	.1620	.0046	2.233 (1.9)	.0319
G1-G4	.0240	19.06 (1.8)	.0841	.0086	4.729 (1.8)	.0742	.1125	19.62 (1.8)	.2732	.0416	26.52 (1.8)	.0726
H1-H3	.0017	2.414 (1.7)	.0852	.0067	9.521 (1.7)	.0802	.0042	.9854** (1.7)	.2731	.0030	10.22 (1.7)	.0795
Mean	.079			.064			.154			.023		
Std. error of estimate, complete equation		.2585			.2349			.3087			.1448	
Residual degrees of freedom		2850			3577			2341			480	

* includes (H3) to distinguish quits from layoffs.
**includes (H7).

VI. Long-Term Evidence on Job-Related Relocations

Reports on past job offers from outside the local area (C1) and responses to those offers (C2) were used as regressors in the analysis of 1971-1972 job changes. As these variables are themselves the cumulative result of job search and relocation decisions that have been the focus of our regression model, it seems useful to ask whether more information can be gleaned from a multiple-variable analysis of those retrospective reports.

The reports that we chose to analyze are those given by the head of the family in his first interview in 1968. To assure that variables A6 and A7 were measured for the head, the population studied was restricted to units with the same head for the years 1968-1972. The heads excluded from the analysis are undoubtedly more mobile geographically and more likely to have changed jobs during the period, but it is not clear that much can be said about the bias in the population with respect to events prior to the sample period that are reported in C1 and C2.

The analysis technique that we chose was a data searching technique using AID. Because the dependent variables refer to a period prior to 1968, background variables (A) appear to be the primary candidates for the analysis. In addition we included the number of employers in the ten years prior to 1968 (a variant of C4) and homeownership (B2).

The results of the analyses are shown in Figures 5.5 and 5.6. The results parallel the earlier regression model. Owning a home inhibited accepting an offer, but that effect was offset by college education. Interestingly, the need achievement proxy differentiates among the acceptance probabilities of college graduates, with high need-achievement scores indicating a propensity to accept offers. Offers of jobs were extended to college graduates and men with many employers. Few women with no college training received offers outside the local labor market area (see Figure 5.6).

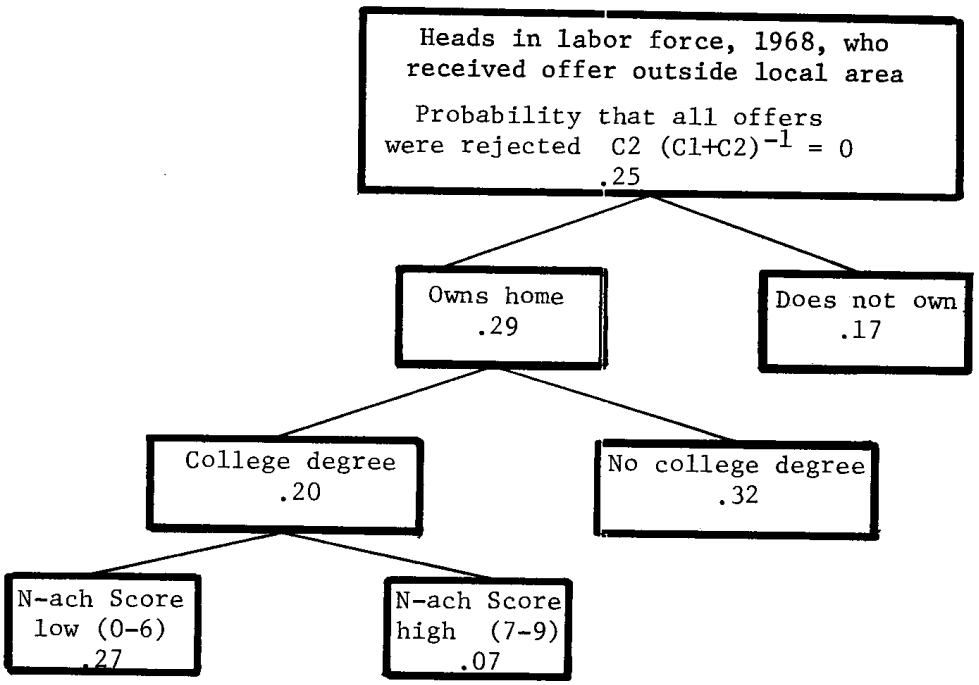
SUMMARY

The model presented indicates that past employment history (C3, C4) is the most important determinant of job changes, both voluntary and involuntary. Wage rate inhibits quits in a fashion predicted by the Holt-David model, but stated aspirations to move for higher paying work do not have the relevance that was predicted.

Being nonwhite stands out among the personal characteristics as an explana-

FIGURE 5.5

Aid Analysis of Past Job Offers

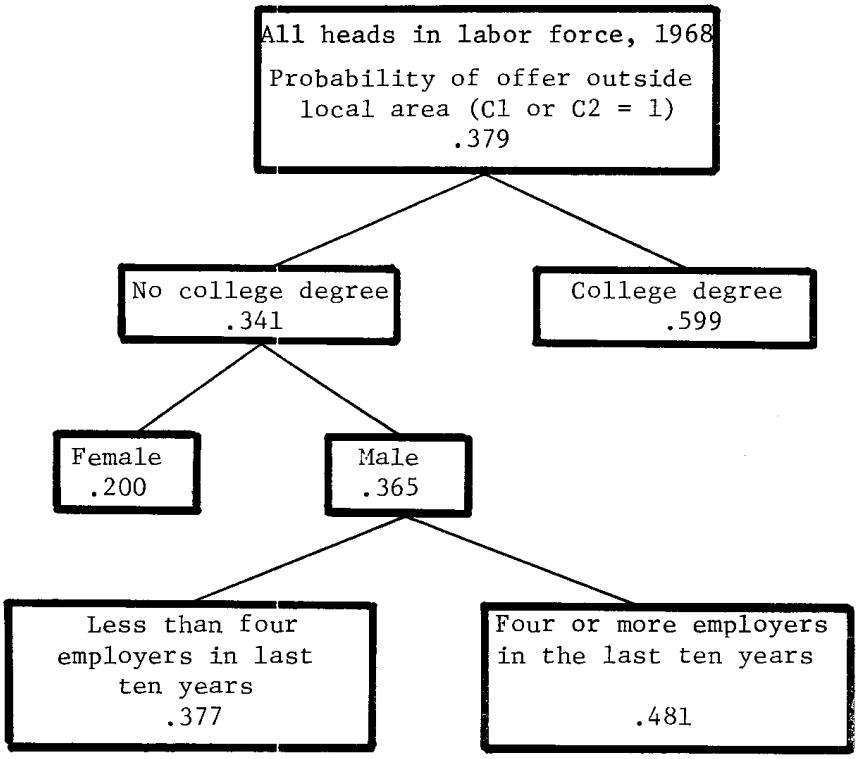


R^2 = .038

N = 909

FIGURE 5.6

Factors Influencing Rejection of All Offers of Jobs Outside Local Area



Predictors

A1 Age
A3 Education
A4 Sex
A5 Race
A6 Test score
A7 N-ach score
B2 Own or rent
C4 Number of employers (to 1968)

R^2 = .058

N = 3925

tory factor that deserves further study. The negative propensity of blacks to quit, other things being equal, and the positive propensity to be laid off could be explained by occupational mix or industry affiliation, but we have not had the opportunity to investigate that hypothesis yet.

Attitudes toward job search and relocation appear to play a significant part in decisions ultimately made. Further investigation on how these attitudes are formed can be undertaken using these panel data.

There appears to be validity to the structure that was imposed on the data, and the partitioning of job changes into quits and layoffs appears to have sorted out different causal factors for the two decisions. The same is true of the distinction between employer motivated moves in the transfer variable and the family initiated search for a wide labor market that is captured in the job related move variable.

WORK IN PROGRESS

The analysis on these job change decisions are being pursued in two ways. A logit model is being fit to the 1971-1972 data to overcome inadequacies of the linear formulation. The framework will then be studied to determine how job change induces changes in wages and trends in wages, relative to those who do not report a change in job. The results to date indicate profound effects of job change on occupational affiliation but little impact on wages or hours.

References

Holt, C. and David, M., "The Concept of Job Vacancies in a Dynamic Theory of the Labor Market," in Measurement and Interpretation of Job Vacancies, New York: Columbia University Press, 1966.

Holt, C., Macrae and Smith, R., The Unemployment-Inflation Dilemma: A Manpower Solution, Washington: Urban Institute, 1971.

Lansing, J., and Morgan, J., Economic Survey Methods, Ann Arbor: Institute for Social Research, 1971.

Morgan, et al, A Longitudinal Study of Family Economics, Ann Arbor: Institute for Social Research, 1969.

Mattilla, P., "Quit Behavior in the Labor Market," Proceedings: Business and Economics Section, American Statistical Association, 1969 (also a related PhD dissertation, University of Wisconsin, 1971).

Parsons, D. O., "Quit Rates Over Time: A Search and Information Approach," American Economic Review, Vol. 63, June, 1973.

Schroeder, L., "Occupational and Geographical Mobility Within Wisconsin, 1946-60: An Economic Analysis" (PhD thesis, University of Wisconsin), 1971.

Toikka, R., "Supply Responses of the Unemployed" (PhD thesis, University of Wisconsin), 1971.

Veroff, J., McClelland, L., and Marquis, K., Measuring Intelligence and Achievement Motivation in Surveys, Ann Arbor: Institute for Social Research, 1971.

APPENDIX 5.1

Codes for Area Labor Market Data

Whether shortage or surplus of unskilled male labor in county. (August 1972)

1. Many more jobs than applicants
2. More jobs than applicants
3. Most people able to find jobs
4. A number of unskilled workers unable to find jobs
5. Many unskilled workers unable to find jobs

9. N.A.

What is the typical wage that an unskilled male worker might receive? (August 1972)

1. Under $1.50
2. $1.50-1.99
3. $2.00-2.49
4. $2.50-2.99
5. $3.00 or more

9. N.A.

Unemployment rate in respondent's county. (August 1972)

1. Under 2%
2. 2-3.9%
3. 4-5.9%
4. 6-10%
5. Over 10%

9. N.A.

Chapter 6

NON-PECUNIARY WORK REWARDS

INTRODUCTION

The ways in which the labor market distributes wages to its workers is the subject of an entire chapter in these analysis volumes and has been investigated in countless books and journals. But the labor market also distributes a divergent set of non-pecuniary "payments" to workers. Such payments include job enjoyability and personal fulfillment, flexibility in the work hours so that the worker may earn more money if he needs to or work less if he wants to, security of employment and income, and, finally, various fringe benefits such as paid vacations and sick leave, medical insurance plans, and the like. Two jobs may have identical wage rates but differ greatly in their desirable characteristics. If the non-pecuniary payments of a job are systematically related to wage rates then results from empirical studies of wage rates (or labor incomes) may be misleading. Expanding the concept of job payoff would affect many different types of studies relating to labor income, among them:

1) Studies of labor income as a return from investment in human capital. General statements of the theory regard psychic income to be as important as monetary income but all empirical work on rates of return to investments have used only measures of the latter. Estimates of the importance of the various investments from such studies will be biased if investments earn a rate for psychic income that is different from the monetary rate.

2) The economic impact of trade unions. Many studies have attempted to measure the amount that unions have affected the structure of wage rates. Several have found that this amount is between 10% and 15% although a few studies have estimated a substantially higher effect. By expanding the income concept to include non-pecuniary components, estimates of the union effect may have to be considerably revised.

3) The impact of background factors on economic attainment. Several studies have postulated that a person's socioeconomic background may have a direct effect on his labor market success. Success has been measured in hourly wage

rates or annual labor income. If the measure includes non-pecuniary factors, the estimated impact of such background factors may be changed.

The Panel data allow quantification of some non-pecuniary payments. These are described in Section I. A framework within which wages and non-pecuniary payments can be analyzed is spelled out and empirically supported in Section II. Section III contains an analysis of the implications of non-pecuniary payments for the typical wage determination equation. Section IV contains a brief analysis of the implications that a more general payment measure has on the estimation of the effect of unions on the wage structure. Section V presents some descriptive analyses of the dynamics of pecuniary and non-pecuniary payments.

ANALYSIS

I. Empirical Payoff Measures

The findings reported in this chapter obviously depend upon the measures of non-pecuniary payments available. The Panel Study provides six different non-pecuniary payoff measures reported by respondents: freedom to increase work hours on the same job, freedom to decrease work hours, the perceived amount of choice in work, whether the annual labor income fell from the previous year, the perceived enjoyability of the job and, finally, whether the individual lost any work through unemployment or strike. These measures and the sample of respondents from which they came will be specified in some detail at this point. The reader who is not interested in this detail may wish to skip to Section II, page 161.

(1) *Freedom to increase work hours on the same job.* Each year, respondents were asked "Was there more work available on (your job) (any of your jobs) so that you could have worked more if you had wanted to?" Note that this question does not mention whether the wage paid for these additional hours would differ from the regular wage rate.

(2) *Freedom to decrease work hours.* This variable is simply based on whether or not there was an affirmative response to the question "Could you have worked less if you had wanted to?"

(3) *Perceived amount of choice in work.* For four of the five interviewing years a question on work choice was asked: "Tell me about your main job -- how much choice do you have about the way you do the work?" Responses were coded on a 1 to 5 scale (5=maximum choice) which roughly quintiled the percent of choice (i.e., 5 means 80%-100% choice, 4 implies 60%-80% choice, etc.).

(4) *Income stability.* This is a dichotomous variable equaling zero if annual labor income decreased from the previous year and one if it increased or remained the same. Clearly an unstable income is one in which there are unexpected decreases and increases in annual income, but any population subgroup that has unstable incomes will score significantly lower on this variable.

(5) *Job enjoyability.* In the final wave of interviews, the following question was asked of all employed respondents: "We know some days on the job are better than others, but in general, would you say that your job is very enjoyable, mostly enjoyable, somewhat enjoyable, not very enjoyable, or not enjoyable at all?" The response was coded on a five-point scale.

(6) *Employment stability.* If the respondent lost work in the previous year because of unemployment or a strike, then his job was considered to have instability of employment.

These variables form an important (but certainly not complete) set of desirable job characteristics. The flexibility of the employment is measured by whether the respondent was able to increase or decrease work hours on his job. Job enjoyability and choice show the desirability of the work itself. While both of these are subjectively reported and may not relate to a more objective observation of desirability, both are important components in a quality of work measure. Income and employment stability measure the stability and security of the work.

Some items necessary for a complete list of non-pecuniary payments are absent. Fringe benefits mentioned earlier such as vacation and sick pay and medical and dental service provisions are not measured. Jobs which are hazardous to the physical or mental health of the worker may not score as low as they should. In analyzing the empirical results which follow, the reader must keep in mind the advantages and disadvantages of these particular measures.

Due to the fact that not all of the questions which make up the payoff variables were asked in all five years, there are a few differences between the non-pecuniary payment variables which are available for the static and the dynamic analyses which follow.

To get a stable descriptive look at the wage and non-wage payments of jobs, static analysis will be confined to respondents who were employed and had the same job during the final two interviewing waves. While restricting the sample this way removes the job changers and temporarily unemployed[1] (and makes the employment stability payoff unsuitable for this static analysis), it is necessary

[1]About 19% of those individuals in the labor force both years are eliminated from the sample because of this restriction.

because the "choice in work" variable was asked only in the fourth wave and the "job enjoyability" variable only in the fifth. Advantages from looking at jobs held over two years include (1) more variability in the "freedom to increase" and "freedom to decrease work hours" variables, and (2) direct measurement (as opposed to respondent recall) of whether annual labor income decreased between the two years. Since the job information is from heads of households and not their wives, analysis will be restricted to males only. Means, standard deviations and ranges of non-pecuniary payments which will be used in the static analyses of Sections II through IV are given in Table 6.1.

The dynamic analysis of Section V will look at differences in wages and non-pecuniary characteristics between 1968 and 1971. The population will be slightly different from the one used in the static analysis and will consist of male heads of households who were employed at the time of both the 1968 and 1971 interviews and who worked at least 250 hours in each of the intervening years, 1969 and 1970. The latter stipulation was made so that only those at least marginally in the labor force for the total time period were included. The job enjoyability measure is not available for either of these years and thus could not be included in the dynamic analysis. All of the remaining variables were dichotomized: freedom to increase or decrease work hours is simply equal to one if yes responses were given, the choice of work variable was set equal to one if the

TABLE 6.1

A List of the Non-Pecuniary Payment Variables
Used in the Static Analysis of Sections II-IV*

Variable Name	Mean	Standard Deviation	Minimum Value	Maximum Value
(1) Number of years free to increase work hours	0.84	0.84	0	2
(2) Number of years free to decrease work hours	0.86	0.83	0	2
(3) Choice in work	4.08	1.36	1	5
(4) Income stability	0.73	0.44	0	1
(5) Job enjoyability	3.88	0.94	1	5

N=1310

*The population consists of male heads of households who were employed at the time of the 1971 and 1972 interviews and reported having the same job for those two years.

MTR7050

reported amount of choice was 80%-100% (i.e., total choice, "They leave it up to me.") and zero otherwise, and the income stability variable was scored one if the respondent did not report a fall in labor income from the previous year due to employment-related reasons. Since the population for the dynamic analysis is not restricted to those with the same jobs, a measure of employment stability becomes meaningful and equals one if the respondent was not laid off or on strike in the previous year. The variables available for the dynamic analysis are given in Table 6.2.

TABLE 6.2

A List of the Non-Pecuniary Payment Variables Used in the Dynamic Analysis of Section V

Variable Name	1968 Mean	1968 Standard Deviation	1971 Mean	1971 Standard Deviation	Minimum Value	Maximum Value
(1) Whether free to increase work hours	0.48	0.50	0.41	0.49	0	1
(2) Whether free to decrease work hours	0.47	0.50	0.41	0.49	0	1
(3) Choice in work	0.66	0.47	0.60	0.49	0	1
(4) Income stability	0.89	0.31	0.83	0.38	0	1
(5) Employment stability	0.88	0.33	0.86	0.35	0	1

MTR7053

II. The Relationship between Pecuniary and Non-Pecuniary Payments

Every job can be associated with a wage rate and a set of non-pecuniary characteristics. To make analysis of the relationship among payoffs manageable, groups of jobs need to be found which are reasonably homogeneous with respect to their mix of pecuniary and non-pecuniary payments. A widely used classification system is the one-digit occupation variable, and, indeed, if the pecuniary and non-pecuniary measures are averaged within occupations, significant and understandable differences among them appear. Table 6.3 presents the average wage rate and mean score for each of the non-pecuniary payment variables defined in the previous section by occupation. Also in Table 6.3, as a rough summary measure of

TABLE 6.3

Non-Pecuniary Characteristic Scores and Wage Rate by Occupation

Occupation	Whether Freedom to increase work hours	Whether Freedom to decrease work hours	Choice in work	Job enjoy-ability	Income stability	Wage rate	Non-pecuniary payment index	N
Professional, technical and kindred workers	1.02	0.91	4.43	4.05	0.78	$6.88	0.80	224
Managers, officials and proprietors	1.00	1.04	4.54	4.15	0.80	$6.71	1.17	184
Self employed businessmen	1.25	1.36	4.76	4.05	0.59	$4.55	1.43	84
Clerical and sales workers	0.84	0.87	4.11	3.86	0.79	$4.54	0.10	135
Craftsmen, foremen and kindred workers	0.71	0.76	3.88	3.80	0.72	$4.62	-0.54	297
Operatives and kindred workers	0.59	0.66	3.44	3.48	0.72	$3.96	-1.45	205
Laborers and service workers, farm laborers	0.65	0.54	3.65	3.79	0.70	$2.93	-1.12	86
Farmers and farm managers	1.23	1.28	4.85	4.26	0.47	$1.99	1.33	53
Miscellaneous (armed services, protective workers)	0.81	0.52	3.12	3.86	0.79	$4.17	-1.07	42
Mean	0.85	0.86	4.08	3.88	0.74	$4.95	0.00	
F	10.3	11.8	21.9	9.8	4.7	35.5	27.5	

($F_{.01,9,1300} = 2.43$)

MTR 7050

the non-pecuniary payments, an index of them is constructed by first standardizing[1] each of them and then simply summing them up. The mean index score by occupation is presented in the final column of Table 6.3.

Table 6.3 shows that among occupations there is significant[2] variability of characteristics, the index of characteristics and (of course) wage rates. Occupations involving self-employment (self-employed businessmen, farmers) score much higher in the index's non-pecuniary characteristics than other occupations. Looking across the individual payoff variables, it can be seen that these self-employment occupations are less desirable only in their income instability. As would be expected, they are much higher in flexibility of work hours and choice in and enjoyability of work.

White collar occupations are in general more desirable than blue collar ones. Professionals and managers are above average on each of the five non-pecuniary variables; craftsmen and foremen, operatives and unskilled laborers are below average on all of them. The two remaining occupational classifications -- clerical and sales, and the miscellaneous group -- are above average on some variables and below on others.

It is also interesting to look at how wage rates differ among the occupations. The self-employment occupations which score so high on the non-pecuniary characteristics have relatively low wage rates. This is because the self-employed on the average work much longer hours than the non-self-employed and the wage rate (as opposed to annual labor income) takes this into account. The remaining occupations are ranked by wage rate with two exceptions; craftsmen and foremen earn slightly more on the average than clerical and sales workers and workers in the miscellaneous category fall in the middle of the blue collar range.

While the occupational classification presented in Table 6.3 seems to be a meaningful way of grouping jobs by pecuniary and non-pecuniary payoffs, the remainder of this chapter will use a slightly different classification scheme that

---

[1] Because some of the variables range between 1 and 5 and others between 0 and 1, a simple sum would give more importance to variables with larger ranges. Standardization involves subtracting each score from its mean and dividing by its standard deviation so that the mean of the standardized variable is 0 and the variability of all of them is comparable.

[2] The test of significance presented in Table 6.3 for each of the variables is the F-ratio from a one-way analysis of variance. As shown at the bottom of the table, the F-ratio at the 1% level for the appropriate degrees of freedom equals 2.43. These F-ratios are based upon the assumption of simple random sampling. The Panel data come from a clustered sample so that there are "design effects," which increase the critical F-ratio by some fraction. All of the variables would still be significant at the 1% level if such an adjustment were made. For a more complete discussion of design effects, see Appendix B.

is based on three main components: white vs. blue collar, self-employment, and union membership.

Each worker brings to the labor market a certain mix of training, aptitude, attitudes and demographic characteristics that determines first the type of jobs that are available to him and second, given the job type, the level of pecuniary and non-pecuniary payments he will receive. The first broad division of job type that must be considered is that of blue and white collar employment. While the heterogeneity of job type within these two groups is considerable, collar color does divide the job market by type of work, prestige, income, and in other important ways. Workers may be limited to blue collar jobs for a variety of reasons. A person's formal training may be insufficient to qualify him for white collar jobs. Demographic characteristics like race, age, and sex may combine to produce the same result.

Given the choice between white and blue collar employment (which is either made by him, or by others on the basis of his personal characteristics), the individual must then consider the option of self-employment. Self-employment offers more desirable working conditions but lower wage rates than working for someone else. The data presented in Table 6.3 show that among the measures of non-pecuniary characteristics available, the self-employment occupations have more flexible work hours, more choice in work and more enjoyable work than the occupations where self-employment does not prevail. The only undesirable characteristic is income instability. The self-employment option exists among both blue and white collar jobs. Blue collar self-employment occupations include farming and some crafts; white collar self-employment includes business and professions. As with collar color, the "choice" of self-employment may not exist for a substantial number of workers. A large capital investment is needed to begin most self-employment jobs and unless a person has sufficient access to investment funds (which also will be determined by a person's training, background and demographic characteristics), he may be unable to opt for self-employment. Within the white collar group, formal training may also be a barrier to entry into self-employment. The self-employed professional occupations such as law, medicine, or dentistry require extensive formal training. This group is sufficiently different from other self-employment groups that it will be analyzed separately.

If the worker does not become self-employed, he then may have the option of joining a union. Union membership is a way in which workers may alter the mix of wage and non-wage payments. Many studies[1] have shown that when personal charac-

[1]See, for example, Stafford (1968) or Boskin (1972).

teristics, industry, and occupation are taken into account, union members receive a significantly higher wage than their non-union counterparts. But it is quite plausible that union members have less desirable jobs with lower non-pecuniary payments. Union contracts formalize working conditions to the point where little work flexibility is left to the union worker. Further inflexibility is undoubtedly due to the production techniques that are associated with some kinds of union work (e.g., the assembly line) and the inflexibility is clearly not the *result* of union activity but may, in a sense, be the cause of it. Less desirable working conditions, when combined with a production technique that brings together a large number of workers make collective action all the more feasible. The extent to which unions cause or result from inflexible and unenjoyable work cannot be determined from our data and indeed, a proper study of the question would fill a volume by itself. What is important for the purposes of this study is that a unionized job is an option available to some workers and it constitutes a job grouping with a significantly different mix of wage and non-wage payments, specifically a higher wage rate and less desirable working conditions (see Table 6.4). As with the white-blue collar and self-employment choices, the option of union membership may be limited to persons of certain background and demographic characteristics and occupational preferences.

In place of the occupational classification listed in Table 6.3, the following categorization of job groups will be used:

1. Self-employed professionals
2. White collar, non-professional, self-employed
3. White collar, union
4. White collar, non-union, not self-employed
5. Blue collar, self-employed
6. Blue collar, union
7. Blue collar, non-union, not self-employed

As with the occupational categories, there is considerable heterogeneity within each of the listed job groups. A more complete classification would disaggregate these job groups.[1] Further disaggregation is prevented, however, by small sample sizes and it will be shown that the job groups listed above are sufficient for the purposes of this chapter.

Table 6.4 presents the mean wage, non-pecuniary index, and individual payoff variables for each of the job groups. Significant differences exist among the job groups on every variable listed and the differences are all in the expected directions. The self-employed professionals have a very high wage and a

[1] In particular, groups 4 and 7 (the non-union, not self-employed, white and blue collar workers). The former group combines some managers and professionals with non-union clerical and sales workers; the latter includes both craftsmen and non-union unskilled laborers.

TABLE 6.4

Mean of Payoff Variable, Non-Pecuniary Index and Wage Rate, by Job Group

Job Group	Number Yrs. free to increase work hours	Number Yrs. free to decrease work hours	Choice in work	Job enjoy-ability	Income stability	Non-pecuniary payment index	Wage rate	N
Professional, Self-employed	1.27	1.23	4.93	4.20	0.43	1.23	$9.76	30
White collar other self-employed	1.24	1.35	4.76	4.14	0.61	1.53	$5.33	122
White collar union	0.90	0.82	3.94	3.84	0.81	0.35	$5.84	89
White collar, non-union, not self-employed	0.94	0.91	4.41	4.04	0.83	0.78	$5.98	386
Blue collar self-employed	1.25	1.22	4.83	4.31	0.52	1.42	$2.02	65
Blue collar union	0.70	0.77	3.54	3.59	0.71	-1.05	$4.68	319
Blue collar, non-union, not self-employed	0.62	0.58	3.73	3.78	0.75	-0.95	$3.66	299
Mean	0.85	0.86	2.92	3.88	0.73	0	4.95	
F	15.4	17.8	29.2	12.4	10.3	36.3	41.8	

($F_{.01,7,1302} = 2.66$)

MTR 7050

relatively high non-pecuniary index score. Within the remaining white and blue collar jobs groups, the self-employed earn lower wages and higher non-pecuniary payments than the non-self-employed and the union workers receive higher wages and fewer non-wage benefits. Wage differences are much greater among the blue collar groups, non-pecuniary differences are large among all but the final two job groups.

While personal characteristics of workers may make certain job groups unavailable, they also are important in determining the level of wage and non-wage payments *within* each group. Within the blue collar, non-union, not self-employed job group, for example, it is expected that workers with greater education, cognitive ability and manual dexterity will earn both higher wages and higher non-pecuniary payments. If the job groupings developed are in fact reasonably homogeneous in their mix of wage and non-wage payments, then we would expect that those workers with a high earning capacity within each group would earn higher wages and score higher on the index of non-pecuniary characteristics.

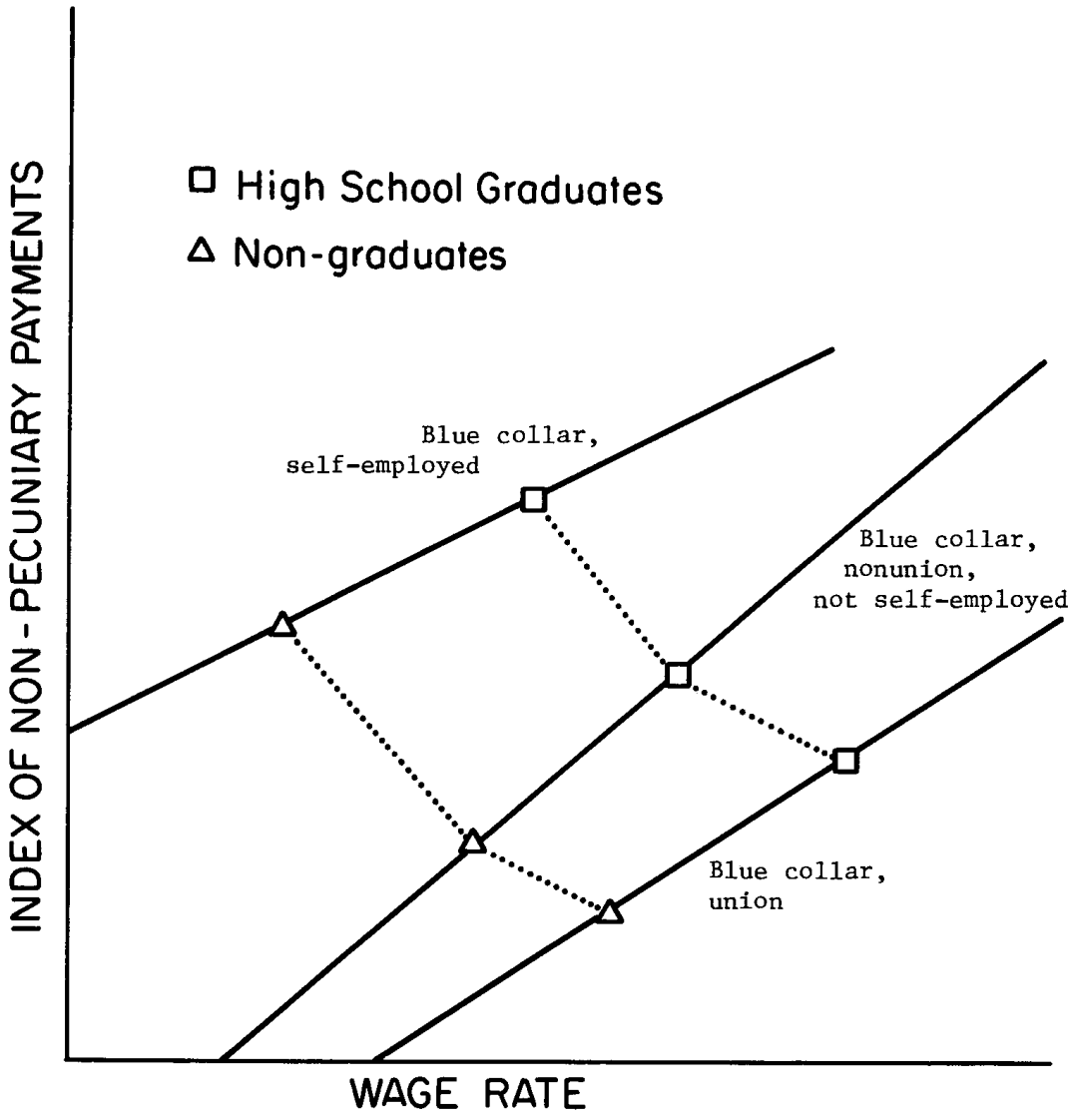
This hypothesis is depicted on Figure 6.1. The horizontal and vertical axes measure wage rate and the index of non-pecuniary job characteristics respectively. For simplicity, only the three blue collar job groups are shown. Each job group has a unique mix of wage and non-pecuniary payment characteristics. Self-employment is relatively higher in non-pecuniary characteristics, the blue collar union group is lower in them, and the non-union, not self-employed job group lies somewhere in between the other two. Assume for simplicity that earnings capacity is determined solely on the basis of whether the worker has graduated from high school or not. If we divide blue collar workers into job groups and by whether or not they have a high school diploma and then plot the mean wage and non-wage scores for them, it is expected that (1) within each job group the high school graduates will earn more of both wage and non-wage payments than the non-graduates and that (2) workers within each education grouping will have average wage and non-wage payments for each job group such that an individual changing from one job group to another will not be able to get both higher wages *and* higher non-pecuniary payments. In other words, there will be a *tradeoff* between wage and non-wage payments among the job groups.

To find out whether the data do in fact show that this is the case, it is necessary to specify "earning capacity" more completely. The determinants of earnings capacity that have emerged from theoretical and empirical work on the subject can be lumped into several broad categories:

(1) *Investment variables*. The human capital literature has focused upon variables such as education, on-the-job training and ability as primary labor

FIGURE 6.1

Hypothesized Relationship Between Wage and Non-Pecuniary Payments for Different Blue Collar Job and Education Groups



income determinants. The latter is not itself an "investment" but needs to be taken into account to obtain unbiased estimates of the effects of the other variables. As measures of these variables we use (a) years of formal schooling, (b) years of current job tenure, and (c) a score on a sentence completion test that was given to each respondent in the final interview year. That earnings are expected to vary over the lifetime of the worker is controlled for the inclusion of variables (d) age and (e) the square of age.[1] The expected parabolic age-earnings profile will follow from a positive coefficient on the age term and a negative one on age-squared.

(2) *Background Variables*. Measures of the socioeconomic status of the parents of the head include (f) father's education, (g) father's occupation, and (h) size of place where grew up. Earnings capacity is expected to be positively related to each of these. Military service is a background event which has been found to affect earnings and so (i) whether veteran is included. An additional variable which is theoretically formed early in life (although measured in the final interview year) and which may affect earning capacity is (j) achievement motivation. More motivated individuals should earn more.

Finally, since wage rates have not been adjusted for cost of living differences, a crude attempt to control for them can be obtained by the inclusion of a measure of city size (k).

While all of these explanatory variables may affect earnings capacity, some may be much more powerful than others and a procedure that will weight the different variables to get a good estimate of earnings capactiy needs to be found. Simply finding the linear combination of explanatory variables that correlates best with wage rates[2] is one possible way to do this although earnings in the context of this study should include non-wage payments. An explanatory variable may be relatively unimportant in determining wage rates but very important for non-pecuniary payments. If non-wage payments were omitted from earnings and only wage rate used, then the estimated importance of that explanatory variable would be understated. What is needed, then, is not the combination of explanatory variables that correlates best with wage rates alone but rather that combination which has the highest correlation with the combination of wage and non-wage payments.[3] When these combinations are found, the characteristics of each worker

---

[1]The inclusion of the square of age enables the estimated relationship between age and earnings to be curvilinear (more specifically, parabolic).

[2]This can be done by least squares regression of wage rates on all of the explanatory variables and then using estimated coefficients to get an "earnings capacity" score for each individual.

[3]The statistical technique which does this is called canonical correlation and it is a simple extension of regression where a linear combination of dependent

can be weighted and an earnings capacity score obtained. To show how workers with different earnings capacities are distributed within and among job groups, the sample is divided into four equal sized groups based on their rank by earnings capacity. The mean wage and non-pecuniary index score are calculated for each earnings capacity quartile in each job group. Results for the three blue collar job groups appear in Figure 6.2, those for the four white collar groups are shown in Figure 6.3. Only groups that contain at least 25 observations are presented.

The graphs in general confirm the notion that within each job group, workers with higher earnings capacities earn both higher wages and non-wage payments. This is especially true for the four non-self-employed job groups. There were not enough high earnings capacity blue collar, self-employed or low capacity professional self-employed to test this hypothesis for those job groups. Only for the white collar, non-professional self-employed does the relationship not hold. For them, a higher earnings capacity is associated with a higher wage but not a higher score on the index of non-pecuniary payments. This may be due to the fact that the self-employed are near the upper limits of the non-wage payment index and are unable to go higher.

The notion that workers may change job groups and increase either wage *or* non-pecuniary payments *but not both* is confirmed for the blue collar job groups. Low capacity self-employed earn much higher non-pecuniary payments and lower wage rates than for those in the non-self-employed job groups. Blue collar union members from each earnings capacity level earn higher wages and lower non-pecuniary payments than their nonunion counterparts.

For white collar job groups, the evidence of tradeoffs between wages and other benefits for workers of similar earnings capacities is mixed. There appears to be a tradeoff for workers in the third capacity quartile. For second quartile members, however, there is a tradeoff only between the self-employed and both the union and nonunion groups. Second quartile white collar workers who neither belong to a union nor are self-employed earn both higher wages and higher non-wage payments than white collar union members of the same earnings capacity. For the highest ability quartile, the hypothesis falls apart: there is no tradeoff for the highest earnings capacity quartile. White collar workers who do not belong to a union earn both higher wages and higher benefits than union workers. The self-employed white collar workers also earn more of both than those not

---

variables, rather than a single variable, is used. The coefficients with the technique are not very different from those from a regression with wage rate alone. They will be presented and discussed in the next section.

FIGURE 6.2

Wage and Non-Pecuniary Payments for Different Blue Collar Job Groups and Earnings Capacity Groups

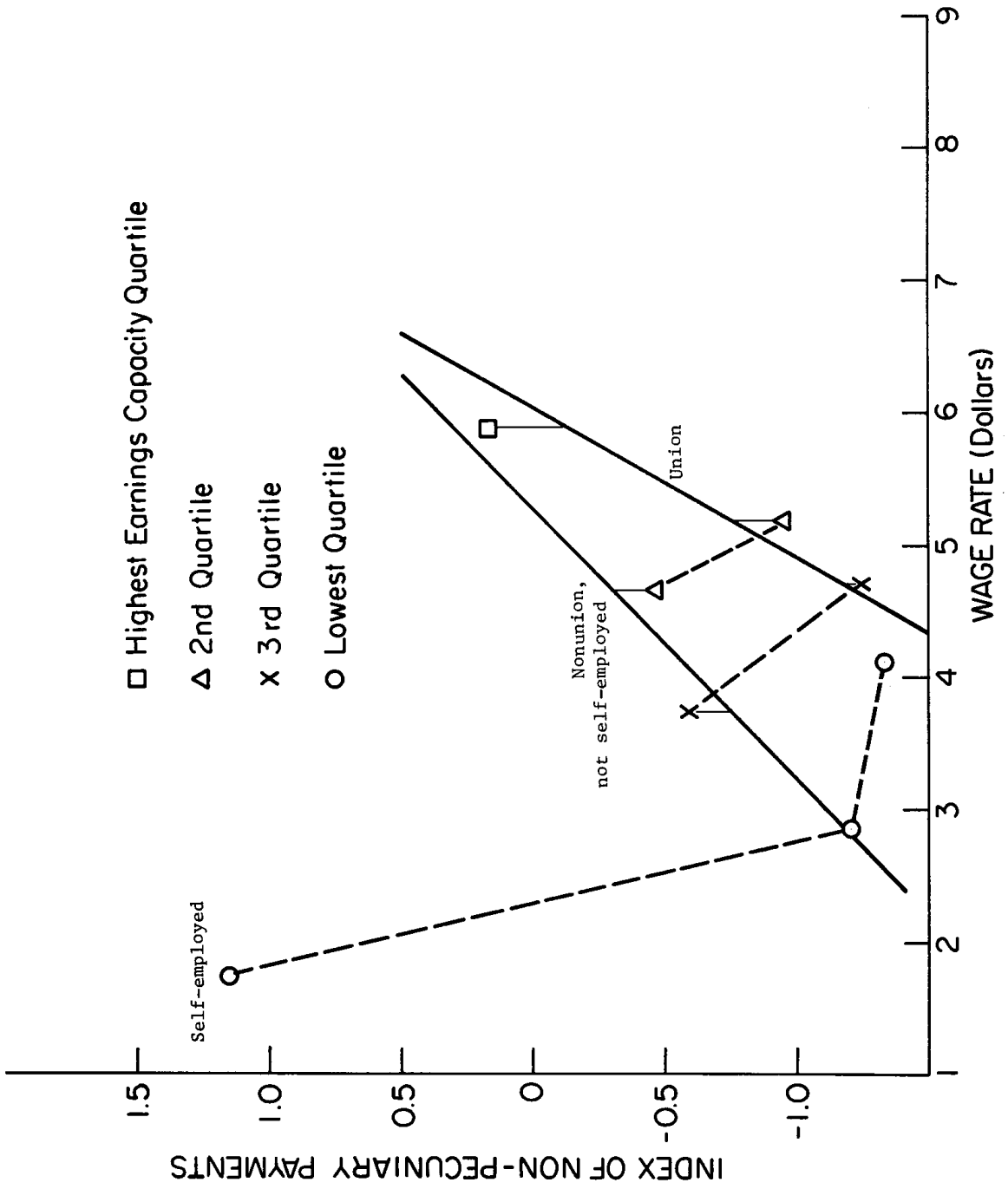
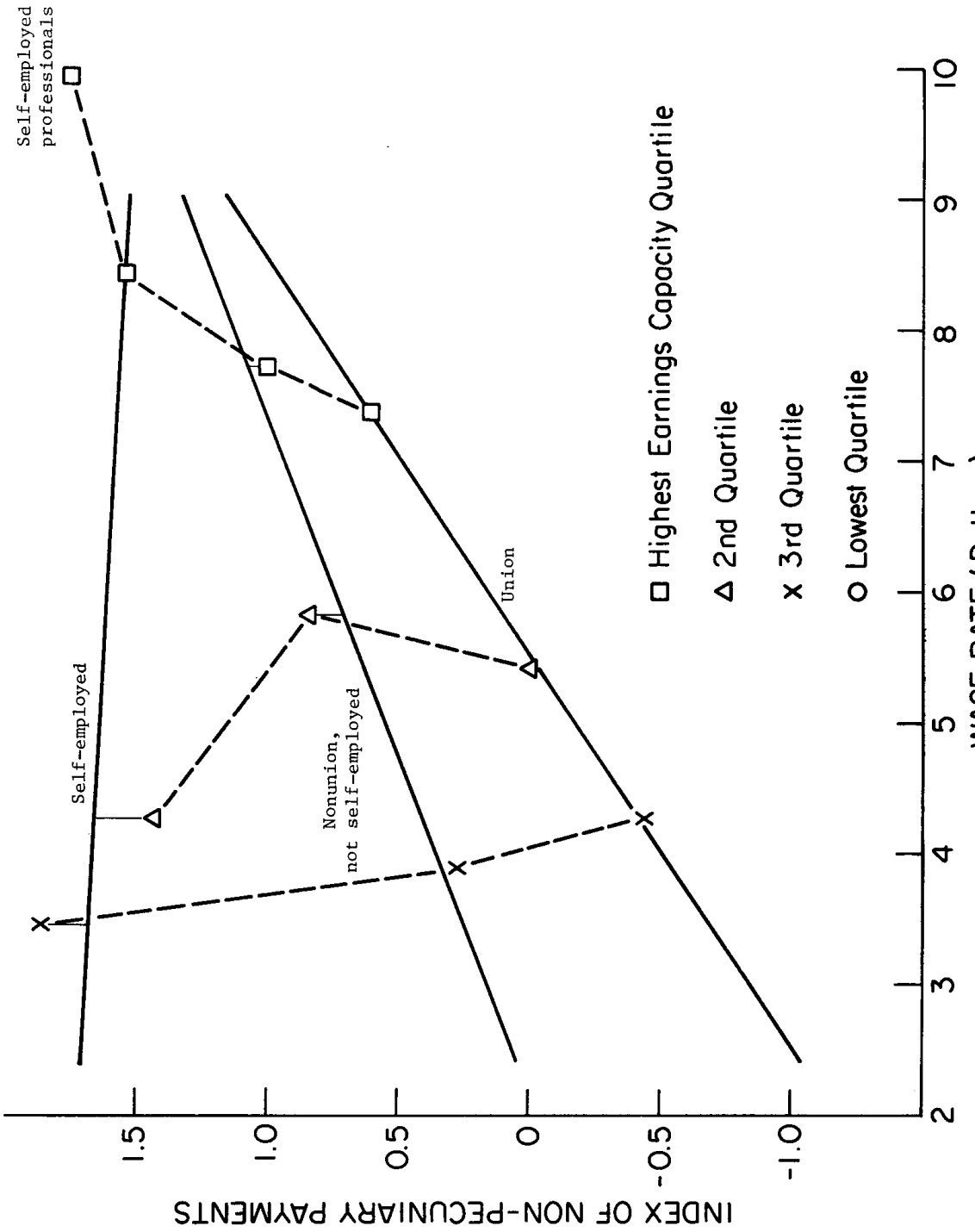


FIGURE 6.3

Wage and Non-Pecuniary Payments for Different White Collar Job Groups and Earnings Capacity Groups



self-employed. Finally, the professional self-employed earn higher wages and non-pecuniary benefits than the high earnings capacity workers in any other job group. For these white collar workers in the highest earnings capacity quartile, either the specification of non-pecuniary payments is incomplete or the real earnings capacity of the upper quartile of individuals is too heterogeneous.

III. Implications for the Wage Determination Equation

The ways in which background, ability, and human capital investment variables relate to monetary job payments (e.g., annual labor income, wage rate) is a well studied although still controversial area. The more careful of these studies will refer to non-pecuniary aspects of jobs and assert that their inclusion may alter the empirical results. No attempt has been made to quantify these non-pecuniary payments and see whether the results do indeed change. Such an attempt will be the subject of this section.

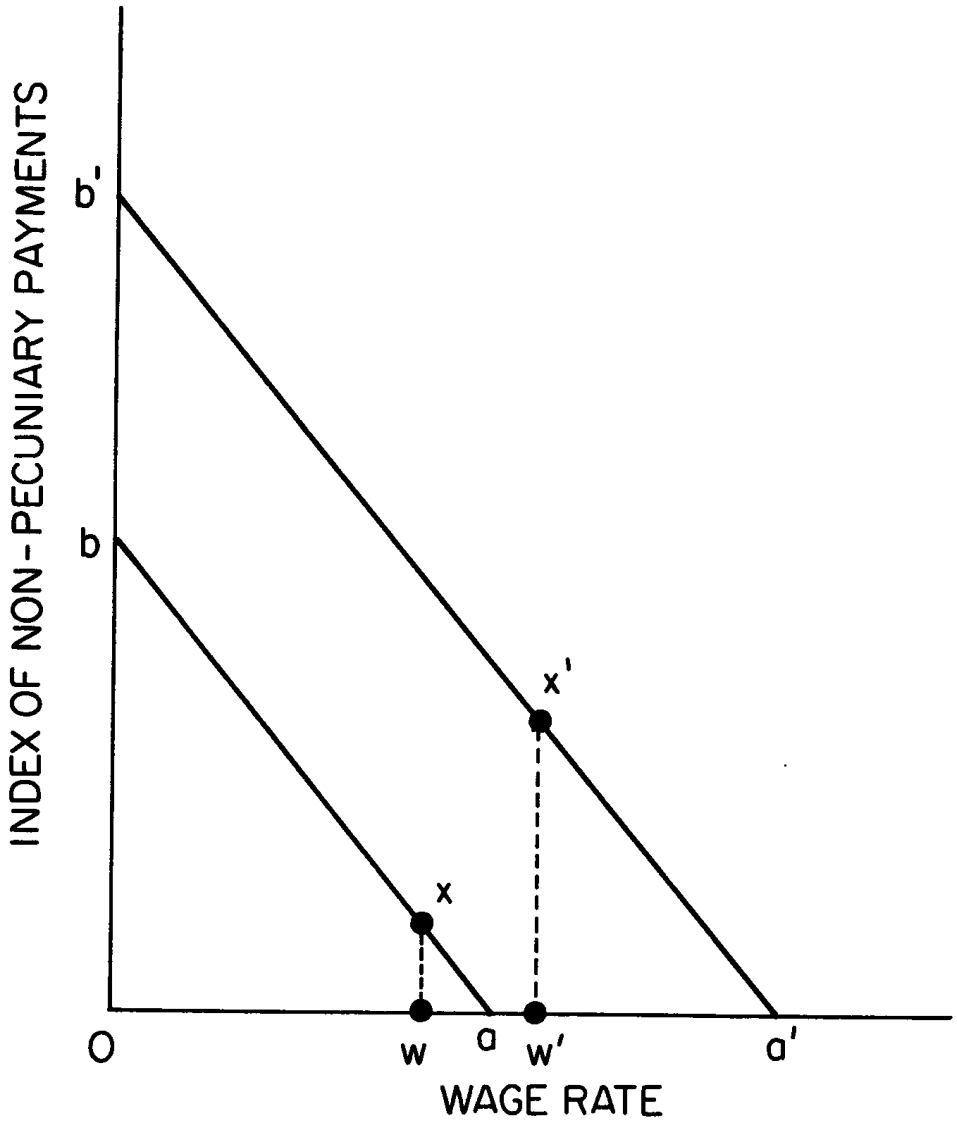
The addition of non-pecuniary benefits into the wage concept may or may not change the estimated importance of the background, ability, and investment variables.[1] If preferences for the wage or non-wage attributes of a job are independent of the explanatory variables then the estimated effects of those variables will not change when non-pecuniary benefits are combined with wage rate. If, on the other hand, the explanatory variables affect these preferences then their estimated effects will be biased. If higher education, for example, led to preferences for more non-pecuniary benefits relative to wages then the importance of education would be underestimated in a wage rate equation. If more education led to preferences for wages over non-pecuniary payments, then its affect would be overestimated in a wage rate equation.

These relationships are shown in Figure 6.4. Suppose that the working population has been divided into two parts on the basis of earnings capacity. By opting for various job groups, workers are able to pick various combinations of wage and non-wage payments. These combinations are represented by line ab for the lower capacity people and by line a'b' for those of higher capacity. Suppose further that two people from the different capacity groups pick combinations represented by the points x and x'. The actual differences between the total pecuniary and non-pecuniary payments these two individuals receive if it could be measured on the wage rate axis alone, would be the distance aa'. If only wage rates are used to measure the difference, it will be found to be ww' -- clearly

[1] The way in which this problem is explained follows Bowles (1972, pp S238-S239), quite closely.

FIGURE 6.4

Wage and Non-Pecuniary Payments for Different Earnings Capacity Groups



an amount smaller than aa'. If the preferences which place individuals at points such as x and x' are related to a particular wage determinant, for example education, then the effect of education will be underestimated if only wage rates are used.

There is reason to believe that several of the wage determinants may affect preferences for non-pecuniary aspects of jobs. Bowles (1972), for example, argues that socioeconomic background may not be independent of preferences. He states, "[T]here is considerable evidence that rich, high status parents place a larger value on the non-monetary aspects of work and a lower value on monetary returns than poorer, lower status parents" (S238). If this is true, then the effects of socioeconomic background on the combined wage rate-non-pecuniary payoff will be understated in a wage rate equation. A plausible argument can be made for such a relationship between each of the wage determinants and preference for non-pecuniary benefits: older workers seek more pleasant, less demanding jobs and are willing to trade off wages for them; college education changes preferences toward non-pecuniary payments; achievement motivation is important when the outcome of an event is in doubt and thus a flexible, challenging job is more important to highly motivated people than the monetary measure of success, and so forth.

Rather than specifically testing a single hypothesis that a certain variable does or does not affect preferences, a more general way of determining wage equation bias is needed. The procedure that will be used here is the following: two different job payoff measures which incorporate both pecuniary and non-pecuniary payments will be developed and then parallel regressions will be run with each as a dependent variable. The resulting coefficients on the wage determinants will be compared to those of a regression with wage rate alone as the dependent variable. Biases in the coefficients, then, can be directly observed.

One way in which wage and non-wage payments can be combined into a single measure is through the following (rather arbitrary) rule: the payoff measure should make wage rate have a weight equal to all of the non-pecuniary payoff variables combined and each of the non-pecuniary payoff variables, in turn, should have equal weight. A utility function which satisfies this rule is:

$$U = (\text{wage}^{1/2} \cdot P_1^{1/10} \cdot P_2^{1/10} \cdot P_3^{1/10} \cdot P_4^{1/10} \cdot P_5^{1/10}),$$

where P_1, P_2, ... P_5 are the five different non-pecuniary variables described in the previous sections.[1] This will be called the *utility index* of wage and non-wage payments.

[1] All of the variables (including wage rates) are standardized with a mean of 10 instead of zero to enable exponentiation.

A second way in which the payoffs can be combined is with weights obtained by a regression technique known as canonical correlation. In simple regression, the correlation between a combination of independent variables and a single dependent variable is maximized. In canonical correlation, a combination of dependent variables is used instead of a single one. The explanatory variables used are those described in the previous section: education, job tenure, test score, age, age^2, father's education, father's occupation, size of place where grew up, whether veteran, achievement motivation, and city size. Table 6.5 presents the coefficients on the various dependent variables obtained from the canonical correlation. Since the variables differ in their means and variances, coefficients are also presented for the standardized variables so that they will be comparable.

TABLE 6.5

Calculated Weight on the Raw Score and Standardized Payoff Variables Which are Used to Form the Regression Index of Wage and Non-Wage Payments

	Relative Weight	
Payoff Variables	Raw Score	Standardized
Wage Rate	.275	.901
Whether free to increase work hours	.213	.178
Whether free to decrease work hours	-.002	-.001
Choice in work	.172	.234
Job enjoyability	-.002	-.002
Income stability	.225	.099

The standardized coefficients listed in Table 6.5 show that wage rate receives a much larger weight than any of the other variables. Job enjoyability and freedom to decrease work hours are weighted to zero, while the remaining three variables -- choice in work, freedom to increase work hours, and income stability -- have substantial positive coefficients. That job enjoyability is not an important correlate of wage determinants when other payoff variables are taken into account is not surprising. Recent evidence[1] shows that only part of the variation in job satisfaction responses can be related to objective measures of working conditions. The responses are also influenced by unstable psychological components obviously not captured in the list of wage determinants. That freedom to decrease work hours loses importance is also interesting. The elimination of involuntary overtime does not appear to be nearly as important as the availability

[1]See, for example, Seashore (1973).

of overtime work itself. The weights presented in Table 6.5 yield a payoff score for each individual which will be called the *regression index* of wage and non-wage payments.

Three measures of job payoff have been developed -- simple wage rate, utility index, and regression index. If wage rate is very highly correlated with the two indexes[1] then it would be expected that coefficients in the wage equation would not change much and wages could confidently be used as a measure of both wage and non-wage payments. The overall correlation between wage rates and the utility and regression indexes are .88 and .95, respectively -- both rather high. Correlations change, however, when the working population is divided by collar color and by job group. These results are presented in Table 6.6. Both indexes correlate quite well with wages for white collar workers and quite poorly for blue collar workers. Further disaggregation into job groups shows that the correlation is lowest for blue collar union members and does not rise above .9 for any of the blue collar job groups for either index.

The results of the parallel regressions of the three payoff variables on the same set of explanatory variables is given in Table 6.7. Coefficients have been standardized (they are "beta weights") to facilitate cross-equation comparisons. Raw score results are presented in the Appendix Table A6.1.

The explanatory power of the three equations is quite similar. That the fraction of variance explained is higher in the regression index equation than in the wage equation is to be expected because the statistical technique which found the weights for the regression index maximized the explained variance. It is somewhat surprising that the rather arbitrarily constructed utility index should also be explained more completely by the independent variables than is the wage rate.

A comparison of coefficients across the different equations suggests the following points:

1) The importance of education clearly increases as the wage concept is expanded to include non-pecuniary payments. The coefficient on education is 16% higher when the regression index of wage and non-wage payments is used instead of wage rate alone and 21% higher when the utility index is the dependent variable. Thus, education appears to be systematically related to the availability of and the preference for non-pecuniary payments when other variables are taken into account.

2) The age-earnings profile obtained when all other explanatory variables

---

[1]There will, of course, be a substantial positive correlation simply because the wage rate is included in both of the other measures.

TABLE 6.6

Simple Correlation Between Wage Rate and
(1) Utility Index and (2) Regression Index
by Collar Color and Job Group

	(1) Utility Index of Wage Rate & Non-Pecuniary Benefits	(2) Regression Index of Wage Rate & Non-Pecuniary Benefits	Number of Observations
Overall	.88	.95	1310
White collar	.96	.97	627
Blue collar	.69	.80	683
Job Group			
1) Self-employed professional	.98	.99	30
2) Non-professional white collar self-employed	.96	.99	122
3) White collar union	.89	.95	89
4) White collar non-union not self-employed	.87	.96	386
5) Blue collar self-employed	.76	.88	65
6) Blue collar union	.67	.77	319
7) Blue collar non-union not self-employed	.73	.81	299

TABLE 6.7

Standardized Regression Coefficients of Wage Determinants for Wage Rate, Utility Index and Regression Index of Payoffs

	Wage Rate	Utility Index of Wage Rate & Non-Pecuniary Benefits	Regression Index of Wage Rate & Non-Pecuniary Benefits
Education	.29**	.35**	.34**
Job tenure	.06*	.07**	.08**
Test score	.10**	.09**	.10**
Age	1.10**	1.03**	1.08**
Age^2	-.97**	-.88**	-.92**
Father's education	.04	.04	.03
Father's occupation	-.01	.01	.00
Size of place grew up	.11**	.08**	.10**
Whether veteran	.01	-.02	.02
Achievement motivation	.02	.08**	.06*
City size	.16**	.09**	.13**
R^2	.278	.304	.305

*Coefficient is significantly different from zero at the 5% probability level.

**Coefficient is significantly different from zero at the 1% probability level.

are held constant flattens out as more weight is given to non-pecuniary payments in the job payoff measure. The estimated relationship between age and each of the three payoff variables is shown in Figure 6.5. Older workers appear to be substituting non-pecuniary payments for wages so that using wage rates alone will understate their full earnings.

3) The importance of achievement motivation in determining earnings is substantially understated if non-pecuniary benefits are omitted from the payoff measure. The effect of achievement motivation on wage rate is small and insignificant. Its effect on the utility and regression indexes is much larger and statistically significant. That the importance of achievement motivation increases with the addition of non-pecuniary benefits is quite consistent with current theories of achievement motivation.[1] They view achievement motivation as a function of the *motive* to achieve and the uncertainty of an event's outcome. Achievement motivation is greatest when the outcome is in considerable doubt (e.g., in Atkinson's formulation, it is maximized when the chance of success is 50%). Jobs with flexibility and choice are those with the least certain outcomes and thus it can be expected that motivation would become more important when measures of flexibility and choice are added to the wage rate.

4) The importance of socioeconomic background does not seem to be biased by the omission of non-pecuniary payments from the wage measure. Estimated coefficients on the variables father's education, father's occupation, and size of place where grew up do not change among the different payoff measures. While it has been argued that these measures do not capture all of the important aspects of background and the payoff variables available in the data do not measure all important non-pecuniary aspects, on the basis of the available background and payoff measures there does not appear to be bias in the estimated importance of socioeconomic background on a complete payoff measure if only a monetary reward measure is used.

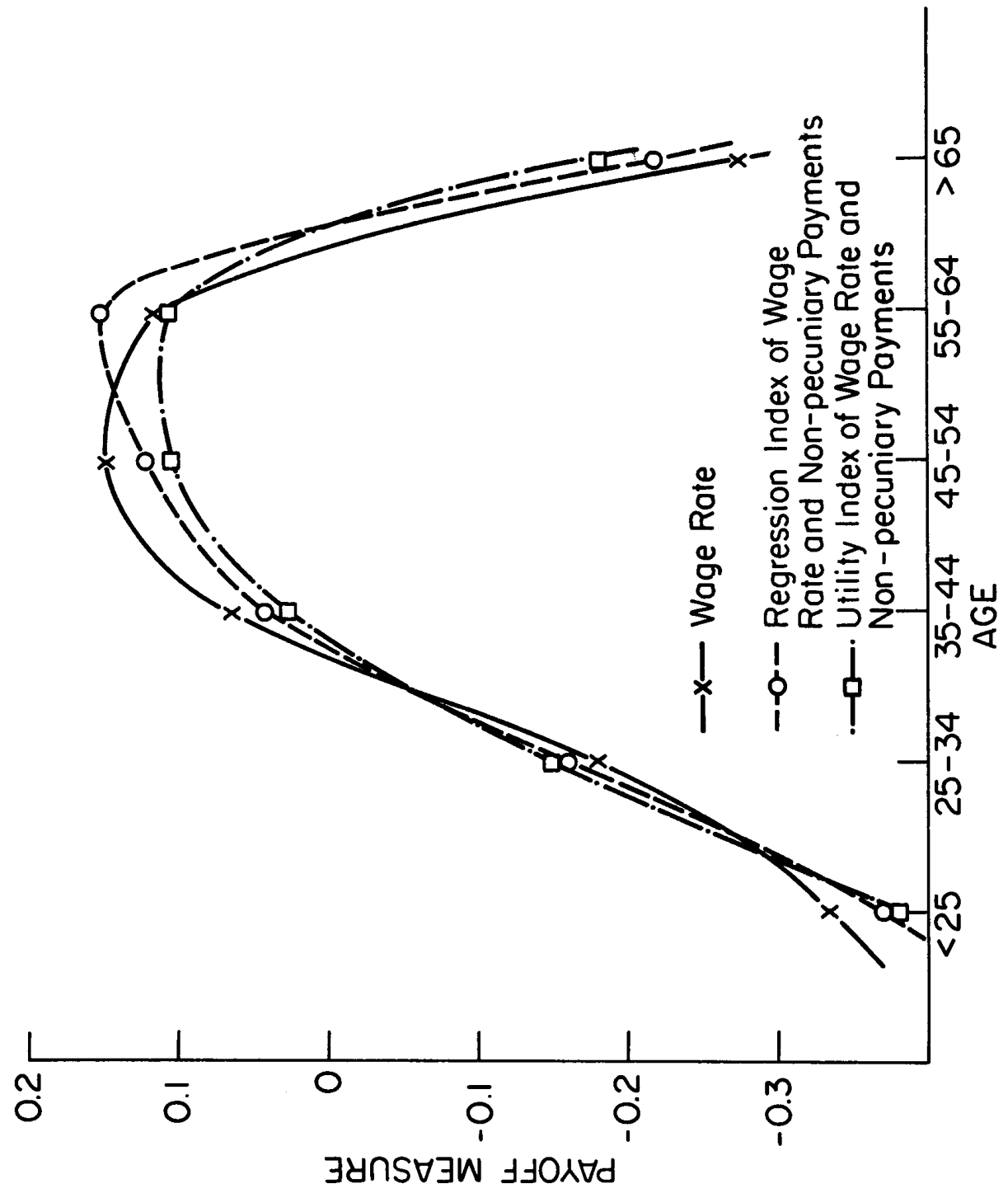
5) The importance of the measure of city size falls as non-pecuniary payments receive increasing weight in the payoff measure. This fact is difficult to interpret because city size is associated with so many other things. It was included in the regressions primarily to adjust in the cost of living and labor market conditions. Its suitability for either of these purposes is far from perfect. The regressions indicate that larger cities are associated with higher wages but also with substantially lower non-pecuniary rewards.

---

[1] See, for example, Atkinson (1966).

FIGURE 6.5

Age-Earnings Profiles for Wage Rate, Regression Index and Utility Index



IV. The Effect of Union Membership on Wage and Non-Wage Payments

Many attempts have been made to estimate the effects of labor unions on earnings. Depending on the level of aggregation of the data and the extent to which personal characteristics, occupation, and industry are taken into account, some of these studies estimate that union members earn about 10-15% more than nonunion members, while others estimate a considerably larger differential. In none of these studies, however, have the non-pecuniary aspects of jobs been taken into account.

Actual estimates of the effect of labor unions on some combined wage and non-pecuniary benefit measure will, of course, depend critically on the non-pecuniary variables used. The measures available in the Panel data relate to flexibility of work hours, choice in work, job enjoyability and income stability. It would be very difficult to attempt to argue that these form an exhaustive list of non-wage payoff measures relevant to a study of union-nonunion differentials. Indeed, many non-pecuniary benefits that unions can provide are not available. The protection of the worker against arbitrary management decisions, the right to appeal such decisions through a formal grievance process and, on a different level, the quantity and quality of fringe benefits provided to the worker are all examples of these unmeasured payoff variables. There are also unmeasured ways in which union membership can lead to *lower* non-pecuniary payments. The appropriate question to ask is whether the available payoff measures are sufficiently representative of all the non-pecuniary benefits to provide a rough quantification of the biases introduced when the "full" impact of labor unions is estimated with only a pecuniary payoff measure. This section's discussion and estimation of the effects of union membership assumes that they are and will use those available measures.

The discussion in Section II suggested that most union jobs are less flexible and enjoyable than comparable nonunion jobs. In general, union membership is associated with higher wages and lower non-pecuniary payments.[1] There are two reasons why unions may be associated with lower non-pecuniary payments:

1) Unions *cause* lower non-pecuniary payments. The union contract formalizes working conditions so that there is less flexibility and choice in union than in nonunion jobs. The contracts are often quite specific about the privileges and responsibilities associated with each job type. In nonunion work these privileges and responsibilities may be less formal and more flexible.[2]

---

[1] The reasons for union members earning high wages have been well studied elsewhere. Here the focus is on explaining why non-pecuniary benefits are lower.

[2] They may also be more inequitably distributed in nonunion work because they are subject to the favoritism that union formality eliminates.

Another way in which unions cause lower non-pecuniary benefits relative to nonunion work is related to the collective bargaining process. The most visible result of a collective bargaining argreement is the wage rate. While non-pecuniary aspects of the job are also negotiated, pressure from members on negotiators will usually result in pecuniary payments being favored over non-pecuniary ones. The union negotiators satisfy members much better by being able to report a $.20 per hour wage increase than four extra vacation days per year or the like.[1]

2) Unions are more likely to be present in industries where non-pecuniary payments are lower. This is truer of the industrial unions than the craft unions. The industrial unions were first organized in industries where working conditions were hazardous and generally undesirable. The production techniques were such that large numbers of workers were brought together in the same physical location. Collective action was both motivated and facilitated by these two factors. Even though unions have undoubtedly increased both the pecuniary and non-pecuniary rewards of these jobs tremendously, there are limits to the extent to which non-pecuniary payments can be received from certain production techniques. The assembly line needs a certain number of workers to keep it operating and, thus, some restrictions on the flexibility of work hours will always be associated with it. The way in which some plants are organized necessarily restricts the amount of choice in work that is available to many of the workers.

An accurate assessment of the effect of unions on non-pecuniary payments can be made only after industrial and production technique differences have been taken into account. The Panel data allow only a rather crude adjustment for industrial differences. A 22 category industrial classification variable will be used. The detail that this variable provides can be seen in some typical classifications: manufacturing durables - metal industries, manufacturing durables - motor vehicle and other transportation equipment, manufacturing non-durables - textile mill products, and construction.[2] There will certainly be variability in industry characteristics within these groupings, but the industry variable will provide some control for the considerable between-industry variability. The overall estimate of the effect of union membership on non-pecuniary payments will

---

[1] The extent to which non-pecuniary issues are important will vary from union to union. Recent talks between the United Auto Workers and the auto companies are an example of collective bargaining where non-pecuniary issues are quite important. Macroeconomic stabilization plans which include wage increase "guidelines" or actual legal limits to wage increases may increase the importance of non-pecuniary issues. From a more long run perspective, however, the emphasis in collective bargaining has usually been on pecuniary matters.

[2] A complete listing of this variable is given in the regression results presented in Appendix Table A6.2.

necessarily remain influenced by the intra-industrial differences.

While it is expected that union membership on the average will lower non-pecuniary benefits, and raise wages, this is not necessarily true for all sub-groups of workers. The effect may vary by occupation, industry, or personal characteristics. Boskin (1972) found a differential between union, nonunion wages by occupation. Among the highly unionized occupations, the wage effect was largest for laborers, smaller but still substantial for craftsmen and operatives, and low for clerical and sales workers. It is quite plausible that substantial differences in non-pecuniary benefits exist among those groups. Unskilled laborers have perhaps the least desirable job conditions and would stand to gain the most in non-pecuniary payments from unionization. The flexibility that the union contract supposedly takes away may not have been there in the first place for unskilled laborers. Among higher status occupations, the effect of unionization on non-pecuniary payments should be more negative. Skilled workers, especially when aggregate economic conditions are favorable, will find nonunion employers offering more desirable jobs at almost comparable wages.

To estimate the effect of union membership on various payoffs, personal characteristics, occupation, and industry need to be taken into account so that the estimated union effect is not really an education effect or an occupation effect. Personal characteristics will be controlled for by the inclusion of the same set of variables that have been used in the previous sections: education, job tenure, test score, age, father's education, father's occupation, size of place where grew up, whether veteran, achievement motivation, and city size. The one-digit occupation classification variable is included to control for occupational differences in the payoffs. Finally, the industrial classification mentioned earlier will also be included. The statistical technique that will be used to estimate the effect of union membership while controlling for the other variables is dummy variable regression (MCA) which gives adjusted mean payoff scores for the two union status groups. Since the various payoff measures have different variability, a simple percentage difference in mean payoff would understate the "actual" difference for payoffs with low variability. To make differences comparable, the effect of union membership on the payoffs will be expressed as a percentage of the standard deviation of the payoff.

The three payoff measures used in the previous section will also be used here. They are (1) wage rate, (2) an index of wages and non-pecuniary payments weighted by canonical correlation and called the *regression index*, and (3) a *utility index* of wages and non-wage payments which gives equal weight to each non-pecuniary payment and then weights all of them equally with the wage rate.

Table 6.8 presents the estimated effect of union membership on the three payoff measures. Also included is the simple percentage difference in wage rates which should be roughly comparable to other wage studies on the effect of unionization. The full set of adjusted mean payoff scores for all important independent variables is presented in Table A6.2 in Appendix 6.1.

TABLE 6.8

Effect of Union Membership
on Wages, Regression Index and Utility Index

	Wage Rate			Regression Index of Wage Rate & Non-Pecuniary Benefits	Utility Index of Wage Rate & Non-Pecuniary Benefits
	Adjusted Mean Wage	Percent Difference	Difference as % of Standard Deviation of Payoff	Difference as % of Standard Deviation of Payoff	Difference as % of Standard Deviation of Payoff
Union member	$5.20	7.4%	11.0%	5.1%	7.1%
Nonunion	$4.84				

MTR7056

When personal characteristics, occupation, and industry are taken into account, the estimated wage for union members is $5.20, compared to $4.84 for nonunion workers -- a difference of 7.4%. This is somewhat less than other estimates with individual data but it may be attributed to differences in years for which the data were gathered (those presented here are the average wage rates for the calendar years 1970 and 1971), differences in sample (we do not, for example, exclude self-employed or college graduates as Stafford (1968) did), or differences in the extent to which industry is taken into account (the 22-category classification used here is more detailed). It will be seen later that while this estimated effect is smaller than that of other studies, the differential effect of union membership on wage rate by occupation is the same.

The relative wage effect, when expressed as a fraction of the standard deviation of wage rates, is 11.0%.[1] As hypothesized, the effect of union membership on earnings declines when non-pecuniary factors are added into the wage concept. Using the regression index of wage and non-wage payments, the difference is estimated to be 5.1%; for the utility index the difference is 7.1%.

[1] It will be recalled that differences must be expressed in this way to be comparable among the payoff measures.

To see if there are differences in wage and non-wage payments for union membership by occupation, union membership was interacted with occupation in the regression. Results for the four most highly unionized occupations are presented in Table 6.9.

The extent to which the effect of union membership depends on the payoff measure used and occupation is quite striking. While the overall estimated union effect declines when non-pecuniary considerations are added to wages, the effect for unskilled earners alone is exactly the opposite. The wage effect of union membership on them is 18%, the wage-non-pecuniary index effect is 24% or 34%, depending on the way in which pecuniary and non-pecuniary characteristics are combined. It indeed appears that the restrictive working conditions unions entail do not show up for the unskilled laborers. The alternative employment opportunities facing union unskilled laborers are jobs with both lower pay and less desirable conditions.

TABLE 6.9

Effect of Union Membership on Wages,
Regression Index and Utility Index, by Occupation

		Wage Rate		Regression Index of Wage Rate & Non-Pecuniary Benefits	Utility Index of Wage Rate & Non-Pecuniary Benefits	
Occupation	Percent Union members	Percent Wage Differences	Difference as % of Standard Deviation of Payoff	Difference as % of Standard Deviation of Payoff	Difference as % of Standard Deviation of Payoff	Number of Observations
Operatives	61%	12.4%	14.0%	6.0%	3.4%	205
Craftsmen & Foremen	52	9.7	14.0	9.0	13.6	296
Unskilled Laborers	41	15.1	18.0	24.0	33.9	86
Clerical & Sales	33	5.1	7.0	1.0	5.1	135

MTR7056

For higher status occupations the union effect on the different payoff measures is more in line with the notion that unions lower non-pecuniary payments. This is most clearly the case for operatives -- the wage effect of unionization for them is 14%, the wage-non-wage effect is 6% or 3%, depending on the payoff measure used. In the categories "craftsmen and foremen" and "clerical and sales" the union effect depends critically on the payoff measure used. Using the regression index as the payoff measure results in a considerably lower union effect

than if the utility index is used. Recalling that the two indexes differ in that the utility index weights the payoff variables "job enjoyability" and "whether free to decrease work hours" much more than the regression index, it appears that union membership has a positive association with these variables for the craftsmen and clerical and sales workers. Why this is so is not immediately obvious.

In summary, the inclusion of the non-pecuniary variables in a measure of labor earnings diminishes the effect of union membership. Studies which use only pecuniary measures of payoff will overstate the union-nonunion differential. This result varies among occupations, however. For unskilled laborers, union membership is associated with both higher wages *and* higher non-pecuniary benefits. The importance of unions to them is *understated* if non-pecuniary benefits are omitted. For more highly skilled occupations, the effect of union membership is *overstated* if non-pecuniary benefits are omitted.

V. Changes in Wages and Non-Pecuniary Benefits Over Time

The previous sections of this chapter have used a cross-section of individuals in the labor market to describe the structure of the market with respect to wage rates and non-pecuniary payments. When it was observed that individuals with similar earning capacities in different job groups had different combinations of wage and non-wage payments, it was implicitly assumed that individuals could alter their mix of payments by changing job groups. Since the self-employed, for example, earned higher non-pecuniary payments and lower wage rates than the non-self-employed, it was stated that individuals opting for self-employment would do so at a sacrifice in wage rate and an increase in non-pecuniary payments.

There are reasons why inferences about dynamics from cross-section data may not hold. The principal one is that the static analysis assumed that every worker was earning as many wage and non-wage payments as he could, given his earnings capacity and choice of job group. Everyone, in other words, was assumed to be in equilibrium, and only a *change* in preferences or earnings capacity would prompt a job change. Obviously, this is not necessarily the case. At any point in time some individuals earn according to their capacities, but others find themselves in jobs that aren't matched to their preferences or capacities. Still others may have been lucky enough to find jobs that pay abnormally high wages and non-pecuniary benefits. Jobs themselves change from year to year also. As the economy goes through the business cycle, many changes occur in the availability and content of jobs. To investigate these changes, longitudinal data are needed. The Panel data are of this kind and the changing wage and non-wage payments of

individuals over time will be discussed in this section.

The exact nature of the dynamic data is discussed in Section I. Briefly, they are from the 1968 and 1971 interviewing years. Five payoff measures (in addition to wage rates) are available: freedom to increase work hours, freedom to decrease work hours, choice in work, income stability, and employment stability. Each is made into a dichotomous variable, taking values of one or zero. A non-pecuniary payoff index for both years is obtained by simply summing the five variables.

Economic conditions in 1968 and 1971 differed dramatically and changes in the job market most certainly occurred. Aggregate demand was very high in 1968; the unemployment rate averaged a very low 3.6%. By 1971, the economy had turned down; unemployment averaged 5.9%.

A comparison will be made between the wage rates and non-pecuniary variables in the two different years. Money wages rose substantially. The average wage rate in 1968 was $3.71 per hour. By 1971 this had risen to $5.31, an increase of 38%.[1] In contrast to money wages, the index of non-pecuniary benefits *declined* to 3.10 (out of 5) from 3.38 -- an 8% decrease. A fall in the index is to be expected as aggregate economic activity slackens. The employment stability measure (which equals zero if the individual was laid off or went on strike in the previous year) will certainly fall. Also, as the labor market loosens, it is expected that workers will have fewer options about working overtime or working shorter hours. Finally, as the business cycle turns down it will be expected that income would become less stable. Table 6.10 shows the change in each individual payoff variable between 1968 and 1971 and it confirms that all of these variables indeed declined as expected. What is somewhat surprising, though, is that the amount of choice in work that individuals reported in 1971 declined as much as did any other payoff variable. This decline may be connected to cyclical fluctuations in the economy, or may be a part of a long-term decline in the quality of work which has received so much recent attention.

The decline in non-pecuniary payments occurred in both blue and white collar occupations. The index dropped 7.9% for the blue collar group, 7.5% for white collar occupations. Table 6.11 presents the incidence of non-pecuniary payment decline by the occupation held in 1968. As would be expected, the self-employment occupations were the only ones that escaped the decline. Farmers and self-employed businessmen experienced large increases in wage rate and small increases in the index of non-pecuniary payments. The remaining occupations suffered

[1] Part of this increase, of course, is due to increases in the cost of living. The Consumer Price Index rose 16.3% between 1968 and 1971.

TABLE 6.10

Change in Non-Pecuniary Payoff Variables
between 1968 and 1971

Payoff Variable	Index Change
Whether free to increase work hours	-.07
Whether free to decrease work hours	-.07
Choice in Work	-.07
Income stability	-.06
Employment stability	-.02
Total	-.28

N=2058

TABLE 6.11

Percentage Changes in Wages and Non-Pecuniary Payments
by 1968 Occupation

Occupation	Percent Wage Change	Percent Non-Pecuniary Index Change	Number of Cases
Professional, technical and kindred workers	29%	-10.2%	264
Managers, officials, and proprietors	29	- 7.9	179
Self-employed businessmen	50	1.0	102
Clerical and Sales workers	37	-9.3	202
Craftsmen, foremen and kindred workers	35	-11.3	440
Operatives and kindred workers	48	- 8.2	423
Laborers, service workers and farm laborers	65	- 6.8	313
Farmers and farm managers	120	6.8	83
Miscellaneous (armed services and protective workers)	54	-17.6	52

significant declines in the index. When changes in the individual non-pecuniary payment variables are examined among the occupations (data not shown) they do seem to be roughly proportional to the decline in the total index. Only for the "choice in work" payoff variable is there a statistically significant difference among occupations. The occupational differences for changes in this variable are presented in Table 6.12. The high status occupations of professionals and managers suffer the largest absolute drop in this variable besides the miscellaneous occupations group. Respondents in the blue collar occupations, on the whole, do not report less choice in their work in 1971 than 1968.

TABLE 6.12

Change in "Choice in Work" Score, by Occupation

	Change in Mean Choice in Work
Professional	-.18
Manager	-.12
Self-employed businessmen	-.02
Clerical and sales	-.07
Craftsmen and foremen	-.05
Operatives	.00
Unskilled laborers	.00
Farmers	.05
Miscellaneous	-.16

MTR7053

Movement between jobs and job groups is a way in which workers can change their mix of wages and non-pecuniary characteristics. Results presented in Section II based on cross-section data showed that blue collar job groups seemed to conform more to the idea that there are trade-offs between wages and non-pecuniary characteristics than the white collar groups. To see if this is confirmed with longitudinal data, wage and non-wage payment changes are averaged for the various job changes by collar color groups. These averages are presented in Table 6.13. They show that blue collar job changers increased their wages considerably more than blue collar workers who did not change jobs. They did so, however, at the expense of non-pecuniary job payments. Blue collar job changers experienced almost twice the fall in the index of non-pecuniary benefits than did those who did not change jobs. White collar job changers, on the other hand, were able to earn both higher wages and enjoy a slightly smaller drop in the non-pecuniary index than the white collar individuals who did not change jobs. Those

TABLE 6.13

1968 Level and 1968-71 Percentage Change in Wages
and Non-Pecuniary Index, by Job Change and Collar Color Groups

No Job Changes	1968 Wage Level	1968 Index Level	Percent Change in Wages	% Change in non-pecuniary Index	Number of Cases
Blue collar both years	$3.16	3.12	43%	- 7.7%	816
White collar both years	4.65	3.80	29	- 7.1	480
Job Changes					
Blue collar both years	2.70	2.83	56	-13.1	371
White collar both years	4.19	3.56	39	- 5.9	200
Blue collar 1968, white collar 1971	3.58	3.45	43	- 6.4	124
White collar 1968, blue collar 1971	3.25	3.43	41	-20.4	67
Mean	$3.71	3.38	38%	- 8.3%	

who changed from blue to white collar occupations showed an average wage increase and a smaller than average fall in non-pecuniary payments. Those who began in white collar work and ended with a blue collar job also showed an average wage increase but fell precipitously in their non-pecuniary payments. Many of the job changes for individuals in this latter category may have been involuntary.

When the working poor (defined as heads of households where the total family income adjusted for needs was in the bottom population quintile any of the four years 1968-1971) are looked at separately, results are quite similar to those of the entire population of blue collar workers. Whether they changed jobs made little difference in their wage increase ($1.48 for changers vs. $1.42 for those with the same job) but made a large difference in the change in the non-pecuniary payment index. Job changers suffered a 10% fall in the index; those with the same jobs had a 2% decline.

It is also interesting to look at changes in the wages and non-pecuniary payments of those changing job groups. From the theory developed in Section II, it would be expected that those joining unions would experience a substantial increase in wages and a larger than average fall in non-pecuniary payments. For those quitting a union, the opposite would occur. Table 6.14 presents the initial levels and changes in wage and non-wage payments for those in different union status groups. Those joining unions began with a lower average wage than others, but enjoyed the largest absolute and relative wage increase during the four-year period. Their wages went up almost 60%. As expected, a cost of this wage increase appears to be a larger than average (14% vs. 8%) fall in non-pecuniary benefits. Those who quit unions had an average wage increase and slightly below average drop in non-pecuniary benefits.

Self-employment is a way in which individuals can select non-pecuniary characteristics at the expense of pecuniary reward. Table 6.15 shows the working population distributed by self-employment status groups. Those who became self-employed did in fact have lower wage increases and have a slightly smaller decline in the non-pecuniary index. For those quitting self-employment, the predicted effect is much more obvious. They enjoyed almost twice the mean wage increase and suffered almost twice the mean non-pecuniary index fall.

A separate look at the wage and non-pecuniary index changes for the working poor is given in Table 6.16.[1] The mean levels and changes for the entire target population is given at the bottom of the table for purposes of comparison with

[1]The classification of that population into types of job group changes is neither exclusive (some may have quit unions and become self-employed) nor exhaustive (it omits those who were neither union members nor self-employed for the period).

TABLE 6.14

1968 Level and 1968-71 Percentage Change in Wages
and Non-Pecuniary Index by Union Status Groups

	1968 Wage Level	1968 Index Level	Percent Change in Wages	% Change in non-pecuniary Index	Number of Cases
Joined union	$2.78	2.94	59%	-14.0%	152
Quit union	3.21	3.26	40%	- 7.7	90
Remained in union	3.88	3.09	35	-10.7	510
Remained non-union	3.76	3.55	38	- 7.0	1306
Mean	$3.70	3.38	38%	- 8.3%	

MTR7053

TABLE 6.15

1968 Level and 1968-71 Percentage Change in Wages
and Non-Pecuniary Index by Self-Employment Status Groups

	1968 Wage Level	1968 Index Level	Percent Change in Wages	% Change in non-pecuniary Index	Number of Cases
Became self-employed	$4.07	3.62	32%	- 8.0%	94
Quit self-employment	3.13	3.73	66	-15.0	77
Remained self-employed	3.61	3.80	39	- 1.1	243
Remained working for someone else	3.73	3.27	38	- 9.5	1644
Mean	$3.70	3.38	38%	- 8.3%	

MTR7053

TABLE 6.16

1968 Level and 1968-71 Percentage Change in Wages and Non-Pecuniary Index, by Union and Self-Employment Group, for Target Population

	1968 Wage Rate	1968 Non-pecuniary Index	Absolute Change in Wage Rate 1968-71	% Change in Wage	Percent Change in pecuniary Index	Number of Cases
Joined union	$2.07	2.65	$1.80	87%	-12.4%	84
Quit union	2.94	3.02	1.05	36	- 8.6	42
Became self-employed	2.26	3.15	1.46	65	3.8	29
Quit self-employment	1.77	3.06	1.58	89	-13.4	31
Stayed in union	3.09	2.60	1.39	45	- 7.7	166
Stayed self-employed	1.58	3.52	1.39	88	4.5	96
Mean for the entire target population	$2.21	2.99	$1.44	65%	- 4.7%	769

the other groups.

It is for the working poor that the hypothesis that there are tradeoffs among job groups is most appropriate. Those who experienced the largest absolute wage increase did so by obtaining union jobs. But at the same time they suffered a fall in non-pecuniary characteristics equal to three times the mean. The group that enjoyed the second highest absolute increase in wages was composed of those quitting self-employment and going to work for someone else. Their fall in non-pecuniary payments, however, was even sharper than for those joining unions. Average or below average wage increases occurred to those quitting unions or becoming self-employed. For the latter group, the modest wage increase was compensated by an increase in non-wage payments. For those quitting unions, the decline in relative wages was not matched by a smaller than average decline in the non-pecuniary index.

SUMMARY

The findings of this chapter can be summarized as follows:

1) Using five measures of non-pecuniary characteristics from the Panel data, it is seen that there are significant and understandable variations in wage and

non-wage payments by different occupational classifications. High status occupations score above average on all of the payoff variables, lower status occupations score consistently below average on all of them. The self-employed have highly desirable jobs except for the income instability they experience, union members score lower than nonunion members on non-pecuniary variables.

2) The idea that an individual can change his combination of wage and non-wage payments by changing jobs is confirmed by both cross-section and longitudinal data. Those leaving self-employment and/or joining unions had higher wage rates and fewer non-pecuniary payments. Those becoming self-employed and/or quitting unions had lower wage rates and higher non-pecuniary benefits. These tradeoffs between wage and non-wage payments are especially noticeable for the working poor and blue collar workers in general.

3) The addition of non-pecuniary payments to the wage concept has several important implications for the effects of variables commonly included in wage studies. The importance of years of schooling and job tenure increases with the addition of non-pecuniary payments; the age-earnings profile flattens out. Socio-economic background variables do not increase in importance when non-pecuniary considerations are combined with wage. Finally, achievement motivation becomes significant when non-wage payments are included.

4) The impact of labor unions on earnings is overestimated if non-pecuniary considerations are not taken into account. Depending on the way in which wage and non-wage payments are combined, the estimated impact of union membership drops by one-third to one-half. This result is not the same for all occupations, however. For unskilled laborers, the importance of union membership is drastically *understated* if non-wage considerations are omitted. For the higher status occupations, as for the working population as a whole, the effect is *overstated*.

5) During the four year period 1968-1971, there was a general decline in non-pecuniary payments. While part of this decline is certainly due to a downturn in the economy, some of it may be independent of aggregate economic conditions. The decline did not occur among the self-employed occupations.

6) Many of those who changed jobs between 1968 and 1971 had differential changes in wage and non-wage payments. White collar job changers ended up with higher than average wage gains and slightly smaller than average non-pecuniary losses. Blue collar job changers, however, while managing higher wage gains, suffered much larger than average losses in non-pecuniary payments.

References

Atkinson, John W., "Motivational Determinants of Risk-Taking Behavior," in Atkinson and Feather (eds.), A Theory of Achievement Motivation, John Wiley, New York, 1966, pp 11-29.

Boskin, Michael J., "Unions and Relative Real Wages," American Economic Review, Vol. LVII, No. 3, June 1972, pp 466-472.

Bowles, Samuel, "Schooling and Inequality from Generation to Generation," Journal of Political Economy, Vol. 80, No. 3, May/June 1972, pp S219-S251.

Seashore, Stanley E., "Job Satisfaction as an Indicator of Quality of Employment," paper presented to the Symposium on Social Indicators of the Quality of Working Life, Canada Department of Labor, Ottawa, February 1973.

Stafford, F. P., "Concentration and Labor Earnings: Comment," American Economic Review, Vol. LVIII, No. 1, March 1968, pp 174-180.

TABLE A6.1

Standardized Regression Coefficients (with Standard Errors in Parentheses) of Wage Determinants for Wage Rate, Utility Index and Regression Index

Independent Variable	Wage Rate	Utility Index	Regression Index
Education	.291 (.030)	.352 (.030)	.337 (.030)
Job tenure	.061 (.028)	.074 (.028)	.076 (.028)
Test score	.097 (.027)	.091 (.027)	.096 (.027)
Age	1.100 (.159)	1.030 (.156)	1.080 (.156)
Age^2	-.966 (.156)	-.879 (.153)	-.923 (.153)
Father's Education	.044 (.028)	.037 (.027)	.033 (.027)
Father's Occupation	-.008 (.029)	.011 (.029)	.004 (.029)
Size of place where grew up	.110 (.029)	.079 (.028)	.099 (.028)
Whether veteran	.006 (.025)	-.018 (.025)	-.015 (.025)
Achievement motivation	.018 (.025)	.082 (.025)	.056 (.025)
City size	.163 (.026)	.095 (.026)	.127 (.026)
Standard error of estimate	.024	.023	.023
R^2	.278	.304	.305

TABLE A6.2

Unadjusted and Adjusted Mean Payoff Scores, by Categories of Independent Variables[a]

Independent Variable	Number of Heads	Wage Rate		Regression Index		Utility Index	
		Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Age of Head		β^2 = .021		β^2 = .018		β^2 = .014	
<25	79	$3.23	$4.03	1.81	2.12	9.62	9.80
25-34	323	4.33	4.40	2.23	2.25	9.88	9.89
35-44	331	5.41	5.51	2.52	2.45	10.04	9.99
45-54	331	5.66	5.31	2.59	2.49	10.08	10.01
55-64	206	4.96	5.41	2.44	2.55	9.97	10.02
≥65	40	3.71	4.11	2.13	2.17	9.85	9.84
Test Score		β^2 = .016		β^2 = .014		β^2 = .013	
<4	11	3.10	4.06	1.69	2.06	9.53	9.78
5-6	46	3.25	4.37	1.88	2.27	9.64	9.89
7	65	3.65	4.61	1.90	2.24	9.67	9.87
8	135	4.01	4.64	2.07	2.30	9.78	9.92
9	192	4.40	4.75	2.20	2.33	9.83	9.90
10	304	4.49	4.63	2.30	2.33	9.92	9.93
11	283	5.46	5.13	2.58	2.47	10.08	10.01
12	197	6.25	5.64	2.80	2.60	10.20	10.08
13	77	7.02	5.62	3.02	2.56	10.30	10.03
Achievement Motivation		β^2 = .004		β^2 = .005		β^2 = .008	
<6	123	3.71	4.83	1.93	2.28	9.68	9.88
7	114	4.67	4.83	2.34	2.40	9.91	9.95
8	168	4.55	4.88	2.26	2.38	9.89	9.96
9	182	4.93	4.97	2.40	2.42	9.95	9.96
10	190	4.83	4.64	2.40	2.34	9.98	9.94
11	173	5.68	5.36	2.66	2.55	10.13	10.07
12-13	206	5.67	5.05	2.65	2.44	10.13	10.01
14-16	154	4.99	4.99	2.34	2.36	9.91	9.92
Industry		β^2 = .021		β^2 = .028		β^2 = .028	
Agriculture, Forestry & Fishing	77	2.24	4.93	1.70	2.29	9.61	10.00
Mining & Extraction	15	4.63	5.41	2.17	2.47	9.81	9.96
Manufacturing Durables:							
metal industries	44	4.93	5.46	2.27	2.52	9.86	10.01
machinery	83	5.10	4.92	2.35	2.34	9.92	9.92
motor vehicle	81	5.29	5.06	2.44	2.45	9.94	9.96
other durables	59	4.33	5.03	2.24	2.50	9.86	10.01
other durables, N.A. what	12	4.61	4.37	2.27	2.22	9.87	9.82
Manufacturing, Non-Durables:							
food	35	4.62	5.00	2.17	2.38	9.81	9.95
textile mill products	18	3.41	4.81	1.83	2.37	9.65	9.97
chemical: petroleum,coal,rubber	42	5.84	5.66	2.64	2.60	10.08	10.07
other	22	5.72	5.13	2.58	2.44	10.08	10.01
Construction	120	5.41	5.80	2.55	2.70	10.07	10.14
Transportation	67	4.68	5.04	2.34	2.47	9.93	10.01
Communication	16	5.18	5.33	2.69	2.76	10.17	10.19
Other public utilities	37	4.81	4.73	2.40	2.41	9.99	10.00
Trade	162	4.55	4.73	2.34	2.36	9.96	9.95
Finance, Insurance	59	6.68	5.85	2.99	2.67	10.32	10.11
Repair Service	26	3.08	3.99	1.99	2.25	9.73	9.86
Business service	17	5.23	4.70	2.41	2.25	9.96	9.87
Other services	208	5.83	4.52	2.69	2.27	10.13	9.90
Government	76	5.15	4.49	2.36	2.17	9.96	9.83
Other	34	4.28	4.10	2.03	2.06	9.73	9.69
Education		β^2 = .095		β^2 = .109		β^2 = .110	
None	15	2.20	3.47	1.56	1.97	9.45	9.69
0-5 grades	31	3.12	4.00	1.77	2.08	9.60	9.72
6-8 grades	166	3.46	3.97	1.88	2.05	9.66	9.77
9-11 grades	208	4.08	4.28	2.05	2.15	9.75	9.81
High school graduate	311	4.44	4.75	2.25	2.34	9.88	9.93
High school + non-academic training	137	4.95	4.66	2.45	2.38	10.00	9.96
Some college	213	5.38	5.07	2.56	2.44	10.06	9.99
College graduate	145	6.89	6.15	3.07	2.81	10.40	10.24
Advanced or professional degree	84	8.73	8.01	3.59	3.35	10.65	10.52

TABLE A6.2
(continued)

Independent Variable	Number of Heads	Wage Rate Unadjusted	Wage Rate Adjusted	Regression Index Unadjusted	Regression Index Adjusted	Utility Index Unadjusted	Utility Index Adjusted
Where Head Grew Up		β^2 = .015		β^2 = .013		β^2 = .010	
Farm, rural area	442	$3.97	$4.51	2.11	2.27	9.81	9.90
Town, Suburb	518	5.00	4.92	2.41	2.40	9.98	9.98
Large city	350	6.13	5.56	2.75	2.57	10.15	10.05
City Size		β^2 = .018		β^2 = .018		β^2 = .010	
<10,000	208	3.47	4.34	1.97	2.23	9.76	9.90
10,00-24,999	154	3.98	5.56	2.15	2.31	9.84	9.93
25,000-49,999	94	4.83	4.90	2.34	2.39	9.94	9.97
50,000-99,999	172	4.65	4.53	2.30	2.27	9.90	9.88
100,000-500,000	319	5.27	5.19	2.51	2.48	10.04	10.03
>500,000	363	6.11	5.48	2.71	2.53	10.12	10.02
Job Tenure		β^2 = .016		β^2 = .018		β^2 = .016	
Less than 2½ years	294	4.23	4.39	2.17	2.22	9.85	9.88
2½-6½ years	431	4.74	4.75	2.33	2.33	9.93	9.93
6½-14½ years	305	5.67	5.47	2.61	2.56	10.07	10.06
More than 14½ years	280	5.25	5.29	2.54	2.52	10.04	10.05
Occupation		β^2 = .041		β^2 = .042		β^2 = .055	
Professional	224	6.88	5.38	3.04	2.56	10.34	10.06
Manager	184	6.71	6.15	3.01	2.81	10.35	10.25
Self-employed businessmen	84	4.55	4.54	2.46	2.40	10.03	9.99
Clerical and Sales	135	4.54	4.56	2.30	2.30	9.92	9.92
Craftsmen and Foremen	297	4.62	4.90	2.24	2.32	9.87	9.92
Operatives	205	3.96	4.76	1.96	2.24	9.67	9.84
Unskilled Laborers	86	2.93	4.14	1.72	2.14	9.55	9.79
Farmers	53	1.99	3.14	1.74	2.17	9.64	9.76
Miscellaneous	42	4.17	4.73	2.02	2.26	9.74	9.91
Union Membership		β^2 = .003		β^2 = .0006		β^2 = .001	
No	891	4.98	4.84	2.45	2.38	10.01	9.95
Yes	419	4.90	5.20	2.29	2.43	9.89	9.99
		(Adjusted) R^2 = .339		(Adjusted) R^2 = .367		(Adjusted) R^2 = .377	
$\bar{Y}$		$4.95		2.40		9.97	
Standard deviation of Y		3.28		1.00		0.59	

[a] Independent variables with β^2 < .01 for all payoff variables are not shown.

MTR7056

Chapter 7

ASPECTS OF THE VARIABILITY OF FAMILY INCOME

INTRODUCTION

Even a cursory examination of families' incomes shows how greatly they vary from one time to another. Part of this variation can be attributed to fluctuations in the economy or to changes in families' real income-earning capacities, but much of it appears to be due to chance occurrences at the individual level. For some investigative purposes this apparent random variability can be ignored, but for many it should not.

This paper brings together some evidence and arguments relating to the phenomenon of income variability. The study examines the distributional incidence, explores some effects on attitudes, and notes some methodological implications of this variability.

Year-to-year changes in the income status of individuals were analyzed by Friedman and Kuznets (1945), and were important in Friedman's (1957) study of the consumption function. The flourishing literature on the permanent income theory of consumption has led to ingenious techniques for abstracting from, or ignoring, transitory income.

Students of the distribution of income have sometimes noted the variability of family incomes over time. Using a panel of Wisconsin taxpayers, David (1971) examined the relative income status of individuals, and measured the variation of income among individuals in occupation-age groups as well as the variability of individuals' incomes over time. Recently, other researchers have looked directly at this phenomenon. Kohen, Parnes, and Shea (1972) used panel data for two and three years to calculate "relative instability coefficients" for individual men in different age groups, and examined the instability characterizing various subgroups; in addition, they tried to isolate the sources of the instability. Chapter 6, Volume I uses five-year reports from the Panel Study of Income Dynamics, and analyzes income instability and factors associated with it.

A problem with these studies is that they tend to lump together all changes of income in a single measure of instability. For purposes of distributional analysis, it may be useful to consider separately three types of income change: (1) change due to fluctuations in the economy and inflation, (2) change due to

real growth in family income-earning capacity, and (3) change due to a host of economic phenomena of a chance or ephemeral nature--illness, unusual overtime, or job shifting, to name a few. The analysis of "income variability" in this study relates only to the effects of the third group of factors.

ANALYSIS

I. A Measure of Income Variability

To abstract from income change of the first type, consider a relatively short sequence of time periods characterized by steady-state growth conditions on the aggregate level. Let the i^{th} family's income be determined as

$$y_i(t) = x_i \cdot (1 + g_i)^t \cdot e^{u_i} \qquad (1)$$

where $y_i(t)$ is the income received in period t,

x_i is a never-observed income base,

g_i is a real rate of growth,

and u_i is a random variable with mean zero.

The family's income is composed of two components: $x_j \cdot (1 + g_i)^t$, the family's permanent income,[1] which is growing at rate g_i; and e^{u_i}, a multiplicative transitory component which depends on the random term u_i.

The real growth rate, g_i, may vary among families because of life-cycle reasons: families' earnings tend to grow rapidly in early years, and then grow more slowly with increasing age--even decreasing before retirement. In addition, among families of the same age, growth rates will vary according to occupational and human capital investment patterns.

A comparison of the income variability of different families reduces to a comparison of the probability distributions of the random determinant, u_i. If each u_i were assumed to be normally distributed, then the standard deviation σ_{u_i} would completely characterize each distribution. This standard deviation is adopted as the measure of each family's income variability in this study.[2] If

---

[1] In this interpretation, a family's permanent income may be continuously changing. No substantive or semantic problems are created by this interpretation, and it is fully consistent with Friedman's (1957) seminal discussion.

[2] For distributions other than the normal, σ_{u_i} does not fully describe what one would want to mean by variability; indeed, for some distributions the standard deviation does not exist. These problems are not too pressing, however, for the empirical sections of this paper.

the standard deviations, σ_u, for two families are equal, they are said to be subject to the same "variability." Of course, being subject to the same variability does not necessarily mean being equally well off; this is a matter to be considered below.

In an unchanging steady-state macroeconomic environment, chance variations in income are reasonably viewed as multiplicative rather than additive, especially for purposes of comparison among families. For example, one week of unemployment decreases the actual incomes of all workers affected in proportion to their permanent incomes.

This simple model will be used to examine the effects of income variability in a panel sample of the United States population for the years 1967-1969, which were years of full employment and fairly steady growth. After deflating income items by changes in the Consumer Price Index, and restricting the analysis to these years, the working presumption is made that the data reflect family income experiences in a steady growth economy. Taking natural logarithms of equation (1),

$$\log y_i(t) = \log x_i + t \cdot \log (1 + g_i) + u_i \qquad (2)$$

$$\text{or} \quad \log y_i = \alpha_i + \beta_i \cdot t + u_i \quad . \qquad (2')$$

Fitting this trend line to the data separately for each family provides estimates of the three dimensions of income: $\hat{\alpha}_i$ is permanent income level (when t = 0), $\hat{\beta}_i$ is a measure of the income trend ($\beta_i \simeq g_i$ for small g_i), and $\hat{\sigma}_{u_i}$ is the measure of income variability.

The data used are the first three years of the Panel Study of Income Dynamics. To focus on units with relatively continuous income-earning capacity, those families in which the head or the head's spouse changed over the course of the sample period are excluded. The primary income concept used here is pretax total money income, which includes all family members' labor earnings, transfer payments, and income from capital. Capital gains and losses are not included.

Equation (2') is fitted separately for each family, using ordinary least squares with three income observations (1967-1969).[1] The resulting estimates

[1] For each family, estimated permanent income for 1968 is the midpoint of the fitted line and is equal to the geometric mean of the three income observations. The measure of income variability, $\hat{\sigma}_u$, is taken to be the root mean square error around the least squares line. More efficient estimates of σ_u could be obtained if one knew the actual rate of growth of families' incomes. Holbrook and Stafford (1971) attempted this in a consumption study using extraneous information on the growth of class incomes. Of course, this is not "knowing" the growth rates, and such an ad hoc procedure has unknown effects.

are subject to considerable error, but nonetheless provide useful measures. These estimates of permanent income level (for the middle year, 1968), trend, and variability are then added to the basic data set containing three years' observations on approximately 3,700 stable families.

II. The Incidence of Income Variability

The measure of variability developed above is useful for comparing the relative uncertainty attached to the income anticipations of different families. Families whose random determinants have the same probability distribution face equal prospects of having their observed incomes be any particular proportion of their permanent incomes. Families whose random determinants have a higher variability face greater chances of having their actual incomes be much greater or much less than their permanent incomes.

Income variability may reasonably be regarded as a burden to families--the greater the variability, the greater the burden. On theoretical grounds, the common behavioral assumption that people are averse to risk suggests that most families would prefer to have their incomes come in a steady flow, rather than with some random variation around the same flow. On practical grounds, having a variable source of income makes it more difficult to plan long-term family finances and to contract debt obligations; this is especially so for families with low permanent incomes.

How is the burden of variability distributed among income receivers? One approach to this question is to relate income variability to permanent income level. For this analysis, families were grouped into income classes, and the mean variability measure for each class was computed. This procedure was repeated for three definitions of income: (1) total family income, (2) the sum of the head's and the spouse's labor income, and (3) the head's labor income. Table 7.1 shows these results.

On the average, the measure of variability of total family income decreases as the level of permanent income increases up to $15,000 or so; above this level, the measure of variability increases with income (for more broadly-defined income classes). In assessing these results, it should not be forgotten that there is wide variation among families in each income class.

When the sum of the head's and the spouse's labor income is examined, the measure of variability first decreases then remains level--or wobbles a bit--as permanent income increases. When only the head's labor income is examined, the pattern of variability is similar to that for combined labor income of head and spouse, but the variability is nearly always smaller in magnitude--especially

TABLE 7.1

Income Level Incidence of Variability

Permanent Income Class	Variability		
	Total Family Income	Head and Spouse Labor Income	Head's Labor Income
$ 0-999	.186	.407	.378
$1,000-1,999	.167	.221	.214
$2,000-2,999	.139	.172	.173
$3,000-3,999	.130	.127	.121
$4,000-4,999	.117	.101	.091
$5,000-5,999	.108	.089	.081
$6,000-6,999	.093	.086	.078
$7,000-7,999	.077	.069	.062
$8,000-8,999	.083	.069	.059
$9,000-9,999	.074	.063	.055
$10,000-10,999	.064	.063	.051
$11,000-11,999	.074	.056	.060
$12,000-12,999	.066	.054	.049
$13,000-13,999	.061	.059	.058
$14,000-14,999	.072	.068	.069
$15,000-19,999	.064	.059	.074
$20,000-25,000	.084	.073	.069
Above $25,000	.095	.056	.059

for families with incomes below $10,000. This finding suggests that the spouse's job-holding behavior is not predominantly an offset to current diminutions in the head's income. Rather, it seems that the spouse's jobholding is independent of the head's, or possibly that it serves as an offset but with some lag.

When either labor income variability pattern is compared to that for total family income, the patterns are found to cross. For low income levels, total family income is less variable than total labor income; for these families, transfer payments (including unemployment insurance) help to dampen the variability of income. For high income families (above $20,000), total income is more variable than labor income; in this range, property income, which is highly variable, accounts for the difference.

The reported results were also analyzed for three subgroups of the sample: families with heads aged 25-44, 45-64, and 65 and over. This was done in order to see if the pattern was caused by differences in variability relating to age or life-cycle status.[1] The patterns reported for the entire sample also held for each of the subgroups for incomes up to $15,000 or $20,000. Above this level, sample size does not permit useful disaggregation.

The welfare implications of the relation between variability and level of permanent income are interesting to consider. Measures of the distribution of permanent income are recognized to be useful indicators of the distribution of welfare. But, if income variability leads to a welfare loss, and if this burden is distributed as indicated in Table 7.1, then the distribution of welfare is even more inequitable than one would have determined simply from looking at the distribution of income levels.[2]

III. Attitudinal Effects of Income Variability

Behavioralists have given considerable attention to the direct effects of attitudes on economic behavior. One may expect, however, that the experience of income variability has important feedback effects on persons' attitudes regarding

---

[1] The mean variability in the two older groups are about equal, while that for the youngest groups was somewhat smaller. For the families with heads aged 18-24, which are not analyzed here as a special subgroup, the mean variability was higher than for other age groups.

[2] In this comparison, "inequitable" means that low income families are relatively worse off. Given the U-shaped incidence of the variability of total income, the Lorenz curve of the utilities derived from permanent income anticipations would cross that derived from the level-plus-variability anticipations. The relative inequality in these two states is ambiguous, if one measures inequality by the Gini coefficient.

their economic affairs.

We investigate these effects on three indexes of attitudes: (1) sense of personal efficacy, which is intended to identify the respondent's satisfaction with himself and confidence about his future, (2) trust (or hostility), which is operationalized by the respondent's self-assessment of trust in others, tendency to get angry easily, and sensitivity to what others think, and (3) aspiration, which includes both personality measures and future employment plans. High scores indicate that the respondent (usually the family head) has positive feelings of personal efficacy, trusts other people and the economic environment, and has strong ambitions to improve his economic situation.

As an exploratory analysis of one part of what must be a very complex behavioral system, respondents' attitudes as expressed in 1970 are related in linear regressions to three important dimensions of their families' previous income experience: level (permanent income in 1968), trend, and variability. The results are reported in Table 7.2, for families with permanent incomes less than $25,000.

Level and variability have statistically significant effects on most of the attitude measures, but the regression results hardly stand as a model of attitude formation. The causal direction, of course, is particularly difficult to prove. Yet, it seems quite reasonable that persons' income experiences do shape the way they approach income-earning activities, and the evidence supports this. In particular, variability seems to be a psychological burden as well as an economic one.

High levels of permanent income are associated with increased feelings of efficacy and trust, but decreased ambition. A higher trend (rate of growth of income) has the same effects as a high permanent income level--increased feelings of efficacy and trust, and decreased ambition. On the other hand, the higher the degree of income variability (uncertainty), the lower the sense of efficacy and trust and the higher ambition. Evidently, experiencing variability makes people feel alienated, but it also makes them try harder.

When these regressions are repeated for the three life-cycle subgroups noted above, the results conform closely to the overall behavior. Variability was negatively but insignificantly related to efficacy, while positively and significantly related to trust and ambition for all cases except one, in which significance was lacking for the oldest group. The sign and significance patterns were similar to the overall relations for permanent income level and trend.

TABLE 7.2

Attitudinal Regressions

	Dependent Variable		
	Efficacy	Trust	Ambition
Constant	2.670*	1.901*	2.807*
	(.059)	(.044)	(.057)
Permanent Income	.104*	.058*	-.024*
	(.006)	(.004)	(.006)
Trend	.247*	.136	-.138
	(.109)	(.081)	(.107)
Variability	-.135	-.517*	.978*
	(.233)	(.173)	(.228)
R^2	.09	.06	.01

Note: Parentheses contain standard errors. An asterisk (*) indicates an estimated coefficient which is significantly different from zero, using a 0.05 significance test. The variable means are:

Efficacy	= 3.4
Trust	= 2.3
Ambition	= 2.7
Permanent Income	= 7.29 ($ thousand)
Trend	= .063
Variability	= .10

IV. Implications of Income Variability for Distributional Analysis

If a random component model such as equation (1) describes the essence of the short run determination of family income in a steady state, then investigators of changes in the distribution of income must be aware of certain methodological implications. For example, an appreciation of the various causes of income change, including random variability, is necessary for the analysis of the dimensions of the poverty problem and for the evaluation of various solutions.

In comparing the poverty populations in 1965 and 1966, Terrence Kelly (1970) found that 35% of persons who were poor in 1965 were not poor in 1966. Reportedly, this finding was interpreted by policy makers to mean that the poor can work themselves out of poverty, and therefore that there is little need for special anti-poverty programs. However, this much gross flow past the poverty line can be predicted to be due simply to random fluctuations, with no real change in families' income-earning capacities. This suggests that it remains a reasonable task for the nation to increase the permanent incomes of poor families, by special programs or by other means.

To see how a prediction of gross flows across the poverty line can be made from the random component model, consider a comparison of incomes for families in "before" and "after" periods t_b and t_a, letting all $g_i = 0$ and assuming that each u_i is normally distributed and not auto-correlated. In addition, assume that permanent income (x_i) is lognormally distributed in the population and that each family is subject to the same variability. In the two periods, each family's incomes are determined according to

$$\log y_i^b = \log x_i + u_i^b \qquad (4)$$

$$\log y_i^a = \log x_i + u_i^a \qquad (4')$$

with $\sigma_u^2 \equiv \sigma_{u^b}^2 = \sigma_{u^a}^2$ being equal for all i. In the population,

$$\text{Var}(\log y) \equiv \text{Var}(\log y^b) = \text{Var}(\log y^a) = \text{Var}(\log x) + \sigma_u^2 \ . \qquad (5)$$

In period b, $\log y^b$ has a normal distribution among families, and likewise for $\log y^a$. Therefore, $\log y^b$ and $\log y^a$ have a bivariate normal distribution with positive covariance, and

$$\rho(\log y^b, \log y^a) = \frac{\text{Var}(\log x)}{\text{Var}(\log y)} \ . \qquad (6)$$

Two parameters need to be determined to make the prediction: the correlation coefficient (ρ) between log values of successive years' incomes, and the relative poverty line. Friedman (1957) cites studies indicating that ρ is likely to range between .8 and .9; here, .85 is taken as a reasonable value for this parameter. In 1965, 13.9% of all families and 17.3% of all persons were poor; for convenience, the poverty line is taken to be that income which defines 15.9% of the population as poor.

From tabulations of the bivariate normal distribution (Pearson, 1931) the probability of escaping poverty in period t_a after having been in poverty in period t_b is found to be .335--nearly the same as actually occurred in 1966, according to Kelly. The point to be made is not that the simple model used here fully accounts for the observed facts, but that much of the movement into and out of poverty is due to transitory forces rather than permanent changes in families' income-earning capacities.

A related observed phenomenon is predictable from the simple income variability model: when the inequality of the distribution of income is calculated on the basis of multi-year total income for families, it is found to be less unequally distributed than any one year's income. (See Benus, 1973.) Income variability also presents special problems to investigators wishing to analyze year-to-year changes in the distribution of income (see Mirer, 1973).

SUMMARY

1) Using the standard deviation of the random determinant of income as a measure of instability, we find that families with the lowest income have the greatest instability.

2) The variability in head's income is smaller than the variability in the income of the head and wife, suggesting that income of the wife does not offset transitory changes in the husband's income.

3) The variability of total income is less than that of labor income for low income families while the reverse is true for those with high incomes.

4) Although a full model of attitude formation has not been developed, we do find that both high levels of income and high growth rates are associated with increased feelings of efficacy and trust but with decreased ambition. On the other hand, greater variability may lead to a lower sense of efficacy and trust but greater ambition. Instability seems to be a psychological burden as

well as an economic one.

5) Random variability rather than permanent income changes can account for a great deal of movement into and out of poverty.

The causes of income variability have largely been ignored here; at least from the macroeconomist's point of view, the phenomenon is largely random. However, if variability does lead to a net loss in social welfare, public policy might be implemented to alleviate or shift part of this loss. Unemployment insurance is one existing response to the problem. Further action to help reduce friction in labor markets and to improve job information may yield benefits which would justify its costs.

References

Benus, J. "Dimensions of Inequality." Working paper, Survey Research Center (University of Michigan), 1973.

David, M. "Lifetime Income Variability and Income Profiles," Proceedings of the Annual Meeting of the American Statistical Association, August 1971.

Friedman, M. and Kuznets, S. Income from Independent Professional Practice. New York: National Bureau of Economic Research, 1945.

Friedman, M. A Theory of the Consumption Function. Princeton: Princeton University Press (NBER), 1957.

Holbrook, R. and Stafford, F. "The Propensity to Consume Separate Types of Income: A Generalized Permanent Income Hypothesis." Econometrica, 39 (January, 1971).

Kelly, T. "Factors Affecting Poverty: A Gross Flow Analysis," in the President's Commission on Income Maintenance Programs, Technical Studies. Washington, D.C.: U.S. Government Printing Office, 1970.

Kohen, A., Parnes, H., and Shea, J. "Income Instability Among Young and Middle-Aged Men." Center for Human Resource Research (Ohio State University), mimeo, 1972. (Presented to NBER Conference, October, 1972.)

Mirer, T. "The Distributional Impact of the 1970 Recession." The Review of Economics and Statistics, LV (May, 1973).

Morgan, J. et al. A Panel Study of Income Dynamics: Study Design, Procedures, Available Data (1968-1970 Interviewing Years). Ann Arbor: Survey Research Center, Institute for Social Research (University of Michigan), 1970.

Pearson, K., ed. Tables for Statisticians and Biometricians, Part II. London: University College (Biometric Laboratory), 1931.

Chapter 8

THE INCIDENCE OF SELECTED TAXES BY INCOME CLASSES

INTRODUCTION

Total federal, state, and local taxes paid in fiscal 1971 amounted to $232 billion. This sum equaled 28% of personal income in that year. Thus the average family bore a tax burden equal to about one-fourth of its income. There was certainly a good deal of variation around that figure. Some families probably escaped with a tax burden equal to less than one-tenth of their income while some unfortunates may have effectively paid more than half of their income in taxes. It is obvious that there is plenty of scope in the present structure of taxation in the United States for governments to effect substantial changes in the distribution of after-tax income.

There have been several statistical studies of the size of the burden at different income levels. Some of the studies concentrate on particular taxes or particular states, others attempt to measure the combined burdens of federal, state, and local taxes on all families in the U. S. A common finding in the latter group of studies is that the combined burdens amount to roughly the same proportion of income at all income levels.[1] The equalizing effects of progressive taxes are more or less offset by the opposite effects of regressive taxes, and the tax structure as a whole is seen to leave the distribution of income practically unchanged. Findings of this type are fairly sensitive to the assumptions made about the degree to which particular taxes are shifted, and there continues to be much uncertainty about what assumptions would be most realistic, especially in the areas of corporate income taxation and property taxation.

The data collected in the Panel Study of Income Dynamics permit an updating of some of the tax burden estimates made in earlier studies, and also make possible some new forms of analysis. First, the long duration of the study permits

[1] For one of the more recent examples, see Tax Foundation, Inc. (1967).

measuring a family's income and tax burdens not only on an annual basis but also on a multi-year basis. Earlier studies of tax incidence have been confined to annual data, and have been unable to answer the question of whether the redistributive effect of taxation changes significantly when the time period used in defining income is lengthened. Second, the detailed data available from the Panel study on income sources, property ownership, and family composition allow the utilization of several different definitions of income, some very comprehensive and others less so.

The present study takes advantage of some of these opportunities. Income has been defined in four different ways and has been measured for both one-year periods and a five-year period. Details of the definitions, each one of which is useful from a certain point of view, are given in Section I. In Sections II-V, the four taxes which can be readily measured from Panel study data are analyzed: the federal individual income tax, the social security tax, the residential property tax, and the federal cigarette tax. The assumptions about shifting for each tax are discussed, and its progressiveness or regressiveness when related to different measures of income are noted. In Section VI, two aspects of food consumption are treated: first, the redistributive effects of exempting food from sales taxation and second, the redistributive effects of the recent inflation of food prices. Finally, an appendix gives details of how the variables utilized were estimated.

ANALYSIS

I. Definitions of Income

Four definitions of income have been used in the present study:

A. *Money Income.* This concept includes cash receipts of four general types:

1. Labor income (wages, salaries, bonuses, commissions).
2. Property income (rent, interest, dividends, unincorporated business profits, but excluding capital gains).
3. Private transfers (gifts, alimony).
4. Government transfers (social security, ADC, and other categorical assistance benefits, unemployment compensation).

The concept is of interest because it is this definition of income, or some close variant thereof, which has been most widely used in previous studies of the incidence of taxes by income groups. It can also be argued that money income is the appropriate definition if an "ability-to-pay" criterion of taxation is being used. The cash receipts in question provide the family with the ability to pay

its taxes.

B. *Net Income.* Others would argue that measuring a family's true economic status, and therefore its ability to bear tax burdens, involves a) taking account of its nonmoney income as well as its cash receipts, and b) recognizing the costs incurred in earning income, like traveling to and from work. We therefore arrive at a concept called "net income," obtained by making the following adjustments to money income:

1. *Add* imputed net rental income of homeowners, a major form of income in kind.
2. *Subtract* certain costs of earning income (travel costs, child care costs, union dues).
3. *Add* realized capital gains, an important form of cash receipt omitted, following convention, from the definition of money income. No questions about capital gains were asked in the Panel study, and so estimates have been made on the basis of the "rent, dividend, and interest income" reported in the study, using Internal Revenue Service data on the relationships at various income levels between adjusted gross income and realized capital gains.

C. *Private Income.* Some would say that the redistributive effect of government taxes and spending could be best measured if the base position for each family were defined as that income which it would receive in the absence of government activity. As a first approximation to this hypothetical concept we define "private income" as net income minus government transfer payments.[1] This definition can only provide an approximation to what is really desired, since to say that "private income" is the same as "no-government income" means making the following somewhat unrealistic assumptions:

1. Government employees receive salaries equal to what they would receive in private employment.
2. Government transfers have no effect on private transfers, private saving behavior, or labor supply, all of which affect the amount of private income received.

---

[1] We note here, and also when similar occasions arise elsewhere in this chapter, an omission which could be corrected if resources permitted another iteration of the calculations performed in our study. If there were no corporate income taxes or property taxes, the incomes of the owners of capital would be higher, at least according to the incidence theory which suggests that these taxes depress the returns to capital ownership in general. In one variant of private income, therefore, property incomes could be adjusted upwards.

D. *Income/Needs Ratio.* It can reasonably be argued that measuring a family's real economic status or its ability to pay taxes involves looking not only at its income but also at the demands on that income. As between two families with the same income, the one containing more members (or older children instead of younger children) is in some definite sense worse off. Thus we arrive at a measure of family welfare or well-being by taking the ratio of net income to consumption needs, where needs are estimated as the dollars required to sustain a family of given size and composition at an adequate level of subsistence.

For each family in the sample, the four types of income were estimated for each of the years from 1967 through 1971.[1] Decile means for the first and last years of this period are given in Table 8.1 and the decile ranges appear in Table 8.2.[2] The configuration of means indicate that the four definitions of income yield varying estimates of the degree of income inequality in the United States. Income or well-being is least unequally distributed if defined as the income/needs ratio. (The degree of inequality can be measured most quickly as the ratio of the mean for the highest decile to that for the lowest. In 1971, the highest decile in terms of income/needs ratio possessed a well-being index only 11 times that in the lowest.) Next was the distribution of net income (the highest receiving 14 times as much as the lowest), next the distribution of money income (16 times), and most unequal was the distribution of private income (56 times). This last phenomenon reflects, of course, the important contribution of government transfer payments to the incomes of the poor.

It is also possible to measure a family's total or average income over the five-year period, 1967-71. Five-year income is a sensible concept only for families whose composition was not radically changed over the period. A family which broke up through death or divorce in, say, 1969 cannot really be said to exist in the latter part of the five-year period. Accordingly, five-year income was calculated only for those families that retained the same head and wife for the whole period. In obtaining the five-year averages, the income for each single year was deflated by the consumer price index (1967=100) in order to cor-

---

[1] Because of limitations on program capacity, the tabulations in this study were actually based not on the entire sample but on an independent three-fourths subsample.

[2] It will be noted that the number of cases was the same in 1967 and 1971, even though the actual numbers of separate families who were interviewed in those two years were different. This occurs because those families experiencing splitoffs during the study period appear twice or more in the 1967 set, in order that an antecedent might be provided for each family interviewed in 1971. In a further iteration, this duplication could be eliminated. There is no such duplication, it might be noted, in those tabulations of this report dealing with families which retained the same head and wife throughout the study period.

TABLE 8.1

Mean Income by Income Deciles for all Families
(N=3827)

Income Deciles	Money Income 1967	Money Income 1971	Net Income 1967	Net Income 1971
Lowest decile	$ 1,552	$ 1,760	$ 1,857	$ 2,225
Second decile	3,081	3,437	3,413	4,105
Third decile	4,451	5,026	4,830	5,666
Fourth decile	5,822	6,789	6,192	7,358
Fifth decile	7,110	8,312	7,589	8,916
Sixth decile	8,536	10,178	9,080	10,809
Seventh decile	10,092	12,137	10,649	12,909
Eighth decile	11,813	14,515	12,641	15,531
Ninth decile	14,365	18,302	15,503	19,466
Highest decile	22,092	29,039	24,837	31,523
All	8,920	10,960	9,667	11,857

Income Deciles	Private Income 1967	Private Income 1971	Income/Needs Ratio 1967	Income/Needs Ratio 1971
Lowest decile	$ 466	$ 523	0.595	0.717
Second decile	2,191	2,212	1.040	1.159
Third decile	3,741	4,038	1.409	1.570
Fourth decile	5,282	5,855	1.755	1.944
Fifth decile	6,743	7,726	2.136	2.328
Sixth decile	8,190	9,574	2.563	2.743
Seventh decile	9,729	11,662	3.031	3.206
Eighth decile	11,588	14,190	3.584	3.834
Ninth decile	14,284	17,911	4.369	4.703
Highest decile	23,452	29,459	7.447	7.793
All	8,574	10,320	2.793	3.001

TABLE 8.2

Lower Limits of Income Deciles for All Families
(N=3827)

	Money Income		Net Income	
Income Deciles	1967	1971	1967	1971
Lowest decile	-	-	-	-
Second decile	$ 2,344	$ 2,630	$ 2,698	$ 3,266
Third decile	3,734	4,254	4,147	4,897
Fourth decile	5,200	5,921	5,466	6,497
Fifth decile	6,500	7,572	6,880	8,146
Sixth decile	7,800	9,122	8,350	9,793
Seventh decile	9,280	11,120	9,843	11,898
Eighth decile	10,973	13,116	11,502	14,028
Ninth decile	13,000	16,000	13,950	17,067
Highest decile	16,000	21,000	17,306	22,514

	Private Income		Income/Needs Ratio	
Income Deciles	1967	1971	1967	1971
Lowest decile	-	-	-	-
Second decile	$ 1,388	$ 1,300	0.842	0.955
Third decile	3,016	3,156	1.230	1.369
Fourth decile	4,533	4,904	1.578	1.755
Fifth decile	6,046	6,836	1.935	2.132
Sixth decile	7,449	8,610	2.344	2.531
Seventh decile	8,950	10,617	2.776	2.968
Eighth decile	10,587	12,800	3.299	3.514
Ninth decile	12,655	15,654	3.893	4.167
Highest decile	16,089	20,769	5.067	5.363

rect for the significant inflation occurring throughout the period. The resulting means and ranges for each income decile are shown in Tables 8.3 and 8.4. In addition to average income received by families with the same head and wife in 1967-71, their annual incomes in 1967 and in 1971 are also shown (in current dollars), in order that any important differences in income distribution between this subgroup and the rest of the sample might be detected. A comparison of Tables 8.1 and 8.3 discloses no substantial differences (beyond what can be attributed to sampling error) between families with the same head and wife and all families either in the mean level or distribution of income.

II. Federal Individual Income Tax

In the fiscal year 1971, the federal individual income tax yielded $86 billion, or 43% of total federal revenue. This tax is generally regarded as contributing the most important element of progressiveness to the American tax structure.

The income tax paid by each family in the Panel study was estimated on the basis of the information reported about income sources and family composition. The incidence of the tax was assumed to lie with the taxpayer. In other words, no shifting was presumed to have occurred. This assumption is justifiable if the tax causes no change in the quantity of factor services offered by the family (principally, labor services), for then the family's gross factor income remains unchanged by taxation and its net income is reduced by the full amount of the tax. The empirical studies conducted in this area generally indicate that the quantity of factor services supplied is insensitive to the marginal and average rates of taxation associated with the federal individual income tax.

Table 8.5 shows, for the first three definitions of income, how the burden of the federal individual income tax varies with the level of income. On an annual basis, the usual finding of progressiveness is confirmed, and the degree of progressiveness does not vary much with the definition of income. When both income and tax are measured on a five-year basis, however, the tax burdens as a percentage of income are seen to become significantly heavier at the lower deciles.[1]

---

[1] Since in arriving at five-year income, the income of each year was deflated, consistency would require that each year's taxes be similarly deflated before calculating five-year tax payments. This was not done for any of the four taxes analyzed in this chapter. The correction could readily be made in a further iteration. The effect is to exaggerate slightly the absolute level of tax burdens in each income decile, but not -- in all probability -- to distort the general pattern of progressiveness or regressiveness.

TABLE 8.3

Mean Income by Income Deciles
for Families with Same Head and Wife, 1967-71
(N=2701)

	Money Income			Net Income		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	$ 1,477	$ 1,968	$ 1,739	$ 1,789	$ 2,444	$ 2,418
Second decile	2,873	3,736	3,337	3,288	4,431	4,291
Third decile	4,343	5,605	4,886	4,790	6,342	5,971
Fourth decile	5,797	7,570	6,292	6,136	8,239	7,487
Fifth decile	7,071	9,320	7,719	7,506	10,085	9,057
Sixth decile	8,381	11,373	9,083	8,940	12,115	10,781
Seventh decile	10,719	13,252	10,507	10,490	14,241	12,439
Eighth decile		15,763	12,363	12,413	16,928	14,732
Ninth decile	14,229	19,618	15,129	15,387	20,993	18,012
Highest decile	22,247	31,116	23,311	25,128	33,803	28,584
All	8,801	11,947	9,443	9,590	12,972	11,384

	Private Income			Income/Needs Ratio		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	$ 364	$ 510	$ 767	0.630	0.769	0.885
Second decile	2,023	2,367	2,590	1.084	1.226	1.422
Third decile	3,651	4,421	4,599	1.468	1.672	1.865
Fourth decile	5,258	6,699	6,386	1.817	2.077	2.273
Fifth decile	6,695	8,723	8,043	2.196	2.479	2.675
Sixth decile	8,095	10,805	9,675	2.618	2.901	3.105
Seventh decile	9,600	12,914	11,319	3.106	3.436	3.602
Eighth decile	11,334	15,468	13,477	3.674	4.055	4.314
Ninth decile	14,089	19,344	16,560	4.521	5.002	5.285
Highest decile	23,659	31,677	26,910	7.853	8.351	8.672
All	8,485	11,298	10,039	2.896	3.199	3.410

TABLE 8.4

Lower Limits of Income Deciles
for Families with Same Head and Wife, 1967-71
(N=2701)

	Money Income			Net Income		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	-	-	-	-	-	-
Second decile	$ 2,190	$ 2,904	$ 2,565	$ 2,578	$ 3,604	$ 3,486
Third decile	3,600	4,681	4,090	4,085	5,274	5,100
Fourth decile	5,168	6,712	5,653	5,465	7,400	6,779
Fifth decile	6,500	8,302	6,991	6,825	9,122	8,253
Sixth decile	7,696	10,400	8,411	8,166	11,086	9,812
Seventh decile	9,100	12,300	9,788	9,720	13,126	11,598
Eighth decile	10,672	14,500	11,366	11,381	15,539	13,567
Ninth decile	12,510	17,278	13,599	13,750	18,636	16,167
Highest decile	16,000	22,330	17,302	17,280	23,832	20,445

	Private Income			Income/Needs Ratio		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	-	-	-	-	-	-
Second decile	$ 1,220	$ 1,303	$ 1,608	0.892	1.008	1.174
Third decile	2,908	3,418	3,595	1.288	1.460	1.669
Fourth decile	4,498	5,506	5,488	1.643	1.871	2.088
Fifth decile	5,948	7,760	7,205	1.996	2.278	2.472
Sixth decile	7,385	9,782	8,853	2.410	2.691	2.882
Seventh decile	8,870	11,863	10,557	2.848	3.124	3.336
Eighth decile	10,386	14,234	12,266	3.348	3.760	3.915
Ninth decile	12,216	17,019	14,746	4.000	4.395	4.728
Highest decile	16,060	22,168	19,008	5.223	5.697	6.010

TABLE 8.5

Federal Individual Income Tax Payments* as a Percentage of Income

(See note on page 252)

	All Families (N=3827)					
	Money Income		Net Income		Private Income	
Income Deciles	1967	1971	1967	1971	1967	1971
Lowest decile	0.8	0.3	1.0	0.6	0.9	0.4
Second decile	2.2	1.8	2.6	2.0	2.6	1.2
Third decile	4.4	3.7	4.1	4.2	4.8	3.8
Fourth decile	5.5	6.0	5.6	5.8	6.8	6.5
Fifth decile	7.8	7.7	7.1	7.2	7.9	8.6
Sixth decile	8.6	9.5	8.6	8.9	9.3	10.1
Seventh decile	9.8	10.0	9.1	9.2	10.0	10.7
Eighth decile	10.4	11.4	9.9	10.5	10.8	11.9
Ninth decile	11.2	12.6	10.2	12.0	11.3	13.0
Highest decile	15.5	17.6	13.8	16.1	14.7	17.4
All	10.3	11.5	9.5	10.6	10.7	12.2

	Families with Same Head and Wife, 1967-71 (N=2701)								
	Money Income			Net Income			Private Income		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	0.7	0.4	7.3	1.0	0.7	5.3	0.8	0.4	14.6
Second decile	2.3	1.6	6.0	2.5	1.6	5.0	2.4	1.3	6.6
Third decile	4.6	3.7	7.2	4.3	3.8	6.3	5.1	3.7	7.2
Fourth decile	6.0	6.6	8.4	6.0	6.4	6.9	7.1	7.2	8.5
Fifth decile	8.2	8.1	9.0	7.3	7.8	7.9	8.4	8.8	8.8
Sixth decile	8.6	9.5	10.1	8.8	8.7	8.7	9.2	10.1	9.6
Seventh decile	10.4	10.6	10.9	9.4	9.5	9.1	10.2	11.1	10.2
Eighth decile		11.9	11.6	9.9	10.9	9.7	11.1	12.3	10.8
Ninth decile	11.6	13.2	12.4	10.6	12.4	10.3	11.8	13.3	11.3
Highest decile	16.0	18.3	16.7	14.1	16.7	13.5	15.1	18.1	14.5
All	10.7	11.9	11.8	9.8	10.9	9.8	11.1	12.6	11.1

*Incidence assumption: tax borne by taxpayer.

Indeed, the federal individual income tax turns out to be *regressive* at the bottom end of the income scale, the tax as a percentage of income being higher for the lowest decile than for the decile next above it. (See note on page 252.)

The finding of income tax regressiveness is familiar at the top end of the income scale, because of the exploitation of loopholes by the very rich (those, say, above the 98th percentile). But regressiveness at the bottom end has gone mostly unnoticed. The reasons for the phenomenon could be fully understood if the interviews were scrutinized on a case-by-case basis. Time does not permit an inquiry of this type, but it can plausibly be conjectured that it is the fluctuation of annual incomes in conjunction with the nontransferability of "unused" exemptions and deductions from one year to the next which produces this result.

The point can perhaps be clarified with a numerical example. Suppose two low-income families, A and B, each contain two members. Under the regulations applying to 1972 income, each then qualifies for personal exemptions totalling $1500 plus a minimum standard deduction of $1300. Each receives fluctuating incomes over a two-year period and pays income taxes (based on 1972 rate schedules) as follows:

	Family A		Family B	
	Year 1	Year 2	Year 1	Year 2
Income	$ 500	$4500	$2500	$5000
Exemptions and deductions	2800	2800	2800	2800
Taxable income	0	1700	0	2200
Tax	0	245	0	322
Average tax	122		161	
Average income	2500		3750	
Average tax/average income	4.9%		4.3%	

Thus the family with the lower average income pays a higher percentage of that income in tax.[1] This result occurs because the two families are treated as having the same taxable income (none) in the year when they receive the lower income (Year 1), whereas the actual incomes of the two families in that year were very different. The result could be avoided by allowing each family to carry forward to the next year any unused exemptions or deductions (the excess of these allowances over total income).[2]

When income is defined in terms of the income/needs ratio, the burden of taxation can no longer sensibly be expressed as a percentage of income, because while taxes are measured in dollars, income is now expressed as a ratio or index

---

[1] Neither family, it might be noted, qualifies for the income-averaging scheme currently permitted under the federal individual income tax. That scheme can only be used if this year's taxable income is at least $3000 greater than 120% of average taxable income in the last four years.

[2] It is also possible that the statistical finding of regressiveness at low incomes is caused by errors of estimation. For example, the estimation of income tax liability neglected the existence of business losses carried forward or back from

number. To develop a meaningful measure of relative tax burdens in this context, we define each decile's relative tax burden as the ratio (expressed in percentage terms) of its share of total taxes to its share of the aggregate index scores. Thus a decile paying 15% of aggregate tax collections and receiving 5% of aggregate well-being (as measured by the income/needs ratios) would have a relative burden index of 300. A decile with mean taxes equal to the grand mean, and a mean income/needs ratio equal to that grand mean, would have a relative burden index of 100. The pattern of these index numbers indicates in what direction, and to what degree, a tax redistributes well-being. If the numbers increase as we move up the income scale, the tax tends to equalize well-being.

Table 8.6 presents the relative burden index numbers for the federal individual income tax in the case when income is defined as the income/needs ratio. In addition, this table presents in index-number form the burden of the tax in relation to net income, so that the consequences of changing from one definition of income to the other can be discerned. It can be seen that when net income is adjusted for family size and composition, relative tax burdens are invariably increased for families in the middle of the income scale (from the third through the seventh deciles). This fact presumably reflects the tendency for consumption needs to be below average both at the bottom and at the top of the net income scale. At the same time, when five-year income taxes are measured against the five-year income/needs ratio instead of against net income, the taxes are seen to be slightly progressive among the poor instead of slightly regressive. It remains true, however, that lengthening the period of analysis increases very substantially the relative burden of the federal individual income tax on the poor.

We have been concerned so far with what has been called the "vertical equity" of the income tax, namely, the question of whether tax burdens increase at a sufficiently rapid rate as incomes increase. Also of interest is "horizontal equity" -- whether tax burdens are approximately equal among different families at the same income level (and hence presumably with the same ability to pay taxes). Table 8.7 shows that there are substantial "horizontal inequities" in the federal individual income tax, in the sense that within each income decile there are wide variations in the percentage of net income paid in tax.[1]

---

other tax years. Hence there is an overstatement of the taxes paid by families whose five-year income was at a low level because of losses suffered in one or two years.

[1] Of somewhat more interest perhaps than the relationship between taxes and net income would be the relationship between taxes and the income/needs ratio. Part of what is here counted as a "horizontal inequity" is the generally inverse relationship under the income tax between tax burdens and family size, and many would count that phenomenon as equitable rather than otherwise. Using the income/needs ratio, which adjusts income for family size, would enable us to measure those variations in tax burdens caused by factors other than family size. This could be done in a further iteration.

TABLE 8.6

Relative Burden Index* for Federal Individual Income Tax**

	All Families (N=3827)			
	Net Income		Income/Needs Ratio	
Income Deciles	1967	1971	1967	1971
Lowest decile	11	6	3	6
Second decile	27	19	27	20
Third decile	43	40	55	46
Fourth decile	59	55	64	58
Fifth decile	75	68	78	79
Sixth decile	91	84	95	85
Seventh decile	96	87	100	99
Eighth decile	104	99	112	100
Ninth decile	107	113	112	109
Highest decile	145	152	130	148
All	100	100	100	100

	Families with Same Head and Wife, 1967-71 (N=2701)					
	Net Income			Income/Needs Ratio		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	10	6	54	6	7	49
Second decile	25	15	51	28	23	56
Third decile	44	35	64	55	49	67
Fourth decile	61	59	70	65	63	79
Fifth decile	74	72	81	80	82	88
Sixth decile	90	80	89	95	86	96
Seventh decile	96	87	93	100	100	96
Eighth decile	101	100	99	109	97	105
Ninth decile	108	114	105	112	110	106
Highest decile	144	153	138	129	145	125
All	100	100	100	100	100	100

*The relative burden index for each decile is its share of the aggregate tax burden divided by its share of aggregate income or welfare (and multiplied by 100). A decile paying 15% of the tax and possessing 5% of the aggregate income/needs ratio scores would have a relative burden index of 300.

**Incidence assumption: tax borne by taxpayer.

TABLE 8.7

Variation by Income Deciles in Percentage of Income
Paid in Federal Individual Income Tax, 1971
All Families (N=3827)

Income Deciles	Federal Individual Income Tax Payments* as a Percentage of Net Income					
	Zero	0.1%-6.3%	6.3%-9.8%	9.8%-12.5%	More than 12.5%	All Families
Lowest decile	49.7%	23.8%	4.3%	2.5%	19.7%	100.0%
Second decile	32.7	34.3	10.8	5.1	17.0	100.0
Third decile	13.4	43.0	17.8	9.0	16.8	100.0
Fourth decile	8.0	39.1	25.5	14.7	12.7	100.0
Fifth decile	5.1	32.6	24.6	19.8	17.7	100.0
Sixth decile	2.8	28.0	31.8	17.8	19.6	100.0
Seventh decile	0.1	28.0	38.7	18.5	14.7	100.0
Eighth decile	0.0	16.8	36.2	31.1	15.8	100.0
Ninth decile	0.0	11.7	34.5	34.2	19.6	100.0
Highest decile	0.0	7.6	21.8	29.3	41.4	100.0
All	11.2	26.5	24.6	18.2	19.5	100.0

*Incidence assumption: tax borne by taxpayer.

These inequities lead some subgroups of an income class to bear heavy tax burdens even when the class as a whole is lightly taxed. Among low-income families, for example, aggregate income taxes are very low in comparison with aggregate income -- at least on an annual basis -- but it is also true, as indicated in Table 8.7, that about 18% of the families in the bottom two deciles paid more than one-eighth of their net income in federal income taxes in 1971. Many of these families probably incurred heavy expenses of earning income (principally costs of travel and child care), and hence had a low level of net income in relation to their taxable income.

III. Social Security Tax

In 1971 social security taxes, or contributions under Old Age, Survivors, Disability, and Hospital Insurance totaled $44 billion, of which $21 billion was paid in the form of employee contributions, a like sum as employer contributions, and the remainder as the contributions of the self-employed. The first and third of these components were estimated for each family member in the Panel study, on the basis of information collected about taxable earnings. The contributions of both employees and the self-employed are calculated by applying a single tax rate (t) to the first n dollars of wages earned during the year, t and n having varied as follows during the period of the study:

Year	t(employees)	t(self-employed)	n
1967	4.4%	6.4%	$6600
1968	4.4	6.4	7800
1969-70	4.8	6.9	7800
1971	5.2	7.5	7800

Regarding the incidence of the contributions of employees and self-employed, the assumption is made that the entire burden is borne by the contributor himself. The reasoning is the same as that applying to the federal individual income tax: the social security contributions are assumed to have no effect on the quantity of labor supplied.[1]

Table 8.8 and 8.9 indicate for the various definitions of income the relative burdens of social security taxes at different income levels. In the cases of money income, net income, and the income/needs ratio, the taxes are progressive among the lowest income groups, become most burdensome around the fifth decile of income, and are thereafter regressive. The relatively light

[1] The same reasoning would suggest that employers' contributions to social insurance are also effectively borne by the employees. In a further iteration, the employers' contributions could therefore be readily incorporated into the analysis.

TABLE 8.8

Social Security Tax Payments* as a Percentage of Income

Income Deciles	All Families (N=3827)					
	Money Income		Net Income		Private Income	
	1967	1971	1967	1971	1967	1971
Lowest decile	2.6	2.3	2.4	2.1	6.7	4.4
Second decile	2.7	2.7	2.8	2.6	3.8	3.6
Third decile	3.6	3.4	3.4	3.4	4.2	4.2
Fourth decile	3.9	3.8	3.6	3.7	4.4	4.2
Fifth decile	4.1	4.1	3.8	3.9	4.4	4.8
Sixth decile	3.8	4.3	3.7	4.0	4.1	4.6
Seventh decile	3.6	3.9	3.4	3.6	3.7	4.2
Eighth decile	3.4	3.6	3.3	3.3	3.4	3.8
Ninth decile	3.1	3.4	2.7	3.3	3.1	3.5
Highest decile	2.4	2.3	2.1	2.1	2.2	2.3
All	3.2	3.3	2.9	2.8	3.3	3.5

Income Deciles	Families with Same Head and Wife, 1967-71 (N=2701)								
	Money Income			Net Income			Private Income		
	1967	1971	1967-71 Average	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	2.6	1.5	1.6	2.4	1.5	1.3	7.1	3.1	2.1
Second decile	2.6	2.1	2.8	2.6	2.2	2.5	3.6	3.0	3.1
Third decile	3.5	3.2	3.8	3.3	3.0	3.2	4.3	3.6	3.9
Fourth decile	4.0	3.7	4.3	3.6	3.6	3.6	4.4	4.3	4.5
Fifth decile	4.1	3.9	4.4	3.8	3.7	3.8	4.5	4.4	4.2
Sixth decile	3.8	3.9	4.3	3.7	3.5	3.8	4.0	4.2	4.2
Seventh decile	3.5	3.6	3.9	3.4	3.3	3.3	3.8	3.8	3.9
Eighth decile		3.6	3.9	3.2	3.2	3.2	3.4	3.6	3.5
Ninth decile	3.1	3.3	3.6	3.3	3.2	3.0	3.1	3.4	3.3
Highest decile	2.2	2.1	2.5	1.9	1.9	2.0	2.1	2.1	2.2
All	3.2	3.1	3.5	2.9	2.9	2.9	3.3	3.3	3.3

*Including employee and self-employed contributions; excluding employer contributions. Incidence assumption: contributions of employees and self-employed borne by employees and self-employed respectively.

TABLE 8.9

Relative Burden Index* for Social Security Tax**

	All Families (N=3827)			
	Net Income		Income/Needs Ratio	
Income Deciles	1967	1971	1967	1971
Lowest decile	83	75	130	93
Second decile	97	93	128	109
Third decile	117	121	147	126
Fourth decile	124	132	131	120
Fifth decile	131	139	125	128
Sixth decile	128	143	120	123
Seventh decile	117	129	113	117
Eighth decile	114	118	110	102
Ninth decile	93	118	94	99
Highest decile	72	75	57	66
All	100	100	100	100

	Families with Same Head and Wife, 1967-71 (N=2701)					
	Net Income			Income/Needs Ratio		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	83	52	45	126	91	99
Second decile	90	76	86	130	110	124
Third decile	114	103	110	144	129	126
Fourth decile	124	124	124	132	126	129
Fifth decile	131	128	131	130	127	126
Sixth decile	128	121	131	120	121	128
Seventh decile	117	114	114	117	121	117
Eighth decile	110	110	110	108	100	106
Ninth decile	114	110	103	95	103	95
Highest decile	66	66	69	56	62	59
All	100	100	100	100	100	100

*The relative burden index for each decile is its share of the aggregate tax burden divided by its share of aggregate income or welfare (and multiplied by 100). A decile paying 15% of the tax and possessing 5% of the aggregated income/needs ratio scores would have a relative burden index of 300.

**Including employee and self-employed contributions; excluding employer contributions. Incidence assumption: contributions of employees and self-employed borne by employees and self-employed, respectively.

burden of social security taxes at the lowest income levels is due to the fact that there are relatively few wage-earners at those levels. The regressiveness among above-average incomes is due to a) the zero marginal tax rate at wage incomes above a certain modest level and b) the declining relative importance of wages as a source of income at those income levels (and the rising relative importance of property income). Measuring income and taxes on a five-year basis instead of a one-year basis does not materially alter these patterns.

In relation to private income, social security taxes are especially burdensome in the lowest income decile, so that, starting at the bottom, these taxes are first regressive, then progressive, then regressive again. This result undoubtedly follows from the fact that wages are a relatively high fraction of private income, especially among the lowest income groups. It is worth commenting, however, that one does not need to adopt this particular definition of income in order to conclude that the social security taxes impose unreasonably heavy burdens at low income levels. If the central objective of this system is to afford protection against poverty, then a more progressive means of financing should surely be found. (If the alternative view is taken that the system is one of contributory insurance, then the objections to the present financing methods become less serious.)

The existence of sizeable burdens on the poor is shown from another perspective in Table 8.10, which presents data on the horizontal inequities of social security taxation. For about one-sixth of the families in the lowest two income deciles, contributions of employees and the self-employed exceeded 4.7% of real income in 1971.

IV. Residential Property Tax

Total property tax collections in the United States amounted to $38 billion in fiscal 1971. About half of this total consisted of taxes on housing. The housing taxes paid by each homeowner in the Panel study were estimated by applying a tax rate to the house value reported by the respondent, the rate being that reported for the area in question by the 1967 Census of Governments. Taxes on rental units were calculated by assuming that the sum of all such taxes equaled 47% of the sum of homeowners' taxes (a figure derived from some estimates offered by Netzer (1966, pp 244-45)), and then allocating the aggregate tax among all rental units on the basis of rent paid.

TABLE 8.10

Variation by Income Deciles in Percentage of Income
Paid in Social Security Taxes, 1971
All Families (N=3827)

	Social Security Tax Payments* as a Percentage of Net Income					
Income Deciles	Less than 0.7%	0.7%-2.8%	2.8%-3.8%	3.8%-4.7%	More than 4.7%	All Families
Lowest decile	63.0%	13.3%	5.5%	5.4%	12.7%	100.0%
Second decile	46.1	15.9	6.5	9.7	21.8	100.0
Third decile	25.3	17.4	10.9	17.1	29.4	100.0
Fourth decile	18.5	15.7	9.2	17.1	39.5	100.0
Fifth decile	13.0	12.0	7.2	38.6	29.2	100.0
Sixth decile	8.7	5.4	23.9	30.7	31.3	100.0
Seventh decile	12.0	8.7	39.2	20.4	19.6	100.0
Eighth decile	6.9	25.5	31.3	28.3	8.0	100.0
Ninth decile	2.1	29.0	37.3	25.2	6.4	100.0
Highest decile	5.0	56.7	29.0	7.7	1.6	100.0
All	20.0	20.0	20.0	20.0	20.0	100.0

*Including employee and self-employed contributions; excluding employer contributions. Incidence assumption: contributions of employees and self-employed borne by employees and self-employed respectively.

The incidence of the taxes on owner-occupied housing was assumed to rest entirely on the owners, whereas the taxes on rental units were assumed to be borne entirely by renters. These assumptions, fairly standard in statistical analyses of tax incidence, can be defended if the two markets in question are perfectly competitive and characterized by a perfectly elastic long-run supply curve. The reasoning is illustrated below in Figures 8.1 and 8.2:

FIGURE 8.1

Market for Owner-Occupied Units
Tax Payable by Owner

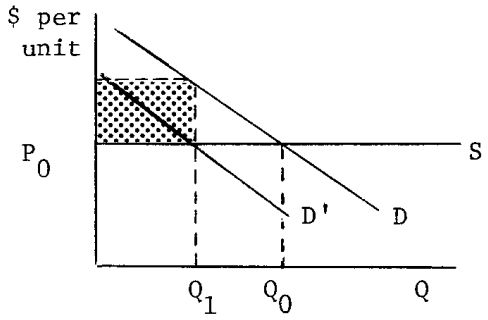
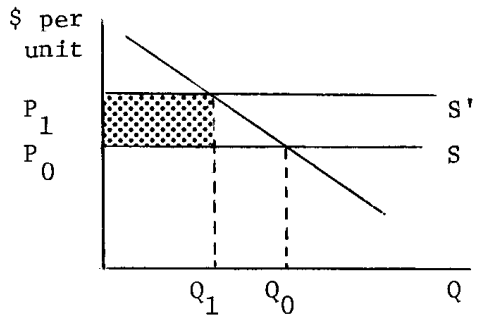


FIGURE 8.2

Market for Rental Units
Tax Payable by Owner



In the market for owner-occupied units, an imposition of a tax on such units which is formally payable by the owner causes a downward shift in the demand curve from D to D'. A given quantity of housing will now be demanded only if the price is lower by the present value of the future tax payments. In the new equilibrium, price remains unchanged at the level given by the unchanged supply curve (whose characteristics depend on cost conditions in the construction industry), and in this sense no shifting of the tax from the owners has occurred. (The amount of the tax is denoted by the shaded area in Figure 8.1.)

In the market for rental units, the imposition of a tax payable by landlords causes an upward shift in the supply curve from S to S'. (It is now the supply curve rather than the demand curve which shifts, because the tax in this second market is legally payable by the supplier rather than by the demander.) Investors will not be willing to construct new units unless they receive a larger before-tax return than before. The result is a contraction of the quantity supplied in the long run and higher rents. The tax, denoted by the shaded area in Figure 8.2, is borne by the renters in the form of those higher rents.

These simple conclusions have been challenged from numerous directions. Indeed, the entire area of property tax incidence is currently in ferment. This chapter is not the place, however, to attempt a resolution of the difficult theoretical and empirical questions which have been raised, and hence we retain here the standard assumptions about incidence.[1]

[1] It may nonetheless be useful to mention some of the main criticisms of the

Tables 8.11 and 8.12 show the incidence pattern of residential property taxes for each of the four definitions of income used. With income and taxes both measured on a one-year basis, the general pattern is of clear regressiveness, with the lowest income decile bearing very heavy relative burdens. When income is defined in "money" terms, residential property taxes in that bottom decile amount to about 10% of income. Defining income in "net" terms reduces this proportion to about 8% -- an expected result, since many homeowners who, in spite of very low money incomes pay considerable amounts of property tax do receive significant income in kind in the form of housing services. A "private" definition of income magnifies greatly the burdensomeness of the housing tax at low levels of income, excluding as it does a form of income -- government transfer payments -- which is of major significance at those levels.

The regressiveness evident in Tables 8.11 and 8.12 is understated for at least one important reason. Property taxes are deductible from income subject to the federal individual income tax, and in general the higher the income a) the more likely the family is to itemize its deductions rather than claim the standard deduction, and b) the higher the marginal tax rate is and hence the higher the amount of income tax reduction per dollar of property tax reported. Consequently, as income increases a continually higher proportion of property tax payments is offset by reduced income taxes.[1]

When we turn from a one-year to a five-year definition of income and taxation, it might be expected that less regressiveness would be observed. In any single year, some families with declining incomes are found still occupying the homes they can no longer afford, while others with rising incomes have not yet moved into the better homes they can now afford. Both kinds of inertia lead to tax regressiveness. Measured over a five-year period, however, housing expendi-

---

simple analysis outlined above:

a) The tax on the land associated with rental housing is more likely to be borne by the landowner than by the tenant since land is a factor of production in fixed supply. This likelihood has been recognized in some statistical studies of tax incidence. Allocating the land component of the tax on rental units to landowners instead of to renters would not, however, materially change the incidence patterns shown in Table 8.11 and 8.12. For most rental properties, land values are much outweighed by building values.

b) The markets in question may not be competitive.

c) The long-run supply curve may not be perfectly elastic.

d) The contraction of output visible in both Figures 8.1 and 8.2 will impose burdens on the factors of production specialized to the housing construction industry, who will experience a reduced demand for their services and reduced factor earnings.

e) The movement of money capital out of the housing sector may force down rates of return in other sectors, imposing burdens on the owners of capital in general.

[1] In a further iteration, these "federal offsets" could be calculated and subtracted from the property tax payments. The regressiveness apparent in Tables 8.11 and 8.12 would also be understated if low-value dwellings were typically over-assessed relative to high-value dwellings. The evidence on this point,

TABLE 8.11

Residential Property Tax Payments* as a Percentage of Income

All Families (N=3827)

Income Deciles	Money Income 1967	Money Income 1971	Net Income 1967	Net Income 1971	Private Income 1967	Private Income 1971
Lowest decile	11.5	8.9	9.0	7.1	41.4	35.9
Second decile	7.1	7.1	6.5	5.5	10.1	11.0
Third decile	5.2	5.4	4.6	4.6	5.7	6.8
Fourth decile	4.6	4.3	4.3	4.1	4.9	5.0
Fifth decile	4.5	3.9	3.8	3.4	4.7	4.1
Sixth decile	3.7	3.5	3.7	3.5	3.9	3.7
Seventh decile	3.8	3.4	3.5	3.2	3.6	3.4
Eighth decile	3.5	3.6	3.3	3.3	3.8	3.6
Ninth decile	3.2	3.5	3.1	3.5	3.1	3.6
Highest decile	2.8	2.9	2.5	2.7	2.7	2.9
All	3.8	3.7	3.5	3.4	4.0	3.9

Families with Same Head and Wife, 1967-71 (N=2701)

Income Deciles	Money Income 1967	Money Income 1971	Money Income 1967-71 Average	Net Income 1967	Net Income 1971	Net Income 1967-71 Average	Private Income 1967	Private Income 1971	Private Income 1967-71 Average
Lowest decile	12.4	9.9	10.8	10.1	8.3	7.8	52.7	43.5	28.2
Second decile	7.9	7.8	7.8	6.7	6.4	6.1	11.4	12.0	9.8
Third decile	5.5	6.0	6.0	4.9	4.9	4.8	6.2	8.3	6.3
Fourth decile	4.5	4.9	4.9	4.4	4.6	4.1	5.2	5.2	4.7
Fifth decile	4.5	4.6	4.5	4.0	4.1	3.8	4.5	4.7	4.2
Sixth decile	4.0	4.2	4.4	3.7	4.0	3.5	4.2	4.4	4.1
Seventh decile	3.8	3.9	4.3	3.8	3.6	3.6	3.9	4.1	3.8
Eighth decile		3.8	3.9	3.4	3.3	3.3	3.8	3.8	3.7
Ninth decile	3.5	3.7	4.0	3.3	3.5	3.4	3.4	3.6	3.6
Highest decile	2.9	2.9	3.4	2.6	2.8	2.8	2.8	2.9	2.9
All	4.0	4.1	4.4	3.7	3.7	3.6	4.1	4.3	4.1

*Incidence assumption: taxes on owner-occupied housing borne by owners; taxes on rental housing borne by renters.

TABLE 8.12

Relative Burden Index* for Residential Property Tax**

All Families (N = 3827)

Income Deciles	Net Income 1967	Net Income 1971	Income/Needs Ratio 1967	Income/Needs Ratio 1971
Lowest decile	$ 257	$ 209	$ 234	$ 179
Second decile	186	162	171	141
Third decile	131	135	148	121
Fourth decile	123	121	124	122
Fifth decile	109	100	116	118
Sixth decile	106	103	107	110
Seventh decile	100	94	105	93
Eighth decile	94	97	90	99
Ninth decile	89	103	80	90
Highest decile	71	79	71	79
All	100	100	100	100

Families with same head and wife, 1967-71 (N = 2701)

Income Deciles	Net Income 1967	Net Income 1971	Net Income 1967-71 Average	Income/Needs Ratio 1967	Income/Needs Ratio 1971	Income/Needs Ratio 1967-71 Average
Lowest decile	$ 273	$ 224	$ 217	$ 239	$ 213	$ 182
Second decile	181	173	169	170	147	136
Third decile	132	132	133	134	132	125
Fourth decile	119	124	114	125	119	125
Fifth decile	108	111	106	122	117	112
Sixth decile	100	108	97	107	107	108
Seventh decile	103	97	100	107	106	104
Eighth decile	92	89	92	92	99	94
Ninth decile	89	95	24	88	91	91
Highest decile	70	76	78	68	70	73
All	100	100	100	100	100	100

*The relative burden index for each decile is its share of the aggregate tax burden divided by its share of aggregate income or welfare (and multiplied by 100). A decile paying 15% of the tax and possessing 5% of the aggregated income/needs ratio scores would have a relative burden index of 300.

**Incidence assumption: taxes on owner-occupied housing borne by owners; taxes on rental housing borne by renters.

tures are presumably closer to the level appropriate to the family's income. There has been time enough for many families temporarily out of equilibrium to make the necessary housing adjustments. These expectations are not, however, resoundingly supported by the results from the Panel study. The property tax is seen to be slightly less regressive when viewed from a five-year perspective, but the change is not remarkable.

As for horizontal inequities, it is likely that serious problems will arise under a system of residential property taxation, since the tax is based upon a form of consumption (housing services) for which tastes vary significantly at any given level of income. Some people like big houses, others prefer to spend their money in other ways. These expectations are confirmed by Table 8.13, which shows a wide dispersion in the property tax payments of homeowners at each income level. (The table does not present any data on variations in rental payments.) In the bottom two income deciles, for example, about one-fourth of the homeowners paid property taxes equaling less than 2.4% of their income, while about one-half paid taxes more than twice that amount.

V. Federal Cigarette Tax

The federal tax on cigarettes, which has stood for many years at the rate of $.08 per pack, yielded a revenue of $2.1 billion in fiscal 1971. The amount paid by each family in the Panel study was estimated on the basis of the reported numbers of cigarettes smoked by members of the family. It was assumed that the tax was entirely borne by the consumer, an assumption justified by the high degree of price-inelasticity which appears to characterize the demand for the taxed commodity.

Tables 8.14 and 8.15 indicate anew the well-known regressiveness of the cigarette tax. There are doubtless some who would argue that these findings should be ignored. First, they might point out, the burdens in question are very small in relation to income, and second, the cigarette tax is not meant to be a vehicle for redistributing income, but rather a means of discouraging an undesirable form of consumption. The second point is, of course, a weak one, in view of the price-inelasticity of demand. As for the first, the burdens are not negligible for the heavy smokers among the poor (as indicated by the data on horizontal inequities presented in Table 8.16), and in dollar terms the total amount of cigarette taxes paid by the poor is substantial. It can be calculated from Panel study data that the lowest two income deciles together paid about $250 million in federal cigarette taxes in 1971. It is not clear that a major social purpose is served by the imposition of this burden.

---

however, is mixed. On the other hand, no allowance has been made for "circuit breakers," and to that extent the regressiveness is overstated. Circuit breakers, which have been widely adopted by state governments in recent years, impose limits on the percentage of income paid in property taxes, particularly among elderly homeowners.

TABLE 8.13

Variation by Income Deciles in Percentage of Income
Paid in Homeowners' Property Taxes, 1971
All Families (N=3827)

	Homeowners' Property Tax Payments* as a Percentage of Net Income						
Income Deciles	Under 1.5%	0.1%-1.5%	1.5%-2.4%	3.4%-5.0%	More than 5.0%	Not a home-owner	All Families
Lowest decile	5.4%	3.7%	3.2%	4.6%	16.7%	66.3%	100.0%
Second decile	7.1	3.8	5.2	8.2	19.6	56.1	100.0
Third decile	7.3	4.5	9.8	7.0	18.0	53.4	100.0
Fourth decile	8.7	2.6	8.0	11.7	11.5	50.6	100.0
Fifth decile	14.0	11.6	15.3	12.9	8.8	37.4	100.0
Sixth decile	13.0	13.0	13.4	9.7	8.0	42.8	100.0
Seventh decile	12.0	18.2	16.0	15.5	9.3	8.7	100.0
Eighth decile	14.3	20.2	16.1	17.7	11.1	20.5	100.0
Ninth decile	15.3	17.6	23.5	17.0	12.0	14.6	100.0
Highest decile	26.9	22.2	13.4	19.5	9.3	8.7	100.0
All	12.4	12.4	12.4	12.4	12.4	37.9	100.0

*Incidence assumption: taxes on owner-occupied housing borne by owners.

TABLE 8.14

Federal Cigarette Tax Payments* as a Percentage of Income

	All Families (N=3827)					
	Money Income		Net Income		Private Income	
Income Deciles	1967	1971	1967	1971	1967	1971
Lowest decile	0.6	0.6	0.5	0.4	1.7	1.9
Second decile	0.5	0.4	0.4	0.4	0.6	0.6
Third decile	0.4	0.4	0.4	0.3	0.5	0.5
Fourth decile	0.3	0.3	0.3	0.3	0.4	0.4
Fifth decile	0.3	0.3	0.3	0.3	0.3	0.3
Sixth decile	0.3	0.2	0.3	0.2	0.3	0.3
Seventh decile	0.3	0.2	0.2	0.2	0.3	0.2
Eighth decile	0.2	0.2	0.2	0.2	0.2	0.2
Ninth decile	0.2	0.1	0.2	0.1	0.2	0.1
Highest decile	0.1	0.1	0.1	0.1	0.1	0.1
All	0.2	0.2	0.2	0.2	0.2	0.2

	Families with Same Head and Wife, 1967-71 (N=2701)								
	Money Income			Net Income			Private Income		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	0.5	0.4	0.4	0.5	0.4	0.4	2.0	1.7	1.0
Second decile	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.6	0.5
Third decile	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.4	0.3
Fourth decile	0.3	0.2	0.3	0.3	0.2	0.3	0.4	0.4	0.4
Fifth decile	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Sixth decile	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2
Seventh decile	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2
Eighth decile		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Ninth decile	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.1	0.1
Highest decile	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
All	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

*Incidence assumption: tax borne by consumer.

TABLE 8.15

Relative Burden Index* for Federal Cigarette Tax**

	All Families (N = 3827)			
	Net Income		Income/Needs Ratio	
Income Deciles	1967	1971	1967	1971
Lowest decile	238	244	311	353
Second decile	214	194	243	206
Third decile	171	178	203	200
Fourth decile	152	156	141	150
Fifth decile	152	156	130	140
Sixth decile	133	122	135	108
Seventh decile	119	128	104	108
Eighth decile	81	89	88	87
Ninth decile	76	67	68	69
Highest decile	43	50	36	37
All	100	100	100	100

	Families with Same Head and Wife, 1967-71 (N = 2701)					
	Net Income			Income/Needs Ratio		
Income Deciles	1967	1971	1967-71 Average	1967	1971	1967-71 Average
Lowest decile	240	218	212	306	332	291
Second decile	190	206	188	222	226	219
Third decile	170	182	153	200	200	181
Fourth decile	160	147	159	157	146	136
Fifth decile	160	159	153	127	149	129
Sixth decile	130	106	129	139	99	124
Seventh decile	110	118	106	102	120	100
Eighth decile	80	88	88	93	75	84
Ninth decile	80	76	71	70	71	69
Highest decile	45	41	47	36	38	43
All	100	100	100	100	100	100

*The relative burden index for each decile is its share of the aggregate tax burden divided by its share of aggregate income or welfare (and multipled by 100). A decile paying 15% of the tax and possessing 5% of the aggregated income/needs ratio scores would have a relative burden of 300.

**Incidence assumption: tax borne by consumer.

TABLE 8.16

Variation by Income Deciles in Percentage of Income
Paid in Federal Cigarette Tax, 1971
All Families (N=3827)

	Federal Cigarette Tax Payments* as a Percentage of Net Income						
Income Deciles	Zero	0.01%-0.18%	0.18%-0.30%	0.30%-0.45%	0.45%-0.73%	More than 0.73%	All Families
Lowest decile	63.8%	2.0%	0.8%	1.8%	6.9%	24.8%	100.0%
Second decile	56.1	3.0	5.3	4.6	9.9	21.1	100.0
Third decile	49.2	6.8	3.8	6.1	16.3	17.9	100.0
Fourth decile	49.3	4.5	4.5	18.0	10.5	13.1	100.0
Fifth decile	45.1	6.8	4.6	15.9	18.1	9.4	100.0
Sixth decile	45.4	7.4	19.0	11.9	10.0	6.2	100.0
Seventh decile	41.3	9.1	16.2	16.1	11.4	5.9	100.0
Eighth decile	50.4	11.5	16.5	11.4	7.8	2.4	100.0
Ninth decile	50.5	18.3	16.1	8.9	6.2	0.0	100.0
Highest decile	45.5	31.4	13.6	6.2	3.3	0.0	100.0
All	49.7	10.1	10.1	10.1	10.1	10.1	100.0

*Incidence assumption: tax borne by consumer.

V. Food Consumption

In 1972 sixteen of the states with retail sales taxes exempted from taxation food purchased for consumption off the premises, and several of the states not presently allowing this exemption are considering a change in their policy. The usual motive for exemption is income-redistribution: the taxation of food is regarded as imposing unreasonably heavy burdens on low-income families. The Panel study obtained data on food expenditure, and can therefore throw some light on the redistributive effects of the tax exemption.

Table 8.17 shows in the right-hand column food expenditures as a percentage of net income by income decile. It is clear that a sales tax on food -- with the reasonable assumption of complete or almost complete forward shifting-- is regressive. If food were exempted from sales taxation and the lost revenue replaced by such measures as a) increasing the rate of sales taxation on all other taxable commodities, or b) increasing the rates of an income tax, the net effect would definitely be in the direction of equalizing after-tax incomes.

It is worth pointing out, however, that the exemption of food from sales taxation is an *inefficient* way of alleviating poverty, in the sense that only a small part of the resources sacrificed by the government end up benefiting the poor. Most of the benefits from the exemption go to the nonpoor. The left-hand column of Table 8.17 indicates that the poor -- in the sense of the lowest two income deciles -- account for only 11% of total food expenditures. This means that the poor would receive only 11% of the benefits of an exemption of food from sales taxation. A state government obtaining revenues of, say, $200 million from the taxation of food, and believing that tax rate increases were politically unfeasible, would be in a position to spend the entire $200 million for the alleviation of poverty (by income maintenance programs, job retraining, low income housing, etc.) if it retained the taxation of food. If food were exempted, only one-ninth of this sum -- about $22 million -- would go to the poor. The rest would be pocketed by the nonpoor.

A further type of inefficiency in the food exemption is suggested by Table 8.18, which shows the wide variations in food expenditures at each income level. As an anti-poverty device, the exemption of food from sales taxation is of little value to those low-income families who for one reason or another spend relatively little on food. While it may be true, as indicated in Table 8.17, that families in the lowest income decile taken together devote 30% of their income to food, it is also true, as indicated in Table 8.18, that one-fifth of those families spend less than half that amount on food.

Thus, the case for the food exemption is not overwhelming, and depends

TABLE 8.17

Food Expenditures* by Net Income Deciles, 1971
All Families (N=3827)

Income Deciles	Share of Decile in Aggregate Food Expenditures	Food Expenditures as a Percentage of Net Income
Lowest decile	4.6%	30.3%
Second decile	6.3	22.9
Third decile	7.4	19.4
Fourth decile	8.4	17.0
Fifth decile	9.6	15.8
Sixth decile	10.4	14.3
Seventh decile	11.4	13.0
Eighth decile	11.7	11.1
Ninth decile	13.7	10.4
Highest decile	16.4	7.7
All	100.0	12.5

*Excluding expenditures for restaurant meals.

TABLE 8.18

Variation by Income Deciles in Percentage of Income Spent on Food Consumption, 1971
All Families (N=3827)

Income Deciles	Food Expenditures* as a Percentage of Net Income					
	Less than 7.9%	7.9%-11.5%	11.5%-15.6%	15.6%-22.5%	More than 22.5%	All Families
Lowest decile	7.9%	5.1%	7.5%	18.9%	60.6%	100.0%
Second decile	11.5	6.9	15.0	20.1	46.5	100.0
Third decile	12.0	11.8	15.9	28.1	32.1	100.0
Fourth decile	10.8	17.1	20.0	30.1	22.0	100.0
Fifth decile	15.6	14.8	23.8	29.4	16.4	100.0
Sixth decile	15.3	25.9	22.8	23.1	12.9	100.0
Seventh decile	18.6	24.9	28.3	21.1	7.0	100.0
Eighth decile	25.3	31.1	29.8	12.7	1.2	100.0
Ninth decile	31.0	32.5	24.0	10.8	1.7	100.0
Highest decile	52.1	29.3	13.3	5.3	0.0	100.0
All	20.0	20.0	20.0	20.0	20.0	100.0

*Excluding expenditures for restaurant meals.

among other things on the range of fiscal alternatives which are available.

A Digression on Inflation

We have been concerned in this chapter with the effects of selected taxes on the distribution of income. A glance at the data on food expenditures in Table 8.17 suggests that there is another tax or quasi-tax -- namely, inflation -- whose effects on the distribution of income can be readily estimated from Panel study data.

It is well known that the recent inflation in the United States has been heavily concentrated in the food area. Since, as indicated in Table 8.17, food expenditures are a higher fraction of income for the poor than for the rich, it would seem reasonable to suppose that the unevenness of the present inflation has imposed special burdens on the poor.

The point can be confirmed if some simple calculations are made. Between December 1972 and August 1973, food prices rose by 29%, while the prices of all consumption items considered together rose by only 9%. If the money income of each decile rose over this period by 9% (reflecting the general inflation), then the lowest income decile would find that if it continued to buy the same real quantity of food in August 1973 as it had bought in December 1972, then that food would cost, not 30.3% of its income as can be assumed for December, but 30.3 X (1.29/1.09) percent, or 35.8%. Thus that decile suffered from the rapid inflation of food prices a burden equal to 35.8 - 30.3, or 5.5% of its income. Corresponding calculations for the remaining deciles yield the following results:

Second decile loses by food price inflation:	4.2% of income
Third	3.6%
Fourth	3.1%
Fifth	2.9%
Sixth	2.6%
Seventh	2.4%
Eighth	2.0%
Ninth	1.9%
Highest	1.4%

This analysis of the redistributive effects of an uneven inflation must remain incomplete, because total consumption expenditures cannot be estimated from Panel study data. But the importance of food expenditures in the budgets of low-income families suggests strongly that an inflation concentrated in the food sector will render the distribution of real income more unequal.

SUMMARY

The more noteworthy findings of this study may be summarized as follows:

1. At the bottom end of the income scale, the federal individual income tax is less progressive when both income and taxes are measured on a five-year rather than a one-year basis.

2. As incomes increase, social security taxes are first progressive and then regressive. Despite their initial progressiveness, they impose substantial burdens on low-income families.

3. Measuring income and taxes on a five year-basis rather than a one-year basis does not substantially moderate the regressiveness of the residential property tax.

4. The federal cigarette tax is markedly regressive.

5. The exemption of food from sales taxation would tend to equalize incomes if accompanied by certain kinds of tax increases, but not if accompanied by the sacrifice of government expenditure on programs aimed at alleviating poverty.

6. An inflation concentrated in the food sector probably makes the distribution of real income more unequal.

APPENDIX 8.1

We list here the sources of the variables used in this study, referring chiefly to the variable codes explained in A Panel Study of Income Dynamics, Vol. II: "Tape Codes and Indexes."

1) Money income: Sum of all family members' earnings, transfers, and capital income (excluding capital gains).

   1967: V81
   1968: V529
   1969: V1514
   1970: V2226
   1971: V2852

2) Net income: Money income + imputed income - union dues - travel to work - cost of child care + realized capital gains

   1967: V322-V294-V471-V477-V1164+1967 capital gains income assignment (see Section 13 below)
   1968: V840-V767-V471-V477-V1164+1968 capital gains income assignment
   1969: V1535-V1229-V1144-V1150-V1164+1969 capital gains income assignment
   1970: V2247-V1931-V1845-V1551-V1865+1970 capital gains income assignment
   1971: V2873-V2532-V2445-V2451-V2465+1971 capital gains income assignment

3) Private income: Net income - government transfer payments

   1967: V81-V523-V1211-V1214-V294-V471-V477-V1164+1967 capital gains income assignment
   1968: V529-V523-V1211-V1212-V1214-V767-V471-V477-V1164+1968 capital gains income assignment
   1969: V1514-V1209-V1211-V1212-V1214-V1229-V1144-V1150-V1164+1969 capital gains income assignment
   1970: V2226-V1911-V1913-V1914-V1916-V1931-V1845-V1551-V1865+1970 capital gains income assignment
   1971: V2852-V2512-V2515-V2517-V2532-V2445-V2451-V2465+1971 capital gains income assignment

4) Income/needs ratio: Net income divided by an estimate of the minimum family subsistence income

   1967: 1967 net income ÷ V32
   1968: 1968 net income ÷ V495
   1969: 1969 net income ÷ V1170
   1970: 1970 net income ÷ V1871
   1971: 1971 net income ÷ V2471

5) Federal individual income tax payments: (Total family income - deductions - exemptions) X tax rate.

1967: V83
1968: V536
1969: V1208+V1224
1970: V1910+V1926
1971: V2511+V2527

6) Head's social security tax.

a) Self-employed

1) How to tell if self-employed.

1967: IF V197 is 1, 3, or 8
1968: IF V642 is 1, 3, or 8
1969: IF V1279 is 1, 3, or 8
1970: IF V1984 is 1, 3, or 8
1971: IF V2582 is 1, 3, or 8

2) Tax payment: Head's labor and business income X tax rate, with maximum

1967: (V74+V1200+V1201+V1202) X .064; maximum=$422
1968: (V514+V1200+V1201+V1202) X .064; maximum=$499
1969: (V1196+V1200+V1221+V1202) X .069; maximum=$558
1970: (V1897+V1901+V1902+V1903) X .069; maximum=$558
1971: (V2498+V2502+V2503+V2504) X .075; maximum=$585

b) Non-self-employed

1) How to tell if not self-employed

1967: IF V197 is 2, 4, 5, 6, 7, or 9
1968: IF V640 is 2, 4, 5, 6, 7, or 9
1969: IF V1279 is 2, 4, 5, 6, 7, or 9
1970: IF V1984 is 2, 4, 5, 6, 7, or 9
1971: IF V2582 is 2, 4, 5, 6, 7, or 9

2) Tax payment

1967: IF V252 is 5 or 7, TAX =V251 X .044; maximum=$290;
IF V252 is 1, TAX = (V251+V1193) X .044; maximum=$290
1968: IF V700 is 5 or 9, TAX = V699 X .044; maximum=$343;
IF V700 is 1, TAX = (V699+V1193) X .044; maximum=$343
1969: (V1191+V1193) X .048; maximum=$374
1970: (V1892+V1894) X .048; maximum=$374
1971: (V2493+V2495) X .052; maximum=$406

7) Wife's social security tax

a) Self-employed

1) How to tell if self-employed

1967: IF V243 is 1, 3, or 8
1968: IF V609 is 1, 3, or 8
1969: IF V1367 is 1, 3, or 8
1970: IF V2074 is 1, 3, or 8
1971: IF V2673 is 1, 3, or 8

2) *Tax payment: wife's labor income X social security tax rate, with maximum*

1967: V75 X .064; maximum=$422
1968: V516 X .064; maximum=$499
1969: V1198 X .069; maximum=$558
1970: V1899 X .069; maximum=$558
1971: V2500 X .075; maximum=$585

b) *Non-self-employed*

1) *How to tell if not self-employed*

1967: IF V243 is 2, 4, 5, 6, 7, or 9
1968: IF V609 is 2, 4, 5, 6, 7, or 9
1969: IF V1367 is 2, 4, 5, 6, 7, or 9
1970: IF V2074 is 2, 4, 5, 6, 7, or 9
1971: IF V2672 is 2, 4, 5, 6, 7, or 9

2) *Tax payment*

1967: V75 X .044; maximum=$290
1968: V516 X .044; maximum=$343
1969: V1198 X .048; maximum=$374
1970: V1899 X .048; maximum=$374
1971: V2500 X .052; maximum=$406

8) Others' social security tax -- all assumed to be non-self-employed

a) *Tax payment*

1967: V79 X .044; maximum=$290
1968: V521 X .044; maximum=$343
1969: V1222 X .048; maximum=$374
1970: V1924 X .048; maximum=$374
1971: V2525 X .052; maximum=$406

9) Homeowners' property tax: Value of owner-occupied housing X effective state and local property tax rate.

The effective local property tax rates were taken primarily from the 1967 Census of Governments, "Taxable Property Values," Table 21. This table listed estimates of the effective local tax rate for 122 local areas. For survey families not residing in one of these 122 areas, the average of the local rates in the state where the family resided was used. For those few states which had no local areas listed in the Census of Governments, estimates of the effective local and state tax rate were taken from Dick Netzer, Economics of the Property Tax (Washington, D.C.: The Brookings Institution, 1966). Finally, for the few states which have a state tax on residential property, the effective rate was estimated by taking the nominal rate: *(Property tax revenue/Total assessed value of residential property,* from Tables 1 and 2, 1967 Census of Governments, "Taxable Property Values") times the ratio of assessed value to market value, as reported in Table 9 of 1967 Census of Governments, "Taxable Property Values."

The residency variables and the house value variables used for each year are:

	Residency	House Value
1967:	V94	V5
1968:	V538	V449
1969:	V1104	V1122
1970:	V1804	V1823
1971:	V2404	V2423

10) Rent payments.

1967: V10
1968: V455
1969: V1128
1970: V1829
1971: V2429

11) Cigarette consumption: Annual expenditure variables converted to number of packs, according to state of residence.

	Expenditure Variables	State Code
1967:	V35	V93
1968:	V498	V537
1969:	V1173	V1103
1970:	V1874	V1803
1971:	V2474	V2403

Conversion rules:

1) If state code is 08, 16, 30, 32, 36, or 45 divide expenditures by .3.
2) If state code is 05, 10, 11, 13, 15, 17, 19, 23, 24, 26, 28, 39, 43, 47, 49, 50, or 51 divide expenditures by .4.
3) If state code is 01, 02, 03, 04, 06, 07, 09, 12, 14, 18, 20, 21, 22, 27, 29, 31, 33, 34, 37, 38, 40, 41, 42, 44, 46, or 48 divide expenditures by .5.

12) Food expenditure: Taken directly from survey question, but deflated to remove state sales tax payments for those states which do not exempt food.

1967: V37
1968: V500
1969: V1175
1970: V1876
1971: V2476

13) Realized capital gains.

All data for imputing realized capital gains income to the survey families were taken from Statistics of Income, Individual Income Tax Returns, for the respective years. The relevant table was labeled: "All Returns: Sources of Income and Loss, Exemptions, Taxable Income, and Tax Items, by Adjusted Gross Income Class."

The first step in the imputation process was to change IRS income classes into income classes comparable to those of the Panel Study. The

discrepancy arises because IRS includes capital gains in its income definition while the Panel Study does not. Thus, IRS income classes had to be deflated to eliminate the influence of capital gains income. This was done by determining what percentage of total adjusted gross income was accounted for by capital gains income for each IRS income bracket. The bracket boundaries were then deflated by that percentage.

Next, from information in Statistics of Income, the average capital income for each return filed was calculated for each income class. Then the number of survey families in each newly defined income class was determined. This number was multiplied by the average capital gain income per return filed for that income class to obtain an estimate of the total capital gains income for families in each income class in the Panel Study. Finally, this total amount was divided among the families in each income class according to the rent, dividend and interest income of the family head. This imputation was then multiplied by two to get total realized capital gains income, since only 50% of long-term capital gains income need be reported for income tax purposes.

Table A8.1 shows the actual assignments used for 1968, based on the gross income of the head and wife and the rent, dividend and interest income of the head.

References

Tax Foundation, Inc., Tax Burdens and Benefits of Government Expenditures by Income Class, 1961 and 1965, (n.Y.: 1967).

Netzer, Dick, Economics of the Property Tax (Washington, D. C.: The Brookings Institution, 1966).

TABLE A8.1

Estimates of Realized Capital Gains by
Gross Income and Rent, Dividend, and Interest Income, 1968

Gross Income of Head and Wife (V518)*	Head's Rent, Dividend, and Interest Income (V703)									
	Zero	$1-499	$500-999	$1,000-1,999	$2,000-2,999	$3,000-4,999	$5,000-7,499	$7,500-9,999	$10,000 or more	Not ascertained**
Under $906	$ 0	$568	$1704	-	-	-	-	-	-	$ 90
$ 906-$ 1,970	0	24	74	$ 158	-	-	-	-	-	44
$ 1,971-$ 2,461	0	48	176	352	$ 486	-	-	-	-	70
$ 2,462-$ 3,954	0	40	122	244	406	$ 650	-	-	-	80
$ 3,955-$ 4,946	0	104	314	628	1046	1672	-	-	-	104
$ 4,947-$ 5,942	0	102	304	608	1014	1622	$ 2,536	-	-	104
$ 5,943-$ 6,942	0	116	346	690	1150	1840	2,878	-	-	124
$ 6,943-$ 7,939	0	108	322	644	1174	1616	2,682	$ 3,762	-	100
$ 7,940-$ 8,919	0	144	434	868	1448	2316	3,612	5,066	-	138
$ 8,920-$ 9,897	0	116	346	690	1150	1840	2,876	4,030	-	182
$ 9,898-$14,755	0	162	484	966	1612	2578	4,028	5,638	$ 7,194	262
$14,756-$19,396	0	292	878	1758	2928	4686	7,322	10,250	19,926	740
$19,397-$23,844	0	282	844	1690	2816	2506	6,042	9,858	22,532	1702
$23,845-$28,058	0	398	1196	2390	3988	6374	9,960	13,948	23,910	2942
$28,059-$45,134	0	434	1300	2600	4334	6934	10,836	15,170	30,790	5680
$45,135-$83,034	0	134	402	804	1342	2146	3,354	4,694	15,796	

*Approximately, adjusted gross income as defined for tax purposes minus realized capital gains.

**Families whose rent, dividend, and interest income was not ascertained were assigned the average capital gain income per return filed for that income class.

Correction to Chapter 8

The data on the five-year incidence of the federal income tax are subject to a computer programming error. Extending the time period of the analysis does make the tax less progressive, but does not result in the reported regressiveness at the lowest income decile. Recent research utilizing six years of panel data produced the following results.

Federal Individual Income Tax Payments as a Percentage of Income, by Income Decile

Money Income Decile	1967	1972	1967-1972
Lowest	.7%	.1%	.9%
Second	2.1	1.1	3.2
Third	4.7	3.4	5.7
Fourth	6.2	5.9	7.2
Fifth	8.0	7.9	8.7
Sixth	8.7	9.6	10.0
Seventh	10.0	10.3	11.0
Eighth	10.7	11.8	11.9
Ninth	11.7	12.9	12.7
Highest	16.0	18.9	18.1

N = 3203

A more thorough analysis will appear in Volume III, the report on the sixth wave of interviews and other special studies on the panel data.

Chapter 9

THE ALLOCATION OF HOUSEHOLD INCOME TO FOOD CONSUMPTION

INTRODUCTION

Although differences in the level and pattern of consumption in poor and rich families has drawn the attention of social reformers for centuries, the quantitative analysis of this problem seems to date only from the end of the 18th century with the studies of Davies (1795) and Eden (1797).[1] Nevertheless, the empirical analysis of family budgets still ranks as one of the oldest branches of quantitative economic and social research. The early studies noted above, as well as most of those that followed during the 19th century, were primarily concerned with isolating regularities in the pattern of household expenditures that might yield useful insights for social policy. The initial studies by Davies and Eden were focused on the habits of the poor, and their data were restricted to the budgets of lower income households. They represented data on the percentage distribution of household expenditures for different low-income groups, but no further analysis was carried out. It is perhaps worth noting in passing that the evidence presented by Davies and Eden does not seem to support what later became known as "Engel's Law" regarding the proportion of income spent on food. Their basic data set, however, was quite small by current standards and consisted of 127 household budgets in Davies' case and only 60 in Eden's study.

In Europe, by the middle of the 19th century, two forces had added considerable stimulus to the further analysis of family budget data. First, there was the increased social agitation of the time throughout the continent (recall the revolutions of 1848) which generated considerable desire for information concerning working class households in particular. Second, the rapid development of statistical analysis placed a set of more powerful tools in the hands of social

[1] For an excellent historical survey of empirical studies of consumer behavior, see G. Stigler (1954) and Williams and Zimmerman (1935).

researchers. One of the chief exponents of the application of these new statistical techniques to social and economic data was Adlophe Quetelet who was also the first to develop the idea of the "equivalent adult" (l'homme moyen) which was to play such an important role in the empirical analysis of household budgets. The most important result of these developments was the famous study of Ernst Engel (1857) based on the family budget data of 153 Belgian workmen. It was on the basis of this study that Engel's Law of consumption (that the proportion of income spent on food declines as income rises) was proposed. It is interesting to note that Engel grouped the households of his sample into three socio-economic classes, rather than grouping the families strictly by income level. His now famous classification was as follows: 1) families dependent on relief, 2) families with subsistence incomes, and 3) others. The assumption (probably justified) was that this classification also corresponded to a grouping by income levels. It was not until 1895 that Engel established his result on the basis of an income rather than social class grouping. His original classification scheme simply reflected the policy issues of that time.

In the United States in 1875, Carroll Wright of the U.S. Department of Labor investigated the budget allocations of about 400 workmen's families in Massachusetts, and found strong support for Engel's Law relating to household consumption of food. Somewhat later, Ogburn's study (1916) of family budgets in the District of Columbia also supported this finding, reporting an income elasticity of .67 for food expenditures.

Since the beginning of this century, countless studies have been carried out using far superior statistical techniques which have permitted researchers to test hypotheses suggested by advances in economic theory as well as to confront various issues of social policy. Among all of these more recent studies, we cannot fail to mention the landmark work of Prais and Houthakker (1955). The continued interest in budget studies and the controversies over their design and interpretation have led to important advances in our understanding of certain economic phenomena, and to the further improvement of statistical techniques.

The present study is very much in the historical tradition briefly outlined above (including the relative emphasis on low income families). Our general objective is to clarify and extend our knowledge regarding the determinants of household expenditures on food, on the basis of the analysis of data on household budgets generated by a five-year panel study. The availability of so rich a data set as the Panel Study of Income Dynamics provides many potentially fruitful paths of analysis, not all of which are exploited in this study. The following paragraphs set out in more detail the nature of our investigation. The primary

purposes of our study can be enumerated as follows:

1) to derive estimates of the income elasticity of food consumption for households with various sources of income,

2) to investigate specifically the effect of transfer payments (welfare, social security and retirement, unemployment insurance compensation, etc.) on the level of food consumption,[1]

3) to investigate the effect of various food subsidy programs (e.g., food stamps) on the allocation of household resources,

4) to investigate whether various demographic characteristics of households (age, sex, race, education, etc.) represent useful groupings for purposes of isolating a stable relationship between income and food consumption,

5) to compare and contrast the household food consumption-income relation for the "neediest" quintile of our sample, with that for the remainder of the sample.

The basic approach used in this study is multivariate regression analysis aimed at the isolation of the appropriate Engel curve. Within this framework the five-year panel of household budget data allows two alternate but not necessarily competing procedures. First, one could pool the panel data in a manner designed to reveal the short-run dynamic response of households to various stimuli of interest. Second, one could employ the panel data in a way designed to reveal the "equilibrium" or "normal" pattern of household expenditures as a function of alternative possible configurations of the determining variables. We have chosen in this initial study to concentrate on the second approach, leaving the matter of dynamics to a future study.[2]

Specifically, we have attempted to isolate the normal relationship of food consumption to the level and composition of household income. For this purpose it is necessary to abstract from (or control against) behavior dominated by adjustment to a changing or transient socio-economic environment within the household unit. In order to focus the data on the kind of consumption behavior we

---

[1] The current study has little to contribute to a recent controversy (Taylor, 1971) surrounding the short-run effect of transfer income on the saving rate. Our study concentrates on the "equilibrium effects" of transfer payments on one component of expenditure only.

[2] It should be noted that the sample is a probability sample expecially constructed to over-represent low income households. It is possible to weight the data so that the resulting sample is representative of the population as a whole. It would have been important to do so if we had been attempting to draw macroeconomic conclusions from the data. We prefer in this study, however, not to permit the data on poorer families to be swamped by those of the far more numerous non-poor.

wish to analyze, we have restructured the sample in the following fashion. First, we limited the data to be used to those households which had the same head and spouse throughout the five-year period. Second, we felt that there was a need to smooth the data in order to avoid the effects of substantial year-to-year swings in the level and component sources of household income.[1] We did this by averaging income, consumption, and all such continuous variables over the five-year span, for each household with the same head and spouse.[2] Finally, in the presence of various food subsidy programs and the option to grow one's own food, expenditures on food understate the value of food consumption. In order to study food consumption we have added the reported value of such items as "saving due to food stamps," "saving due to meals purchased at school," and so on, to the basic food expenditure variable. As near as we can come, then, our dependent variable is a measure of food consumption, and our basic unit of analysis is a household's average food consumption over the period 1968-72. Tables 9.1-9.3 at the end of Section I provide some numerical characterization of the data used in this study. These tables should prove useful in setting a frame of reference for interpreting the results of the regression analysis.

ANALYSIS

I. The Model

HOUSEHOLD SIZE, HOUSEHOLD COMPOSITION AND NORMALIZATION OF VARIABLES

It is difficult to proceed with the analysis of the effects of household income on the level of household consumption without taking explicit account of differences in household size. To begin with, variations in household size may very well have a larger effect on food consumption than do variations in household income. Further, the potential correlation between household size and income makes it difficult to isolate the effects of income on food consumption if household size is treated as one of the components of the random error term in the regression model. The simplest (and most common) way of accounting for vari-

---

[1] Smoothing is especially important in the context of our data set since the years 1968-72 include years of rapid growth in income as well as a period of recession (1969-70). In addition, food subsidy programs increased in importance during the period and substantial changes occurred in the level of social security retirement benefits.

[2] For a variable such as education or location, etc., we generally use the condition as of the last year of the period; for age of head we use the average value.

ation in household size is to let *consumption per capita* depend on *income per capita* or, to put the matter more formally, to assume that the following function is homogeneous of the first degree:

$$C = f(Y, P), \tag{1}$$

where C = household consumption of food,

Y = household income

P = number of persons in a household.

The homogeneity assumption then implies that:

$$C/P = h(Y/P), \tag{2}$$

that is, consumption per capita is a function of income per capita. The "per capita model" is a good beginning, but it fails to allow either for any economies of scale in consumption or for any differences in the age composition of households. What is necessary, therefore, is to refine this model further by defining and specifying an appropriate set of variables that will permit analysis of the separate effects of household income, size, and age composition on food consumption.

Economies of scale in consumption can be allowed for only by relaxing the homogeneity assumption made above and once this is done a number of alternative possibilities are available. Perhaps the simplest refinement of the per capita model would be the following:

$$\frac{C}{P} = g\left(\frac{Y}{P}, P\right) \tag{3}$$

or in the more specific constant elasticity form, we could write,

$$\frac{C}{P} = A\left(\frac{Y}{P}\right)^{\beta} P^{\gamma} \tag{4}$$

Differences in the age composition of various households, however, is the most difficult of these factors to incorporate. The best known procedure is to measure household size not by a simple "head count," but by a scale of "equivalent persons," where a child, for example, is counted as some appropriate fraction of an adult. This approach was used by Engel and much more recently by Prais and Houthakker (1955). The main problem with this procedure has always been the establishment of a metric that would translate household members into "equivalent persons" for clearly the appropriate transformation would be different for each component of expenditure. Fortunately for the case at hand, a convenient metric exists. The U.S. Department of Agriculture's minimum food requirement standards provide the information necessary to construct a "food needs" variable for each household that takes specific account of variations in the com-

position of households.[1] We can, therefore, examine for each household the ratio of food consumption to food needs and thus effectively account for the different composition of households. In order to specify a variable more clearly related to the per capita model and the "equivalent person" approach of previous studies, we have transformed the food needs variable which already reflects family composition in a way which produces a measure of the number of "standard persons" in each household. In our data, the average number of persons per household ($\overline{P}$) is 3.85 and the average value of food needs per household ($\overline{FN}$) is \$1113, so that \$289 (equal to $\overline{FN}/\overline{P}$) can be taken as a measure of "standard food needs per person." If the food needs value calculated for a particular household, say FN, is divided by "standard food needs per person," the result, say N, can be viewed as the number of "standard persons" in the particular household. This latter variable can be expressed as follows:

$$N = FN/(\overline{FN}/\overline{P}) \tag{5}$$

Thus, in the empirical analysis, we use the following general type of model:

$$\frac{C}{N} = g(\frac{Y}{N}, N) \tag{6}$$

which allows for differences in household size, household composition, and economies of scale in consumption. Finally, it is perhaps constructive to show the explicit relationship between the dependent variable suggested in (6) above (C/N) and that suggested by the per capita model (C/P) and/or the simple ratio of food consumption to food needs (C/FN). The relationship between C/N and C/FN can be expressed as follows:

$$\frac{C}{N} = \frac{C}{FN}\ (\overline{FN}/\overline{P}) \tag{7}$$

These two variables are simply related by a multiplicative constant which has no serious implications for the empirical analysis and the choice between them is cosmetic only. We have chosen C/N (consumption per standard person) for convenience of comparison with earlier studies. The relationship of C/N to C/P is more complex and can be expressed as follows:

$$\frac{C}{N} = \frac{C}{P}\ (\frac{\overline{FN}/\overline{P}}{FN/P}) \tag{8}$$

For reasons noted above, we have a strong preference for C/N as the variable of analysis since it accounts for household composition.

---

[1] The U.S. Department of Agriculture minimum food requirement standards in this data set were based on 1967 prices. For purposes of the current study, we have updated these standards to account for the inflation in food prices. To measure the overall inflation in food prices we used the U.S. Department of Labor's Consumer Price Index for food.

THE SPECIFIC FUNCTIONAL FORM

Throughout most of our analysis we have used the following two forms as the basis of our investigation:

$$\ell n\frac{C}{N} = \alpha + \beta\, \ell n\frac{Y}{N} + \gamma\ \ell n\ (N/\bar{N}) \qquad (9)$$

$$\frac{C}{N} = a + b\,\frac{Y}{N} + c(N-\bar{N}) \qquad (10)$$

where ℓn is the natural logarithm (to the base e). All of the variables in (9) and (10) have already been defined except for $\bar{N}$ which refers to the mean number of standard persons in the sample. These are similar to the relationships used most widely by previous investigators. Both equations relate consumption per standard person to income per standard person and the household's size relative to the mean size of households in the sample. Equation (9) assumes a constant income elasticity for food and equation (10) a constant marginal propensity to consume food. The household size variable is expressed as a deviation from the sample mean so that the effect of mean household size is contained in the intercept term. A possible difficulty, perhaps, is that neither of these forms permits a direct investigation of the existence of a "saturation level" for household expenditures on food. This hypothesis could be investigated by a model of the following form:

$$\frac{C}{N} = \alpha - \frac{\beta}{(Y/N)} \qquad (11)$$

We have not investigated any such saturation hypothesis. Our primary concern is to study the effects on food consumption of alternative sources of income and, in this context, the mathematical form of a saturation model becomes extremely difficult to implement statistically.

FURTHER SPECIFICATION OF MODEL AND RESEARCH STRATEGY

As noted above, our primary interest is in deriving an estimate of the income elasticity of a household's demand for food and investigating whether the source of household income (i.e., "earned" income versus transfer income, etc.) has any differential effect on demand. We begin by specifying the following general linear model:

$$\frac{C}{N} = a_0 + a_1(N - \bar{N}) + a_2\,\frac{Y}{N} \qquad (12)$$

$$a_2 = \alpha_1 + \sum_{i=2}^{k} \alpha_i\,(\frac{Y_i}{Y}) \qquad (13)$$

where Y_i = i^{th} component of total household income (Y). This model allows not

only for household size, composition, and income, but also permits the marginal propensity to consume food (a_2) to be affected by the relative importance of various income components (e.g., transfer versus non-transfer income). To understand the meaning of such a specification, suppose that total income (Y) is the sum of three components: labor income (Y_1), transfer income (Y_2), and the imputation "saving due to food stamps" (Y_3).[1] Letting β_i (i = 1,2,3) be the marginal propensities to consume food (MPC's) out of these three sources of income, we can write:

$$\frac{C}{N} = a_0 + a_1 (N - \bar{N}) + \beta_1 \frac{Y_1}{N} + \beta_2 \frac{Y_1}{N} + \beta_3 \frac{Y_3}{N} \qquad (14)$$

Since $\frac{Y}{N} = (\frac{Y_1}{N} + \frac{Y_2}{N} + \frac{Y_3}{N})$ we can write

$$\frac{Y_1}{N} = \frac{Y}{N} - \frac{Y_2}{N} - \frac{Y_3}{N} \qquad (15)$$

Substituting the expression for $\frac{Y_1}{N}$ in (15) into (14) and rearranging terms yields

$$\frac{C}{N} = a_0 + a_1(N - \bar{N}) + \beta_1 \frac{Y}{N} + (\beta_2 - \beta_1)\frac{Y_2}{N} + (\beta_3 - \beta_1) \frac{Y_3}{N} \qquad (16)$$

In equation (16) the coefficient of total income (per standard person) is the MPC out of labor income; the coefficient of transfer income is the excess of the transfer income MPC over the labor income MPC; and the coefficient of food stamp income is the excess of the food stamp MPC over the labor income MPC. Thus, equation (16) normalizes on the labor income MPC (β_1) and highlights the degree to which the MPC's out of other income sources differ from the MPC out of labor income. A zero value for the coefficient of the transfer income variable in equation (16) would indicate that transfer income carries the *same* MPC as labor income; a positive coefficient would indicate that the MPC is higher out of transfer income than out of labor income. The same analysis applies, of course, to food stamp income, but a rather interesting phenomenon exists in this case. If the government were selling "scrip" to low income households (say $15 worth of scrip for $10 in cash) and the scrip were useable for *any* purchase, one might expect to find that the MPC out of scrip income ("saving due to scrip") is about the same as that out of a cash transfer component (perhaps welfare income). But food stamps are not scrip, they can only be used to purchase (domestic) food products and indeed the food stamp program exists precisely in order to permit certain low income households to improve their standard of food consumption.

[1] If the purchase of $10 worth of food stamps entitles the purchaser to $15 worth of food at the food store, then the difference, $5, is what we refer to as "saving due to food stamps" and is properly handled as an income imputation.

Nonetheless, it is possible for a household which becomes eligible for food stamps to "spend" all of its food stamp income on food, spend less of its cash income on food than previously, and thereby wind up with an MPC out of food stamp income which differs little from its MPC out of some cash income source. The smaller is the coefficient of $\frac{Y_3}{N}$ in equation (16), the greater is the extent to which households manage to "funge" their food stamp income (turn it into general scrip) by spending less cash income on food.

Now note that equation (16) can also be rearranged to read

$$\frac{C}{N} = a_0 + a_1(N - \bar{N}) + [\beta_1 + (\beta_2 - \beta_1)\frac{Y_2}{Y} + (\beta_3 - \beta_1)\frac{Y_3}{Y}]\frac{Y}{N} \qquad (17)$$

which is precisely equivalent to the form given above as the pair of equations (12) and (13), with the understanding

$$\alpha_1 = \beta_1$$
$$\alpha_i = \beta_i - \beta_1, \qquad \text{for } i = 2,3, \ldots, k. \qquad (18)$$

To estimate this model, we return to the form given in equation (16), employ the coefficient relations in (18), and allow for an additive stochastic error term, to yield

$$\frac{C}{N} = a_0 + a_1 (N - \bar{N}) + \alpha_1 \frac{Y}{N} + \sum_{i=2}^{k} \alpha_i \frac{Y_i}{N} + \varepsilon \qquad (19)$$

We have also formulated the corresponding logarithmic version of the model as:

$$\frac{C}{N} = A_0(N/\bar{N})^{A_1} (\frac{Y}{N})^{A_2} \qquad (20)$$

$$A_2 = \eta_1 + \sum_{i=2}^{k} \eta_i (\frac{Y_i}{Y}) \qquad (21)$$

In this case the composition of household income has its direct effect on the *elasticity of demand*. Substituting (21) into (20), taking logarithms, and allowing for a stochastic error term, yields the following "constant elasticity" regression model:

$$\ell n \frac{C}{N} = A_0 + A_1 \ell n(N/\bar{N}) + \eta_1 \ell n \frac{Y}{N} + \sum_{i=2}^{k} \eta_i (\frac{Y_i}{Y}) \ell n \frac{Y}{N} + u \qquad (22)$$

To interpret this version of the model, suppose that we again consider the same three income components as in the case of equations (14) - (16). Equation (22) then specializes to

$$\ell n \frac{C}{N} = A_0 + A_1 \ell n(N/\bar{N}) + \eta_1 \ell n \frac{Y}{N} + \eta_2(\frac{Y_2}{Y}) \ell n\frac{Y}{N} + \eta_3(\frac{Y_3}{Y}) \ell n\frac{Y}{N} + u. \qquad (23)$$

The elasticity of $\frac{C}{N}$ with respect to $\frac{Y}{N}$, say $\eta_{C,Y}$, is given by:

$$\eta_{C,Y} = \eta_1 + \eta_2\left(\frac{Y_2}{Y}\right) + \eta_3\left(\frac{Y_3}{Y}\right) \qquad (24)$$

The parameter η_2 measures the differential contribution of income component Y_2 relative to income component Y_1 to the income elasticity of food consumption, and η_3 is interpreted analogously. If $\eta_2 = \eta_3 = 0$, then Y_2 and Y_3 make the same contribution to the income elasticity as does Y_1, the income component on which we have normalized. In this case $\eta_{C,Y} = \eta_1$. If $\eta_2 > 0$, then the income elasticity $\eta_{C,Y}$ exceeds the basic value η_1 by the product of the differential for component number two, η_2, and the share of component number two in total income $\left(\frac{Y_2}{Y}\right)$.

In confronting the data set with these two models we decided to separate clearly the hypothesis search ("data mining") phase of the investigation from the hypothesis testing phase. To accomplish this we took advantage of the ability to separate the entire data set into two *independent* half-samples and to conduct the search phase on one half of the data, saving the remainder for the testing phase of the investigation. During the search phase of the study we confined ourselves to the functional forms set out in equations (19) and (22) above and to the consideration of the following special income components (Y_i); welfare payments, social security and retirement payments, unemployment insurance benefits, miscellaneous transfer income, income subsidies due to participation in the food stamp program and/or subsidized meals at work or school, and the income generated by raising home grown food. Finally, as part of this initial stage of our investigation, we fitted the linear version of the regression model separately to a number of different subgroups of the half-sample in order to determine whether the mechanism governing this aspect of household behavior revealed any noticeable differences between these groups. In this connection we first divided our half-sample of households into a number of subgroups defined along various demographic lines, such as age, race, sex and education of the head of household. This did not prove to be a fruitful line of research as the data revealed few noticeable differences in the behavior of these groups in the context being studied here. The same was true when we divided the households into urban and rural groupings. On the whole, these search activities produced very few insights; and those which did stand out will be discussed in detail below. An alternative "income criterion" for partitioning the sample households, however, did prove to be quite useful. In this case we identified a target[1] population defined as the lowest quin-

[1]This target population differs from the one used in other chapters. We have taken those in the lowest quintile on the average ratio of income/food needs rather than those in the lowest quintile any one of the five years on the ratio of income to total income needs.

tile of households in our half-sample in terms of income per standard person, (Y/N). Our analysis revealed very substantial differences in the allocation of household budgets to food consumption in the target and non-target households.

Before turning to the results of the regression analysis, we call the reader's attention to Tables 9.1-9.3 which contain relevant descriptive statistics concerning the variables used in the regression analysis. These data provide useful background for interpreting the results to be presented in the succeeding sections of this chapter.

II. Some Results

The experimentation discussed above has led us to estimate the parameters of the following linear relationship governing the household's budget allocation to food consumption.

$$\frac{C}{N} = (A_0 + A_1 T) + A_2(N - \bar{N}) + (A_3 + A_4 T)\frac{Y}{N} + A_5\frac{W}{N}$$
$$+ A_6\frac{(YTR-W)}{N} + (A_7 U + A_8 U')\frac{FDSAV}{N} + A_9\frac{SG}{N} + \varepsilon. \qquad (25)$$

The variables in the above relationship (25) are defined as follows:

C = Market value ($'s) of food consumed by household excluding both restaurant meals and saving occasioned by the production of home grown food.

N = Number of "standard persons" in the household.

Y = Household income, net of federal income taxes. In addition to labor, capital, and transfer income this figure includes a number of important imputations.[1]

W = Welfare payments ($'s) to husband and wife.

YTR = Total transfer payments ($'s) to the household. The variable (YTR-W) is, therefore, the non-welfare component of the household's transfer income.

FDSAV = Dollar value of subsidies from the food stamp program and from subsidized meals at work and/or school and other "free" food.

SG = Dollar value of saving occasioned by growing own food.

U = Dummy variable. Takes the value 1.0 if a household lives within five miles of the center of a city of at least 50,000 people, and a value of 0 otherwise ("urban" households).

---

[1] The imputations cover the following items: 1) saving due to performing own car and house repairs, 2) imputed rent for owner occupied housing, 3) saving generated by household participation in food subsidy programs, 4) saving from growing own food, 5) saving from rent subsidy programs, 6) other sources of income in kind.

TABLE 9.1

Sample Means of Consumption and Income Variables[a]
(Dollars per "Standard Person")

	Target Households	Non-Target Households
Total Income	$798.0	$2987.0
Food Consumption (C/N)	356.5	512.6
Welfare Income (W/N)	172.6	36.9
Other Transfer Income (YTR-W/N)	117.5	304.9
Income from Food Subsidy Program (FDSAV/N)	55.5	18.6
Income Generated by Savings on Home Grown Food (SG/N)	6.7	10.2
Number of "Standard Persons" per household	5.5	3.4

[a]All calculations refer to the initial half-sample.

TABLE 9.2

The Relative Size of Various Income Flows:
Mean Ratios of Indicated Variables to Total Income[a]

	Target Households	Non-Target Households
"Wage" Income (Y_1)[b]	.554	.846
Welfare Income (W)	.216	.025
Other Transfer Income (YTR-W)	.144	.115
Imputed Items		
i) Saving due to Food Subsidy Programs (FDSAV)	.078	.009
ii) Saving on Home Grown Food (SG)	.008	.005

[a]All calculations refer to the initial half-sample.

[b]"Wage" income refers to an aggregate of all those components of total income not separately treated in the table.

TABLE 9.3

Some Demographic Characteristics of the Initial Half-Sample

	Target Households	Non-Target Households	Total
Sex of Head			
Male	154	1045	1199
(Percent of total sample)	(9.3)	(63.0)	(72.3)
Female	152	308	460
(Percent of total sample)	(9.2)	(18.6)	(27.7)
Race of Head			
White	40	979	1019
(Percent of total sample)	(2.4)	(59.0)	(61.4)
Non-white	266	374	640[a]
(Percent of total sample)	(16.0)	(22.5)	(38.6)
Sample Size	306	1353	1659
(Percent of total sample)	(18.5)	(81.5)	(100.0)

[a] As noted above, our sample is not chosen so as to be representative of the U.S. population as a whole. For example, in 1970 only eleven percent of U.S. families had a non-white head. This compares to a figure of 38.6 percent in our sample.

U'= 1.0 - U ("non-urban" households).

T = 1.0 for target households; 0 for non-target households. (Target households are defined as those in the lowest quintile of the Y/N distribution).

ε = Stochastic error term.

This model represents both a sharper focusing on particular income components and a rather modest expansion, in a number of directions, of the general model proposed above, equation (19). For example, this specification specifically isolates a number of income components which our initial experiments indicated would be useful. Thus, although welfare payments are treated separately, all other transfer income is treated in one aggregate (YTR-W). The income component not shown separately (the analogue of Y_1 in our earlier illustrations) is the sum of labor and property income and a number of imputations. In subsequent discussion it will be useful to be able to refer to this component on which we have normalized in an economical way. For want of anything much better, we shall refer to this simply as "wage income." In addition, this version of the model allows for the principal differences exhibited by different subgroups of the population as revealed during a series of preliminary experiments. In particular, it allows, through the variable T, for a different intercept and marginal propensity to consume for the households in the target population. Finally, allowance is also made for a differential reaction for urban and non-urban households to food subsidy programs.

The parameters of equation (25) were estimated by least squares from the data generated by the households in our half-sample, with the following result (standard errors are shown in parentheses below the coefficients):

$$\frac{C}{N} = \underset{(7.80)}{378.79} - \underset{(36.64)}{154.99T} - \underset{(2.05)}{13.70}\,(N - \bar{N}) + \left(\underset{(.002)}{.046} + \underset{(.044)}{.097T}\right)\frac{Y}{N} + \underset{(.018)}{.041}\,\frac{W}{N} - \underset{(.006)}{.0008}\,\frac{YTR-W}{N} + \left(\underset{(.101)}{.204U} + \underset{(.068)}{.398U'}\right)\frac{FDSAV}{N} - \underset{(.137)}{1.233}\,\frac{SG}{N} \qquad (26)$$

$R^2 = .418$ SEE = \$.35.03

Table 9.4 presents the implied estimates of the MPC for food out of a number of different income sources for both target and non-target families.

The parameter estimates permit a number of interesting inferences:

1) As expected, there is a significant difference in the mechanism governing the budget allocation to food in target and non-target households. In

TABLE 9.4

The Marginal Propensity to Consume Food from Various Income Sources
(based on equation (26))

	"Wage" Income (Y_1)	Welfare Income (W)	Other Transfer Income (YTR-W)	Income from Food Subsidy Program (FDSAV)		Aggregate Income[a] (Y)	
				Urban Households	Non-Urban Households	Urban Households	Non-Urban Households
Target Households	.143	.184	.141	.347	.541	.145	.147
Non-Target Households	.046	.087	.047	.250	.444	.053	.061

[a]The MPC out of aggregate income is computed according to equation (13).

TABLE 9.5

Elasticity of Food Consumption
with Respect to Total Income (Y)
(based on equation (26))

	Urban Households	Non-Urban Households
Target Households	0.323	0.329
Non-Target Households	0.293	0.360

particular, the target households exhibit a substantially higher MPC out of wage income. The target households have an estimated wage income MPC of 0.143 compared to 0.046 for the non-target units. The results for both groups of households, however, clearly support Engel's Law that the proportion of income spent on food declines as income rises. In terms of elasticities (evaluated at the appropriate mean values), the estimated value of the elasticity of food consumption with respect to total income averages about 0.325 for both the target and non-target households, with urban households exhibiting a somewhat lower figure than non-urban households. Table 9.5 presents these elasticity estimates in more detail. These estimates are substantially lower than those reported by Houthakker ((1957) or Houthakker and Taylor (1970), but similar to those reported by Brandow (1961), Lansing and Dickinson (1970), Tobin (1950), and Girshick and Haavelmo (1947). The results reported by Houthakker (1957) and Houthakker and Taylor (1970), however, are expenditure rather than income elasticities and there is substantial reason to expect the income elasticity of household food consumption to be lower than the expenditure elasticity. The relationship between these two elasticity measures can be expressed as follows:

$$\eta_{C,Y} = \eta_{C,E} \cdot \eta_{E,Y}$$

where $\eta_{C,Y}$ = Income elasticity of food consumption

$\eta_{C,E}$ = Expenditure elasticity of food consumption

$\eta_{E,Y}$ = Income elasticity of total expenditures.

Since $\eta_{E,Y}$ can be expected to be less than one at the household level, it follows that $\eta_{C,Y} < \eta_{C,E}$.

2) The estimated coefficients on the FDSAV/N variable indicate that households respond to various food subsidy programs in an interesting way. Every additional dollar of subsidy income results in $.20 to $.40 more food consumption than would an additional $1.00 of wage income. This MPC differential is far greater than that applying, say, to welfare income, but it does imply that households succeed in using a significant share of such subsidy income to increase their general purchasing power. Thus, programs such as the Agriculture Department's food stamp program do induce increased consumption of food, but they also allow, through substitutions, increased consumption on other items as well. It is interesting to note that urban households "funge" their subsidy incomes to a much greater extent than do non-urban households. Finally, we did test whether households responded any differently to the food stamp program than to other types of food subsidies (largely low-priced meals at work and/or school). The evidence

indicates that the response was the same to the different programs.

3) The coefficient on SG/N (saving on food produced at home) is rather difficult to interpret. Since this component was *not* included in the dependent variable, the negative sign indicates that this source of income decreases the amount spent on other food items. The interpretation of the magnitude of the coefficient, however, is extremely difficult since it is dependent on the nature of what is grown and the percentage mark-up that is typical (for the items grown) at both the wholesale and retail level.[1] On the whole, this is not a very important source of income, even in the rural areas. In the rural areas this item averaged about $26 per standard person in our half-sample.

We also estimated the logarithmic version of the above equation. In its logarithmic form the model is specified as follows (see equation (22)).

$$\ell n \frac{C}{N} = A_1 + A_2 T + \alpha_2 \ \ell n(N/\bar{N}) + [\beta_0 + \beta_1 T] \ell n \frac{Y}{N} + \beta_2 \left(\frac{W}{Y}\right) \ell n \frac{Y}{N}$$
$$+ \beta_3 \left(\frac{YTR-W}{Y}\right) \ell n \frac{Y}{N} + [\beta_4 U + \beta_5 U'] \left(\frac{FDSAV}{Y}\right) \ell n \frac{Y}{N} + \beta_6 \left(\frac{SG}{Y}\right) \ell n \frac{Y}{N} + u \qquad (27)$$

As with the linear model, the parameters of this relationship were estimated by least squares from the data generated by the households in our half-sample yielding the following results:

$$\ell n \frac{C}{N} = \underset{(.115)}{3.794} - \underset{(.423)}{1.652T} - \underset{(.004)}{.082} \ \ell n \ (N/\bar{N}) + \left(\underset{(.015)}{.299} + \underset{(.063)}{.243T}\right) \ell n \frac{Y}{N}$$
$$+ \underset{(.006)}{.021} \frac{W}{N} \ell n \frac{Y}{N} + \underset{(.004)}{.002} \left(\frac{YTR-W}{Y}\right) \ell n \frac{Y}{N} + \left(\underset{(.042)}{.109U} + \underset{(.026)}{.193U'}\right)$$
$$\left(\frac{FDSAV}{Y}\right) \ell n \frac{Y}{N} - \underset{(.063)}{.636} \left(\frac{SG}{Y}\right) \ell n \frac{Y}{N} \qquad (28)$$

$$R^2 = .449 \qquad SEE = .256$$

The inferences to be drawn from the above parameter estimates are qualitatively very similar to those generated by the linear model which was discussed above. In particular, a number of income components (welfare payments, food subsidies, savings from home grown food) do make a differential contribution to the overall income elasticity of food consumption as suggested by equations (21) and (24) above. Using the estimated coefficients from the above equation together with equation (24) the elasticity of food consumption with respect to total income can be computed as follows:

---

[1] The SG variable measures only the saving due to growing food at home, and is not, therefore, a measure of consumption. Since *no* corresponding measure of consumption was determined in the survey, we excluded SG itself from the dependent variable.

a) for target households:

$$\eta_{C,Y} = .299 + .243 + .021\,\frac{W}{Y} + .002\,\frac{(YTR-W)}{Y} + (.109U + .193U')\,\frac{FDSAV}{Y} - .636\,\frac{SG}{Y} \qquad (29)$$

b) for non-target households:

$$\eta_{C,Y} = .299 + .021\,\frac{W}{Y} - .002\,\frac{(YTR-W)}{Y} + (.109U + .193U')\,\frac{FDSAV}{Y} - .636\,\frac{SG}{Y} \qquad (30)$$

Substituting the appropriate mean values of the indicated variables into the above expressions reveals that the estimated income elasticity implied by equation (28) is approximately 0.55 for target households and 0.30 for non-target households. Recall that the linear model generated a total income elasticity of about 0.325 for both target and non-target households (see Table 9.5). Thus, the income elasticity estimates generated for the target households are substantially higher in the logarithmic model. The estimated logarithmic model implies a kind of "strong Engel's Law" in which the proportion of income spent on food declines as income increases and declines more rapidly at higher income levels (i.e., the higher income group has the lower income elasticity). Since elasticities are relations between percentage changes in two magnitudes, a logarithmic formulation assumes constant elasticities over the whole range. An arithmetic formulation assumes a constant absolute response, which can be converted to an elasticity only at some pair of values for income and consumption.

In order to investigate more thoroughly the difference between target and non-target households with respect to the budget allocation for food consumption, we fit equation (25) separately to the data generated by these two subgroups of the half-sample. This procedure, of course, allows *all* of the coefficients in the model to reflect differences that may exist in the behavior of these two groups. The estimated relationships so derived are as follows:

a) target households:

$$\frac{C}{N} = \underset{(22.76)}{191.68} - \underset{(1.97)}{10.73}\,(N-\bar{N}) + \underset{(.027)}{.160}\,\frac{Y}{N} + \begin{pmatrix}.097U + .037U'\\(.030)\quad(.025)\end{pmatrix}\frac{W}{N} + \underset{(.023)}{.006}\,\frac{(YTR-W)}{N} + \begin{pmatrix}.369U + .623U'\\(.159)\quad(.094)\end{pmatrix}\frac{FDSAV}{N} - \underset{(2.3)}{(4.45U} + \underset{(.31)}{.718U')}\,\frac{SG}{N} \qquad (31)$$

$R^2 = .403$ SEE = \$73.60

b) non-target households:

$$\frac{C}{N} = \underset{(8.66)}{382.74} - \underset{(2.70)}{15.27}(N-\bar{N}) + \underset{(.002)}{.046}\frac{Y}{N} + \underset{(.022)}{.028}\frac{W}{N} - \underset{(.070)}{.003}\frac{YTR-W}{N}$$
$$+ \begin{pmatrix} .149U + .354U' \\ (.113) \quad (.082) \end{pmatrix}\frac{FDSAV}{N} - \underset{(.15)}{1.276}\frac{SG}{N} \qquad (32)$$
$$R^2 = .339 \qquad SEE = \$145.10$$

As expected, these results also confirm some of the behavioral differences that characterize the budget allocation decisions of target and non-target households. The estimated income elasticities are very close to those revealed by the single linear model, equation (26). It seemed appropriate, however, to test, in a more formal manner, just what gains we were achieving by allowing for these various distinctions between target and non-target households. To do this we considered the following three models:

Model A:

$$\frac{C}{N} = (A_0 + A_1 T) + A_2(N-\bar{N}) + A_3\frac{Y}{N} + A_5\frac{W}{N} + A_6\frac{(YTR-W)}{N}$$
$$+ (A_7 U + A_8 U')\frac{FDSAV}{N} + A_9\frac{SG}{N} + \varepsilon_A$$

Model B:

$$\frac{C}{N} = (A_0 + A_1 T) + A_2(N-\bar{N}) + (A_3 + A_4 T)\frac{Y}{N} + A_5\frac{W}{N}$$
$$+ A_6\frac{(YTR-W)}{N} + (A_7 U + A_8 U')\frac{FDSAV}{N} + A_9\frac{SG}{N} + \varepsilon_B$$

Model C:

a) target households:

$$\frac{C}{N} = \alpha_0 + \alpha_1(N-\bar{N}) + \alpha_2\frac{Y}{N} + (\alpha_3 U + \alpha_4 U')\frac{W}{N} + \alpha_5\frac{(YTR-W)}{N}$$
$$+ (\alpha_6 U + \alpha_7 U')\frac{FDSAV}{N} + (\alpha_8 U + \alpha_9 U')\frac{SG}{N} + \varepsilon_{C,1}$$

b) non-target households:

$$\frac{C}{N} = \beta_o + \beta_1(N-\bar{N}) + \beta_2\frac{Y}{N} + \beta_3\frac{W}{N} + \beta_5\frac{(YTR-W)}{N}$$
$$+ (\beta_6 U + \beta_7 U')\frac{FDSAV}{N} + \beta_8\frac{SG}{N} + \varepsilon_{C,2}$$

These comprise a series of "nested" models in the sense that Model B is a special case of Model C (where: $\alpha_3 = \alpha_4 = \beta_3$, $\alpha_5 = \beta_5$, $\alpha_6 = \beta_6$, $\alpha_7 = \beta_7$, $\beta_8 = \alpha_8 = \alpha_9$), and Model A is a special case of Model B (where $A_3 = A_4$). Thus, Model C contains Model B which contains Model A. Model A allows only for a separate intercept term for target households, while Model B allows in addition, for separate MPC's

out of wage income, and Model C relaxes even more constraints. In this context, therefore, we can perform an F-test to help us decide which of the restrictions should be relaxed.

We proceeded in a sequential manner, beginning by comparing Models A and B. The appropriate F-test is defined as follows:

$$F_{1,1649} = \frac{ESS_A - ESS_B}{ESS_B} \quad \frac{df_B}{df_B - df_A}$$

where ESS_i = Error sum of squares for Model i

df_i = Degrees of freedom for error in Model i.

This test statistic is appropriate for testing the hypothesis that Models A and B are the same (i.e., that the data contain the restrictions implicit in Model A). If the computed F value from the above statistic is greater than the critical F value (for the appropriate degrees of freedom) then we reject the null or "no difference" hypothesis in favor of Model B. The computed F value (in this case 4.826) enables us to reject the null hypothesis (that both models are the same) as the .025 level. Thus, Model B with separate marginal propensities to consume out of wage income for target and non-target households is preferred to Model A. In a perfectly analogous fashion we tested the restrictions implied by Model B relative to Model C. In this case, however, we were unable to reject the null hypothesis. Model B, therefore, remains our preferred model.

III. A Test of the Model

As outlined above, one aspect of our research strategy was to separate the hypothesis search phase of our investigation from the hypothesis testing phase. Our procedure was to divide our entire sample into two independent half-samples, saving the second of these samples for a test of the model (or models) isolated by preliminary data analysis on the first sample. The parameter estimates presented in Section II above were all derived in the hypothesis search phase of our study on the basis of data analysis on the initial half-sample. In order to test these models (equations (26) and (28)) we then estimated the parameters of these relationships from the data generated by the second sample. The following parameter estimates were derived when the linear model was applied to the second half-sample.

$$\begin{aligned}\frac{C}{N} = {} & \underset{(7.31)}{405.19} - \underset{(32.85)}{226.23T} - \underset{(2.02)}{16.19}\,(N-\bar{N}) \\ & + \left(\underset{(.002)}{.036} + \underset{(.035)}{.134T}\right)\left(\frac{Y}{N}\right) + \underset{(.018)}{.052}\,\frac{W}{N} - \underset{(.006)}{.013}\,\frac{(YTR-W)}{N} \\ & + \left(\underset{(.082)}{.474U} + \underset{(.085)}{.595U'}\right)\frac{FDSAV}{N} - \underset{(.15)}{1.19}\,\frac{SG}{N} \qquad (33)\end{aligned}$$

$R^2 = .407$ SEE = \$136.30

The above parameter estimates together with their associated standard errors confirm all the major hypothesis isolated during the hypothesis search phase of our investigation. In particular, we note the continued strong evidence in favor of allowing both a separate intercept and a separate MPC for "wage" income for the target households. Further, the roles discussed above with respect to the influence of welfare income, income generated by food subsidy programs, etc., on the budget allocation process are fully supported by these estimates. Table 9.6 presents the MPC estimates by source of income implied by equation (33) and compares them to those implied by our data analysis on the initial half-sample (see Table 9.4).

Although in the framework of the linear model the evidence from the second half-sample qualitatively confirms the conclusions derived in the initial phase of our investigation, Table 9.6 does reveal a number of quantitative differences in the point estimates of a number of the MPC's. In terms of the MPC for total income (Y), the second half-sample generates an average estimate of .175 and .038 for the target and non-target families respectively. This compares to the initial estimates of .146 and .056 derived from the first half-sample. In order to test formally the hypothesis of equal coefficients in the two half-samples we carried out the F-test suggested by Chow (1960). This involves fitting the linear model to a set of data formed by pooling the data from both half-samples and considering how the error sum of squares compares to that achieved by allowing separate regression equations for each half-sample. The results of the test led us to reject the hypothesis of equality. That is, despite the fact that both half-samples produce qualitatively equivalent conclusions, the data do not support the hypothesis of equivalent parameter values in the two half-samples.

When the logarithmic model was applied to the second half-sample we obtained the following result:

$$\ell n \frac{C}{N} = \underset{(.13)}{3.83} - \underset{(.40)}{1.61T} - \underset{(.016)}{.071}\ \ell n\ (N/\bar{N}) + \left(\underset{(.016)}{.297} + \underset{(.058)}{.223T}\right) \ell n\ (\frac{Y}{N}) + \underset{(.007)}{.030}\ \frac{W}{Y}\ \ell n\ (\frac{Y}{N}) + \underset{(.005)}{.004}\ \frac{(YTR-W)}{Y}\ \ell n\ (\frac{Y}{N}) + \left(\underset{(.055)}{.162U} + \underset{(.033)}{.209U'}\right) \frac{FDSAV}{Y}\ \ell n\ (\frac{Y}{N}) - \underset{(.078)}{.669}\ \frac{SG}{Y}\ \ell n\ (\frac{Y}{N}) \qquad (34)$$

$$R^2 = .425 \qquad SEE = .275$$

Table 9.7 compares the estimated coefficients derived in the framework of the logarithmic model from the first and second half-samples. In this case the results are very similar both quantitatively and qualitatively. The total income elasticity of food consumption estimated from the second half-sample averaged 0.53 and 0.29 for the target and non-target households respectively. This

TABLE 9.6

The Marginal Propensity to Consume Food from Various Income Sources

	"Wage" Income (Y_1)	Welfare Income (W)	Other Transfer Income (YTR-W)	Income from Food Subsidy Program (FDSAV)		Aggregate Income (Y)	
				Urban Households	Non-Urban Households	Urban Households	Non-Urban Households
First Half-Sample[a]							
Target Households	.143	.184	.142	.247	.541	.145	.147
Non-target Households	.046	.087	.047	.250	.446	.053	.061
Second Half-Sample[b]							
Target Households	.170	.222	.157	.644	.765	.174	.175
Non-target Households	.036	.088	.023	.510	.631	.037	.038

[a] Hypothesis Search Phase.

[b] Hypothesis Test Phase.

TABLE 9.7

A Comparison of the Estimated Coefficients of the Logarithmic Model in the "First" and "Second" Half-Samples

Variable	Estimated Coefficients: First Half-Sample	Estimated Coefficients: Second Half-Sample
Constant	3.794	3.833
T	-1.652	-1.614
$\ell n\ (N/\bar{N})$	-.082	-.071
$\ell n\ (Y/N)$	.299	.297
$T\ell n\ (Y/N)$	.243	.223
$W/Y\ \ell n\ (Y/N)$	.021	.030
$(TRY-W)/Y\ \ell n\ (Y/N)$	.002	.004
$UFDSAV/Y\ \ell n\ (Y/N)$	.109	.162
$U'FDSAV/Y\ \ell n\ (Y/N)$	.193	.209
$SF/Y\ \ell n\ (Y/N)$	-.636	-.669

compares to figures of 0.55 and 0.30 derived in the hypothesis search phase of our study. Finally, we carried out the same F-test outlined above in connection with the linear model to test the hypothesis that the half-samples imply equal coefficient values in the logarithmic model. As one would expect from the evidence presented in Table 9.7 we are unable to reject the hypothesis of equality in this case. In view of these results we would be inclined to prefer the logarithmic over the linear version of the model, and it would seem to be appropriate to employ the entire data set to estimate the parameters of the logarithmic model so as to gain the advantages of the larger sample size. The estimated coefficients based on the entire data set are as follows:

$$\ell n \frac{C}{N} = \underset{(0.87)}{3.845} - \underset{(.284)}{1.567T} - \underset{(.010)}{.078}\ \ell n\ (N/\bar{N}) + \left(\underset{(.011)}{.296} + \underset{(.042)}{.220T}\right) \ell n\ \left(\frac{Y}{N}\right)$$
$$+ \underset{(.004)}{.026}\ \frac{W}{Y}\ \ell n\ \left(\frac{Y}{N}\right) + \underset{(.003)}{.003}\ \frac{YTR-W}{Y}\ \ell n\ \left(\frac{Y}{N}\right)$$
$$+ \left(\underset{(.031)}{.132U} + \underset{(.021)}{.200U'}\right) \frac{FDSAV}{Y}\ \ell n\ \left(\frac{Y}{N}\right) - \underset{(.019)}{.651}\ \frac{SG}{Y}\ \ell n\ \left(\frac{Y}{N}\right) \qquad (35)$$

$R^2 = .435$ SEE = .266

These coefficients imply the elasticities for food consumption with respect to total income which are shown in Table 9.8.

Finally we computed a new set of estimated income elasticities under the assumption that no welfare or food subsidy programs (i.e., W = FDSAV = 0.0). In this situation the only supplemental income programs available are the various

TABLE 9.8

Estimated Elasticities of Food Consumption with Respect to Total Income
(Pooled Sample, Equation (35))

	Urban Households	Non-Urban Households
Target Households	0.526	0.532
Non-Target Households	0.301	0.303

social insurance programs. The effect of this assumption on the aggregate income elasticity of food consumption was marginal. For both target and non-target households the estimated elasticity was lowered a minor amount (0.02 at most). Thus, although these programs permit a higher *level* of food consumption, they do not have any substantive effect on the income elasticity of food consumption.

SUMMARY

The present study has attempted to isolate, from a body of data on household budgets, certain key parameters governing the household budget allocation to food consumption. In this intial study we have concentrated on the equilibrium or steady-state properties of this mechanism. Within this context we have investigated the differential roles of various types of household income and have dealt separately with the budget allocation process in the "neediest" households segment of our sample. To summarize our principal findings:

1) In the allocation of resources to food consumption, the major distinguishing element is membership in the target group (i.e., low income per standard person). Households in the target group display an income elasticity of food consumption slightly in excess of .5; for non-target households the corresponding figure is about .3.[1]

2) Welfare income is devoted to food consumption to a greater extent than is true of wage income, but the difference is so small at the margin that overall income elasticity is barely affected by empirically relevant variations in the share of income accounted for by welfare payments. We found no evidence to indicate that non-welfare transfers should be treated differently from wage income in the analysis of food consumption.

---

[1] An income elasticity of .5 means that a 2% increase in income leads to a 1% increase in food consumption.

3) Income from food subsidy programs (e.g., food stamps) proved to be even more strongly devoted to food consumption than did welfare payments. However, the food subsidy programs are sufficiently small as a source of income (even for the target group) that their effect on the income elasticity of food consumption is small.

4) The evidence clearly implies that the various income-supplement programs aimed at the poor permit a higher standard of food consumption, but have minimal effects on either the overall marginal propensity to consume food or the income elasticity of food consumption.

Although a number of interesting and useful results were obtained in this study, the basic data set remains rich in possibilities for further analysis. Perhaps one of the most important aspects of the budget allocation process that remains to be investigated is the dynamics of household response to short-run variations in income, income sources, and household composition. A pooling of the panel data in the manner suggested by Nerlove (1971) would provide an unusually good opportunity to study the dynamic aspects of the budget allocation process.

References

Brandow, G. E., Interrelations among Demands for Farm Products and Implications for Control of Market Supply, Pennsylvania State University College of Agriculture Extension Station, University Park, Pennsylvania, 1961.

Chow, G. C., "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," Econometrica, Vol. 28 (July 1960).

Davies, D., The Case of Laborers in Husbandry, Bath, 1795.

Eden, Sir F. M., The State of the Poor, London, 1797.

Engel, E., Das Gesetz der Dichtigkeit, Zeitschrift K. Sachs, Landesamt, November, 1857.

Girshick, M. A., and Haavelmo, T., "Statistical Analysis of the Demand for Food: Examples of Simultaneous Estimation of Structural Equation," Econometrica, Vol. 15, No. 2, 1947.

Houthakker, H. S., "An International Comparison of Household Expenditure Patterns, Commemorating the Centenary of Engel's Law," Econometrica, 1957.

Houthakker, H. S., and Taylor, L. D., Consumer Demand in the United States, 2nd Edition, Harvard University Press, Cambridge, Massachusetts, 1970.

Lansing, J., and Dickinson, K., Consumption Patterns of the Poor, Survey Research Center, University of Michigan, mimeo, 1970.

Nerlove, M., "Further Evidence on the Estimation of Dynamic Economic Relations from a Time Series of Cross Sections," Econometrica, Vol. 39, No. 2 (March, 1971).

Ogburn, W., "Analysis of the Standard of Living in the District of Columbia in 1916," Publications of the American Statistical Association, XVI (1918-19).

Prais, S. J., and Houthakker, H. S., The Analysis of Family Budgets, Cambridge University Press, 1955.

Stigler, G., "The Early History of Empirical Studies of Consumer Behavior," Journal of Political Economy, April 1954.

Taylor, L. D., "Saving Out of Different Types of Income," Brookings Papers on Economic Activity, 2: 1971, The Brookings Institution, Washington, D.C.

Tobin, J., "A Statistical Demand Function for Food in the United States," Journal of the Royal Statistical Society, Series A 113: 1950.

Williams, Faith M., and Zimmerman, C. C., Studies in Family Living in the United States and Other Countries: An Analysis of Material and Method, U.S. Department of Agriculture, Miscellaneous Publication No. 223, Washington, D.C., 1935.

Wright, C., Sixth Annual Report of the Bureau of Labor Statistics, Boston, 1875.

Chapter 10

BIRTHS, EXPECTED FAMILY SIZE, AND POVERTY

INTRODUCTION

One of the major causes of change in family well-being is change in family composition, including births. This Panel Study finding is already popularly established in the prevailing stereotype that poor families are large and in the widespread sentiment that if poor people had fewer children they wouldn't be so poor. The logic of this relationship is readily apparent. The common definition of poverty is being below some level of income adequacy, where income adequacy is measured as the ratio of income to family needs; a family's needs, in turn, are based on the number of people in the family, their age and sex, and whether the family lives on a farm. Clearly if a family increases in size while its income remains constant its income adequacy declines; among families with low income, differences in number of children may partly explain why some families are below the poverty level and others are not.

The actual extent to which family size is related to poverty has been demonstrated by James D. Smith (1972) in a simulation based on the Panel Study. For the families in the Panel in 1970 Smith estimated family income in years when families had births and whether these births pushed the families into poverty or not. He then speculated about what would have happened if all births which pushed families into poverty had been prevented. What would happen if all families had perfect contraception and a strong determination to prevent births in order to stay out of poverty? Smith estimates that if these conditions had prevailed between 1960 and 1970, and everything else had remained the same, there would have been 40% fewer poor families in 1970 than there actually were, the number of persons living in poverty families would have been 70% less, and the aggretate dollar deficit[1] would have been 55% less. The proportion of poor families with no children would have increased sharply, while poor families with more than 4 children would have been very rare by 1970.

---

[1]The aggregate dollar deficit is the annual transfer payment which would be required to bring all poor families up to the poverty line.

Smith discusses two policy implications of his simulation: reducing tax incentives for children (e.g., deductions for dependents), and outright subsidies for not having children (comparable perhaps to farm subsidies for not growing crops). Drawing these implications from his findings requires two assumptions. The first is that many families fell into poverty by having children because they lacked the motivation to prevent the children; either they were ineffective users of contraception or they truly wanted large families. The second assumption is that people are motivated by economic incentives, and the reason so many families lacked motivation is that the economic incentives were not large enough. Thus, Smith proposes to increase the incentives for poor families not to have children as a way to reduce the incidence of poverty. In this chapter we attempt to investigate the validity of these assumptions by analyzing why people have children.

In performing our analyses we have restricted the sample in several important ways. First, we have limited the analysis to women in the child-bearing years. Second, we have included only married women in our analyses, since we lack important information about births to unmarried women and since the porportion of unmarried women who have babies is small (creating statistical problems of analysis). In the United States as a whole most women who have babies are married, and our explanations of who has babies will be quite adequate. When our interest is focused specifically on the poor we shall be somewhat cautious about our conclusions, since among poor people the proportion of births that are illegitimate is not insignificant and we have omitted unmarried women from consideration.[1]

In the United States today very few women past the age of 35 have babies. We analyzed births during the Panel period (1968-72), restricting the sample to women under age 35 who were married to the same husband all four years. We investigated a number of characteristics of families in order to find out which ones predicted who would have a baby. We separately studied those who expected a birth and those who did not to see what factors are associated with planning "failures." In general we conclude that most babies are born because of parental planning; "failures" are nearly equally common among all types of families.

In order to understand the relationship between births and poverty, therefore, we must explain parents' plans. Each year couples were asked if they expected to have more children and in 1972 they were asked how many more. We added

---

[1]The specific reasons for limiting the sample are given in subsequent sections. We cannot estimate the rate of illegitimacy from our Panel data because some women gave birth and also got married or got divorced between interviews, and we don't know whether they were actually married or not when they gave birth. If we consider only women with unchanged marital status during the panel period (1968-72) over 99% of the women who gave birth were married. Among the poor, however, somewhat less than 90% of the women who gave birth were married.

this number to the number of children they already had to construct the variable "expected family size" and analyzed this variable intensively. Younger and older couples were analyzed separately to control for the peculiar circumstances surrounding the postwar baby boom. Because the relevant data were obtained only in 1972, the analysis is cross-sectional, including all married couples in which the wife was under age 50. Our analysis differs from previous studies of expected family size because we used Panel data to construct several important variables. Traditional fertility differentials were found for older couples but not for the younger ones.

Because these traditional explanations of fertility no longer seem useful, much effort has been devoted recently to developing new explanations. Most of these emerging theories suppose that, since family planning is nearly universal, couples expect children because they want them, that they derive satisfactions which outweigh the troubles and costs. These theories seem to reduce to a cost-benefit analysis of family size. The most readily measured costs and benefits of children are economic, so that economic analysis of expected family size is the most developed of these new theories. The major contributions of economic theory to the study of fertility are the concepts of "opportunity costs" and "total family resources." Opportunity costs refer to the value of time parents divert from other activities in order to rear children; the most important part is the income a mother loses because she reduces her employment while taking care of preschool children. Family resources differ from family income because resources include the value of leisure time. This difference is important because children demand considerable attention, and parents with more leisure time can afford to have more children (other things being equal).

We have attempted to develop a model based on the economic theory of fertility. We estimated a model that predicts wives' wage rates and used it to assign wage rates to women who don't work as well as to those who do, and then computed potential family income on the basis of the husband's and wife's wage rate.[1]

We used panel data on the relationship between having a baby and change in time spent on housework, along with wife's wage rate and data on changes in expenditures for paid child care, to estimate a model of marginal opportunity cost of children. This model was used to assign values of opportunity cost. Finally, we used panel data to estimate the recent trend in husband's potential income.

We used these constructed variables along with background characteristics

[1]The way we have combined income and leisure to measure total family resources is commonly called "potential income."

associated with differences in tastes or norms to specify several models for both younger and older couples. Our estimates of the effects of the economic variables on expected family size, while interesting in several aspects, are generally quite small and not significant.

Our general conclusions are that most births are planned and planning failures do not seem to be characteristic of the poor. Couples' plans regarding family size do not seem to be based on economic motivations, and it seems unlikely that policy manipulation of economic variables would have much effect on family size. We have been unable to explain why some couples expect more children than others, so we cannot recommend any policies in this regard. All of these conclusions are based on the analysis of married couples. Among the poor, unmarried women produce a significant number of births and their reasons for having children may be entirely different from those of married women. We have been unable to investigate this. However, any analysis of births among unmarried women, and any public policy directed toward preventing these births, should not only account for why these women have children but also for why they aren't married. Unless there is an interaction between being unmarried and having plans for children, there is no reason to expect married and unmarried women to differ with respect to use of contraception and plans for family size. If they do not differ then the conclusions stated above apply equally to unmarried mothers.

ANALYSIS

I. Births 1968-1972

In this section we describe the characteristics of families who had babies during the study period, 1968-72, comparing them to families who did not have babies. We simplify the analysis of births here by considering only couples who remained married during the entire period; that is, families with the same head and wife for all interviews. This selection must be explained, since several of the categories of women not inlcuded in our analysis include substantial numbers who had babies. One such category includes women who were daughters of sample members in 1968 and who subsequently left home, got married, and formed their own households. They are excluded from the analysis because they were exposed to the risk of childbirth for a shorter time than the stably married women (so the two groups cannot be compared) and because we know very little about them personally at the beginning of the study period. Another group excluded from our analysis is the women who were divorced, widowed, or separated during the study period;

they too were exposed to the risk of childbirth for less than the full study period.

The most important groups of women excluded from analysis, however, are the women who were unmarried and living in their own households at the start of the period; some of these women got married during the study period and others remained unmarried.[1] The birth rates among married and unmarried women are quite different, so a proper analysis of births must take account of marital status. In addition, a substantial number of the women who both got married and had a baby during the study period probably were pregnant before getting married.[2] This too should be considered in an analysis of births, since the birth rate among unmarried women will depend strongly upon whether unmarried women who get pregnant remain unmarried. The birth rate among married women will be less affected by the relationship between marriage and premarital pregnancy because of the relative sizes of the two groups of women. Our data are not sufficiently detailed in respect to date of birth and date of marriage to provide an acceptable measure of premarital pregnancy. Without this information, findings about births to women who were unmarried in 1968 would be very misleading.[3] Thus we analyze births only among couples who were stably married during the study; their births comprise the great majority of all births recorded in the survey, for the total population as well as for subgroups such as the poor, so in this regard they are the population of greatest importance.[4]

---

[1]The category "unmarried" includes single, widowed, and divorced women.

[2]The prevalence of premarital pregnancy is discussed by Freedman and Coombs (1966a).

[3]There are 238 unmarried female heads of households in the sample who remained unmarried during the entire panel period and who were under age 35 in 1970; only 9% of them had a baby between 1968 and 1972. The percentage having babies was much higher for some groups of stably unmarried women: 21% among women with less than 12 years of education, 21% among blacks, and 16% among women with an average income during the period of less than $4000. These figures are consistent with the conclusion that lower status or black unmarried women are more likely to have babies than are other unmarried women. However, the figures also are consistent with the conclusion that lower status or black women are less likely to get married, especially if they are premaritally pregnant. Thus the figures are consistent with either of two policies directed at reducing poverty: discouraging illegitimate births, or encouraging marriages. We note that the structure of welfare rules is relevant to both policies. Finally, it is important to recognize that these births to unmarried women are only 2½% of all births in this period to households with stable composition (unmarried, or married to the same spouse, at all interviews), so excluding them from the major analysis does not affect our understanding of births in the United States.

[4]In addition we exclude from analysis couples where the wife is beyond the age of bearing children. While reproduction is biologically possible for many women past age 45, in the United States today very few women give birth after age 35, so we consider only wives under 35 years old (in 1970) as the population "exposed to risk."

There are a great many characteristics of couples that could possibly be associated with whether they have a baby. In preliminary analyses we investigated 19 variables representing a variety of dimensions: family background, demographic situation of the family, initial economic position and changes over the four-year period (both actual and anticipated), environmental and personal constraints, wife's role orientation, and several psychological indexes of personality characteristics.[1] Using ransacking procedures with an independent subsample[2] we found that by far the best predictor of which couples had births was their own prediction, whether they expected more children at the time of the 1968 interview. Of those that did, 69% had a baby by 1972. Of the couples who did not expect more children, 23% had a baby by 1972. Clearly, most couples planned their families, although a significant minority failed to achieve their fertility expectations.[3] We proceeded to investigate these failures by analyzing separately the couples who expected more children and those who did not. Births represent planning successes for the former group and planning failures for the latter. We continued using ransacking techniques with a random subsample of each group to select the most important of the 19 variables and these were combined as models for predicting births in each group. The results of these models for the full sample are presented in Tables 10.1 and 10.2.

We shall discuss first the results of our analysis of couples who expected no more children since births among these couples represent the more serious type of planning failure; these results are shown in Table 10.1. The reader should bear in mind that the variables shown in Table 10.1 were selected from a larger list of variables because they seemed most strongly associated with whether couples had a baby. Even so, many of these variables seem not to have a very

---

[1]These variables are: expectations of births in 1969; husband's marital history; wife's age; husband's race and religion; husband's labor income in 1967 and trend in income 1967-71; 1967 family money income/needs; wife's employment status in 1967; husband's unemployment 1967-71; index of family savings in 1968; 1968 expectations of a change in family income; 1968 county unemployment rate; index of personal efficacy and planning horizon, 1968; index of aspirations and ambitions, 1968; whether husband handicapped in 1968; sentence completion test score, 1972; number of children under age 18 in 1968; and wife's education.

[2]We used THAID and Multiple Classification Analysis to ransack three-fourths of the sample. These procedures are explained in Appendix C.

[3]We use the terms "plan" and "planning failure" somewhat loosely. Whether couples "expected" a birth is not an exact indication that the birth is wanted. Some couples may have expected another baby because the wife was currently pregnant or because of fatalistic acceptance of an inability to prevent unwanted births (based on past experience). Some "failures" as we measure them may simply represent changes of plans. Finally, some couples may still have a baby, in which case their classification as successful or unsuccessful planners would change. For these reasons, and others related to methodology, our results differ from those of several other studies; see, for example, Freedman, et al. (1965), Bumpass and Westoff (1970), and Commission (1972).

TABLE 10.1

Proportion of Couples Who Had Babies during 1968-1972 among Stably Married Couples Who Expected No More Children[a]

	eta^2	beta^2	N	%	Effects[b] gross	net
Grand Mean			367		.23	.23
Number of Children already Born in 1968	.004	.007				
0			17	7	.00	.02
1			28	9	-.05	-.09
2			106	37	.03	.03
3+			216	47	-.02	-.01
Wife's age in 1970	.013*	.010*				
Under 27			86	20	.10	.09
27-34			281	80	-.02	-.02
Husband's Labor Income in 1967	.017	.008				
Under $4000			83	12	.11	.07
$4000-$6999			159	37	-.06	-.04
$7000-$9999			69	26	.02	.01
$10,000 or more			56	25	.02	.03
Religion	.001	.003				
Protestant			307	80	-.00	-.01
Catholic			60	20	.02	.05
Husband's Unemployment, 1968-72	.017*	.011*				
None			196	62	-.04	-.03
Some			171	38	.07	.06
Wife's Education	.002	.016				
0-11 years			164	33	-.03	-.07
12 (high school diploma)			115	36	.01	.01
12 + nonacademic training or some college			71	23	.02	.05
College degree			17	8	.03	.09
Husband's Marital History	.040**	.042**				
First marriage			322	89	-.03	-.03
Remarried			45	11	.24	.25
Index of Ambition/Aspiration	.025**	.015*				
Low			74	22	-.07	-.04
Medium			145	43	-.04	-.03
High			148	34	.09	.07

$R^2 = .120$

[a] These are results from a Multiple Classification Analysis of whether couples had at least one baby during the four-year period, based on the full sample of couples in which the husband and wife were the same at each interview, the husband expected no more children in 1968, and the wife was under age 35 in 1970.

[b] The effects are simply differences between category proportions and the overall proportion (grand mean) of couples having a baby. The gross effects are the observed, unadjusted differences. The net effects are adjusted for the effects of the other variables included in the model (i.e., adjusted for intercorrelations among the independent variables).

* The standard F-test for these statistics is significant at .05; this is simply a description of the magnitude of the effects, not a strict probabilistic statement, since none of the assumptions required for an F-test is justified with these data.

** The standard F-test for these statistics is significant at .01, with the same qualifications as above.

TABLE 10.2

Proportion of Couples Who Had Babies during 1968-72 among Stably Married Couples Who Expected to Have More Children

	eta^2	$beta^2$	N	%	Effects gross	Effects net
Grand Mean			376		.69	.69
Wife's Age in 1970	.019**	.027**				
Under 27			222	58	.05	.06
27-34			154	42	-.07	-.09
Husband's Labor Income in 1967	.007	.042**				
Under $4000			97	21	-.04	-.07
$4000-$6999			159	40	-.02	-.06
$7000-$999			74	22	.01	.04
$10,000 or more			46	17	.08	.19
Wife's Employment in 1967	.003	.012				
Not employed			186	48	-.00	-.03
Part time (up to 1200 hours)			85	22	-.03	-.04
Full time (over 1200 hours)			105	29	.03	.08
Husband's Unemployment, 1968-72	.005	.008				
None			218	62	.00	.01
Up to one month total			61	16	.05	.03
Over one month total			97	22	-.04	-.07
Family Savings	.010	.015*				
None			85	16	.07	.10
Value less than 2 months income			157	44	.02	.01
Value over 2 months income			134	39	-.05	-.06
Wife's Education	.021*	.027*				
0-11 years			96	21	.09	.10
12 (high school diploma)			145	39	.03	.03
12 + nonacademic training or some college			105	30	-.05	-.07
College degree			30	10	-.13	-.13
Index of Ambition/Aspiration	.005	.009				
Low			63	19	-.05	-.08
Medium			163	41	-.01	.00
High			150	40	.04	.04

$R^2 = .092$

*The standard F-test for these statistics is significant at .05; this is simply a description of the magnitude of the effects, not a strict probabilistic statement, since none of the assumptions required for an F-test is justified with these data.

**The standard F-test for these statistics is significant at .01, with the same qualifications as above.

important effect on the proportions having a birth. We have indicated which relationships are most important according to one of the three statistical tests which we computed; all three tests generally gave consistent indications.[1]

Among couples where another birth was not expected in 1968, the husband's marital history seems to have had the strongest association with births; couples in which the husband had been married more than once had a baby more often than once-married couples. We have no ready explanation for this, as we had expected that after controlling for expectations the variable would not be important; its unexpected importance is symptomatic of our inability to explain births. Husbands who were unemployed during the study period had unexpected children more often than husbands who were never unemployed; this has been observed in other studies also, but has never been adequately explained.[2] Younger wives were more likely to have children; we had expected this for several reasons. The older wives probably have a slightly reduced biological capability for bearing children. In addition, in 1968 they probably had a longer interval since previous birth and thus wished to avoid further births more intensely than the younger wives. Finally, husbands who scored highest on the index of ambition/aspiration were more likely to have children; we had expected the opposite result and are unable to interpret this relationship.

The most important findings concern the variables that seem to be unrelated to fertility planning failures. For example, there appear to be no differences in failure rates by initial family size, by religion, or by race (not shown in Table 10.1). The effects of wife's education were very small, but the evidence suggests that, if anything, better-educated wives were *more* likely to have a birth which was not planned in 1968. The differences by income are very small for incomes above $4000; there was a greater failure rate for the lowest income group, although the sampling error is large for this group and this finding is quite unreliable.

Our primary conclusion from these results is that, with the variables available, we are unable to explain variations in births among couples who expected no more children. This may be because we have a weak measure of expectations

[1] Our statistical tests include 1) comparison of the three-fourths and one-fourth sample results, 2) estimates of the standard error for each category proportion or effect, and 3) an F-test of the overall differences among category proportions, for both unadjusted and adjusted effects. The third test is essentially a test of the significance of the eta^2 and beta^2 values, and we show the results of this test in Tables 10.1 and 10.2. Because of the sample design and our ransacking procedures none of the tests can be interpreted as an accurate measure of likelihood or significance; they are all, however, informative descriptions of the results.

[2] See, for example, Freedman et al. (1965) and Freedman and Coombs (1966b).

which does not take account of changes over time, differences of opinion between the spouses, and other problems. We think a more likely explanation is that much of the variation is truly random[1] and that we lack information on variables that may be associated with the non-random part of the variation. We do not know what these variables might be. One variable we have not included in our analysis might seem obvious to the reader: use of contraception. Past studies have shown that virtually all couples of reproductive age in the United States know about contraception, approve of it, and expect to use it at some time. Furthermore, studies have indicated that the effectiveness of use of contraception increases as couples approach attainment of their family size desires, and that variations in use are quite small among couples who expect no more children. In this study, data on contraception are not sufficiently detailed to permit investigation of its effect on birth rates among couples who expect no more children. Our aggregate figures on current use of contraception, however, agree closely with those from other studies conducted at the same time; we shall assume that if we had more detailed inforamtion we would arrive at the same conclusions as obtained in the other studies, namely that most couples do use some method of birth control reasonably conscientiously and effectively.[2]

The results of our analysis of births among couples who expected to have more children are shown in Table 10.2; here higher proportions having births represent higher fertility planning success rates. Again we find that although these variables were selected from a larger list because of their relative importance,[3] several of them seem to have very slight association with planning success. Of the variables that are associated with births, the most important are income and wife's education. Among this group of couples, planning successes were more common among higher income husbands and less-educated wives. The effect of education may be due to the short length of the study period; many of the better-educated wives may yet have the expected baby, after they have finished school or established their career. The strong relationship between higher

---

[1] Contraceptive techniques are not wholly effective even if used diligently. In any population where women depend on contraception to prevent births starting at a relatively young age, accidents will be surprisingly common and seem to occur at random. See Keyfitz (1971) and Michael (1973).

[2] Recent studies of contraception and births include Westoff et al. (1963), Bumpass and Westoff (1970), Westoff (1972), Ryder and Westoff (1971), and Keyfitz (1971).

[3] The variables were selected by ransacking a subsample of respondents. The results in Table 10.2 are for the full sample. As before we evaluated the importance of the results using 3 statistical tests; the tests gave generally consistent indications, and we indicate importance on the basis of the F-test for overall differences among the category proportions.

income and higher fertility is surprising; we have no immediate explanation; this relationship may have gone undetected in previous studies because it is obscured by correlations with other variables, notably age and education. The lower birth rate among older women may be due largely to problems of sterility. It is also consistent with the hypothesis that couples change their fertility expectations more often if the decision involves the final expected birth and less often if the couple expects two or more additional births; other things being equal, older couples should be closer to attaining their expected family size.

Failing to have an expected birth is, at present, a much less serious policy issue than having unexpected births, particularly in terms of policies directed at reducing poverty; thus our most important results are contained in Table 10.1, and we present Table 10.2 primarily because it is useful in understanding why our conclusions contradict well-established results from other studies. Several recent, widely publicized studies[1] have reported that the rate of having "unwanted" births varies sharply with education, income, and race: low education women are twice as likely to have unwanted births as women with college degrees, and the differences by income and race are at least as great. Our conclusions are that there are no important differences by any of these variables. The reasons for the different conclusions are varied and technical and we cannot explain them all here in detail. We shall, however, indicate their general nature so that the reader can decide which conclusions are more valid.

Some of the differences arise because the data were collected by different methods. The National Fertility Studies were cross-sectional surveys in which mothers identified births retrospectively as having been wanted or not. The Panel Study, of course, determined expectations in 1968, prior to any of the births. The studies were based on different respondents (wives vs. husbands) and selected different age ranges of wives for analysis. The National Fertility Studies reports describe proportions of births that were unwanted; we have ignored how many births each woman had and we describe proportions of women having unexpected births.[2]

Finally, comparison of the two National Fertility Studies indicates that

---

[1] The studies are based on the 1965 and 1970 National Fertility Studies and thus are as comparable as two studies can be; see Bumpass and Westoff (1970a) and Commission (1972, Chapter 11).

[2] Of the couples who expected more children, 15% had two or more children; only 3% of the couples who expected no more had two or more births. By focusing on couples rather than births we have exaggerated slightly the incidence of planning failures overall, but none of the differentials is affected.

both the overall incidence and the range of differentials in unwanted births are diminishing slowly over time; since the Panel data refer to a later period than the most recent National Fertility Study we would expect to find smaller differentials. All of these differences in the data, however, would seem to have small effects which often work in opposite directions, and they cannot account for the large differences in results.

Probably the most important cause of the discrepancies is that the other studies compute the proportion of all births which were unwanted; this confounds the incidence of wanted births and of unwanted births. We have distinguished couples as to whether they expected more children; within a short period of time[1] couples who expect more children cannot have an unwanted child. Thus differences in the proportion of couples who expect more children are sufficient to produce differences in the proportions of all births that were wanted. This is best illustrated by the variable "wife's age." Most older wives expect no more children; thus among older wives there will be very few "expected" births, and even if there are also few unexpected births they will be a large proportion of the total number of births. In the Panel Study we find that of all stably married wives under age 27 (in 1970) who had babies during the study period, only 10% had not expected them; among wives age 27-34 who had babies, however 33% had expected no more. From these computations we would conclude that unexpected births are more prevalent among older wives; in Tables 10.1 and 10.2 we have seen that in fact older wives were *less* likely to have unexpected *and* expected births, and the confusing factor is that older wives were much more exposed to the risk of having unexpected births as they usually did not expect another child.

We have chosen an obvious and extreme example to illustrate the importance of differences in exposure to the risk of having unwanted or unexpected children. We find, however, that for variables other than age there are considerable differences in proportions expecting no more children, arising presumably from differences in age at marriage, in birth intervals, and in total numbers of children desired. For example, we have found that by following the methods used to analyze the National Fertility Studies we obtain large racial and educational differences in the proportion of couples having unexpected births comparable to the results reported for those studies. We have seen in Table 10.1 that when we take account of exposure to the risk of having unexpected children the differentials by education are reversed, so that college educated women actually are slightly more likely to have accidents, and the racial differences are greatly reduced (and

[1] The National Fertility Studies data refer to births over a five-year period; the Panel data are based on a four-year period.

disappear when we control for other variables).

The major focus of our research is poverty; the methodological differences discussed above affect measures of differentials in fertility planning failures by income and by income adequacy just as they do for age, education, and race. But these methodological differences are not sufficient to explain the differences in results. Two further problems remain. In the National Fertility Study reports couples are classified by family income. Women who have unexpected births are not as likely to be employed as other women, and this would exaggerate the intended relationship. In our analyses we categorize couples by husband's income. In addition, because the National Fertility Studies rely on retrospective information, couples are categorized by income level at the end of the time period for which births are measured. In the Panel data we have found a fairly strong association between birth expectations and change in income: husbands with rapidly rising incomes are more likely to expect more children and thus are less exposed to the risk of an unexpected birth. We do not know why this association exists nor what the direction of causation is. Nevertheless, differences between income categories in the proportion of couples expecting no more children increase over time. Using the method of calculating the proportion of births that were unwanted, as applied in the National Fertility Study, we find that the differences in incidence of unexpected births are greater when couples are categorized by final income level than when categorized by initial income level. We have categorized by initial level, as this corresponds to the intended causal interpretation.

In summary, we have found that a large majority of married couples successfully plan their fertility: of the couples who expected more children, nearly 70% had at least one baby over a four-year interval; and of the couples who did not expect more children, over 75% had none. These figures, of course, indicate an unacceptably high rate of planning failures as well, although some of the discrepancy between expectations and behavior may be due to changes of plans, differences of opinion between spouses, and other factors which really are failures only in a very broad sense. The incidence of unexpected babies is an important policy issue since previous research has led to the conclusion that such accidents are particularly common among the poor, and that the prevention of unwanted births might greatly reduce the level of poverty in the United States. We have found that unexpected births are more common among low income families largely because more low income families expect no more children and thus are exposed to the risk of an accident. In other words, the higher proportion of births that are unwanted among the poor is not due to having more unwanted births but to

wanting fewer additional children (in the period 1968-72). This does not mean that accidental births are not a serious problem for the poor, but it does suggest that the cause is common to all income groups and is not a special characteristic of the poor. These conclusions for different income groups also apply to different educational and racial groups. While we have discounted these "causes" of unexpected births, we have been unable to find any true causes.

Most couples successfully plan their fertility, so an investigation of the relationship between poverty and births must deal with the determinants of family size goals as well as with planning failures. This is the topic of the next section.

II. Expected Family Size

At every interview of the Panel Study respondents were asked whether they expected more children, and in 1972 they were also asked how many more.[1] We have combined the responses to the 1972 questions in the single variable "expected family size" and have used this variable for intensive cross-sectional analysis of why couples differ in their family size goals.[2] We have compared the overall distribution of couples by expected family size with distributions obtained at roughly the same time by the Current Population Survey; while there are differences, they are small and probably attributable to sampling differences. Our conclusion is that this measure of expected family size is comparable to measures used in many other studies and that it is a valid indicator of married couples' fertility goals.

In analyzing expected family size we have considered couples of two separate age groups. Older couples expect very few additional children so their fertility expectations have mostly been achieved. These couples had most of

---

[1] These questions were asked only of married couples in which the wife was under age 45. Thus we are unable to analyze fertility expectations of unmarried women.

[2] For repsondents who expected more children in 1972, "expected family size" was coded as the total number of children they expected to have. For respondents who did not expect more, expected family size was coded as their actual number of children; thus this measure differs from others sometimes used, such as desired family size, in that we take no account of whether children already born were expected or wanted. We exclude from analysis all couples who were unsure if they expected more children or how many more; these are about 8% of all eligible respondents. We have also excluded couples with wife over age 30 (in 1970) who expect to have no children; they are less than 5% of all couples in this age range and it is very likely that their fertility is biologically constrained. About 12% of the younger couples expect to have no children; they have been included in the analysis because it is very likely that their goal can be explained better sociologically than biologically. Finally, we have included couples

their children during the postwar baby boom and prior to the introduction of new, highly effective means of contraception (notably the pill). Younger couples, by contrast, have generally just begun to have children, and expected family size represents a future goal. Nearly all of their children will be born in the post baby boom era that is characterized by patterns of marriage and child spacing which significantly differ from the previous era. The younger couples have available better methods of controlling fertility which may have affected their choice of goals. In short, the explanations of expected family size may be different for the two age groups, and we analyze them separately. The boundary between young and old is arbitrary; in terms of differences in reproduction, we have selected wife's age 30 as the best dividing point.[1]

Past studies have identified substantial differences in fertility goals and expectations between social groups, such as Catholics and Protestants, urban and rural residents, and men in white collar and blue collar occupations; these differences have been attributed to differing subcultural norms, values, and ways of life.[2] We too have investigated differential fertility, using a variety of variables indicating social background, cohort, and achieved characteristics.[3] In general we have found that many of the traditional sources of differential fertility do explain some of the variation in expected family size among the older couples; among younger couples, however, these variables have much smaller effects and explain little of the variation in expected family size.

---

with wife aged 45-49 in the analysis even though they were not asked about their fertility expectations; we have assumed they expect no more and have coded their expected family size as their actual number of children.

[1]Thus in this section "younger couples" are those with wife under age 30 (in 1970), and "older couples" are those with wife age 30-49. We use wife's age in 1970, even though some of the couples were not married in 1970, to make the age groups comparable with Census data and results from other surveys.

[2]Past research has been summarized by Freedman (1961-62) and by Hawthorn (1970). Some of the most important studies in the past decade are by Freedman and Coombs (1966a and 1966b), Kiser et al. (1968), Bumpass and Westoff (1970), Ryder and Westoff (1971), Duncan (1965), and Duncan et al. (1965).

[3]The background variables include husband's father's occupation and education, husband's race and religion, husband's urban-rural background, husband's number of siblings, and husband's sentence completion test score (see Appendix F for a discussion of this scale). Our measures of cohort are wife's age (in 1970) and whether the husband is older than the wife by at least five years. The achieved characteristics are husband's age at first birth, husband's income from labor in 1971, and wife's education. In preliminary analyses we also investigated husband's current occupation; it had so little relationship to expected family size that we dropped it from further examination. We used a variety of statistical techniques to search for interactions and to examine special topics, using a randomly selected three-quarter sample. Here we report final results based on the full sample.

Among older couples the most important differences in expected family size is between Catholics and non-Catholics; this has also been found in other studies. Older Catholics expect to have 4.0 children, while non-Catholics expect 3.2 children. The effects of other variables are different for the two religious groups so we have analyzed them separately. The sample of Catholics is small (255 couples) and our estimates of fertility differentials are unreliable because sampling errors may be large. Most of the variables show the traditional patterns of differentials, but from our data we cannot accurately measure the magnitude of these differentials. The most important background variable is father's occupation: Catholics from higher status families expect larger families, as many other studies have also found. The importance of this variable is greatly reduced when we control for the effects of other variables. Our findings suggest quite strongly that the effects of all of the background variables, as well as current income and education, are much smaller and less important than the effects of husband's age at first birth and of age of wife. For example, couples with wife age 30-34 expect nearly one child less than couples with older wives. Some of our results are shown in Appendix 10.1.

Most of the traditional sources of fertility differences are evident among the older non-Catholics as well; the sample size is larger here and we are much more certain about the magnitudes of the differences, For example, husbands from higher status families expect fewer children, blacks expect more children, husbands with many brothers and sisters expect larger families, and men who grew up in rural areas expect larger families. When we control for intercorrelations most of these effects of background disappear and the only variables which remain important are rural background and the sentence completion test score. Wife's years of schooling also are related to differences in fertility expectations, and this relationship is independent of the effects of the husband's sentence completion test score. Finally, we find that among older non-Catholics, as among Catholics, the variable most strongly associated with expected family size is husband's age at first birth: couples who start to have children when the husband is over age 30 expect to have fewer children in all. This relationship is difficult to interpret because the direction of causation is ambiguous.[1] Some

[1]For example, it is possible that the husbands expect fewer children because they are older at the birth of the first child, but it is also possible that husbands who expect few children delay their arrival until an older age. It is also possible that the relationship is spurious. Both age at first birth and expected family size could be caused by the same variables, or couples could want the same number of children regardless of age at first birth but the couples who started having children earlier have some unwanted and unexpected births (which by definition are now counted as part of their expected family size).

of these differences in expected family size among older non-Catholics are shown in Appendix 10.1.

The only background characteristics of younger couples which seem to have important effects on expected family size, even before adjusting for the effects of other variables, are race and number of siblings. Blacks expect to have a half child more than other couples, on the average, and husbands who came from large families themselves expect to have slightly more children than husbands from small families. The effects of both of these variables are greatly reduced when we adjust for intercorrelations. Education and income also are related to differences in fertility goals: couples with fewer years of schooling and lower incomes expect to have about .3 more children than other younger couples. These variables, however, are correlated with race, age, and age at first birth; the adjusted effects of each variable, shown in Appendix 10.2, are complicated and difficult to interpret. The most important conclusions, however, are quite clear: expected family size among younger couples depends much more strongly upon the timing of family formation (age and age at first birth) than upon social background or current status, and all of the variables considered here are much less important among younger couples than they are among older couples.[1]

Demographers have been observing diminution in the major fertility differentials for some time, so our findings are not completely unexpected. This trend has been attributed to trends in basic aspects of American society, such as the transformation of agriculture and of rural ways of life, the revolution in communication and transportation, changes in immigration flows, and the vast reorganizations of the industrial and occupational structures of the economy. In the face of the massive modernization this country has experienced in this century, it would be surprising if fertility had remained constant. Nevertheless, it is somewhat startling to see how completely the old patterns have disappeared.

Let us turn to the major concern of this research, the relationship between poverty and family size. Since most couples plan their family size and planning failures appear to be random events, we must suppose that low income families choose to have children regardless of the impoverishing consequences. Indeed we

---

[1] Forty percent of the younger couples in the sample did not yet have a child (and some expected never to have one). For these couples we assigned "age at first birth" on the basis of husband's current age. The inaccuracy of this assignment may partially explain the reduced importance of this variable among younger couples. Our model did include an indicator of whether couples had children yet or not, so the estimates of adjusted effects reflect a "control" for reproductive experience. The indicator itself had an estimated zero effect on expected family size, suggesting that the goals of childless couples may be no less realistic or imaginative than the goals of couples who already have some children.

see in the Chapter Appendixes that low income families expect to have larger than average size families. There are several possible explanations for this. One is that low income families come from subcultures in which children are very highly valued. For example, low income couples might have come from rural, low status families and have had many brothers and sisters, and thus have acquired strong values for children which were unaffected by their relatively brief education. High income families, on the other hand, may have come from wealthier urban families and have had fewer brothers and sisters; thus they may have learned to value material achievement more than a larger family, values which were reinforced by extensive education. In addition, low income couples may come from religious or racial groups which have distinctive values regarding children and family life. As we have seen above, even after we control for various background and subcultural variables the lowest income couples are still found to expect above-average size families, although, among the older couples, controlling these variables greatly reduces the differences between income groups.[1]

It is possible that the income-expected family size relationship is spurious, due to both variables being caused by age at first birth. Past research has has indicated that couples who get married young and have children immediately suffer financially relative to couples who marry and have children later: later in life the former couples are found to have lower incomes and smaller assets.[2] Couples who start their families at young ages also are found to expect more children. We find, however, that when we control for the effects of age at first birth the lower income families still seem to expect above-average size families, so the relationship is not wholly spurious.[3]

Perhaps the most attractive explanation of why low income families don't expect smaller families is the suggestion, based on economic theory, that ability

---

[1]There are very few low income older Catholics, so our comments here refer only to older non-Catholics and to younger couples. Among the older non-Catholics the relationship between income and expected family size is irregular and not significant when we control for the effects of other variables; it appears, however, that couples in the lowest income group expect more children than the average for all couples. Almost certainly they don't expect fewer children than average, as might be expected if they were intent upon avoiding poverty.

[2]See Freedman and Coombs (1966a and 1966b). The "hasty" couples are not worse off financially because they come from poorer families; age at marriage and length of birth intervals do not seem to be strongly related to family background.

[3]We advise caution, however, in interpreting our findings regarding age at first birth. This variable should be strongly related to income only among the younger couples, but 40% of them are still childless and have been assigned at "age at first birth." In addition, many young people who will have older ages at first birth are not yet married and thus are not included in our sample here; therefore results for these cohorts will change in subsequent surveys.

to afford children depends on both income and the costs of children. Children *are* expensive; perhaps the costs of children are much less for low income families so they can afford to have at least as many as higher income families can afford.[1] This implies that if we controlled for differences in costs of children we would find that lower income couples actually expect smaller families, consistent with their desire to avoid poverty. The major difficulty in doing this is, of course, the problem of measuring the costs of children.[2]

There are two types of economic costs of children: direct expenditures and opportunity costs. Direct expenditures include such obvious items as food and clothing, and perhaps education. Other expenditures benefit all members of the family and may be attributed partly to the children; these include cars, television, and housing. It is difficult to specify exactly what portion is attributable to the children. Finally, some uses of family income such as parents' travel and accumulation of assets may appear unrelated to children and yet be of great but unmeasurable general benefit to them. In this sense there are "externalities" in family consumption, so that children benefit from the parents' expenditures, and it is difficult to find any family income which is not an investment or expenditure on the children. In other words, direct costs of children are extremely hard to define and measure; we have not found a solution to the problem.

The most important contribution of economic theory to the analysis of family size is the concept of opportunity cost. Children are very demanding of the parents' time as well as their money; when parents decide to have children they simultaneously decide to forego alternative activities. For example, bearing children generally reduces a mother's employment and, by reducing her on-the-job experience, may also reduce her wage rate. The value of her lost income is an opportunity cost of the children. Since this cost represents "what the mother would have done if..." it cannot be observed or measured directly; however, it is possible to estimate the cost by comparing different women, and we have done this.[3] Our measure of opportunity costs takes account of differences in use of

---

[1] Notice that this implies that the current measures of "family income needs" and hence of poverty are simply averages across income levels, and thus, for their intended purposes, may be inaccurate.

[2] See, for example, articles by Becker (1960, 1973), Cain and Weininger (1970), D. Freedman (1963), Easterlin (1969), Namboordiri (1972), Ryder (1959, 1973), Turchi (1973), and Willis (1973). Other problems in the economic analysis of family size are also discussed in these articles.

[3] Using Panel data for women with at least one young child or no children at all in 1968 (i.e., not women with children all above age 6), we compared the change in time spent on children among women who had a baby with those who did not have a baby. Women who had a baby generally increased their time spent on children,

time, differences in the value of time (the wage rate a wife could earn if she was employed), and differences in ability and willingness to buy professional child care. We discuss the details of our definition and estimation of opportunity cost of children in Appendix 10.3. We also discuss there our analysis of differences in opportunity costs; for example, we find that these costs are lower for residents of large cities and for couples where the husband has a low wage rate.

Because of the way that we define opportunity costs of children we must refine somewhat our measure of income. Instead of using husband's income from wages and salary, as in previous analyses, we use "potential family income"; this is based only on the average hourly earnings of the husband and wife, and takes no account of number of hours worked. Because some wives do not work, we estimate wife's potential wage rate. In addition, we introduce a measure of trend in potential family income, since ability to afford children may depend on expected future income as well as current income. These income measures are defined and discussed in Appendix 10.3.

We have used these constructed measures of potential family income (both level and trend) and opportunity costs of children to test the economic explanation of the income-expected family size relationship.[1] The relationship between income and expected family size is quite regular among younger couples, and in this analysis we have used a linear regression model for convenience.[2] Couples with higher incomes expect to have fewer children, as we have already seen; a difference in potential income of $1000 is associated with a difference in expected family size of .01 child.[3] In addition we find that couples who face

while women who did not have a baby generally reduced their time spent on children (because the youngest child started going to school). The difference in changes in time use, controlling for other factors, was attributed to having a baby. This measure of time was weighted by the wife's potential wage rate to arrive at a cost of the time spent on the baby. This estimation procedure illustrates the great value of panel data.

[1]The test is deficient, of course, because we were unable to define or measure the direct expenditures for children. In the literature on this economic model it is almost universally hypothesized that the opportunity costs of children are larger than the direct expenditures, so our test should be useful if interpreted carefully.

[2]Using the simple linear regression model, husband's labor income explains 1.3% of the variation in expected family size; this compares favorably to our previous analysis using categories, in which the income categories explained just 1.0% of the variation (see Appendix 10.2, values of eta^2). The simple regression coefficient (i.e., slope) of income is -.027, indicating that a difference in income between husbands of $1000 is associated with a difference in expected family size of .027 child.

[3]The intuitive meaning of this relationship is clearer if we think in terms of

higher opportunity costs of children also expect to have fewer children, as economic theory predicts. A difference in opportunity costs of $1000 is associated with a difference in expected family size of about .03 child.[1] Contrary to the theory, when we control for the effects of opportunity costs we do not find that lower income families expect fewer children. Indeed, the effects of potential family income on expected family size are practically unchanged while the effects of opportunity costs are reduced essentially to zero. When we add measures of family assets (savings) and income trend to the model and control for background characteristics such as race and number of siblings, still the effects of potential family income on expected family size are unchanged: everything else being equal, lower income families expect to have larger families. The effects of opportunity cost, savings, and income trend are all very small (and not significant), while the background characteristics are found to have important associations with expected family size. These results are shown in Table 10.3.[2]

Our measure of opportunity costs is likely to be quite inaccurate for older couples since it was derived from the experiences of younger wives during the panel period (1968-72), and older wives very likely have different attitudes toward family life and employment. Any measure of income for these couples also is likely to be misleading, since the theory is intended to explain decisions about family size and current measures of income may depart considerably from the couples' incomes when they were still making family planning decisions.[3] Thus, it is much more difficult to analyze the relationship between income and expected family size for older couples, and we have made little progress. In any case, the results will be of historical interest only, since nearly all older couples

---

average hourly earnings. We use the couple's combined wage rates to compute potential income; the combined wage rate is simply the sum of the husband's and wife's average hourly earnings. A difference between couples of $1.00 in combined wage rates amounts to a difference in potential incomes of $4000, so the $1.00 difference in wage rates is associated with a difference in expected family size of about .04 child.

[1] The correlation between opportunity costs and expected family size is -.048, indicating that opportunity costs explain much less than 1% of the variation in expected family size. The matrix of correlations between the income and cost variables and expected family size is presented in Appendix 10.3.

[2] We experimented with alternative measures of opportunity costs and income, in effect ransacking the data in an attempt to find *any* set of variables that would show, after all, that lower income couples do expect smaller families. We substituted husband's actual income for potential family income, and wife's wage rate and education for opportunity costs; we also tried different functional forms (i.e., non-linear). The model shown in Table 10.3, which is most consistent with theory, gives the *most* favorable results in terms of predicting small family sizes among low income families.

[3] Less than 3% of the older couples expect to have more children. Some of the others may still change their minds and have more, but probably most of the older couples stopped thinking seriously about how many children to have some time ago.

TABLE 10.3

Economic Model of Expected Family Size for Younger Couples, 1972 Cross-Section

	Regression Coefficient	Standardized Coefficient (beta)	(t)[a]
Potential family income[b]	.010	-.087	(2.0)
Opportunity cost	-.019	-.032	(0.8)
Savings: worth 2 months income	-.057	-.024	(0.5)
Savings: worth at least 2 months income	.084	.036	(0.7)
Five-year trend in husband's potential income	.242	.038	(0.9)
Child splitoff from poor family[c]	.071	.022	(0.5)
Wife under age 20	-.024	-.008	(0.2)
Wife age 25-29	.256	.106	(2.8)
Husband 5+ years older than wife	.515	.176	(5.1)
Black	.429	.104	(2.9)
Husband has 3+ siblings	.166	.070	(2.0)
Constant	2.222		
	R^2 = .080		
Number of cases[d]	814		

[a]The (t) column shows the ratios of coefficients to their estimated standard errors. Due to the complex sample design the standard errors are not estimated accurately, so these figures cannot be given a strict statistical interpretation. Nevertheless a ratio below 2.0 probably is not statistically significant at the .05 confidence level.

[b]The income and cost variables are scaled in thousands of dollars.

[c]Trend is the average annual increase in potential income (over 5 years) expressed as a percent of the five-year average; thus trend=7.5 indicates a 7.5% annual rate of increase in husband's potential income. The splitoff indicator is a dummy variable control for inaccuracies in the estimation of trend.

[d]Results are reported for the randomly selected three-quarter sample. The major results of this model were evident from the ransacking stages, and we saw no reason to re-estimate the model with the full sample.

expect no more children and their past expectations and motivations are irrelevant to current public policy.

In summary, we have attempted in this section to explain couples' fertility goals, having previously found that goals have a considerable impact on behavior. Past research has identified various social and cultural sources of differences in expected family size; for example, expected family size has been linked with religion, farm background, and number of brothers and sisters. We found many of these same relationships among older couples, although some disappeared when we controlled for correlations among the social and cultural factors. All of the relationships are considerably smaller among younger couples, and these background variables have little explanatory power any more. For both younger and older couples the effects of social characteristics such as education and family background are much less important than measures of the timing of fertility: age at first birth and current age. At present the importance of these two variables is a mystery, not a satisfying explanation of differences in expected family size.

Among both older and younger couples, low income families expect somewhat more children than high income families; thus their fertility goals serve to aggrevate their economic plight. We have attempted to explain this by searching for other characteristics of the poor, besides their low income, which might account for the large family size expectations. We have been thoroughly unsuccessful in this search. The poor still expect larger families after we control for differences in social and cultural background, education, and costs of children. They do not expect enormous families, only slightly above average in size; but apparently in no way is there a tendency for them to expect small families, as we might expect.

Since poverty is related to both income and family size, there have been suggestions to reduce poverty by encouraging smaller families. These suggestions assume that people respond to economic incentives but that the current incentives need to be made greater. We have found no significant relationship between existing costs and fertility plans, so it seems unlikely that increasing the costs will affect these plans. The only significant economic incentive appears to be income. Families who are well off expect fewer children. Our findings suggest that increasing family incomes for low income, fertile families might reduce poverty in the shortrun and dependency later through effects on the birth rate.

SUMMARY

1) In studying which families had babies, by far the best predictor is whether, at the beginning of the panel period, the family planned to have more children. Seventy percent of those who planned to have a baby did so by 1972. Of the couples who planned not to have any more children 75% had not had a birth by 1972. We analyzed each of these groups separately in order to understand which couples had planned successfully and which had not (or had changed plans). We were largely unable to explain success or failure of either type -- not having planned babies or preventing unplanned babies. Certainly our findings do not support certain stereotypes. Planning failures were *not* especially common among the stably married poor, the uneducated, Catholics, or blacks. Our conclusion is that babies are born largely because of parental planning. This conclusion seems to hold for most groups of couples that we were able to examine, including the poor.[1] This demonstrates that low income families who "fall" into poverty by having large families do so voluntarily, not because the births are accidents.[2]

2) In order to understand the relationship between births and poverty, we then studied the number of children a couple expected to have. Expected family size has been studied extensively in the United States, largely in terms of group differences. For example, most studies have located Catholic-Protestant, urban-rural, and social class differences. We have replicated most of these findings:[3] the expected fertility differentials were found for older couples, while the differentials were very much smaller, often not significant, for younger couples. These findings are consistent with the well-established trend toward smaller fertility differentials, although we were surprised at the extent to which traditional patterns of expected family size differences have disappeared.

3) As an alternative to the traditional explanations of fertility, we have developed an economic model of fertility which measures the costs and benefits of having children. Our estimates of the effects of economic variables are small and not statistically significant. These findings are based on complicated mani-

---

[1] Our conclusion is consistent with findings from some studies but not others. The discrepancies arise from differences in method (panel vs. cross-section), differences in definitions of "planned" births, and differences in the respondent (husband vs. wife).

[2] This applies, of course, only to married couples. We do not know whether illegitimate births were planned or were unwanted accidents.

[3] We did not literally replicate past studies; rather, we used different methods with a differently-defined sample and obtained similar results.

pulations of the data, which were guided by theory that is new, ambiguous, and controversial, so the findings can easily be criticized. For this reason we have studied several alternative models, but they have all indicated the same general conclusion. It seems likely that, even with improvements in the models, the detectable relationships between economic variables and expected family size will remain small. Apparently the economic theory does not identify important behavioral responses in the area of fertility.

References

Becker, Gary S., "An Economic Analysis of Fertility," in Universities-National Bureau Committee for Economic Research, Demographic and Economic Change in Developed Countries, Princeton, Princeton University Press, 1960.

Becker, Gary S., and Lewis, H. Gregg, "On the Interaction Between the Quantity and Quality of Children," Journal of Political Economy, Vol. 81, No. 2, Part II, 1973, pp. 279-88.

Bumpass, Larry, and Westoff, Charles F., The Later Years of Childbearing, Princeton, Princeton University Press, 1970.

Bumpass, Larry, and Westoff, Charles F., "The Perfect Contraceptive," Population Science, 169, September 18, 1970a, pp 1177-1182.

Cain, Glen G., "Issues in the Economics of a Population Policy for the United States," American Economic Review, Vol. 61, No. 2, 1971, pp. 408-17.

Cain, Glen G., and Weininger, Adriana, "Economic Determinants of Fertility: Results from Cross-Sectional Aggregate Data," Discussion Paper 84, Institute for Research on Poverty, University of Wisconsin, Madison, 1970.

Cohen, Malcolm S., and Stafford, Frank P., "A Life Cycle Model of the Household's Time Allocation," Mimeo, Economics Department, University of Michigan, Ann Arbor, 1973.

Commission on Population Growth and American Future, Population and the American Future, Superintendant of Documents, U.S. Government Printing Office, Washington, D.C. 1972.

De Tray, Dennis N., "Child Quality and the Demand for Children," Journal of Political Economy, Vol. 81, No. 2., Part II, 1973, pp 70-95.

Duncan, Otis Dudley, "Farm Background and Differential Fertility," Demography, 2, 1965, pp 240-49.

Duncan, Otis Dudley, et al., "Marital Fertility and Size of Family Orientation," Demography, 2, 1965, pp 508-15.

Easterlin, Richard A., "Towards a Socioeconomic Theory of Fertility: A Survey of Recent Research on Economic Factors in American Fertility," in S.J. Behrman, Leslie Corsa, and Ronald Freedman (eds.), Fertility and Family Planning: A World View, Ann Arbor, University of Michigan Press, 1969.

Easterlin, Richard A., "Does Human Fertility Adjust to the Environment?" American Economic Review, Vol. 61, No. 2, 1971, pp 399-407.

Freedman, Deborah S., "On the Relation of Economic Status to Fertility," American Economic Review, Vol. 53, No. 3, 1963, pp 414-26.

Freedman, Ronald, "The Sociology of Human Fertility: A Trend Report and Bibliography," Current Sociology, Vol. 10/11, No. 2, 1961-62, pp. 35-121.

Freedman, Ronald, and Coombs, Lolagene, "Childspacing and Family Economic Position," American Sociological Review, Vol. 31, No. 5, 1966a, pp 631-48.

Freedman, Ronald, and Coombs, Lolagene, "Economic Considerations in Family Growth Decisions," Population Studies, Vol. 20, No. 2, 1966b, pp 197-222.

Freedman, Ronald, Coombs, Lolagene, and Bumpass, Larry, "Stability and Change in Expectations about Family Size: A Longitudinal Study," Demography, 2, 1965, pp 250-75.

Hawthorn, Geoffrey, The Sociology of Fertility, London, Collier-Macmillan Ltd., 1970.

Johnston, J., Econometric Methods, 2nd Edition, New York, McGraw Hill, 1972.

Keyfitz, Nathan, "How Birth Control Affects Births," Social Biology, Vol. 18, No. 2., 1971, pp 109-21.

Kiser, Clyde V., Grabill, Wilson H., and Campbell, Arthur A., Trends and Variations in Fertility in the United States, Cambridge, Harvard University Press, 1968.

Michael, Robert T., "Education and the Derived Demand for Children," Journal of Political Economy, Vol. 81, No. 2, Part II, 1973, pp 128-64.

Namboodiri, N. Krishnan, "Some Observations on the Economic Framework for Fertility Analysis," Population Studies, Vol. 26, No. 2., 1972, pp 185-206.

Fao, P., and Miller, R. L. Applied Econometrics, Belmont, California, Wadsworth Publishing Company, 1971.

Ryder, Norman, "Fertility," in Philip Hauser and Otis Dudley Duncan (eds.), The Study of Population, Chicago, University of Chicago Press, 1959.

Ryder, Norman, "Comment," Journal of Political Economic, Vol. 81, No. 2, Part II, 1973, pp 65-9.

Ryder, Norman, and Westoff, Charles F., Reproduction in the United States, 1965, Princeton, Princeton University Press, 1971.

Smith, James D., "Birth Control and Economic Well-Being," in Human Behavior in Economic Affairs (Essays in Honor of George Katona), Elsevier Publishing Co., Amsterdam, 1972.

Turchi, Boone A., "The Demand for Children: An Economic Analysis of Fertility in the United States," unpublished PhD dissertation, University of Michigan Ann Arbor, 1973.

Westoff, Charles F., "The Modernization of U.S. Contraceptive Practice," Family Planning Perspectives, Vol. 4, No. 3, 1972, pp 9-12.

Westoff, Charles F., Potter, Robert G., and Sagi, Philip C., The Third Child, Princeton, Princeton University Press, 1963.

Willis, Robert J., "A New Approach to the Economic Theory of Fertility Behavior," Journal of Political Economy, Vol. 81, No. 2., Part II, 1973, pp 14-64.

APPENDIX 10.1

Expected Family Size by Background Characteristics and Cohort for Older Couples, 1972[a]

	eta^2	$beta^2$	N	%	Effects[b] gross	Effects[b] net
CATHOLICS						
Grand Mean			255	100	4.00	4.00
Father's Occupation	.043*	.017				
White collar			51	21	.23	.23
Craftsman			56	24	.24	.20
Operative, miscellaneous			67	27	-.56	-.35
Laborer (including farm)			37	14	-.16	-.15
Farmer			44	14	.50	.13
Wife's age	.045*	.043*				
30-34			59	23	-.70	-.69
35-39			73	27	.33	.25
40-44			70	27	.14	.24
45-49			53	22	.16	.13
Husband's age at first birth	.117*	.154*				
Under 21			7	3	B	B
21-24			41	14	.37	.45
25-29			119	47	.54	.59
30 and over			88	35	-.78	-.90
Husband's income, 1971	.006	.019				
Under $5000			19	4	-.44	-.60
$5000-$7499			27	9	-.13	-.38
$7500-$9999			37	11	.17	.26
$10,000-$14,999			79	31	-.12	-.18
$15,000 and over			93	45	.11	.20
Wife's education						
Not high school graduate	.011	.003	89	27	.12	-.02
High school graduate only			97	42	-.04	-.03
Some college			51	22	.14	.17
B.A. degree or more			18	8	-.59	-.23
NON-CATHOLIC						
Grand Mean			902	100	3.25	3.25
Where husband grew up	.025*	.010*				
Rural area			378	36	.31	.22
Town			335	39	-.06	-.11
City			189	25	-.35	-.14
Sentence completion test score	.055*	.015*				
Low			292	19	.74	.41
Medium			315	36	.00	-.03
High			295	45	-.32	-.15

APPENDIX 10.1
(continued)

	eta^2	$beta^2$	N	%	Effects[b] gross	Effects[b] net
Wife's age	.010	.014*				
30-34			226	23	-.08	-.15
35-39			220	23	.08	.08
40-44			247	30	.19	.24
45-49			209	25	-.22	-.22
Husband's age at first birth	.089*	.085*				
Under 21			39	3	.45	.15
21-24			179	15	.84	.81
25-29			383	46	.13	.16
30 or over			301	35	-.58	-.58
Husband's income, 1971	.026*	.006				
Under $5000			130	6	.69	.20
$5000-7499			146	12	.23	-.09
$7500-9999			170	16	.29	.07
$10,000-14,999			239	30	-.17	-.17
$15,000 and over			217	36	-.18	.10
Wife's education	.061*	.007*				
Not high school graduate			401	32	.56	.19
High school graduate only			253	33	-.18	-.13
Some college			184	25	-.23	-.03
B.A. degree or more			64	10	-.62	-.12

[a]These are results from a Multiple Classification Analysis of expected family size for the full sample of married couples in 1972 in which the wife's age (in 1970) was 30-49. Couples expecting no children have been excluded. Results are shown for selected variables. The full model included the variables shown above plus father's education, race (non-Catholics only), number of siblings, and an indicator of the age difference between spouses.

[b]The effects are simply differences between category means and the overall (grand) mean. The gross effects are the observed, unadjusted differences. The net effects are adjusted for the effects of all other variables in the model (i.e., adjusted for intercorrelations among the independent variables).

*The standard F-test for these statistics is significant at .05; this is simply a description of the magnitude of the effects, not a strict statistical statement, since none of the assumptions required for an F-test is justified with these data. In interpreting the results we have been guided by these descriptive F-tests, by measures of the approximate sampling errors for each separate category mean, and by a comparison of the results from the three-quarter sample and the full sample; these guides generally are consistent.

APPENDIX 10.2

Expected Family Size by Background Characteristics and Cohort for Younger Couples, 1972[a]

	eta^2	$beta^2$	N	%	Effects[b] gross	net
Grand mean			1084	100	2.25	2.25
Race	.016*	.007*				
Nonblack			789	91	-.05	-.03
Black			295	9	.48	.32
Number of siblings	.014*	.007*				
0-1			211	22	-.07	-.07
2			207	22	-.19	-.14
3-4			281	28	.02	.05
5 or more			385	29	.18	.11
Wife's age	.005	.013*				
Under 20			279	18	.03	-.15
20-24			499	46	-.09	-.08
25-29			306	36	.09	.17
Husband's age minus wife's age	.023*	.045*				
0-1 years, or husband younger			447	40	-.11	-.19
2-4 years			428	40	-.06	-.04
5 or more years			209	20	.34	.47
Husband's age at first birth	.011*	.031*				
Under 21			102	6	.25	.24
21-24			403	32	-.03	.07
25-29			453	47	.06	.07
30 or over			126	15	-.24	-.47
Husband's income, 1971	.010*	.014*				
Under $4500			213	14	.18	.20
$4500-6999			259	19	.11	.14
$7000-9999			315	28	.01	.02
$10,000 and over			297	38	-.13	-.16
Wife's education	.012*	.003				
Not high school graduate			301	22	.23	-.02
High school graduate only			339	33	-.11	-.08
Some college			332	33	-.03	.04
B.A. degree or more			112	12	-.04	.13

[a] These are results from a Multiple Classification Analysis of expected family size for the full sample of married couples in 1972 in which the wife (in 1970) was under 30. Results are shown for selected variables; the full model included the variables listed in Appendix 10.1 plus an indicator of whether the couples yet had any children.

[b] See notes to Appendix 10.1.

APPENDIX 10.3
Table A

Marginal Opportunity Costs of Children --
A Panel Analysis of Mothers Under Age 35[a]

	eta^2	$beta^2$	N	%	Effects gross	Effects net
Grand mean			262		$1568	$1568
Husband's wage rate, 1968	.020	.078				
Under $2.00			80	21	-494	-1010
$2.00-2.99			73	25	-467	-879
$3.00-3.99			56	25	34	66
$4.00 +			53	30	698	1366
Four-year trend, husband's wage rate	.004	.027				
Less than 5% annual increase			83	34	-119	-240
5-11% annual increase			64	27	-258	-696
12%+ annual increase			115	40	273	669
Husband's Unemployment, 1968	.000	.001				
None			217	85	13	33
Some			45	15	-76	-196
Husband's occupation, 1968	.009	.019				
Professional/technical/managerial			61	33	212	421
Clerical/sales			30	12	92	61
Craftsman			48	21	143	330
Operative			75	22	-629	-799
Other			48	12	196	-381
Husband self-employed	.011	.008				
No			234	85	-155	-131
Yes			28	15	872	740
Wife's education	.028	.043				
Less than high school			84	23	-326	345
High school diploma			90	36	255	-42
High school + nonacademic training			27	11	1332	1628
Some college			61	30	-556	-826
Race-Religion	.002	.002				
White Protestant			146	66	37	-116
White Catholic			53	27	74	277
Black			63	7	-621	18
Wife's age in 1970	.009	.039				
Under 25			133	47	48	328
25-29			91	38	242	238
30-34			38	15	-786	-1680
Husband's achievement motivation	.041	.110				
Low			93	31	58	464
Medium			93	36	797	1091
High			76	33	-916	-1609

APPENDIX 10.3
Table A
(continued)

	eta^2	$beta^2$	N	%	Effects gross	Effects net
City size	.018	.082				
500,000+			93	35	-433	-1108
25,00-499,999			100	40	-103	48
Under 25,000			69	24	804	1535
Husband's background	.034	.040				
Rural			71	24	-47	-287
Town			109	44	-619	-578
City			82	32	891	1012
Index of housing & neighborhood quality	.007	.008				
Low			128	41	8	16
Medium			79	30	-395	-410
High			55	29	395	399
Capital income, 1968	.051	.024				
Less than $500			243	89	-279	-171
$500-1999			9	5	B	B
$2000+			10	6	B	B
Birth order of baby	.003	.000				
First birth			71	28	-293	25
Second or higher			191	72	114	-10
Number of births, 1969-72	.003	.010				
One baby			230	89	-68	-118
Two or more babies			32	11	578	996

$R^2 = .303$

[a]These results are interaction terms in a Multiple Classification Analysis of change in total labor costs of children (see text for definition) between 1969 and 1972; they show differences in the dependent variable between women who had a baby in the panel interval and women who did not. Estimates of importance of variables (eta and beta) are based on power in explaining the sum of squares left unexplained by an additive model (i.e., the model without these interaction terms). The sample is all couples with same husband and wife at interviews between 1969-72 where the wife was under age 35 in 1970 and either had no children in 1968 or had at least one preschool child (under age 6). The stability of the statistical estimates depends only on the 262 women in this sample who had a baby during the panel period.

APPENDIX 10.3
Table B

Simple Correlation Matrix for Expected Family Size
and Income and Cost Variables: Younger and Older Couples Separately

YOUNGER COUPLES	1	2	3	4	5	6	7	Mean
1. Marginal opportunity cost	1.0	.06	.09	.38	.41	.19	-.05	2.6
2. Wife's wage rate		1.0	.74	.69	.38	-.06	-.05	2.72
3. Wife's education			1.0	.45	.20	-.07	-.06	12.4
4. Potential family income				1.0	.81	.15	-.09	26.5
5. Husband's actual income					1.0	.09	-.11	8.6
6. Trend in husband's potential income						1.0	.02	10.7
7. Expected family size							1.0	2.28
OLDER COUPLES								
1. Marginal opportunity cost	1.0	-.01	.16	.33	.37	.28	-.09	3.6
2. Wife's wage rate		1.0	.71	.56	.37	-.00	-.18	3.00
3. Wife's education			1.0	.47	.37	.00	-.22	11.7
4. Potential family income				1.0	.90	.35	-.13	33.4
5. Husband's actual income					1.0	.29	-.11	11.8
6. Trend in husband's potential income						1.0	-.02	6.7
7. Expected family size							1.0	3.45

APPENDIX 10.3

The Construction of The Economic Variables

WIFE'S WAGE RATE

In order to construct measures of opportunity cost and income we need to know how much each wife could earn if she were employed. Of course many wives are not employed, so we must estimate potential wage rate and assign values to these wives. We have done this by calculating a model that predicts the wage rates of women who do work (using 1972 data) and using the model to impute wage rates for all women.[1] We restricted the model to the population of interest to us, married women under age 50. This assignment of wage rate assumes that women who don't work could earn as much as similar women who do work; probably this is incorrect but it is our best guess of their potential wage rate. The most important terms in the model are age-education-city size interactions. Other variables used to assign wage rate are race, distance from nearest large city, region, urban-rural background of the husband (used as a proxy for the wife's background), and county unemployment rate. The correlation between assigned wage rate and actual wage rate among the women who work is .39. The correlation between assigned wage rate and education, its most powerful determinant, is .74 (for all women assigned a potential wage rate).

OPPORTUNITY COST OF CHILDREN

The opportunity cost of children is the value of all activities foregone because of having children. We are interested here in estimating marginal opportunity cost, the increase in costs due to an additional child, since this is the variable that should be related to why some women want more children than others. We measure "activities" in terms of time. We consider three broad uses of time: time spent working, time spent on children, and leisure (a residual category for all other uses of time). In general, the total time spent on children should increase with the number of children; the opportunity cost of an additional child is the value of the time diverted from work and from leisure to care for it.[2]

---

[1] If we used actual wage rates for some women and assigned wage rates for other women, our estimates of the effects of wage rates on other variables would be biased because of differences in measurement errors. Thus we assign values to all women on the basis of the same model.

[2] We need to consider both time lost from work and time lost from leisure, rather than just the work component as some have done, because children represent a

The simplest measure of the value of work time is wage rate. The value of leisure time is of course controversial. If we assume leisure has a different value than work time, then we face enormous problems in estimating opportunity costs.[1] We have opted for the simplest assumption, that all time is valued equally and that this value is the wife's wage rate. Thus the opportunity cost of an additional child will be measured by the increase in time the wife spends in child care multiplied by her market wage rate.[2]

Our data contain no information directly on time spent on children; we rely instead on the information on hours of housework. We analyze only wife's opportunity cost because the relationship between housework and time spent on children is not tenable for husbands. Housework is not a good measure of time spent on children, but changes in hours of housework due to changes in number of children is, we think, a moderately good indication of changes in time spent on children.[3]

Since marginal opportunity costs are the increase in total child costs (excluding direct expenditures) due to an additional child, we must begin the construction of this variable by defining total costs. "Total labor costs of children"[4] is constructed by multiplying hours of housework by the wife's potential wage rate and adding the costs of paid housework and child care. By regressing *changes* in total labor costs of children on a number of factors including whether

---

financial burden. Increasing numbers of children may lead some couples to increase time spent on children *and* time spent at work while greatly reducing their leisure. Focusing on just one component would lead to an inaccurate estimate of opportunity cost.

[1] These problems are specifying a complicated model and estimating a system of simultaneous equations. If we assume different values of time, then we must explain the allocation of non-child care time between employment and leisure. With the procedure that we follow, we need to explain only time spent on children; we ignore how other time is used.

[2] We use the assigned potential wage rate for value of time. We have ignored the "job interruption" effect which some people have included in opportunity costs. This refers to the presumed reduction in wage rate due to loss of employment experience while having children. In preliminary analyses we found no evidence of an important effect of family size on wife's wage rate, controlling for other determinants of wage rate.

[3] We refer here to the fact that mothers spend much time on child care which they might not include as housework; increases in child care due to a baby, however, might be more accurately reflected in hours of housework. Another problem is the possibility of inaccurate information on hours of housework. We investigated this by controlling for who provided the information on housework -- that is, whether the respondent was the husband or the wife. This control was totally unimportant, indicating the data are free from at least this type of biased error.

[4] Here "labor" does not refer to the effort of having a baby nor to employment; we use it to indicate costs associated with time rather than with direct expenditures on material objects such as food and clothing.

the wife had a baby, using Panel data,[1] we obtain an estimate of the net effect of a baby on total costs. This is an average marginal opportunity cost for all wives.[2] In order to estimate differences in marginal opportunity costs among subgroups of wives we specified interaction terms involving the dummy-variable indicator of whether the wife had a baby. We included variables indicating whether the birth was a first or higher-order birth and whether the wife had more than one birth during the Panel period to control for economies of scale and different opportunity costs at different parities. In summary, our estimate of the overall effect of a baby on total labor costs of children is adjusted for the effects of other determinants of these total costs; as are the estimates of effects on marginal opportunity costs. For example, in estimating differences in marginal opportunity costs between income groups we control for differences due to race or education.

Several problems with our approach should be mentioned. First, our estimates of marginal opportunity costs are unbiased and can be used to explain expected family size only if we assume that they are not themselves caused by expected family size. This assumption would not be valid, for example, if expected family size were correlated with having a baby during the Panel period. We have attempted to minimize this possibility by restricting the sample: we excluded women who would have been very unlikely to have a baby, and we included many women who would be likely to have a baby regardless of their expected family size. For example, women with no children in 1969 would be likely to have a birth whether they expected eventually to have two children or six. We lack data on initial expected family size, but we found that whether a couple had a baby between 1969 and 1972 or not is nearly uncorrelated with expected family size in

---

[1] Information on housework was not obtained in 1968 so our Panel period is 1969-72. In order to get valid comparisons of women who did and did not have a baby, for this analysis we restricted the sample to stably married women under age 35 who either had no children in 1969 or had at least one preschool child then. Note that roughly the same type of analysis could have been performed using cross-sectional data by regressing total labor costs of children on number of children. In fact we performed both panel and cross-sectional analyses during preliminary methodological explorations. The results were gratifying in that relationships generally went in the same direction in the two types of analyses. However, the magnitudes differed, and several statistical problems were more acute with the cross-sectional approach; the use of Panel data seems much more satisfactory.

[2] Note that the opportunity cost represents two distinct effects. Among women who had a baby, total labor costs of children increased. Among women who did not have a baby, total labor costs decreased because the children already born became older and required less attention. Hence our measure includes the effect of a baby on postponing the date at which the mother becomes "free" (when all children are in school).

1972. Thus we do not think our estimates are biased because of simultaneity.[1]

Most discussions of the economic theory of fertility have concluded that the costs of children are incurred over a couple's lifetime and are met by lifetime earnings; that is, there may be borrowing from future income in order to finance lumpy costs. Following this theory, costs should be computed from birth of a child through his university education (if any). We have chosen not to compute such costs but rather to measure only early childhood costs. It seems to us that using lifetime costs makes specific assumptions about people's time perspectives (i.e., rates of discount) which are not based on empirical evidence and which strongly influence the results. In addition, the estimation of lifetime costs invariably requires combining the experiences of different people at different ages (the synthetic cohort technique). We suspect that cohort tastes and market opportunities have fluctuated considerably in many matters relating to work and fertility, and the synthetic cohort method seems invalid.

POTENTIAL FAMILY INCOME: LEVEL AND TREND

In estimating opportunity costs of children we have considered the value of foregone time from both leisure and employment. To be consistent, our measure of family resources should include the value of both leisure and employment time. For this purpose we cannot use actual employment and leisure time, since these are dependent upon number of children already born; for a measure of ability to afford children we want an estimate of all possible leisure and employment in the absence of children. But in our view of things, this is *all* available time; thus all families have equal resources of potential time available. Since we assume that leisure and employment have equal value, differences in potential family resources are due entirely to differences in wage rates.[2]

While we do not wish to attempt to estimate lifetime potential resources, for the same reasons that we eschew lifetime costs, we do think that it is reasonable to suppose that major allocations of money and time may be based on considerations beyond current income level. Because we have Panel data we are able to specify current trend and instability of economic status (using recent unemployment as a measure of instability) without running into serious difficulties.

---

[1] On the other hand, our methods have resulted in fairly small sample sizes (262 women who had a baby) and the estimates probably are subject to considerable sampling error.

[2] Let us denote the total amount of time as T. The value of T does not matter; in our models we have used T = 4000, based on 16 hours per day, 5 days per week, 50 weeks per year. Denote the husband's and wife's wage rates as Wh and Ww respectively. Then potential family income (or resources) is computed as Wh*T + Ww*T = (Wh + Ww)*T. Since T is constant, variations in potential family income is due to variation in the sum of spouses' wage rates. Empirically we use husband's actual average hourly earnings and wife's assigned value of potential average hourly earnings.

It would be dangerous to extrapolate current trend far into the future, so our use of the variables potential income level and trend and recent unemployment jointly approximates a measure of "short-run permanent income." Our measure of wife's potential wage rate is imputed on the basis of characteristics such as education and race which largely are unchanging; hence we take wife's potential wage rate as constant and we measure potential income trend on the basis of trend in husband's wage (since potential time also is constant). Our use of this variable in the analysis of expected family size requires a value for all currently married couples; due to changes in marital status, the proper Panel data are missing for some couples and we have invented an approximation of trend in potential income.[1]

RESULTS

Our estimates of differentials in marginal opportunity costs of children are shown in Table A. Couples are assigned values of marginal opportunity cost on the basis of the net effects shown in the last column of Table A. For many of the variables we find substantial changes in the estimates of effects when we control for intercorrelations, suggesting that these intercorrelations are fairly large. Generally this won't be a problem since our major interest in the results is to predict opportunity costs. It is a serious problem, however, in terms of interpreting and understanding the differentials in opportunity costs; we shall not attempt to discuss Table A in detail.[2] As we anticipated, opportunity costs seem to be higher for upper income families (i.e., where husband's wage rate is higher); they also seem to be higher for couples where the husband's income is increasing rapidly. Costs seem to be lower in large cities, no doubt

---

[1] For some families included in our 1972 sample of married couples the husband was not head of household all years; for example, this occurs for female sample members who got married after 1968 and for husbands who were living with their parents in 1968. For such couples the data on head's wage rate in early Panel years refers to the wage rate of someone other than the current husband. For all Panel years we have divided the head's wage rate by the family income needs standard, since this seemed the best adjustment for changes in headship; we have used these ratios to compute the trend in head's wage rate. Among families with same head all years, the approximation appears to be satisfactory. When we compare families with same head all years and splitoff families, the approximated trends are similar for similar types of families except for those with particularly low initial wage rates. The rate of increase in wage rate is much higher for poor splitoffs than for the poor stable families, which is consistent with other findings in this study regarding the benefits of splitting off from a poor family. In our model of expected family size we use the trend in wage rate based on the approximation, and we include a dummy variable to control for whether this trend is due to being a splitoff from a poor family or not.

[2] A more careful and complete analysis of differentials in time spent on children (and in the quality of this time) appears elsewhere in this report.

reflecting differences in child rearing practices or in availability of cheap professional child care services. Surprisingly, husband's achievement motivation appears to be relatively strongly related to opportunity costs, with "more motivated" couples having lower costs; evidently such an attitude on the part of the husband is incompatible with the wife devoting valuable time to children. Other surprising results are the weak relationships between opportunity costs and race, religion, and wife's education.

Matrices of correlations among the major economic variables and expected family size for younger and older couples are shown in Table B. Marginal opportunity cost, potential family income, and trend in potential income are only moderately correlated, so there are no problems of multicollinearity in our models. Several of the constructed variables are highly correlated with their unconstructed counterparts: wage rate with education, potential income with actual income. Marginal opportunity cost, however, is not highly correlated with other variables, suggesting either that it is a theoretic innovation or that it is poorly constructed. It also is barely correlated with expected family size; this relationship becomes even smaller when we control for the effects of other variables. We have assigned values of marginal opportunity cost to older couples using the model in Table A; as explained previously, very likely this model is inappropriate for older couples and correlations involving this variable are probably meaningless.

Chapter 11

TIME INPUTS TO CHILDREN

> "We realize that it's the parents and family who are the most important determinants, especially in the early years of the child's life, of what the child will become."[1]

Within the past few years more economists have come to view the household as a producing unit as well as a unit which consumes economic goods and services. The seminal work of Becker (1965) demonstrated the usefulness of the approach which recognizes that a family utilizes its members' time, plus goods and services purchased outside the family, as inputs to produce basic "commodities." Child care is one such commodity, and the inputs of interest are the amount of time devoted by the mother and father to it. There is considerable evidence that inputs of both time and goods to child care during the preschool years are important in developing the child's early abilities, skills, and sense of belonging to a social unit (Bowles, 1970; Coleman, 1966) -- or what the economist would term "early human capital." This early socialization or human capital, interacting with the skills and abilities obtained from formal schooling and labor market experience, will determine, in large part, the child's future economic well-being.

Only recently have there been attempts to measure the inputs, particularly time, that are provided to young children by different socioeconomic groups as a means of quantifying the differences in preschool human capital (Hill and Stafford, 1973; Leibowitz, 1972, 1973). From these studies there is evidence that time inputs vary substantially across socioeconomic groups. High education and high income families spend much more time per child on their young children than parents with lower education and income. An effort has also been made to relate these time inputs to the educational attainment of children; the results of this study demonstrate a strong relation between proxies for the quantity and quality of time inputs children receive at home and their subsequent educational attainment (Leibowitz, 1973). Although the sample was highly specialized, being restricted to children in the "genius" or "near genius" category as measured by psychological I.Q. tests, the results are encouraging and suggest that extending the analysis to the entire population could prove enlightening. One major diffi-

---

[1] Dr. Edward Zigler, Director, Office of Child Development, Department of H.E.W., quoted in O'Keefe (1973).

culty in doing so, however, is that no large data base exists which can provide information on a lifetime panel basis for all the pertinent variables: preschool inputs, formal schooling, and subsequent labor force participation and earnings. The only remaining alternative is to piece together evidence about adults in the labor force who are likely to have received different levels of preschool inputs and evidence on the way in which preschool inputs differ for people from a variety of backgrounds. For example, there is evidence that Jews have greater earnings than adults of other groups. Does this relate simply to their higher level of formal schooling or does there appear to be an independent influence which can be attributed to a higher level of home inputs? Or is the educational attainment of Jews and others perhaps also explained by home inputs? The earnings of Catholics is another example. In a recent paper John Hause (1972) has shown that Catholics in some cases have significantly higher earnings than Protestants for a given level of formal schooling. Do Catholics provide larger preschool investments for their children, and can these investments help explain the higher adult earnings of Catholics?

The examples above, though they refer to religion, point out a general strategy: find the differences among various social groups (by religion, education of parents, and so on) in time allocated to preschool children; then examine the educational attainment and adult earnings of persons who were exposed to the different time inputs to evaluate the potential significance of such inputs in understanding lifetime earnings and also intergenerational influences in economic well-being.

The literature on human capital has emphasized the importance of formal schooling and has no doubt been in part responsible for the implementation of a variety of public programs aimed at increasing the availability of schooling and training programs to a wider range of persons. What are the policy implications if one were to find that time inputs at the preschool level do indeed influence subsequent development and adult earnings? Two strategies are suggested. One would be to provide children from disadvantaged backgrounds with time inputs from adults other than parents. Another would be to find ways to increase parental time to children through policy measures. In our research we have demonstrated that while the husband's wage or annual income (as well as his wife's) is unimportant in determining his own time allocation to preschool children, it is important in influencing the time allocation of his wife to preschool children. For example, if we consider women at a given educational level, husbands' earnings capacity, as measured by educational attainment, has a significant impact on time she allocates to the children. From this we conclude that there is a sub-

stantial income effect in encouraging the wife to spend time with the children. That is, additional family income allows the wife to reduce her time spent in the labor market and reallocate her time to other activities. This would be one of the benefits of an income maintenance program -- time taken from the labor market is presumably spent on child care. Even if poverty group mothers, who are themselves poorly educated, do not succeed in teaching their children skills relating directly to educational attainment, there are other forms of human capital which can be enhanced: trust, personal security, and ability to interact with people.

One dimension of human capital formation in the home which we examine is the difference in time allocation by sex of child. It is frequently argued that females experience a childhood which is qualitatively different from males -- that females are oriented toward certain values and that "acceptable" and "unacceptable" career paths are learned early in childhood. The family is thereby thought to reinforce sexual differentiation and hence to contribute to sex differences in occupational choice. We seek to ascertain whether there are differences by sex of child in the level of preschool time inputs. Do families allocate more or less time to female children and does this differ by income and education? If such differences do exist, we expect there to be sex differences in educational attainment and adult labor force experience.

We have two major goals in this chapter. The first is to verify or provide support for a method of imputing time allocation to preschool children, a method which we used in previous work (Hill and Stafford, 1973) on the Productive Americans survey. The basic method is to regress hours of housework and market work on the number of children in different age categories. This verification goal is methodological but is a necessary step before additional analysis can be pursued. The second goal is to suggest the possible importance of time inputs in influencing educational attainment and lifetime earnings capacity and to discuss some related topics.

ANALYSIS

I. Replication and Other Methodological Issues

A REVIEW OF THE ISSUES

In previous work we argued that regressing annual housework hours of the wife on number of children in various age groups can provide an estimate of time allocation to children, but we also noted that there are several reasons why this method might be inappropriate or of limited accuracy. A brief listing of these

problems follows.

1) Our data provide information on housework and market work but not on other types of time allocation. As a result, time spent with children which parents do not consider to be housework -- reading, trips, sledding, swimming, and other activities -- is not included.

2) Even if variations in housework time attributable to the presence of children provide an accurate measure of time allocated to children, there is an issue of what is the opportunity cost of the time allocated. The marginal wage forgone by women during housework time can, in the long run, be greater than their current potential wage because of foregone on-the-job training and depreciation of market skills involved in withdrawal from the labor force.

3) As the number of children increases and housework time increases, do there appear to be "economies of scale?" That is, are there diminishing marginal time allocations to children as the family size grows? If this is true it could imply that two children do not need twice the care that one child does, but it is also possible that the diminishing marginal time allocation simply reflects families not maintaining a stable level of quality in bringing up children as the family grows. There is no simple way to resolve this problem. To approach this issue sensibly requires, in part, an investigation of the educational attainment and adult earnings for children from large and small families.[1] Data of this type may provide evidence on whether a diminishing marginal time allocation reflects an economy of scale or simply the choice by parents to achieve a lower per child level of real inputs as family size grows. This is part of a larger issue of the quality of the time inputs, of course.

4) If one observes a small net increase in housework time for increasing numbers of children, then it could be that hours allocated to children are seriously understated. This is because housework time can be reallocated from activities other than child care to child-related activity. Because of such substitution *within* the category of housework, estimates of home time per child are likely to be biased downward. As the third point above, one critical test of the validity of time allocation as measured through our regression analysis is an evaluation of the influence of measured housework time attributed to children on their educational attainment and adult labor force experience and earnings.

5) A final problem relates to inference from a cross-section such as the Productive Americans data.[2] This requires one to assume that, aside from differ-

---

[1] In Part II of this chapter we provide some evidence of the effect of family size on educational attainment from the Productive Americans survey, other chapters in this volume use the panel data to make this investigation.

[2] This study of work effort was conducted by the Survey Research Center, see Morgan (1966).

ences in number of children in the different age categories, different families within a variety of groups are comparable. This is a rather strong assumption and can be tested through the use of panel data. Here the families are obviously standardized and we can study the resulting changes in housework (and market work) associated with changes in the number of children.

In our earlier work we addressed ourselves to the first four of the points developed above and also noted that in many cases we were forced to use a small sample size. Hence, we investigate the direct issue of replicability of our earlier results first and then proceed to examine the evidence on the role of time inputs in adult achievement.

REPLICATION

In our earlier paper our major variable of stratification was the occupational status of the husband. To define the strata we utilized the Duncan occupational scale used in the Productive Americans data. We divided our sample into three occupational groups defined by the index (1-33 = high; 34-66 = middle; 67-100 = low). With this classification we observed a difference in housework time input to preschool children between the high and low groups of about 2.7:1, (see Table 11.1) derived as follows: multiply the coefficients on the children variables by the corresponding number of years in each of the age intervals and sum for each income group (e.g., for the high SES group: (3 X 500) 1500 + (2 X 354) 708 + (2 X 472) 944 = 3152 - from column 1). Then ratios can be obtained (e.g., 3152/945 = 3.3). In making these comparisons across SES groups there is an issue of how to treat the statistically insignificant but negative coefficients in the low status group (column 5). If one treats them as anomalous and sets them to zero, the corresponding ratio is 2.7:1.

The occupational breakdowns in the Income Dynamics Panel and Productive Americans data are not identical, but there should be a fairly strong correspondence between the three pairs of occupational groups we have defined for the two surveys, particularly for the high and low groups.[1] In the Panel survey the middle group is necessarily heterogeneous since it contains both white collar (clerical) and blue collar (craftsmen) families and these families may differ substantially in terms of lifetime earnings potential and other important variables. Further, there are some differences in the actual procedures used to measure housework time in the two studies (Morgan, 1966, pp 79, 285-86; Institute for Social Research, 1972, pp 137-38, 336), and the panel contains an oversampling of low income blacks which resulted in panel weights. Our regression pro-

[1] A complete description of the characteristics of our sample is contained in Appendix 11.1 together with means and standard deviations of selected variables.

gram did not contain an option for weights and we had to run the regressions unweighted. This should reduce the time allocation to children in low status families in the panel data relative to the Productive Americans data and there will be a brief discussion of the impact of weights on our comparison later in this section.

Despite the differences across the two studies, examination of Table 11.1 reveals a number of strong similarities. First, there is an obvious change in terms of time allocation away from market work and toward housework when preschool children are present. Generally, the increase in housework is greater than the corresponding reduction in market work within each of the occupational groupings. This can occur because child-care time can come out of not only market time but also leisure time. Second, levels of housework for the different occupational groups, and consequently the interoccupational differences, are fairly well maintained. If we examine the high status groups, the coefficients for children aged 0-2, 3-4 and 5-6 are 500, 354, and 472, respectively, in the Productive Americans data and 457, 375, and 373 in the panel data. In the low status groups the figures are: 385, -16, -89 and 327, 42, and 102. Although the coefficients for children ages 3-4 and 5-6 are of opposite sign in the two samples, the coefficients are never significantly different from zero. Hence, the two surveys match quite well, and if one specifies the best estimate of the children aged 3-4 and 5-6 coefficients to be zero, then the ratio of time inputs to preschool children between high and low status groups is 2.7:1 in the Productive Americans data and 2.3:1 in the Panel data. This match will not be so close when weighting is introduced, but the general results are comparable given the differences in the form of home time data in the two surveys and the differences in the definition of the occupational groups. A third important similarity is the age dependent shape to housework time in the different occupational groups. For low status groups, both the panel and Productive Americans data show a sharp reduction in housework time given to older preschool children (ages 3-4 and 5-6) compared to the time allocated to infants. On the other hand, high status families appear to put in a steady level of time for all preschool children. The better educated wives in high status families may perceive greater benefits from invested time inputs to older children since they can provide services similar in results to formal schooling. We will demonstrate in Section III that family planning also differs markedly across occupation groups, and we argue that the children of low status families, being to a larger extent unplanned, may cause serious financial handicaps which encourage the wife to increase her hours supplied to the labor market to a level consistent with her labor supply prior to children.

TABLE 11.1

Regressions of Annual Hours of Housework and Hours of Market Work
by Married Women under 60, Productive Americans and O.E.O. Data

	Productive Americans[a]						O.E.O.[b]					
	High SES		Middle SES		Low SES		Professionals, Managers, Self-employed		Clerical, Craftsmen		Operatives, Laborers	
Variable	Housework (1)	Market (2)	Housework (3)	Market (4)	Housework (5)	Market (6)	Housework (7)	Market (8)	Housework (9)	Market (10)	Housework (11)	Market (12)
Children 0-2	500	-235	393	-188	385	-210	457	-307	214	-229	327	-216
	(180)	(126)	(124)	(91)	(90)	(62)	(86)	(76)	(80)	(67)	(72)	(60)
Children 3-4	354	-166	406	-158	-16	-12	375	-241	164	-199	42	-14
	(184)	(129)	(155)	(113)	(101)	(69)	(80)	(70)	(81)	(68)	(67)	(56)
Children 5-6	472	-167	431	-114	-89	117	373	-171	183	-99	102	-82
	(214)	(149)	(138)	(101)	(108)	(74)	(79)	(69)	(73)	(61)	(65)	(54)
Constant	1792	759	1987	717	2214	759	1414	766	1618	816	1649	736
	(109)	(76)	(82)	(60)	(61)	(42)	(47)	(41)	(50)	(41)	(45)	(38)
N	189	189	299	299	506	506	565	565	629	629	797	797
S.E.E.	1203	841	1145	838	1235	849	881	778	972	807	999	830
R^2	.103	.043	.119	.037	.049	.028	.147	.074	.038	.049	.034	.022

The estimated standard errors are found in parentheses below the estimated coefficient

*Actual age ranges coded for CHILDREN are as follows:
CHILDREN 0-2: 0-2.9
CHILDREN 3-4: 3.0-4.9
CHILDREN 5-6: 5.0-6.9

[a]Productive Americans Survey, 1965. Housework and market work refer to 1964.

[b]O.E.O. Panel Survey, 1968-72. Housework and market work refer to 1969.

WEIGHTED VERSUS UNWEIGHTED REGRESSIONS

The sample of families in the Panel consisted of two components: a cross-section sample of dwellings in the coterminous United States, and a subsample of families interviewed in the spring of 1967 by the Census Bureau of the Office of Economic Opportunity. The cross-section sample of dwellings was selected from the Survey Research Center's master sampling frame at a constant overall sampling rate. The Census sample was a probability sample with eight basic selection fractions, but it included only those families with incomes equal to or less than $2000 + N ($1000) where N is the number of persons in the family. This income cutoff was roughly equal to twice the federal poverty line used in 1967. Because of this oversampling of low income families, it is very likely that our estimates of the time allocation to children in low status families are biased downward in the absence of weights which control for the differences in response rates and sample selection probabilities in the two components of the panel sample. In order to investigate the magnitude of that bias we have re-estimated our housework regressions for the high and low status families discussed above using a weighted regression program available at the Survey Research Center. These regressions are compared with our unweighted ones in Table 11.2.

An examination of Table 11.2 indicates that, indeed, the preschool time inputs are greater in the weighted regression. If we now compute the high-low status preschool time differential using the weighted regression coefficients, we obtain a ratio of 1.6:1. This is in contrast to a ratio of 2.7:1 in the Productive Americans survey and 2.3:1 in the unweighted Panel regressions. While the weighted comparisons do show a smaller time differential by social class, it certainly is not small enough to support a conclusion of equality of preschool home investments in children across SES groups. Further, the difference in the age (of child) dependent shape to housework time observed in the regressions of Table 11.1 and in our earlier work is preserved in the weighted regressions. Consequently, while weighting does narrow the estimated preschool time differential, it does not, we believe, narrow it sufficiently to vitiate our past research or the evidence relating to several topics we explore in Part II of this paper.

SIMPLE DYNAMICS OF TIME ALLOCATION

Most of this paper is devoted to an analysis of time budget data from the 1969 wave of the Panel. In this section, however, we report some preliminary results of work underway using data from several years of the Panel.

The problems of analysis in the context of a dynamic model of time allocation are, unfortunately, not trivial. One of the questions of interest is, pre-

TABLE 11.2

Weighted and Unweighted Housework Regressions
for Married Women under 60 by Occupation of Head

Children Variables	Professionals, Managers, Self-Employed		Operatives, Laborers	
	Weighted	Unweighted	Weighted	Unweighted
0-2	499 (83)	542 (80)	461 (76)	355 (72)
3-4	489 (81)	370 (79)	181 (78)	37 (69)
5-6	308 (79)	290 (79)	122 (79)	73 (67)
7-9	282 (61)	272 (60)	74 (64)	17 (54)
10-12	31 (64)	26 (63)	74 (63)	95 (53)
13-17	111 (46)	111 (45)	50 (44)	71 (35)
Constant	1244	1244 (57)	1610	1543 (54)
S.E.E.	833	859	1013	994
R^2	.224	.193	.074	.049

sumably, how changes over time in the wife's market and housework are related to changes in the number of children within certain age intervals. Changes in the number of children can, however, take place in a variety of ways, all of which have different implications for the time allocation of the wife. Suppose we construct a variable, $\Delta(0\text{-}2)$, which denotes the difference between the number of children 0-2 years old in 1971 and in 1969, and we wish to relate that to ΔHW = change in the wife's housework between the same two years. Now it is clear that $\Delta(0\text{-}2)$ can be equal to 0 either because there were no young children in either year or because a birth offset the movement of a present child into a higher age interval. The ΔHW resulting from these two events is sure to be quite different even though $\Delta(0\text{-}2) = 0$ in both cases.

As an initial step in analyzing the dynamics of time allocation we have attempted to analyze the relationship between ΔHW and $\Delta(0\text{-}2)$ by first removing from our sample all women who, in 1969, had children 0-2. Consequently, when we look at changes between 1969 and 1971, we know that $\Delta(0\text{-}2) \geq 0$ and the equality holds *only* if there were no young children in either year. Further, we have also restricted our analysis to families with the same head and wife between 1969 and 1971 and between the ages of 21-45 in both years. The response of housework time to a change in the number of children should also depend on the number of children 3-6 and 7-17 already present. Indeed, there may be an interactive effect between $\Delta(0\text{-}2)$ and the number of prior children by age interval to the extent that older children care for younger ones or there are scale economies in the care of preschool children. We have again stratified the sample by the occupational groups used in the static analysis. The results of our preliminary work are found in Table 11.3.

The results of this simple dynamic model are quite consistent with our cross-sectional results. Only for wives in the lowest SES group do the two interaction variables add significantly to explained variance ($F = 3.00$). For wives in the high and middle groups, the response of housework to children 0-2 being added to the family between 1969 and 1971 is independent of the number of children age 3-17 already there. The significant negative interactions in the low SES group, however, give some evidence for economies of scale in preschool child care or the use of older children (7-17) to care for the young ones and thus release some of the wife's time for work in the market. We find the same evidence of declining marginal time inputs to preschool children by the low SES group in our cross-sectional work discussed in Section II. Further, when comparing the increments to housework due to $\Delta(0\text{-}2)$ across SES groups, we find that the high group has $\frac{\partial \Delta HW}{\partial \Delta(0\text{-}2)} = 678$ while for the low group the partial (evaluated at the mean values of CHILDREN 3-6 and CHILDREN 7-17) is equal to 219. This is

TABLE 11.3

Regressions of Change in Housework for Married Women, 21-45 with No Children Ages 0-2 in 1969 by Occupation of Head*

Variable	Professionals, Managers, Self-Employed	Clerical, Craftsmen	Operatives, Laborers
Δ (0-2)*	678	520	1083
	(231)	(266)	(340)
Children 3-6*	-29	-54	75
	(80)	(84)	(74)
Children 7-17*	57	-113	-71
	(40)	(44)	(38)
Δ(0-2) X Children 3-6	-63	66	-440
	(216)	(212)	(241)
Δ(0-2) X Children 7-17	-76	60	-236
	(109)	(107)	(142)
Constant	-290	205	-142
	(107)	(131)	(124)
N	257	251	235
S.E.E.	910	1003	1007
R^2	.052	.108	.075

*Dependent variable=ΔHW=total housework hours in 1971-housework hours in 1969,
Δ(0-2)=children 0-2 in 1971,
children 3-6=number of children ages 3-6 in 1969,
children 7-17=number of children ages 7-17 in 1969.

even a more striking time differential by socioeconomic class than is shown in Table 11.1 for CHILDREN 0-2. While part of this differential is due, no doubt, to differentials in the exact timing of births between 1969 and 1971, it does illustrate again our most fundamental result: the existence of SES differentials in time inputs to preschool children.

II. Selected Topics

EXPECTATIONS OF CHILDREN AND FAMILY PLANNING

The obvious intertemporal nature of child care and labor supply decisions implies that not only the immediate presence of preschool children but also the expectation of future births will affect time allocation. There are several dimensions to this relationship, the first of which concerns the nature of the expectation process itself. The fact that a family expects additional children in the future need not imply that there is formal family planning. Indeed, one might suppose that for many low income families the expectation of additional children is born more out of resignation than of formal plans concerning the number and spacing of children. Some evidence on class differentials in family planning is provided by computing the correlation coefficient between two dummy variables: PLAN (=1 if answered "Yes" to the question "Are you and your wife doing anything to limit the number of children you will have?"), and EXPECT (=1 if answered "Yes" to the question "Do you expect to have any (more) children?"). The correlation was computed for white collar and blue collar subsamples and equalled -0.28 and -0.14, respectively. The larger (negative) correlation for white collar families indicates that for these relatively high status families, the expectation of future children is more closely associated with some formal mechanism for controlling family size and spacing.[1] This is consistent with the research of demographers (Ryder and Westhoff, 1971) and our earlier work with the Productive Americans data.[2]

If a family does expect children, the effect of this on time allocation will depend upon the size and age composition of the current family. In the ab-

---

[1] In Chapter 10, Volume II, J. Cramer uses the terms "plan" and "expect" interchangably in his discussion of family size and uses expected family size as his main dependent variable. We believe there is an important conceptual difference between these two terms and, therefore, don't find his result that when low-status parents expect to have more children they have them to be inconsistent with our conclusion that this is very loosely associated with formal family planning.

[2] The difference between correlation coefficients is even more striking if the Panel data is stratified by educational attainment of head and wife. For those families in which both head and wife had at least some college, $r = -0.49$ while $r = -0.12$ for families in which both head and wife had not attended college.

sence of preschool children the expectation of children is likely to lead the wife to devote additional time to the labor market in order to improve the family's economic situation prior to the arrival of children. On the other hand, expectations of additional children in the presence of preschool children will lead the wife to specialize in the production of home commodities, including child care. We know that the presence of preschool children leads to a (shadow) price of home time for wives which is significantly greater than the wage they could potentially earn in the market (Gronau, 1973). This, together with the fact that a stock of nonmarket skills is built up by being in the home with young children, will lead the wife who expects additional children to reduce further her time devoted to market work.

These propositions were tested by including both the dummy variable EXPECT and the interaction between it and CHILDREN 0-6 (which will be denoted by EXP 0-6) in market work and housework regressions for our sample stratified by white collar or skilled (professionals, managers, craftsmen and clerical workers) and blue collar (operatives, laborers) occupation. It should also be noted here that in contrast to the sample used in the replication of our previous results discussed in Part I, the wives in the sample used in this and the remaining sections are all between the ages of 21 and 45. The regression results are shown in Table 11.4.

The results seem to be consistent with the above discussion. That is, if we set CHILDREN 0-6 equal to zero, the sign of the coefficient of EXPECT indicates movement into the market and out of housework by the wife in anticipation of addition of young children to the family. When young children are already present, however, the estimated coefficient of the interaction variable (EXP 0-6) indicates a further withdrawal from the market and increased time devoted to the preschool children already present. The magnitude of the coefficient of EXP 0-6 in the market work regressions also indicates a larger withdrawal from market work for the white collar or high skilled wives, perhaps reflecting the fact that expected, but unplanned, children in blue collar families induce a smaller and less permanent withdrawal from the market. We cannot place too much reliance on this inference, however, for the null hypothesis that the market work regression slopes are equal between the two subsamples cannot be rejected (F=0.548).

ECONOMIES OF SCALE

In our earlier paper we tested for the presence of economies of scale in the time allocated to preschool children and determined that they were absent. We were concerned there with the fact that although lower status families devoted less time per child to preschool children, they had more children. If,

TABLE 11.4

Expectations of Children and the Allocation of Time to Housework and Market Work, Married Women Aged 21-45 by Occupation of Head

Variable	Professionals, Managers, Self-employed, Craftsmen, Clerical		Operatives, Laborers	
	Housework	Market Work	Housework	Market Work
Children 0-6	259	-144	129	-126
	(38)	(29)	(49)	(40)
Children 7-17	102	-27	35	-9
	(22)	(17)	(28)	(23)
Expect	-54	189	-47	56
	(114)	(89)	(186)	(153)
Exp 0-6	80	-237	177	-156
	(77)	(61)	(108)	(89)
Constant	1384	789	1513	895
	(75)	(58)	(107)	(87)
N	833	833	428	428
S.E.E.	959	750	1022	838
R^2	.098	.085	.044	.055

therefore, there were substantial scale economies in raising children, one might argue that our measure of time spent on children overstated the inequality between high and low status families. The rejection of the economies of scale argument was tentative and subject to further research. In particular, it is extremely difficult to isolate differences in tastes from technological effects in the provision of child services.

A test for the presence of economies of scale or diminishing marginal utility in the allocation of time to preschoolers is provided by including a quadratic term in CHILDREN 0-6 in our regressions. Table 11.5A illustrates the results of this addition when the data are stratified by the head's occupation. In contrast to the occupational stratification used earlier, the HIGH SES group includes only professionals, managers, and self-employed businessmen. LOW SES includes every other coded occupation. The total sample size is also smaller here for we have deleted families in which the wife's education was a missing variable.

A different stratification technique is employed in Table 11.5B. Here we define groups on the basis of the head's and wife's educational attainment. In particular, we have the following strata:

1. LOLO: Neither head nor wife have attended college;
2. LOHI: head has not attended college but wife has;
3. HILO: head has attended college but wife has not;
4. HIHI: both head and wife have attended college.

A stratification by educational attainment seems particularly meaningful in the context of a study of the allocation of time. The head's education is a useful proxy for a family's "permanent" income, while the wife's education is a strong predictor of the price of her time and potential market wage (Gronau, 1973).

In the strata in which the head is relatively well educated or employed in a high status job (HIGH SES in Table 11.5A and HILO, HIHI in Table 11.5B, there is no evidence of significant diminishing time input to preschool children as their number increases. In contrast, the three strata containing low educated or low status heads do indicate a significant decline in the time input per preschool child as the number of these children increases. It would be difficult to argue, we believe, that low status families are more efficient in the provision of child services and that this is reflected in the existence of economies of scale. What the results do indicate is that the wives in high status families (as defined by the head's education and/or occupation) spend essentially a constant amount of time per preschool child regardless of their number, while very young children in low status households receive a smaller amount of parental time

TABLE 11.5a

Tests for Economies of Scale in Housework Time Inputs to Preschool Children, by Occupation of Head

Variable	High SES*	Low SES*
Children 0-6	331 (132)	294 (83)
Children 7-17	98 (30)	60 (19)
$(\text{Children } 0\text{-}6)^2$	41 (47)	-46 (24)
Constant	1258 (90)	1498 (72)
N	389	825
S.E.E.	908	1020
R^2	.179	.037

*Occupations included are listed in the text.

TABLE 11.5b

Tests for Economies of Scale in Housework Time Inputs to Preschool Children, by Education of Head and Wife

Variable	LOLO	LOHI	HILO	HIHI
Children 0-6	262	919	524	282
	(85)	(314)	(199)	(190)
Children 7-17	50	111	54	120
	(20)	(73)	(49)	(51)
$(\text{Children } 0\text{-}6)^2$	-33	-233	-62	63
	(24)	(112)	(64)	(73)
Constant	1526	973	1514	1118
	(74)	(194)	(149)	(118)
N	805	65	179	165
S.E.E.	1019	843	990	843
R^2	.033	.189	.122	.189

than did their older preschool siblings. To the extent that preschool time inputs do have a positive influence on educational attainment and subsequent earnings, the results of Tables 11.5A and 11.5B have important implications for studies of intergenerational income inequality.

In a recent paper, Johnson and Stafford (1973) have shown again that the level of educational attainment on the part of individuals is systematically determined by a set of economic and demographic variables pertaining to early childhood development. In particular, for a sample of white males in 1964 taken from the Productive Americans data, they have demonstrated that the number of siblings has a negative effect on an individual's educational attainment, other things being equal. Our results imply that if the individual is raised in a family whose head has a high level of education, he will receive a constant and relatively large level of preschool time inputs independent of the number of his siblings. Given this result, the negative effect of number of siblings on education should be attenuated for these high status families. To test this we have estimated a regression explaining education much like that appearing in Johnson and Stafford (1973) except that we have added a dummy variable, FATHER H.S. GRAD (=1 if the head's father graduated from high school) and an interaction term between this variable and number of siblings. High school rather than college education of the father has been used as the variable "break-point" since high status and/or high educational attainment was more properly reflected by this level of educational attainment in the first half of this century. The results of the regression are as follows:[1]

$$
\begin{aligned}
ED = {} & 1.03 \ln(EXP) + 1.42 \underset{(0.301)}{\text{FATHER H.S. GRAD}} - 0.046 \underset{(0.006)}{\text{AGE}} \\
& \quad (0.283) \\
& - 0.375 \underset{(0.043)}{\text{SIBLINGS}} + 1.05 \underset{(0.170)}{\text{URBAN ORIGIN}} \\
& + 0.136 \underset{(0.047)}{\text{OLDSIBS}} + 0.174 \underset{(0.083)}{\text{FATHER H.S. GRAD X SIBLINGS}} \\
& + 8.02 \\
& \quad (1.60)
\end{aligned}
$$

with $R^2 = 0.311$ and S.E.E. = 2.52. The positive and significant coefficient of the interaction term indicates that the negative effect of SIBLINGS on EDUCATION is substantially weakened for individuals from high status families. And while we don't have direct evidence that this is due to the constancy of preschool time inputs in these households, this regression result together with Tables 11.5A and 11.5B provides strong circumstantial evidence for this.

---

[1] The variables are defined as follows: EXP = per pupil educational expenditure by region of origin, AGE = age of respondent in 1964, URBAN ORIGIN = dummy variable if grew up in an urban area, OLDSIBS = number of older brothers and sisters. For additional details, see Johnson and Stafford (1973, pp 142-47).

RELIGIOUS PREFERENCES

In the introduction to this chapter we described some recent evidence (Hause, 1972) that Catholics have higher earnings than Protestants for a given level of formal schooling. In the context of our investigation this fact leads us to test for the presence of differentials in preschool time inputs by parents' religious preference. To the extent that we find such differentials, it will provide us with an appealing explanation of subsequent earnings and educational attainment differentials. Hopefully, then, many of the "background variables" typically included in earnings functions in a rather *ad hoc* manner will begin to be interpreted in a manner consistent with their relationship to preschool investments in human capital.

Using our same basic sample -- husband/wife families between the ages of 21 and 45 where the husband was employed in 1969 -- we have eliminated all families with religious preference other than Protestant and Catholic.[1] Our basic functional form is by now familiar; we add here a dummy variable CATHOLIC (= 1 if the family is Catholic) and the interaction between CATHOLIC and the number of children ages 0-6. A positive sign on the estimated coefficient of CATH 0-6 would indicate that, across our sample, Catholic mothers allocate more housework time to preschool children than do Protestants. As is apparent from Table 11.6, this is precisely what we observe with the null hypothesis that the coefficients of the Catholic dummy and interaction variable are both zero being rejected at the 1% level in the housework regression (F = 6.57). We cannot reject this hypothesis in the market work regression at the 5% level where the calculated F = 2.35. In conjunction with the work of Hause (1972), Table 11.6 again provides some evidence of the relationship between time inputs into preschool children and postschool economic well-being.

SEX DIFFERENTIALS

A persistent and well-documented earnings differential is that between men and women. Even after standardizing for differences in labor market participation and other factors, women still receive earnings which are about 71% of those received by men (Oaxaco, 1971). There are several reasons that can be and have been offered for this phenomenon; however, we are concerned here with how this might relate to differentials in preschool time inputs by the sex of the child. We present some interesting and provocative preliminary results of an ongoing analysis of this differential. At this point we do little more than report one set of regression results. We will defer to a later paper a detailed analysis

---

[1] A separate analysis of Jewish families was undertaken but the sample size was too small (N=33) to provide meaningful estimates of the parameters.

TABLE 11.6

Allocation of Time to Market Work and Housework,
Married Women 21-45, by Religious Preference

Variable	Housework	Marketwork
Children 0-6	182	-155
	(32)	(26)
Children 7-17	66	-13
	(17)	(13)
Cath	87	-0.15
	(99)	(80)
Cath 0-6	111	-76
	(62)	(50)
Constant	1451	846
	(56)	(46)
N	1111	1111
S.E.E.	976	976
R^2	.075	.058

and interpretation of these and other results.

We have again stratified by the head's and wife's educational attainment as described earlier in this chapter. Now we regress housework in each of these four groups on the number of sons and the number of daughters 0-6 and 7-17. The comparison of most interest is between the estimated coefficient of SONS 0-6 and DAUGHTERS 0-6. Systematic differences between these two coefficients by socio-economic class or the parents' educational attainment may give some insight into how the above mentioned earnings differential is generated through sexual differences in preschool human capital development. The regression results are found in Table 11.7.

It is worth pointing out two interesting implications of these results. First, holding the wife's education constant and moving from low to high levels of the head's education (comparing, e.g., LOLO with HILO and LOHI with HIHI), it is clear that the total time allocated to preschool children increases for both sexes of children. Second, holding head's education constant reveals that wives with at least some college education spend more time with their preschool daughters than with their sons, while the reverse is true for non-college educated mothers. Further, these differences are, for the most part, statistically significant.[1] The husband's education apparently serves primarily as an income proxy leading to increased consumption (production) of the child-services commodity and a resultant increase in its time inputs. The mother's education serves to determine the allocation of time by sex within the total determined by the head's income.

On the basis of the results in Table 11.7, we would expect that daughters of well educated mothers would receive substantially more formal schooling (and perhaps earnings) than would daughters of women with little schooling, holding their father's income or education constant. This expectation is borne out in Chapter 7, Volume I. Using an ingeniously designed sample from the Panel data, it shows that when income, family size and father's education are held constant, having a college educated mother rather than one who only completed grade school is associated with about one extra year of schooling for daughters. In contrast, father's education has a much more pronounced effect on the educational attainment of the son.

---

[1] Using a one-tailed test at the 0.05 level, the estimated difference between the coefficients of DAUGHTERS 0-6 and SONS 0-6 is significantly *greater* than zero for LOHI ($t = 1.98$) and HIHI ($t = 1.53$) and significantly *less* than zero for LOLO ($t = 1.64$). The null hypothesis that the coefficients are equal could not be rejected for HILO ($t = 0.82$).

TABLE 11.7

Allocation of Time to Housework for Married Women, 21-45, by Age and Sex of Child

Variable	LOLO	LOHI	HILO	HIHI
Daughters 0-6	100	526	278	551
	(48)	(152)	(111)	(106)
Daughters 7-17	31	-148	8	133
	(32)	(127)	(80)	(87)
Sons 0-6	210	174	410	334
	(46)	(117)	(106)	(99)
Sons 7-17	67	326	87	127
	(32)	(116)	(77)	(85)
Constant	1568	1089	1570	1070
	(68)	(179)	(131)	(108)
N	805	65	179	165
S.E.E.	1019	821	993	841
R^2	.035	.244	.123	.198

SUMMARY

We have presented and discussed several topics concerning the allocation of time to preschool children. Our two main conclusions may be summarized as follows:

1) The methodology we employed in earlier research (Productive Americans Study) to estimate preschool time inputs stands up quite well when confronted with a new and different data source (Panel Study). While the time differentials between high and low status families we estimated in the Panel data are somewhat narrower than the previous ones, they still point to considerable inequality of home investments in children across SES groups.

2) There is considerable evidence that the background variables frequently included in the estimation of earnings functions are systematically related to preschool time inputs. As we have seen, differences in both religious preference and educational attainment of the parents lead to dramatic differentials in the allocation of time to children. Even more striking are the differentials by sex of child observed in different education-of-parents groups.

It is the relationship between time inputs to preschool children and subsequent economic well-being which we plan to investigate further. That this relationship is of more than academic interest is indicated by the recent development of a national program ("Home Start") which has as one of its objectives the involvement of parents in the preschool development of their children (O'Keefe, 1973). It is our belief that the study of time inputs to preschool children is an important element in understanding intergenerational inequality in schooling and income.

References

Becker, Gary S., "A Theory of the Allocation of Time," Economic Journal, 75 (September, 1965): 493-517.

Bowles, Samuel, "Towards an Educational Production Function," in Education, Income and Human Capital (W. L. Hansen,ed.), New York: Columbia University Press, 1970.

Coleman, James S., et al., Equality of Educational Opportunity, Washington, D.C.: Government Printing Office, 1966.

Gronau, Reuben, "The Effect of Children on the Housewife's Value of Time," Journal of Political Economy, 81, Part II (March/April, 1973): 5168-5199.

Hause, John C., "Earnings Profile: Ability and Schooling," Journal of Political Economy, 81, Part II (May/June, 1972): 5108-5138.

Hill, C. Russell and Stafford, Frank P., "Allocation of Time to Preschool Children and Educational Opportunity," Journal of Human Resources (forthcoming).

Institute of Social Research, A Panel Study of Income Dynamics: Study Design, Procedures, Available Data, Ann Arbor: Survey Research Center, 1973.

Johnson, George E., and Stafford, Frank P., "Social Returns to Quality and Quantity of Schooling," Journal of Human Resources, 8 (Spring, 1973): 139-155.

Leibowitz, Arleen, "Education and the Allocation of Women's Time," New York: National Bureau of Economic Research, 1972.

-- "Home Investments in Children," Journal of Political Economy (forthcoming).

Morgan, James N., et al., Productive Americans, Ann Arbor: Institute for Social Research, 1966.

Oaxaco, Ronald, "Male-Female Wage Differentials in Urban Labor Markets," unpublished doctoral dissertation, Princeton University, 1971.

O'Keefe, Ruth A., "Home Start: Partnership with Parents," Children Today, 2 (January/February, 1973): 12-16.

Ryder, Norman B., and Westhoff, Charles F., Reproduction in the United States, Princeton: Princeton University Press, 1971.

APPENDIX 11.1

BASIC DATA SET

With the exception of the section of this chapter discussing the simple dynamics of time allocation, all of the variables used were from the year 1969. The basic sample of families used in the analysis possessed the following characteristics:

1) The family contained both a male head and wife and both were between the ages of twenty-one and forty-five in 1969. In Tables 11.1 and 11.2, however, families with head and wife between the ages of twenty-one and sixty were used in order to make those results comparable with our earlier work with the Productive Americans data.

2) Between the years of 1968 and 1972, the male head and his wife were the same individuals.

3) The male head was employed in 1969 in one of the seven occupational groups listed below.

DATA STRATIFICATION

The two stratification variables used in this chapter are (1) the occupation of the male head in 1969 and (2) the educational attainment of the head and his wife. The strata were defined as follows:

1) Various combinations of the following seven occupational groups were employed as proxies for socioeconomic status of the family:

   a. Professional, technical and kindred workers
   b. Managers, officials and proprietors
   c. Self-employed businessmen
   d. Clerical and sales workers
   e. Craftsmen, foremen and kindred workers
   f. Operatives and kindred workers
   g. Laborers and service workers

2) The educational breakdown was made on the basis of whether the head and/or wife had attended college where this included those who had attended college but did not graduate, those who had a bachelor's degree, and those who had received an advanced or professional degree. The following four strata were defined:

   a. LOLO: both head and wife have not attended college
   b. LOHI: head has not attended college but wife has
   c. HILO: head has attended college but wife has not
   d. HIHI: both head and wife have attended college.

TABLE A11.1

Means and (Standard Deviations) of Selected Variables by Strata

Variable	Profes-sionals, Managers, Self-employed	Clerical workers, Craftsmen, Operatives and Laborers	LOLO	LOHI	HILO	HIHI
Housework, Wife*	1760 (993)	1823 (1030)	1844 (1035)	1570 (914)	2026 (1048)	1572 (928)
Market Work, Wife*	556 (768)	652 (828)	626 (826)	706 (753)	545 (804)	564 (737)
Housework, Head*	82 (170)	89 (219)	75 (191)	104 (188)	108 (254)	112 (216)
Market Work, Head*	2425 (682)	2257 (612)	2276 (623)	2276 (397)	2454 (669)	2342 (652)
Children 0-2	0.278 (0.496)	0.359 (0.569)	0.349 (0.567)	0.308 (0.557)	0.318 (0.502)	0.321 (0.529)
Children 3-4	0.318 (0.536)	0.414 (0.586)	0.409 (0.591)	0.369 (0.547)	0.441 (0.591)	0.236 (0.440)
Children 5-6	0.327 (0.520)	0.408 (0.606)	0.419 (0.609)	0.415 (0.635)	0.330 (0.517)	0.297 (0.509)
Children 7-17	1.372 (0.960)	1.777 (1.840)	1.918 (1.858)	1.154 (1.481)	1.497 (1.552)	0.970 (1.341)

*Measured in hours per year (1969).

Chapter 12

OTHER ANALYSIS

We list here some of the other analyses of the data which are completed and still in progress. It is impossible to keep track of all of them. The tapes have been distributed to a number of institutions where many researchers may be at work on a single tape. Numerous copies of the documentation have also been sold and are presumably in use.

A number of analyses are still in process at the Survey Research Center, including two dissertations by Jacob Benus and Jonathan Dickinson which are near completion and others in various stages. Much more research can fruitfully be done using behavior patterns or attitudes as something to be explained, studying the extent to which people really have any control over their own fates, and making a better assessment of the effects of attitudes and achievement motivation among those who have some freedom to change.

A sixth wave of data has already been collected. With the addition of new families formed by 1973 splitoffs, we now have six years of data for 5285 families. This provides not only better measurement of the trend in each family's fortunes, but enables us to test the predictive power of the analyses already done. Furthermore, the additional data come from a period of rapidly rising prices and somewhat less unemployment, and thus perhaps more disparate patterns of income increases than usual. The data were collected economically, mostly by telephone, and were limited to such outcome variables as work, income, and changes in jobs, residences, or family composition.

The following is a summary of some of the analysis being done elsewhere with these data.

SOCIAL AND ECONOMIC FACTORS IN MARITAL INSTABILITY

Oliver Moles

Office of Research and Exploratory Studies
National Institute of Education

Introduction

This is a status report on a study to explain why three factors are so repeatedly and strongly associated with marriages which end in separation or divorce. The three factors are socioeconomic status, race, and location. Marital instability is more frequent among those who have lower incomes and occupations, who are black, or who live in cities. This study was begun while the author worked for the Office of Economic Opportunity.

The analysis includes all families with a wife under age 45, when most splits occur, which were intact at the first interview in 1968 and the husband the interview respondent (the usual case). Eight percent of these families had separated or divorced by 1972, four years after the first interview. While this may seem high, divorces are now occurring at record high levels.

A preliminary analysis based on the 1968-71 data is available in a paper entitled "Some Social and Economic Background Variables in Marital Instability," by Oliver Moles, September 14, 1972. This paper discusses a number of variables -- sociological, economic, and psychological -- which are related to marital instability. But it has several important limitations:

1. Sampling errors were not yet available, so the size of significant differences could only be approximated.
2. The only control variable employed was per capita income.
3. Specific questions or hypotheses were not phrased. Instead many kinds of data which might bear on instability were examined.
4. A few men who had already apparently separated were inadvertently included.

A 1968-72 analysis increases the number of cases of separation and divorce, and hence the reliability of the findings. It may be possible to show how events at one time led to others the next year which in turn led to marital instability in the third year, or to show consequences of marital disruptions which do not show up until the second year afterward.

There are several other strong advantages of this data base. The richness of economic behavior variables will help to identify which components of income and employment are most powerful. The longitudinal design may permit a test of how much downward drift in socioeconomic status and movement to cities occurs soon after marital disruption. The interview with husbands assures more accuracy

in the measurement of socioeconomic variables. And because of oversampling low income families it will be possible to analyze their circumstances in more detail. The response rate since 1968 has been very good.

Analytic Methods

The statistical analysis is taking several forms. Cross-tabulation of frequency distributions with weighted percentages separating and divorcing (combined) among respondents with various background characteristics is the first approach. Subgroup analyses controlling separately for length of marriages and income by needs (Orshansky poverty index) have already been performed and some results of this will be mentioned below.

The major method for determining how much of the three major variables is explained by the hypothesized intervening variables will be a form of regression analysis called Multiple Classification Analysis developed at the Survey Research Center. This program treats each category of each predictor (e.g., under 20 at marriage) as a dummy or dichotomous variable. One is either in the category or not. This avoids assumptions about linear relations and the shape of the distribution normally needed in regression analysis. The output is shown in terms of percentages separating and the deviation of each category from the grand mean, both unadjusted and adjusted for the effects of other variables. It also shows the percentage of variance explained singly and jointly. Where the intervening variables, such as economic problems for blacks, explains any part of the original relationship the adjusted percentages will reflect this.

The Study Questions

The main purpose of the analysis is to try to specify more precisely why low socioeconomic status, race, and a city dwelling should so often be related to marital instability. Various hypotheses can be advanced to explain why each of these should be important. The analysis concentrates on explanations concerned with differences in demography, social structure, interpersonal relations, and motivation.

1. *Socioeconomic status.* Census data indicate that at lower income and occupation levels there is more marital instability. But these socioeconomic variables were measured after disruptions occurred, and may have been affected by them. It would be very useful to determine the direction and extent of any drift there is in employment, occupation, and income after separation compared to the situation for similar intact families. This should be done separately for husbands and wives, but the low response rate from separated and divorced husbands may preclude getting definitive information on this.

A second hypothesis is that the concept of relative deprivation can explain rates of instability better than absolute deprivation. The scarcity of economic rewards is of interest here, and this deprivation can be viewed across one's lifetime or in comparison with one's contemporaries. The concept of relative de-deprivation can account for more instability among those men who were "pretty well off" while growing up, which is true regardless of their current income levels in the preliminary findings. While the experience of deprivation cannot be measured directly, there are a number of conditions which should promote relative deprivation of economic rewards measurable from the study:

a. low per capital income in the city;

b. high ambition and low income;

c. income during husband's childhood greater than present income;

d. wife's income, occupation, and employment higher than husband's (greater effect among relatively poor);

e. rural-urban migration (differences in well-offness should be more accentuated in cities for the poor the longer they live there without success, so people who have lived all their lives in cities and are relatively poor should feel more deprived than migrants);

f. high occupation and low income of husband;

g. high education and low income of husband.

Preliminary tabulations suggest that some of these are related fairly strongly to marital instability, notably wives who make more money than their husbands. Husbands who are employed less than full time also are in more unstable unions, regardless of their wives' labor force participation. Discrepancies between occupation and income, education and income, present and childhood income and ambition with low income also are fairly strongly related to instability.

2. *Race.* The higher rates of instability noted among blacks may be caused by one or several of the demographic and social structural variables commonly associated with race which are themselves frequently caused by various forms of racial discrimination.

Surprisingly, race was not highly related to separation and divorce in the aggregate, though it was at low and high income levels. But because of its importance, a multiple regression analysis with dummy variables is being performed to determine the unique contribution of race after controlling out other variables such as income, occupation, age at marriage, number of children, and condition of housing. The disadvantage of being black in general leads to disadvantage on each of these variables. If these associated disadvantages are causes of lower rates of marital stability, then controls for the mentioned variables

should reduce the size of the relationship between race and instability.

3. *Location.* The larger the city or metropolitan area in population the higher its rates of marital instability. In rural areas farmers are more stable than non-farm residents. Since the statistics are based on place of residence of broken and intact families, there is again some possibility of movement to cities to seek improvements in level of living among women and their families who have separated from their husbands. While perhaps unlikely, this possibility can be checked at least for short term changes (1-2 years after separation) with the national Panel Study data.

Location has many possible meanings, but one which sociologists frequently mention is the more impersonal, segmental and anomic (normless) existence faced by urban dwellers, and the lower level of social support and control this produces. The panel study asked questions on several kinds of social contacts (e.g., neighbors known, relatives nearby, church attendance) which should be instrumental in bringing about such support and control.

Church attendance is moderately related to instability in all subgroups, especially among the poor, whereas knowing neighbors by name is only related among the poor and those with moderately long marriages before 1968 (10-19 years). Having relatives nearby is no aid to marital cohesion except among the poor. Likewise club attendance benefits only the poor and so the above social supports seem to affect marital stability principally among the poor.

Another possible correlate of urban location is level of ambition. At least compared to those who stay in rural areas, young men who move to cities have been found to be more aspiring. This ambition may also interfere with the fulfillment of family responsibilities, perhaps more so among men who are less successful. The distribution of ambition among locations and migrants to urban areas and the relation of ambition to marital instability is then another area of interest. The ambition index did not produce a very strong relationship to separation and divorce, although an index of ambition-by-income showed that low income highly ambitious men were especially vulnerable to marital instability. Further analysis remains to be done.

Results to Date

In the cross-tabulations to date, two factors stand out as the strongest predictors of separation and divorce. They are the head and family's income and the quality of housing. The latter is an index including type of housing (living in a detached single family dwelling is also highly related by itself), home ownership, value of home, obvious defects, crowding, type of housing in the immediate neighborhood, and distance to nearest city. The quality of housing

does not seem to be a simple reflection of income since the income control did not reduce the original relationships. Consequently, a Multiple Classification Analysis is being run on various components of the index plus other fairly strong predictors including family income, the poverty index, race, number of children, and time since marriage. This should make clear which components of the housing index are most important in producing the effect.

A second MCA is being run on 12 of the strongest predictors. They are the housing index, head's income, occupation, weeks worked, the poverty index, race, number of children, premarital births, age of youngest child, head's age when wed, time since marriage, and distance from home to the nearest city.

When the results of these regression programs are fully analyzed it should be possible to say much more about the relative contributions of socioeconomic status, race, and location to the occurence of separation and divorce. It may also be productive to repeat the regression analyses for blacks and the poor to see if different variables are more potent for them. A full report on the study should be ready in the next few months.

POVERTY AND FAMILY WELL-BEING

Albert J. McQueen
Oberlin College

Oliver C. Moles, Jr.
National Institute of Education

The well-being and overall quality of life of families are functions, in the first instance, of economic position. Limitations on the potential well-being of poor and near-poor families -- the subject of this study -- result from the fact that they are subject to economic deprivations and crises and meager resources for achieving even moderately elevated standards of living they may aspire to, let alone those enjoyed by the more affluent segments of the population. Often poor families must endure for long periods in such dire financial straits that their styles of life become geared to a bare subsistence existence and a sense of hopelessness for affecting significant improvements. Near-poor families generally have "surplus" resources above their basic subsistence needs and thus are in a position to reach higher standards of living than poor families.

Yet the financial level of families, while the primary determinant, is not the sole cause of family well-being. Secondary determinants involve personal, family, and community factors. Persons bring different values, experiences, competencies, and goals to the challenges of acquiring and managing family

resources and of coping with the daily exigencies of living in poverty or on its fringes. Also family variables such as size and composition, social assets (e.g., extensiveness of kinship and friendship networks), and ecological location will have major bearing on the nature of problems families must contend with and the stragegies readily available to them for doing so. The type and size of community are factors which determine the nature of major social and economic constraints and options guiding family actions. Thus, at a given level of poverty or near-poverty, families will tend to be arrayed along a continuum of well-being from those who under-utilize their resources and only attain low levels of family living to the ones who manage to achieve higher standards of living than their resources would seem to support. This means that although near-poor families would on the average have higher standards of living than poor families, some of the latter may be much better managed than some of the near-poor ones and thus surpass them in general family well-being. Consequently, we may expect some overlap in well-being between families located at different economic levels within a limited range.

This study focuses on differential family circumstances and behaviors that may affect well-being among poor and near-poor families. It assumes that family members individually and collectively devise strategies for acquiring and using resources for family needs and that these coping strategies yield different outcomes in terms of family well-being and quality of life. By dwelling upon family responses to poverty, we do not concern ourselves with the nature of poverty as a *social fact* of American society. This would involve an analysis of the social structure of inequality in order to reveal how the phenomenon of poverty is generated and sustained in the major economic, political, and social institutional spheres. In contrast, the present study begins with poverty as a social fact and endeavors to understand the internal processes by which families cope with poverty and their patterns of accomodation to it as well as movement out of it. The resulting knowledge, while it would not indicate ways of eliminating poverty *per se*, could have important value for formulating ameliorative policies and programs pertinent to the problems and capabilities of identifiable *types* of poor families. As an example, the analysis might suggest that an income maintenance program alone may prove sufficient to significantly improve the quality of life of some poor families and perhaps even help boost them out of poverty, while other families might benefit little from financial subsidies unless additional social services and guidances were available to them.

The unit of analysis in this study is the nuclear family. Extended and other forms of augmented families will be examined functionally as aspects of

family composition. The sample will include those poor and near-poor black and white families in the Family Income Dynamics study whose heads were under 65 years of age in 1968. The age limitation is made to eliminate any special effects of retirement.

One of our main interests is in comparing black and white families who are similarly situated with regard to poverty to see if they are different in well-being and to identify probable coping strategies and other social factors that might account for any observed differences. A history of racism has produced well-known white advantages over blacks in many areas -- occupations, employment, income, housing, etc. Our concern is to determine if such advantages are evident at the level of family living standards, even controlling for poverty level.

The two scales necessary for the basic classification of families are to determine poverty and near-poverty levels and family well-being. The measurement of the former has been incorporated into the coding scheme of the study in the form of the "Orshansky ratio" of the total annual family money income to annual family needs. The second scale is more complicated.

The notion of family well-being implies the existence of assets and access to resources sufficient to allow families to live in some favorable relationship both to living standards valued in the society at large and to family values and aspirations. A comprehensive measure of family well-being would incorporate a variety of family measures along at least three dimensions: the material, social, and social psychological. Since much of the data needed to construct such a composite scale are not available in the study, a more modest approach involving certain material assets has been taken. It is to devise a scale of relatively strong indicators of the overall well-being of families. After a preliminary examination of certain data, we have identified three sets of variables that seem to be the best indicators of family well-being in the study: housing quality (home ownership, average value per room, ratio of actual to required number of rooms in terms of family composition, extent of visual defects in the house), whether the family has savings, and whether the family is covered by some form of medical insurance. The assumption is that the ability of poor and near-poor families to achieve a good quality of housing (especially with ownership), to put some money aside for protection against future crises or to acquire other assets and to maintain insurance against health hazards are all indices of generally effective management of resources for family purposes that will tend to reflect a general state of family well-being.

Differential patterns of well-being among poor and near-poor families will constitute, for this study, the dependent variables, the problematic phenomena to

be explained. In the analysis the two major controls will be poverty level and race.

The independent variables will consist of those background, experiential, and social structural factors that condition the ways family members define social situations embracing their families, options available to them, and probable gains and losses from different lines of action. While the independent variables are major influences and limiting factors upon the level of well-being a family might attain, they are conceptually one step removed in the causal chain from that outcome. Intervening are those attitudinal and behavioral processes -- here labeled "coping strategies" -- by which resources are actually manipulated for family purposes to produce different standards of living. This variable scheme is outlined as follows with a listing of some of the variables that will be used in the analysis:

Dependent variables:	levels of family well-being (controlled on poverty level and race)
Intervening variables:	ambitions and family aspirations, money and real earning acts, economizing behavior, social connectedness for functional information and aid, planning behavior.
Independent variables:	family composition, family life cycle, education and background of head of the household (and spouse), migration patterns and length of residence in the community, characteristics of the community.

Being a five-year panel study, the Family Economics research enables us to undertake both cross-sectional and longitudinal analyses of family adaptations to poverty. These two approaches are based on a conceptualization of family activity in terms of problem-solving tasks involved in continuing efforts to achieve desired levels of family well-being. The numerous family tasks may be subsumed under two broad rubrics of problems: family maintenance and social status.

The family maintenance problems have to do with the day-to-day challenges of adaptation and survival of the family as a viable social unit. They involve tasks of physical maintenance, protection, reproduction, socialization, education, and recreation. Family well-being, as the term has been operationalized here, is concerned only the levels of physical maintenance and protection and related tasks and behaviors for resolving them. The cross-sectional analysis will examine the 1968 sample to delineate salient patterns and dynamics of family adaptation in terms of the foregoing dependent, intervening, and independent variable

schema.

While the family maintenance orientation in the context of poverty is geared largely to dealing with contemporary exigencies of existence, the social status perspective is weighted heavily toward the future. It is concerned very much with maintaining or increasing the varied behavioral assets, personal qualities, possessions, and symbolic, life-style characteristics that affect the family's social ranking in the community and family members' sense of pride and worth. To the extent that persons in poor families effectively work to enhance family well-being, they will often activate processes that are likely to result in elevating the family's social status and increasing their own feelings of worth and esteem. An understanding of such efforts and processes is a major focus of the analysis, for we are interested in the dynamics by which poor families contribute to the maintenance and change in their social positions. Instead of concentrating solely on shifting occupational and income patterns of social mobility, or on changes in poverty status, the analysis will be concerned with changes in relative family well-being during the five years and with the identification of the types of families and coping strategies that are associated with improvements in family well-being and with movements out of poverty.

A MODEL OF HEAD'S INCOME

Lee Rainwater
Department of Sociology
Harvard University

This analysis is designed to replicate and extend path models of income as a consequence of socioeconomic background characteristics which have been developed by Otis Dudley Duncan and his co-workers and by Christopher Jencks and his co-workers. The analysis takes head's five year income as the dependent variable and explores the effects of the following characteristics on income -- minority status (Negro and Spanish origins), growing up in rural or urban areas, father's socioeconomic characteristics (occupation, education, whether well or poorly off), present location (size of community, distance from metropolitan area, unskilled male wage rate), head's education, head's occupational characteristics (occupation, self-employment, union membership, ownership interest in a corporation), hours worked (including the effects of unemployment and sickness independent of hours worked), and other characteristics (marital status, veteran or not, health conditions).

The model of the influence of these characteristics on income that is being tested is a multiplicative rather than a linear model. Income is specified as the product of high or low income producing characteristics rather than as the sum of such characteristics. The analysis has been carried out using two different kinds of specifications of the independent variables. In one specification the independent variables are entered as continuous variables (e.g., years of education). In a second specification, a dummy variable regression analysis is carried out so that the coefficients associated with each background characteristic (e.g., college graduate, father a manual worker, more than 750 hours of unemployment in five years) can be determined. The first phase of the investigation will be completed in January, 1974.

TRANSITIONS FROM AND TO SINGLE PARENT FAMILIES

Lee Rainwater
Martin Rein

Department of Sociology
Harvard University

This study, which is just beginning, is designed to investigate correlates and consequences of single parenthood -- that is, families headed by a mother or a father. The study will focus in particular on events associated with the transition into or out of single parent status as these come about in connection with separation, divorce, remarriage, and other changes in family composition. Among the factors to be examined, both as causes and consequences, are family income, women's labor force participation, sources of income, family size, etc.

No data for completion of these studies has yet been set.

INTERGENERATIONAL TRANSMISSION OF INEQUALITY

John Akin
Department of Economics
University of North Carolina-Chapel Hill
(formerly at Institute for Research on Poverty, Wisconsin)

Irwin Garfinkel
Department of Social Work, University of Wisconsin

The intergenerational transmission of inequality and the effect of differences in per pupil school expenditures on wage rates and earnings of prime-aged males will be examined, and expanded to females if the initial results look

promising. The direct and indirect effects of the quantity and quality of school and of family inputs on earnings will be estimated taking into account those variables which measure attitudes, values, and abilities in an attempt to determine the relationship(s) between them and increases in earnings.

HEALTH AND LABOR SUPPLY

David Elesh
Sociology, University of Wisconsin
Jack Lefcowitz
Social Work, University of Wisconsin

The Panel data will be used to address two questions: 1) what are the effects of variations in the persistence of illness on labor supply, 2) what effects does the illness of the household head have on the labor supply of other household members, as part of a two-year project on health and labor supply which will be based for the most part on National Health Survey tapes.

ESTIMATION OF LABOR SUPPLY RESPONSE OF FAMILIES TO THE ENACTMENT OF INCOME MAINTENANCE PROGRAMS

Irwin Garfinkel
Social Work, University of Wisconsin
Stanley Masters
Economics, University of Notre Dame
(Institute for Research on Poverty, University of Wisconsin)

The labor supply response of families to the enactment of income maintenance programs is being estimated. Using data from the Survey of Economic Opportunity and the SRC-OEO Income Dynamics Panel, the authors are estimating labor supply responses using Multiple Regression Analysis for various subgroups of the total adult population. For each subgroup, at least four dependent variables are being used: 1) a dummy for labor force participation and, for beneficiaries of an income maintenance program, the amount of time in the labor force as measured by 2) weeks per year, 3) hours per week, and 4) hours per year. One advantage of the Panel data is that it enables us to look at time actually on the job while other data sources only measure time employed (which includes vacations and sick leave). The Panel data are also particularly useful because they contain several measures of "economic ambitiousness." Measures of this variable are not available in any other survey which is amenable to a labor-supply study. Since ambition is likely to lead simultaneously to higher nonemployment income (NEY),

higher wage rates (WR), and higher labor supply, the omission of an ambition variable from past labor-supply regressions are likely to lead to positive biases in the NEY and WR coefficients. One objective of this research is to test the sensitivity of the WR and NEW coefficients to the inclusion of an ambition variable.

BETTER MEASURES OF ECONOMIC STATUS

Robert E. Haveman
Department of Economics; Director, Institute for Research on Poverty
University of Wisconsin

Irwin Garfinkel
Social Work, University of Wisconsin

An attempt is being made to define a more comprehensive measure of the economic status of a family (called net earnings capacity) and to estimate this value for a national sample of families. With this measure substituted for current family income, revised estimates of economic inequality can be made, as can an alternative definition of poverty and of the composition of the poverty population. Comparable sets of earnings capacity estimates are being developed from 1971 Current Population Survey and Panel study data.

JOB SHIFTS AND GROWTH IN EARNINGS

Aage B. Sorensen
Sociology, University of Wisconsin

An analysis of job shifts as a function of individual background and earnings, and employment levels in county of residence. Relation between intention to shift and actual shifts are of major interest. The analysis is carried out, separately for blacks and whites. This research forms the basis of Sarah Fuerst's master's thesis, under the author's supervision. A discussion paper on the project should be available in March, 1974.

The second project is an extension of the above. This is an analysis of growth in earnings over the five-year period covered by the Panel, with special emphasis on determining how job opportunities (as determined by employment levels) affect growth in earnings and returns on individual background characteristics such as education. A report should be available in the late spring next year.

MIGRATION: A LONGITUDINAL ANALYSIS OF ECONOMIC AND NONECONOMIC DETERMINANTS AND THE PRIVATE ECONOMIC BENEFITS

Wesley C. Weidemann
Agricultural Economics, University of Wisconsin

D. Lee Bawden
Economics, Agricultural Economics, University of Wisconsin

The objectives of this study are 1) to find characteristics of individuals which predispose them to migrate, 2) to determine private economic gains and losses resulting from migration, and 3) to assess the effect of psychic cost on migration. The head of household was selected as the unit of analysis.

The impact of characteristics of individuals upon subsequent migration behavior was determined through multiple regression analysis. Relative impact of various characteristics was determined by comparison of regression coefficients.

Parallel cross-sectional and longitudinal analyses were made of the effects of migration on income. Comparison of the results leads to the conclusion that cross-sectional analysis is more likely to be biased by variables which have been omitted from the equation. In some cases longitudinal analysis reversed conclusions drawn from cross-sectional analysis. Gains and losses associated with migration are compared for various groups.

The measure of psychic cost analyzed was not found to have a significant influence on migration.

Work in progress involves refinement of economic gains and losses accruing to various groups. Propensities to migrate of various groups are being compared to migration gains and losses for these same groups.

OTHER ANALYSIS

A series of working papers has been produced by the project staff, some of which have been published elsewhere and some superseded by later work. A list of those still relevant and available at the Survey Research Center follows:

1. "Measures of Economic Well-Offness and Their Correlates," published in American Economic Review, May 1969 by Morgan and Smith.
3. "Estimates of Individual Labor Supply Based on a Cobb-Douglas Utility Function" by Jonathan Dickinson, April 1970.
4. "Variability of Economic Well-Being and Its Determinants" - published in American Economic Review, May 1970 - by Morgan and Smith.

6. "Transportation of the Poor" by Jacob Benus, July 1970.

9. "A Description of Eight Categories of the Poor" by John B. Lansing and Katherine Dickinson, August 1970.

10. "Consumption Patterns of the Poor" by John B. Lansing and Katherine Dickinson, August 1970.

11. "A Comparison of the Census and Survey Research Center Measures of Poverty Levels, on the Same Set of Data" (with supplement by Morgan and Benus) by James N. Morgan, Beverly Harris, and Tecla Loup, January 1971.

12. "Two Notes on Earnings Differentials by Sex and Race" by James N. Morgan and Tecla Loup, January 1971.

14. "Local Data" by Jacob Benus (a note on our sources of environmental information), February 1971.

15. "Housing: The Relation of Quantity to Quality (cost to number of rooms) and the Relation of Housing Consumption (costs) to Income" by James N. Morgan, February 1971.

16. "An Overview of Three-Year Changes in Attitudes, Behavior, and Status" by James N. Morgan and Richard E. Barfield, February 1971.

17. "Labor Force Participation of Wives: The Effects of Components of Husbands' Income" by Katherine Dickinson and Jonathan Dickinson, June 1971; published in Mandell and others, Surveys of Consumers, 1971-72, Institute for Social Research, Ann Arbor, Michigan, 1973.

18. "Trends in Inter-Family Transfers" by Nancy A. Baerwaldt and James N. Morgan, March 1972; published in Mandell and others, Surveys of Consumers, 1971-72, Institute for Social Research, Ann Arbor, Michigan, 1973.

19. "Income and Welfare of the Aged" by James N. Morgan, January 1972.

20. "The Retirement Process in the United States" by James N. Morgan, February 1972; paper for Ninth International Congress of Gerontology, Kiev, July 1972.

21. "The Distribution of the Poor" by James N. Morgan, February 1972.

22. "An Initial Search for Any Attitudes or Behavior Patterns that Seem to Lead to Improvement in Economic Well-Being" by James N. Morgan, March 1972.

23. "Birth Control and Economic Well-Being" by James D. Smith, April 1972; published in B. Strumpel, Morgan, and Zahn, Human Behavior in Economic Affairs, Elsevier, Amsterdam, 1972.

24. "Some Illustrative Sampling Errors for the Four-Wave Data Set from the OEO Panel Study of Family Income Dynamics" by staff, May 1972.

25. "Change in Family Composition as a Behavior to be Explained" by James N. Morgan, June 1972.

26. "Static and Dynamic Responses of Food Consumption to Income" by Jacob Benus, June 1972.

27. "Investigation of the Attitudinal and Behavioral Indexes" by Katherine Dickinson, July 1972.

28. "Time Period, Unit of Analysis and Income Concept in the Analysis of Income Distribution" by Jacob Benus and James Morgan, September 1972.

29. "Income Instability as a Dimension of Welfare" by Jacob Benus and James Morgan, September 1972; published in Proceedings of the Social Statistics Section, American Statistical Association, 1972.

30. "Division of the Family Economics Household Sample Into Four Independent Subsamples" by Irene Hess, January 1973.

Staff members of the Research and Plans Division of the Office of Economic Opportunity produced some working papers, two of which deal with transitions into and out of poverty, and the results of considering longer periods: Jonathan P. Lane, "One Year vs. Four Perspectives in Counting Low Income Families," May 1972; Lester Klein, "A Partitioning Algorithm for Studying Income Dynamics," 1972.

In addition, two papers by staff members of the Wisconsin Institute for Research on Poverty are or will be available: Thad W. Mirer, "The Distributional Impact of the 1970 Recession," Review of Economics and Statistics, 60 (May, 1973), 214-224; and Geoffrey Carliner, "Income Elasticity of Housing Demand," Review of Economics and Statistics (forthcoming).

One dissertation at the University of Michigan will be published in 1974, using some of the panel data: Boone Turchi, The Demand for Children: An Economic Analysis of Fertility in the United States, Ballinger Publishing Co., Cambridge, Mass., 1974.

Two dissertations at Pennsylvania State University have been finished: Winston Phillips, A Method of Estimating Comparative Returns to Commercial Farm Operator Labor and Management, June 1971; and Gerald E. Plato, Effects of Selected Disadvantaging Characteristics on the Hourly Earnings and Labor Force Participation of Household Heads, December 1973.

The Urban Institute has been using the data to improve the behavioral parameters in its simulation models, in the explanation of wage rates, labor force participation, hours of work, unemployment, and occupational choice. Many of the details can be found in: Guy Orcutt, Steven Caldwell, Gary Hendricks, Gerald Peabody, and Richard Wertheimer, Macroanalytic Simulation of American Family Behavior: A Tool for Policy Analysis, Working Paper 509-5, Urban Institute, August 1973 (to be published). See also: Richard F. Wertheimer, "Labor Market Activity in a Microsimulation Model: First Report," in Proceedings of the

Business and Economic Statistics Section, American Statistical Association, 1972 (pp 486-491).

Finally, a dissertation in the Department of Agricultural Economics at the University of Wisconsin has been completed by Wesley C. Weidemann: Migration: A Longitudinal Analysis of Economic and Noneconomic Determinants and the Private Economic Benefits, 1973.

INDEX