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AN ECONOMETRIC ANALYSIS OF MICHIGAN'S WELFARE CASELOAD, 1968-71

By

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ABSTRACT

AN ECONOMETRIC ANALYSIS OF MICHIGAN'S WELFARE CASELOAD, 1968-71

By

Aydın Ulusan

The rapid increase in welfare rolls over the past few years has resulted in an increased recognition of the need for an explanation of the size and composition of this sector of the economy. This dissertation examines public assistance, the alternatives to receiving public assistance, and the factors affecting the individual's choice among the available alternatives.

The number of people choosing welfare over other alternatives, as well as those choosing to leave public assistance, determine the size of welfare rolls at any given point in time. Thus, time-series data are utilized in estimating equations on new recipients to and terminations from Michigan's Aid to Families with Dependent Children (AFDC) and General Assistance (GA) programs. Although past and present labor market conditions as well as benefit levels seem to affect the decisions of individuals in any given month, neither the direction nor the magnitude of their impacts are consistent across subgroups of the welfare population that are examined.

To test the effects of some demographic characteristics on the probability of a recipient's employment, cross-section survey data on AFDC recipients are used in estimating a Logit Model. The results indicate that factors such as race, education, presence of pre-school children, and living in model cities neighborhoods affect the choices open to AFDC recipients.

Finally, a Logistic Growth Model is estimated by using time-series data on female-headed AFDC families. It is seen that this model can be used with an acceptable degree of confidence for predicting caseloads and the associated program costs.

To my father, Aziz Ulusan

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CHAPTER I

PURPOSE AND ORGANIZATION

The size and composition of welfare rolls has been the cause of growing concern to legislators, social scientists, and taxpayers alike. Although some heuristic explanations have been offered, they are of limited value in either forecasting or providing useful guidelines for welfare policy. In this dissertation, the alternatives to receiving public assistance and the factors affecting the individual's choice between them will be examined.

The number of people choosing welfare over other alternatives, as well as those choosing to leave public assistance, determine the size of welfare rolls. The alternatives and the factors causing individuals to make decisions are represented by the flow diagram in Chapter II.[1] The flows of people in and out of welfare and the flows of information upon which decisions are based are presented with the intention of delineating the broader decisions implicit in micro models of consumer choice.

Chapter III develops an econometric model of people entering and leaving welfare rolls. The importance of present as well as past labor market conditions on the decision to choose welfare is incorporated into this empirical model by the use of a distributed lag structure. Using time-series data, the model is estimated and tested. Although labor market conditions and benefit levels are seen to affect the decision of individuals, neither the direction nor the magnitude of their impacts are consistent across sub-groups of the welfare population that are examined.[2]

The alternative to the welfare system that is of particular interest is the labor market; indeed, a major objective of the 1967 Social Security Amendments was to assure that recipients ". . .enter the labor force and accept employment so that they will become self-sufficient."[3] Unfortunately for a large number of welfare recipients, the attainment of self-sufficiency as measured by their termination from the caseload has not followed the acquisition of employment. Rather, the effect of the 1967 Amendments has been to increase the number of persons who are simultaneously employed and receiving welfare.[4] This is a necessary consequence of the higher break even points incorporated in the welfare reforms.[5] As the number of people falling into this category are not accounted for by data on terminations or incoming recipients, the empirical model presented in Chapter III cannot analyze their decision to combine both labor market activity and welfare status. In order to provide insight into the factors affecting the probability of an Aid to Families with Dependent Children

(AFDC) recipient's employment, survey data are used in estimating a "Logit Model" in Chapter IV. This specification overcomes some of the statistical problems resulting from the use of a dichotomous dependent variable. The results indicate that demographic characteristics such as race, education, presence of pre-school children, and living in model cities neighborhoods affects the choices open to AFDC recipients.

The rapid increase in the number of welfare recipients over the past few highly prosperous years has generated concern and frustration. Although the number of persons receiving AFDC in Michigan declined slightly during the 1950's, it increased by 143 percent in the next decade and has nearly doubled in the last three years. AFDC (nearly 70 percent of the total welfare population in December 1972) is the largest category of public assistance in Michigan. Moreover in the past 15 years, it has shown the most dramatic increases of any welfare program in the state. These statistics do not give the whole picture however. A closer look reveals that it is the AFDC-R (female-headed) category in particular that exhibits this trend. Given these facts, the importance of an accurate predictive model of flows coming into the AFDC-R category becomes obvious. Based on the assumption that many non-quantifiable occurances have been instrumental in the accelerated growth rate of this category of public assistance, Chapter V presents a modified "Logistic Growth Model" for, essentially, predictive purposes. Time series data are used in the estimation of this model and the results indicate that it can be used with an acceptable degree of confidence for predicting caseloads and their implied costs to the state.

The final chapter is devoted to a summary of findings and some conclusions.

FOOTNOTES TO CHAPTER I

[1]See Figure 2.1 below, p. 9.

[2]The welfare categories included in our analysis are Aid to Families with Dependent Children (AFDC), and General Assistance (GA). AFDC is a federal program established to provide assistance to children who are deprived of parental support or care by the death, continued absence from the home, or physical or mental incapacity of a parent, or by the unemployment of the father. Hereafter, those cases where the father is present will be called AFDC-U, Aid to Families with Dependent Children-Unemployed Father, and those cases where only the mother is present AFDC-R, Aid to Families with Dependent Children-Regular. Whenever a reference to the combined group is made, i.e., AFDC-U and AFDC-R, it will be denoted as AFDC. GA is a non-federal program administered by the county departments of social services. It provides assistance to persons where needs are not met by other programs or their own resources. These two programs, AFDC and GA, are the only ones that are significantly affected by labor market conditions, and employment-related welfare policy changes, and are therefore most amenable to the kind of analysis we wish to undertake.

[3]Social Security Amendments of 1967, Sec. 201 (C)(A), P.L. 90-248, January 2, 1968.

[4]See Vernon K. Smith and Aydin Ulusan, The Employment of AFDC Recipients in Michigan, Studies in Welfare Policy, Publication 163 (Lansing: Michigan Department of Social Services, 1972).

[5]The breakeven level is the point under a negative income tax scheme where the tax on earnings equals the income guarantee and is thus the point at which an individual's earnings would push him off of welfare.

CHAPTER II

AN ANALYSIS OF CASELOAD TURNOVER

Introduction

In this chapter, flows of people in and out of certain welfare-related components of the economy are traced. These flows depend on decisions about the relative value of alternative courses of action and on information about those alternatives. The conceptual model to be presented is not proposed as an alternative to the static micro models of consumer choice; it delineates the broader choices implicit in them.

The flows of people coming into Michigan's AFDC-R, AFDC-U, and GA programs and the flows of people terminating from these programs are focused upon in our analysis. Besides comprising a very large proportion of the total welfare population, these categories are probably the only ones that are significantly affected by factors to be presented below. These three categories will be analyzed jointly or separately depending upon the aspect of the problem under scrutiny and the availability of data.

The information influencing decisions consists of data on labor market conditions, expected wages, welfare benefit levels, and costs and returns implicit in the choice of one alternative over others. There also exist other factors such as changes in the rights of individuals to receive public assistance, socio-economic and demographic changes, revisions of welfare policy, and shifts in attitudes and tastes with respect to public assistance. The broader scope of our model also enables us to incorporate a degree of "dynamism," inherent in the response to flows of this information, not possible within the static framework of consumer choice models. The use of subscripted variables are imporant since some flows of information may lag behind events; the perception of relative opportunities, for example, is based on past as well as present events, as shown by the profound influence of the work history of AFDC women on their choices between work and welfare.[1]

Similarly the dissemination of information is a dynamic phenomenon resulting in an ever-widening response as it becomes available to more and more people. The flood of information, in the form of simplified welfare manuals, which became available to slum and ghetto dwellers in the 1960's is a good example of this. Such evidence is provided by a study which summarizes the impact as follows:

> From September of 1965 to September of 1966. . .[the] AFDC caseload in [a particular anti-poverty] area grew by 36.6 percent; the total city AFDC caseload, during the same period, increased by only 8.6 percent. . . .All the [anti-poverty] agency did. . .was to make people aware of the availability of AFDC [and] to stimulate the use of (it).[2]

We shall now set up the conceptual model, and relate the behavioral models found in the literature to its components.

A Model of Flows To and From the "Welfare Sector"

We have employed what might be termed a "systems-science" approach to model building. Flows of people and information are represented by the solid and broken lines respectively in Figure 2.1. Each module will be defined, then the bahavioral assumtpions about the people within them will be explained. The population whose behavior is described by this diagram is assumed to be stationary.

Module 1

This represents the caseload in the previous period (t-1) for the particular category of public assistance under examination. Included are both recipient's who are not employed, and those who are employed and receiving welfare benefits simultaneously (the latter being represented by the shaded region). There are three alternatives to choose from for both groups. Group 1, the unemployed recipients, can

(i) stay on welfare and remain unemployed,

(ii) stay on welfare but become employed, or

(iii) leave welfare.

Group 2, those who are employed recipients, can

(i) stay on welfare and remain employed,

(ii) stay on welfare but become unemployed, or

(iii) leave welfare.

If alternatives (i) or (ii) are chosen by either group it means a flow into Module 2, the caseload in period (t).

FLOWS BETWEEN THE LABOR MARKET AND WELFARE SECTORS

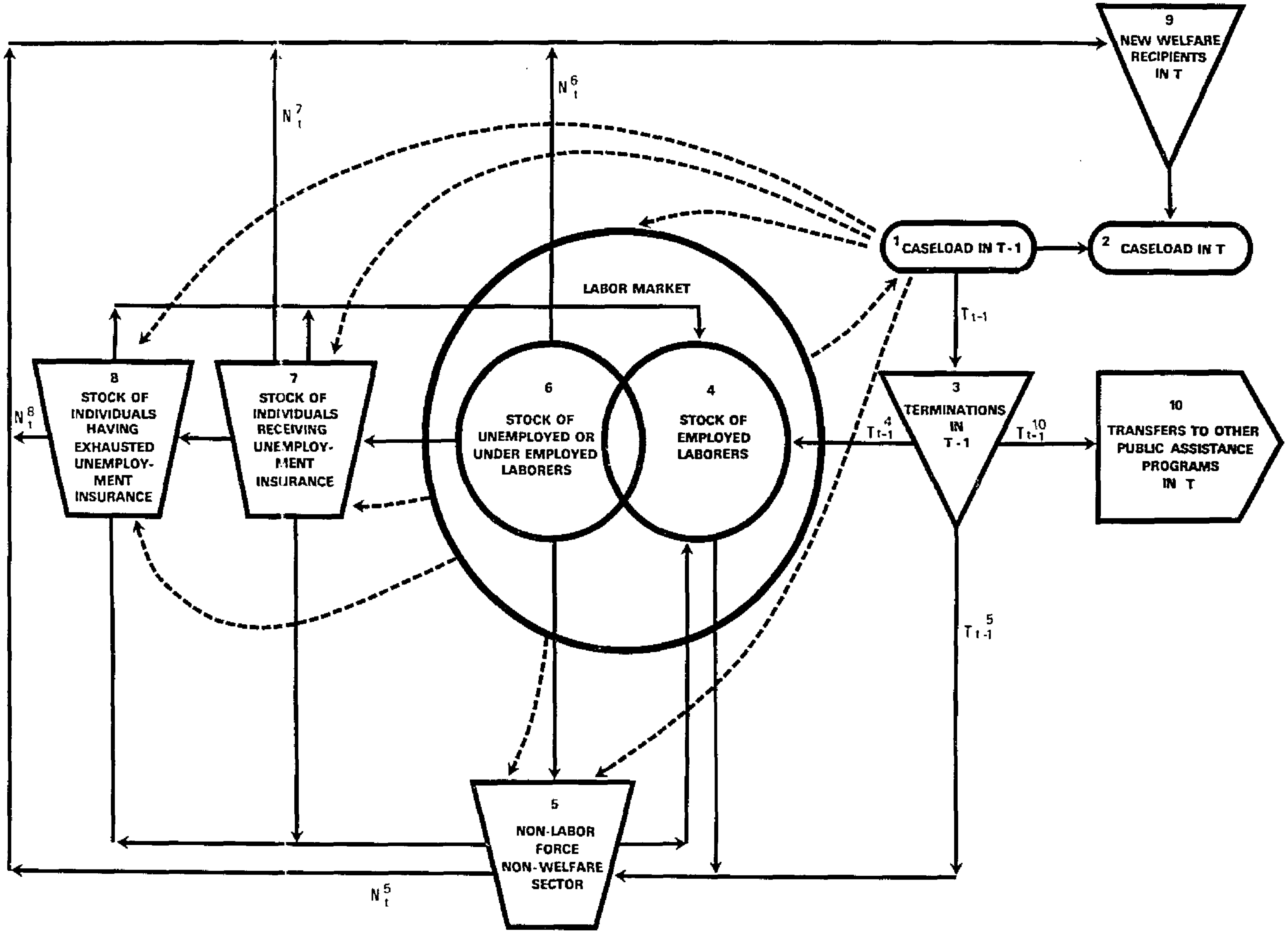

FIGURE 21

If, however, the decision to leave welfare is made (alternative (iii) for both groups) then a flow through the node represented by module 3, terminations is period (t-1), results.

Module 2

The caseload in period (t) is represented by this component, and needs no further elaboration as it is identical to module 1 with respect to composition and alternatives.

Module 3

Termination from welfare in period (t-1) is represented by this module. Although it is not a component comprising a stock of people faced with alternatives, it can be considered a "summation operator" on flows coming out of the welfare sector or a node through which people flow. That is to say it represents the sum of recipients who have decided to terminate and flow into

(i) Module 4: the stock of employed laborers

(ii) Module 5: the non-welfare, non-labor market sector, or

(iii) Module 10: other public assistance programs.[3]

Module 4

This represents the stock of employed laborers. However, it intersects the other component of the overall labor market, the stock of unemployed or underemployed laborers. As with modules 1 and 2, the status of employment is differentiated by shading the appropriate area. The region of module 4 that does not intersect with module 6 is comprised of people who have two choices open to them

(i) continuing their employment, or

(ii) leaving the labor force.

Those who chose to leave the labor force flow into module 5, the non-labor force non-welfare sector. Retired people, women getting married, and young people continuing their education would be good examples.

The area that intersects module 6 represents the underemployed and low-wage earners, and the choices open to them will be discussed in defining module 6.

Module 5

The group of people who are neither on welfare nor in the labor market makes up module 5. A mother now deserted by her husband, people supported by relatives, retirees living off their pensions, and students are examples of members of this group. The alternatives they can choose from are

(i) remaining in this group,

(ii) joining the labor force, or

(iii) becoming a welfare recipient.

Alternative (ii) implies a flow into module 4, and alternative (iii) a flow into module 9.

Module 6

The low-wage employment market, the underemployed, and unemployed individuals seeking jobs make up this component of the model. The alternatives facing this group are

(i) remaining in the labor market which implies staying in module 6 or flowing into module 4,

(ii) moving into the non-labor force, non-labor market sector, i.e., module 5,

(iii) receiving unemployment insurance, which means a flow into module 7, or

(iv) becoming a welfare recipient and flowing into module 9.

Module 7

The stock of individuals receiving unemployment insurance is represented by module 7. This group can choose between

(i) remaining in this component until they exhaust their benefits and then flow into module 8,

(ii) getting back into the labor force, i.e., going into module 4,

(iii) flowing into module 5, the non-labor force non-welfare sector, or

(iv) becoming a welfare recipient and flowing into module 9.[4]

Module 8

The flow of people from module 7, the stock of individuals receiving unemployment insurance, replenishes the stock of individuals having exhausted such benefits, and is represented by module 8. It is really a node like module 3 (thought as a summation operator) and members are expected to be in passage to the following alternatives:

(i) going back into the labor force,

(ii) going into the non-labor force non-welfare sector, or

(iii) receiving public assistance.

Alternative (i) results in a flow into module 4, (ii) in a flow into module 5, and (iii) in a flow into module 9.

Module 9

As with module 3, this component of the model is a "summation operator." It represents the total flow coming into the welfare sector, i.e., the sum of new welfare recipients in period (t), coming from modules 5, 6, 7, and 8.

Module 10

Module 10 is included for accounting reasons and represents transfers to other public assistance programs from GA. The choices available to this group need not be dwelt upon as they are incorporated into the caseload of other categories represented by module 2.

The definition of each component of the conceptual model, the flows of people among the components (solid lines), and the factors affecting their decisions, presented as information flows (broken lines), can be summarized in the following way.

Denoting the stock of new public assistance recipients in period (t) by N_t, we can write

$$N_t = \sum_j N_t^j \; ; \; j = 5,6,7,8, \qquad (2.1)$$

where N_t^5 = inflow from the "non-welfare, non-labor market sector" in period t,

N_t^6 = inflow from the "stock of unemployed and underemployed" in period t,

N_t^7 = inflow from the "stock receiving unemployment benefits" in period t, and

N_t^8 = inflow from the "stock having exhausted unemployment benefits" in period t.

Termination from welfare in period (t) are denoted by T_t, and can be summarized as

$$T_t = \sum_i T_t^i \; ; \; i = 4,5,10, \qquad (2.2)$$

T_t^4 = outflow going into the labor force in period t,

T_t^5 = outflow going into the "non-welfare, non-labor market sector" in period t, and

T_t^{10} = outflow going into other public assistance programs in period t.

We can now represent the caseload in period (t) as follows:[5]

$$C_t = C_{t-1} - \sum_i T^i_{t-1} + \sum_j N^j_t \;;\; \begin{matrix} i = 4,5,10, \\ j = 5,6,7,8, \end{matrix} \qquad (2.3)$$

where

$$T^i_t = f_i(x_{1t}, x_{2t}, \ldots, x_{nt}, \varepsilon_t);\; i = 4,5,10, \qquad (2.4)$$

$$N^j_t = g_j(x_{1t}, x_{2t}, \ldots, x_{nt}, \zeta_t);\; j = 5,6,7,8, \qquad (2.5)$$

x_t = a vector of variables representing the information flows, or factors affecting choices of leaving or entering the welfare sector,[6] and

ε_t, ζ_t = random variables representing unaccountable or unmeasurable information flows or factors affecting the decision process in period t.

The task ahead of us is to define the x vector explicitly so that empirical evidence can be brought to bear on the question of caseload size.

Behavioral Considerations

Individuals in the modules face alternatives among which they must choose. Assuming that they are rational, the choices made must result in what the decision makers feel is a better state of affairs. Let us say they have a preference function $u(z_1, z_2, \ldots, z_n)$, the arguments of which are the alternatives they can choose from. There are, however, constraints on these alternatives. This can formally be stated as follows:

$$\max.\ u(Z); \quad Z = [z_i]; \quad i = 1,2,\ldots,n, \qquad (2.6)$$

$$\text{S.T.}^{7} \quad g^j(Z) = 0; \qquad j = 1,2,\ldots,m. \qquad (2.7)$$

That is, the individual must combine the n alternatives in such a way that the m constraints are satisfied and his preference function is maximized.[8]

The remainder of this section will be devoted to a discussion of the elements of the Z vector, the alternatives, and the constraints placed upon them.

Generally the elements of the Z vector are goods and services, the consumption of which provide utility or satisfaction to the consumer. However, if it is assumed that various goods and services are purchased in fixed proportions at constant prices, then income can be treated as generalized purchasing power. Thus, a consumer's satisfaction can be said to depend on income, Y, and leisure, L, i.e.,

$$U = u(Y,L). \qquad (2.8)$$

The wage rate, w, and the amount of time worked, (24-L), put limits on the income that can be earned; therefore, the constraint on income is

$$Y = w(24-L). \qquad (2.9)$$

Studies of the economics of public assistance have almost exclusively used the above model of consumer behavior. Modifications on the income constraint (2.9) are the only things differentiating these products.

The pioneering application is that of Brehm and Saving[9] who suggest the following qualifications:

(a) a consumer who chooses to be on general assistance must either specialize in leisure or must earn less than some minimum income, Y^g, deemed necessary by the state.

(b) if there is a stigma attached to being on welfare the grant that the consumer receives should be discounted by some factor k, where $o \leq k \leq 1$.[10]

The existence of a welfare grant, Y^g, and the discount rate, k, requires the construction of a new income constraint beginning at the point where the consumer specializes in leisure and receives the stigma discounted welfare income, kY^g. As the individual begins to earn money, he views his total income as

$$Y = Y^e + k(Y^g - Y^e), \tag{2.10}$$

where Y is total income, Y^e is earned income, k is the discount rate, and Y^g is the welfare grant. The total income equation can be written as

$$Y = w(24-L) + k[Y^g - w(24-L)] \text{ if } [Y^g - w(24-L)] > 0, \tag{2.11a}$$

and

$$Y = w(24-L) \qquad \text{if } [Y^g - w(24-L)] \leq 0. \qquad (2.11b)$$

where w is the wage rate and L denotes leisure. The increment to the consumer's income for each additional hour of work will depend upon the wage rate w and the stigma discount k, i.e.,

$$\frac{\partial Y}{\partial L} = w(k-1). \qquad (2.12)$$

As $o \leq k \leq 1$ and $w > 0$,

$$\frac{\partial Y}{\partial L} \leq 0 \qquad (2.13)$$

so the higher the wage rate, the higher the stigma attached to being on welfare (a smaller k) and the higher the cost of leisure. In the limiting cases of no stigma (k=1) or no available jobs (w=0), the consumer will specialize in leisure.

Although the concept of a stigma attached to being on welfare is not elaborated upon by Brehm and Saving, Albin and Stein[11] associate it with disutilities imposed upon recipients by welfare departments trying to control the demand for welfare payments by reducing the perceived value of welfare income.

There is another explanation for k implicit in a negative income tax model put forth by Green[12] among others. Prior to the 1967 Social Security amendments all categorial and general public assistance programs had a statutory implicit tax rate of 100 percent on welfare income. That is, the basic grant was reduced by one dollar for each dollar of earnings. After the 1967 reforms, the implicit tax rate was reduced.[13] Green replaced the stigma discount, k, by one minus the tax rate or (1-t) in his more applicable model. His suggestion that a lower penality rate on increased earnings would be less likely to induce a potential relief recipient to give up working altogether has been verified by the increase in the number of persons who are simultaneously employed and receiving welfare since the implementation of the 66 2/3 percent tax rate.[14]

Applying only to female headed AFDC families, AFDC-R in our terminology, the behavioral model put forth by Saks[15] is a departure from the previous modifications of the income-leisure approach. He suggests a different set of arguments for the Z vector as well as a different income constraint and introduces the concept of allocating time between child care provided at home and market-purchased child care. The female head of the potential AFDC family is seen as having the following optimization problem

$$\max.\ U = u(H_m, H_o, L, X), \tag{2.14}$$

$$\text{S.T.}\quad I + P_w(24-H_o-L) = P_X X + P_H H_M, \tag{2.15}$$

where H_m = market-purchased child care,

H_o = hours of child care provided at home,

L = leisure,

X = all other goods and services,

I = unearned income,

P_w = expected wage,

P_x = expected price of all goods and services, and

P_H = expected price of market-purchased child care.

Saks then proceeds with the familiar analysis of consumer behavior to solve for the equilibrium demand for H_m, H_o, L, and X in terms of expected prices and unearned income. Following the negative income tax model, Saks finally ends up with an income constraint of the following form:

$$G + (1-t_I)I+(1-t_w)P_w(24-H_o-L)=P_xX+P_HH_M, \qquad (2.16)$$

where G is the expected basic guaranteed income, t_I is the tax on unearned non-welfare income when someone is on welfare, and t_w is the tax on earnings when one is on welfare. Income, and income compensated substitution effects are calculated, and the work-welfare choice examined.

In pointing out the choices open to individuals in each module of Figure 2.1 we implied that microeconomic models of choice chould be used in analyzing their decisions. As we are concerned with three different categories of public assistance, AFDC-R, AFDC-U, and GA, we shall now see which behavioral models would be best suited for each of these categories and what modifications might be made to make them more applicable.

For analyzing the behavior of AFDC-R recipients, Saks' model is the best suited. However, child care is not as great a consideration as it used to be. The provision of child care services in Michigan has been considerably expanded in the last few years; for example, all WIN[16] program participants are provided with allowances for such services. Thus a more general set of choices among home-produced and purchased goods and services might be appropriate. This is the general solution developed by Gary Becker in his theory of the allocation of time.[17] Thus the AFDC-R recipient's optimization problem would be

$$\text{max.} \quad U = u(X_p, X_H, L), \tag{2.17}$$

$$\text{S.T.} \quad G + (1-t_I)I+(1-t_w)P_w(24-H_x-L)=P_x(X_p) \tag{2.18}$$

$$\text{if } [G-(1-t_I)I-(1-t_w)P_w(24-H_x-L)]>0, \text{ and}$$

$$I+P_w(24-H_x-L) = P_x(X_p)$$

$$\text{if } [G-(1-t_I)I-(1-t_w)P_w(24-H_x-L)]\leq 0,$$

where X_p = purchased goods and services,

X_H = home produced goods and services,

L = leisure

G = welfare grant,

T_I = welfare tax on unearned income[18] (i.e., deductions from grant due to I),

I = unearned, non-grant income,

T_w = welfare tax on earned income[19]

P_w = expected wage,

H_x = hours expended in producing home goods and services, and

P_x = expected price of all market produced goods and services.

Given that there are husbands in the home of AFDC-U, and GA cases, this model may not be as relevant in analyzing their behavior. For them, the income-leisure approach with a modification of the income constraint is more appropriate. Their optimization problem will then be

$$\max. \quad U = u(Y,L) \tag{2.19}$$

$$\text{S.T.} \quad Y = G+(1-t_I)I+(1-t_w)P_w(24-L) \tag{2.20}$$

$$\text{if } [G-(1-t_I)I-(1-t_w)P_w(24-L)]>0, \text{ and}$$

$$Y = P_w(24-L)$$

$$\text{if } [G-(1-t_I)I-(1-t_w)P_w(24-L)]\leq 0,$$

where Y is total income, and the remaining variables are as defined above.

If we assume that receiving public assistance means an increase in the total income of individuals, then the "income effect" will imply an increased consumption of all "normal" goods and services. If leisure is a normal good, its increased consumption results in reduced work effort. On the other hand, the imposition of a tax on earned and unearned income of welfare recipients reduces the price of leisure thereby reinforcing the income effect toward less work effort. However, a stigma associated with receiving welfare would weaken this income effect. Furthermore, going on welfare may be associated with a decrease in total income for some recipients;[20] if this loss is not made up for by the value of increased leisure or the substitution of home produced goods for purchased goods, the implied reduction in work effort might not materialize.

The imposition of additional constraints on the welfare choice such as a social maximum work week, work requirements, and minimum wages reduce the feasible set to such an extent that the optimization problem either becomes overconstrained or, at best, very confusing.[21] However, the applicability of comparative static analysis is thrown into serious doubt when dynamic considerations are brought into light.

If receiving public assistance implies an increase in the total income of individuals, then some dynamic effects may lead to an increased work effort offseting the static effects postulated above. For example, Conlisk[22] suggests that a taste of higher income may lead to a desire for even more income thus increasing the work motivation of recipients. Furthermore, better nutrition and health and investment in the children's education made possible by the increased level of income may result in increased work effort in the short as well as the long-run.[23] Although Saks[24] points out that the deprecia- tion of human capital resulting from the loss of industrial discipline and decay of skills is a possibility which might reduce the expected wage of a recipient, training programs (e.g., WIN) available to welfare recipients would have the opposite long-run effect.

Changes in labor market conditions may also enter the individual's preference function in a dynamic way. Prolonged unemployment leading to a depletion of savings, the exhaustion of unemployment benefits, and a general reduction in expected income would, more than likely, increase the probability of applying for welfare.[25]

The dynamic effects of political, legal, and sociological changes may also undermine the conclusions drawn from the static analysis. Piven and Cloward,[26] in particular, stress this aspect of the problem in explaining the rise in caseloads in the sixties. They hypothesize that the rise in welfare rolls was not just a direct result of economic depriviation inflicted on families as a consequence of agricultural modernization leading to urbanization and chronic urban unemployment. Rather, the removal of traditional restrictions that had kept these people off the rolls in the past has led to the rapid increase in the number of public assistance recipients.

With the emergence of welfare rights as a national issue in the mid-1960's, social workers, lawyers, welfare employees, student activists, church groups, Civil Rights organizations, and the poor themselves began to question previously unchallenged issues and practices. This in turn has led to court rulings and legislative changes which have enabled a great many persons who were previously excluded to become welfare recipients. Piven and Cloward contend that this upsurge in pressure was stimulated by the federal government through its intervention in local welfare arrangements. Specifically:

> --The establishment of new services, both public and private, that offered the poor information about welfare entitlements and the assistance of experts in obtaining benefits.
>
> --The initiation of litigation to challenge a host of local laws and policies that kept people off of welfare rolls.
>
> --The support of new organizations of the poor which informed people of their entitlement to public welfare and mounted pressure on officials to approve their applications for assistance.[27]

However, the Great Society programs had not been designed to increase the welfare rolls; indeed, it was hoped that education and training programs directed at the poor would result in fewer recipients.

The "storefront service center" became the most prevalent welfare rights service in the 1960's. Most were sponsored by the Office of Equal Opportunity's (OEO) "community-action programs" (CAPs) and were staffed by social workers, lawyers, churchmen, students, and the poor themselves. These centers, which acted as advocates of the poor in dealing with local social service departments served hundreds of thousands of poor people. The impact of such services was summarized in a 1969 HEW study:

> A statistically significant relation did exist between CAP (Community Action Program) expenditures and the AFDC poor-rate--the higher the (per capita) expenditure the higher the rate (at which poor families were on the rolls). Although there is no direct evidence, CAP programs may have helped the poor understand their rights under existing public assistance policies and may have lowered the amount of personal stigma recipients felt. There is evidence showing that CAP programs are associated with reduced feelings of helplessness. CAP expenditures per 1,000 poor persons were inversely related to powerlessness (the more a city received CAP funds, the fewer the number of recipients feeling helpless).[28]

A flood of information in the form of simplified welfare manuals supplemented the face-to-face dissemination provided by the CAPs.

While an increasing number of people were coming to believe that they had a right to demand welfare, a series of judicial decisions were undermining some of the regulations by which relief rolls had been kept down in the past. The OEO's Neighborhood Legal Services Program gave impetus to this legal assult on the system. By 1968, 250 legal service projects had been established which operated about 850 neighborhood law offices staffed by approximately 1,800 attorneys.[29]

Pressure was also exerted by welfare rights groups which banded together in a National Welfare Rights Organization (NWRO) claiming more than 100,000 dues-paying members in some 350 local groups by 1969.[30] NWRO's contribution to the rising welfare rolls was in making slum and ghetto families less fearful in applying for aid and demanding their rights.

All of these pressures finally lead to gradual but definite legal and procedural changes in the nation's welfare system. Michigan's experience is summarized by a list of welfare policy changes presented in the Appendix to this chapter.

Before proceeding with the empirical analyses, it will be useful to review what has been put forth in this chapter. After the presentation of a model of flows in and out of the welfare sector, micro behavioral models of consumer choice were shown to apply to the decision process of individuals in the components of the conceptual model. Qualifications with respect to the applicability of these micro models were then reviewed. Although the imposition of additional constraints on the welfare choice introduced doubts as to the credibility of the comparative statics analysis, dynamic considerations were seen to be considerably more damaging in this respect. Furthermore, dynamic forces outside the scope of traditional economic analysis (such as political, legal, and sociological factors) were suggested as possible determinants of the choice to become a welfare recipient.

The empirical models to be presented in the following chapters are tentative, and exploratory in nature. In Chapter III, time series data on incoming AFDC-R, AFDC-U, and GA recipients and terminations from these programs are utilized in analyzing some determinants of caseload size. Although a degree of dynamism is incorporated into the model by the use of a distributed lag structure, the state of the art plus the absence of data restrict us from going any further here.

The absence of data on people who are simultaneously employed and receiving welfare exclude this growing category from the model in Chapter III. It is, however, this sub-group of the welfare population that merits special attention. Training programs and financial incentives to work, for example, fall heavily on this sub-group. Thus, rather than excluding the employed welfare recipients completely from this examination, cross-sectional survey data are utilized in Chapter IV to analyze some factors influencing their probabilities of employment.

Finally, in an attempt to incorporate the non-quantifiable legal, political, and sociological factors as determinants of caseload size, a "predictive" growth model is specified and estimated in Chapter V. Time series data are used in estimating this non-linear model of AFDC-R caseload growth. This was the category which we believe was most influenced by those factors mentioned above.

FOOTNOTES TO CHAPTER II

[1]See Leonard Goodwin, Do the Poor Want to Work?, (Washington, D.C.: Brookings Institution, June, 1972).

[2]Maryland State Department of Public Welfare, A Report on Caseload Increase in the Aid to Families with Dependent Children Program, 1960-66, Research Report No. 2 (Baltimore: The Department, July 1967), p. 36.

[3]GA recipients may be transferred to any of the other welfare programs.

[4]People receiving unemployment compensation are not eligible for the AFDC-U program.

[5]In Equation (2.3) terminations, T_t, is lagged one period due to the accounting process used by the Michigan State Department of Social Services. The reduction in the caseload due to the number of recipients terminating from welfare in period (t) is taken into account when presenting the caseload figure for period (t+1).

[6]It is possible for some elements in the X vector to be zero in either of Equations (2.4) or (2.5), i.e., the same variables may not determine both openings and closings.

[7]S.T. will be used throughout as an abbreviation for "subject to."

[8]This does not rule out the possibility of one or more of the alternatives not being chosen.

[9]C. T. Brehm and T. R. Saving, "The Demand for General Assistance Payments," American Economic Review, Vol. 54(December, 1964), pp. 1002-18.

[10]Brehm and Saving concede that $o \leq k \leq 1$ but point out that it could exceed 1 for people "who prefer to live off the fat of the land."

[11]Peter S. Albin and Bruno Stein, "The Constrained Demand for Public Assistance," Journal of Human Resources, IV(Summer 1968), pp. 300-11.

[12]Christopher Green, "Negative Taxes and Money Incentives to Work: The Static Theory," Journal of Human Resources, III(Summer 1968), pp. 280-88.

[13]The "income disregard" provision of the 1967 Social Security amendments has reduced the marginal rate to 66 2/3 percent for AFDC recipients by disregarding the first $30 of earned income per family, plus one-third of the earnings in excess of $30, plus all work expenses in determining the size of the grant.

[14]See Gary Louis Appel, Effects of a Financial Incentive on AFDC Employment: Michigan's Experience Between July 1969 and July 1970, (Minneapolis, Minnesota: Institute for Interdisciplinary Studies, March 1972); and Vernon K. Smith and Aydin Ulusan, The Employment of AFDC Recipients in Michigan, Studies in Welfare Policy, Publication 163 (Lansing: The Michigan State Department of Social Services, 1972).

[15]Daniel H. Saks, "Economic Analysis of an Urban Public Assistance Program: Aid to New York City Families of Dependent Children in the Sixties," (unpublished Ph.D. dissertation, Princeton University, 1973).

[16]WIN is the Work Incentive Program which aims at increasing the employment potential of AFDC recipients.

[17]Gary S. Becker, "A Theory of the Allocation of Time," Economic Journal, LXXV (September, 1965), pp. 493-517.

[18]This is a 100 percent tax in Michigan, i.e., for every dollar of unearned income, the grant is reduced by one dollar.

[19]As was explained in a previous footnote, this tax has been reduced to 66 2/3 percent for AFDC recipients, but it is still 100 percent for other categories.

[20]This is suggested by Saks, op. cit.

[21]See Albin and Stein, op. cit.

[22]John Conlisk, "Simple Dynamic Effects on Work-Leisure Choice: A Skeptical Comment on the Static Theory," Journal of Human Resources, III (Summer, 1968), pp. 324-26.

[23]This is suggested by Michael Jay Boskin in his "The Negative Income Tax and the Supply of Work Effort," National Tax Journal, XX(December, 1967), pp. 353-67.

[24]Saks, _op. cit._

[25]This possibility is suggested by Herschel Kasper in "Welfare Payments and Work Incentive: Some Determinants of the Rates of General Assistance Payments," _Journal of Human Resources_, III(Winter, 1968), pp. 86-110.

[26]Frances Fox Piven and Richard A. Cloward, _Regulating the Poor_,(New York: Random House, 1971).

[27]_Ibid._, p. 250.

[28]U.S. Department of Health, Education, and Public Welfare, _A Report on Caseload Increase in the Aid to Families with Dependent Children in New York City, November 1968-February 1969_, Report on a joint review carried out by the United States Department of HEW and the New York State Department of Social Services (Washington: The Department, 1969), pp. 48-49.

[29]Piven and Cloward, _op. cit._, p. 306.

[30]_Ibid._, p. 314.

CHAPTER III

AN ECONOMETRIC MODEL OF FLOWS IN AND OUT OF WELFARE

Introduction

In this chapter, time series data from July 1968 to December 1971 are used in testing the relative importance of labor-market and welfare-sector variables in the decisions to enter and leave Michigan's AFDC-R, AFDC-U, and GA programs. The data refer to the entire state. On the assumption that prolonged unemployment leads to both the exhaustion of financial resources and a reduction of the possibility of employment, a distributed lag structure is employed in the analysis of the effects of labor market changes on the flow of new welfare recipients (N_t). Terminations (T_t) from public assistance are hypothesized to depend upon current values of variables. More dynamic specifications of this relation were not tested in this dissertation.

The Model[1]

Based upon the model presented in Chapter II, the following econometric model is specified for Michigan's AFDC-R, AFDC-U and GA population:

$$C_t \equiv C_{t-1} - T_{t-1} + N_t, \tag{3.1}$$

$$T_t = \alpha_1 D_t + \alpha_2 EW_t + \alpha_3 (D_t)(EW_t) + \alpha_4 NFLF_t + \alpha_5 C_t + \alpha_6 G_t + \varepsilon_t \tag{3.2}$$

$$N_t = \beta_0 + \beta_1 [w_o U_t + w_1 U_{t-1} + \ldots + w_m U_{t-m}] + \beta_2 NFLF_{t-1} + \beta_3 EX\beta_{t-1} + \beta_4 TR_t + \beta_5 EW_{t-1} + \beta_6 G_{t-1} + \zeta_t \tag{3.3}$$

where C_t = total caseload of the relevant program in month t,

T_t = terminations from the relevant program in month t,

N_t = total number of new cases entering the relevant program in month t,

D_t = a variable measuring the demand for labor in month t,[2]

EW_t = expected wages in month t,

$NFLF_t$ = Michigan's non-farm labor force in month t,

G_t = average monthly grant per relevant public assistance case in month t, and

U_t = Michigan's total unemployment rate in month t,

EXB_{t-1} = number of Michiganders exhausting unemployment benefits in month t-1,

TR_t = transfers to all other public assistance programs from GA in month t, (appropriate independent variable for AFDC categories only.)

ε_t, ζ_t = disturbance terms.

Equation (3.1) is only an accounting identity summarizing the flows to and from welfare. If we wish to explain caseloads, we must go about it by explaining terminations from and new cases coming into public assistance.

<u>The Terminations Equation</u>

Equation (3.2) is the terminations equation and is a function of the following variables:

$$X_t = (D_t, EW_t, NFLF_t, C_t, G_t, \varepsilon_t),$$

with the first variables representing labor market conditions, the next two the welfare sector, and the disturbance term representing unaccountable or unmeasurable random phenomena affecting the decision to leave welfare.

Numerous studies and official program statistics indicate that there is a high degree of mobility between employment and welfare dependency. The AFDC program statistics[3] show that the median time on welfare is only 20 months. Longitudinal and retrospective studies of recipients conclude that both before and after receiving public assistance families are in the labor force.[4] Thus, families move between welfare and work status in accordance with changing family and labor market conditions.[5]

Although the unemployment rate for the civilian labor force is one of the most closely watched indicators of labor market conditions, it is of limited value for our purposes. As we seek a reliable measure of the demand for labor, the unemployment rate leaves much to be desired.

Besides being profoundly affected by changes in the supply of labor, its applicability to welfare recipients (especially women) is highly questionable.[6] Given the difficulties of using the unemployment rate as a measure of the demand for labor, particularly when it is to apply to welfare recipients, two other measures were also used for the (D_t) variable in the terminations equations. Wage and salary employment (WSE_t) is one of these, and gives the total number of people receiving wages and salaries in Michigan. Although it is, of course, partially an indication of labor supply, it was considered to give a better indication of the overall demand for labor. Since most welfare recipients do not have the skills that would qualify them for employment in manufacturing industries, employment in non-manufacturing industries ($ENMI_t$) seemed to be another good choice for this measure.[7] Finally, the total unemployment rate (U_t) was also used, in order to determine whether it is a good measure of the demand for the services of welfare recipients. From these three choices of (D_t), the statistically most significant one for each category will be presented in the results.

The higher the demand for labor, the more people we would expect to terminate from public assistance, i.e.,

$$\frac{\partial T_t}{\partial WSE_t} \geq 0, \text{ and } \frac{\partial T_t}{\partial ENMI_t} \geq 0.$$

Similarly, the lower the unemployment rate, the higher should be the terminations figure, thus,

$$\frac{\partial T_t}{\partial U_t} \leq 0.$$

The relative attractiveness of employment or the likely wage will also affect the choice between continuing assistance or terminating. It should be pointed out, however, that those who do terminate because of employment do so because they expect higher earnings than the fixed break-even income level for welfare recipients under negative tax schemes. Although most investigators use manufacturing wages or a similar proxy for this variable, we have tried to calculate a somewhat different measure using information on the occupational distribution of employed welfare recipients in the late sixties to weight manufacturing and service industry wages in a particular period. The appendix to this chapter explains just how the weighted expected wage variable (EW_t) was derived.[8] It is not a satisfactory variable, but may be better than other proxies. Higher expected returns will make it more attractive to be in the labor force, thus,

$$\frac{\partial T_t}{\partial EW_t} \geq 0.$$

Although the variables (D_t) and (EW_t) are important in themselves, we also hypothesize an interaction between them. That is, terminations would be even higher if there were an increased demand for labor coupled with high expected wages. Conversely, some terminations resulting from an increased demand for labor would be offset by low expected wages. Taking partial derivatives, this can be expressed as

$$\frac{\partial T_t}{\partial D_t} = \alpha_1 + \alpha_3 \; EW_t \geq 0, \text{ and}$$

$$\frac{\partial T}{\partial EW_t} = \alpha_2 + \alpha_3 \; D_t \geq 0.$$

The supply of labor also has some bearing on the number of terminations. A large supply would imply more competition for the few available jobs. Thus, terminations can be expected to diminish when the supply of labor increases. Although Michigan's non-farm labor force ($NFLF_t$) is not the best measure of the total supply, data limitations dictate its employment in this model. We would expect

$$\frac{\partial T_t}{\partial NFLF_t} \leq 0.$$

The size of the caseload (C_t) is included as an explanatory variable to control for differences in the number of potential terminations over time. The more people who are on welfare, the more people who could, other things being equal, leave welfare. Thus, we expect

$$\frac{\partial T_t}{\partial C_t} \geq 0.$$

The cost of terminating from public assistance will also influence a client's decision. Although it does not take into account other benefits (Medicaid, food stamps, child care, etc.), the average monthly grant (G_t) is the best measure of benefits foregone upon leaving welfare. The higher the grant level, the less willing recipients will be to leave welfare, i.e.,

$$\frac{\partial T}{\partial G_t} \leq 0.$$

The New Cases Equation

Equation (3.3) relates the new cases coming into public assistance to the following variables

$$X_t = (U_t, U_{t-1}, \ldots, U_{t-m}, NFLF_{t-1}, EX\beta_{t-1}, EW_{t-1}, TR_t, G_{t-1}, \zeta_t).$$

The current and lagged values of the unemployment rate (U_t) and the next three variables are generated by past and present labor market conditions. The transfers from GA variable (TR_t) and the average monthly grant (G_{t-1}) originate in the public assistance sector. The error term (ζ_t), again, represents unaccountable and unmeasurable random factors in period t.

All of the explanatory variables, with the exception of transfers from GA to other public assistance programs (TR_t) and the unemployment rate (U_t), are lagged one month for institutional reasons. Incoming recipients in month (t) would not appear in the caseload until month (t+1) due to the time required for processing of applications, determining eligibility, etc. This does not apply to transfers from GA.

As other writers have pointed out,[9] an assumption that worsening labor-market conditions causes a simultaneous increase in welfare rolls would be, at best, simplistic. A more dynamic process seems to be at work. We hypothesize that past as well as current labor market conditions influence the stream of people coming onto welfare. Prolonged unemployment would imply the exhaustion of savings, reduced job opportunities, and increased necessity of accepting public assistance. Furthermore, we assume that there is some maximum period of unemployment beyond which specific families cannot subside unless they apply for public assistance. Since our econometric model is specified to analyze aggregate behavior, this maximum period would have the most weight in explaining incoming welfare recipients. That is if people can hold out for, say, 4 months before applying for assistance, then the unemployment rate of four months ago would have the most weight in explaining numbers of new recipients in the current month. For a large population, unemployment rates in months prior to and after the average maximum period would have lower weights reflecting the distribution of resources and alternative opportunities in the population. Figure 3.1 summarizes our assumptions in this respect.[10]

RELATIVE WEIGHTS OF LAGGED UNEMPLOYMENT RATES

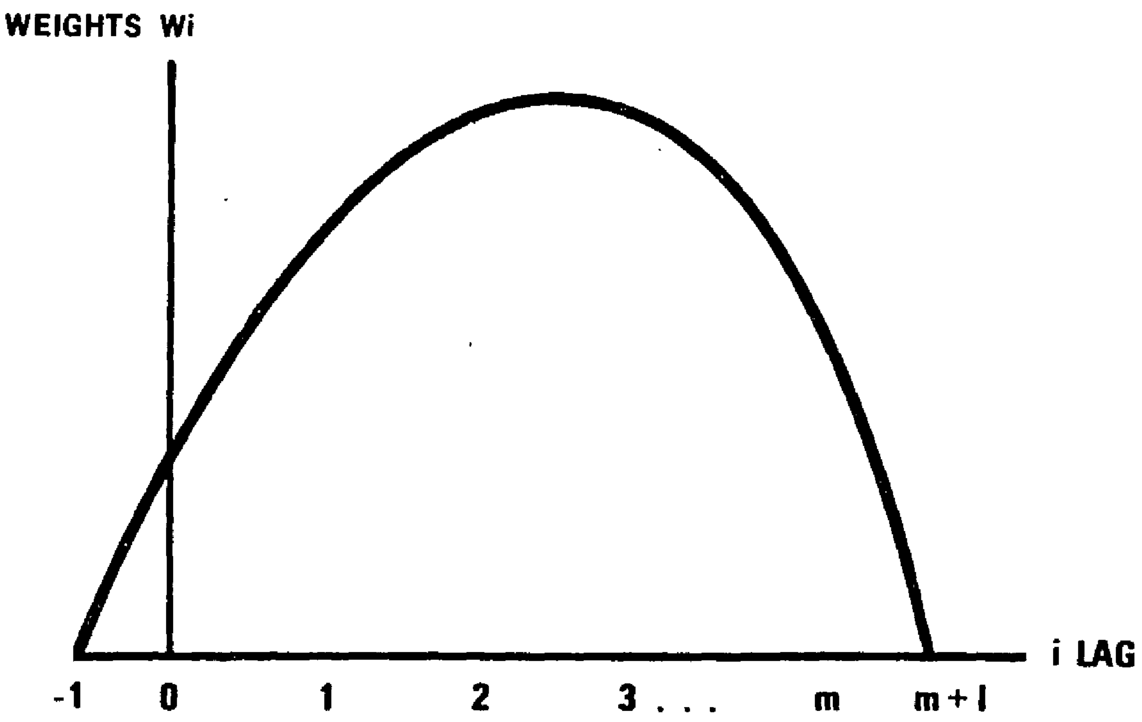

FIGURE 3.1

The current unemployment rate (U_t) and its lagged values (U_{t-1}), (U_{t-2}),...,(U_{t-m}) are utilized in the new recipient (N_t) equations to test the above hypothesis. The "Pascal Lag," and the "polynomial lag" are the only distributed lag structures that would be appropriate for the above configuration.[11] The relative ease of estimating the polynomial, or Almon lag, led to its incorporation into Equation (3.3); the degree of the polynomial and the length of the lag to be determined by the data. As implied by Figure 3.1 we expect the direction of the relationship to be such that

$$\frac{\partial N_t}{\partial U_{t-i}} \geq 0; \quad i=1,2,\ldots,m.$$

Following the logic of our terminations equation the expected returns from becoming a public assistance recipient are represented by the welfare grant level (G_{t-1}) and the cost of dropping out of the labor market is the expected wage (EW_{t-1}). We expect:

$$\frac{\partial N_t}{\partial G_{t-1}} \geq 0, \text{ and}$$

$$\frac{\partial N_t}{\partial EW_t} \leq 0.$$

The number of Michigan residents exhausting unemployment benefits (EXB_{t-1}) will also affect the number of new welfare recipients. Under unfavorable labor market conditions, the process of becoming unemployed, receiving unemployment benefits, and unsuccessfully seeking employment will culminate in the exhaustion of these benefits. When the last unemployment check is received, and job prospects still look dim, the probability of applying for public assistance should be quite high; thus, we postulate that

$$\frac{\partial N_t}{\partial EXB_{t-1}} \geq 0.$$

Growth in the supply of labor, as represented by the non-farm labor force ($NFLF_{t-1}$), should also have an affect on the number of new cases (N_t). The larger the number seeking employment or employed, the smaller the probability of adequate employment for the marginal worker. Thus, we hypothesize that

$$\frac{\partial N_t}{\partial NFLF_{t-1}} \geq 0.$$

Some general assistance (GA) recipients are transferred to other public assistance programs every month. A fraction of these end up on AFDC-R and AFDC-U, affecting the size of (N_t).[12] Thus

$$\frac{\partial N_t}{\partial TR_t} \geq 0.$$

Estimation

The new recipients (N_t), and terminations (T_t) equations will be estimated for each category (AFDC-R, AFDC-U, and GA) separately using ordinary least squares.

The new recipients (N_t) equation will be estimated with quadratic, cubic, and quartic polynomial lag structures and for each degree of the polynomial a 4, 5, 6, 7, and 8 month lag will be specified. From the resulting estimates, the "best" degree of polynomial and length of lag will be chosen.[13] We have also assumed that the unemployment rate of the coming month, t+1, and the month preceding the specified lag, t-(m+1), will have no affect on (N_t). This will imply the following constraint on the weights.

$$w_{m+1} = w_{-1} = 0.$$

The terminations (T_t) equations will be estimated with the three alternative measures of the labor demand (D_t) explained above, the total unemployment rate (U_t), wage and salary employment (WSE_t), and employment in non-manufacturing industries ($ENMI_t$). The variable having the highest level of statistical significance will be presented in the next section of this chapter.[14]

Results

The estimated terminations and new recipients equations for each category are presented in Tables 3.1 and 3.2 respectively.[15]

TABLE 3.1.--Time Series Analysis of Terminations from Michigan's AFDC-R, AFDC-U, and GA Programs.[a]

Eqn.	Dep. Var.	Independent Variables								d.f.	F	R^2	D-W
		WSE_t	$ENMI_i$	EW_t	$(WSE_t)(EW_t)$	$(ENMI_t)(EW_t)$	$NFLF_t$	C_t	G_t				
	AFDC-R												
3.4	T_t	4.76**		-116.52*	0.00		-0.38	0.10***	-43.40***	6,36	20.82	0.78	1.61
		(2.67)		(75.62)	--		(3.09)	(0.03)	(20.84)				
	AFDC-U												
3.5	T_t	8.84*		-185.77	0.07		-5.90	0.34***	-33.18***	6,36	16.19	0.73	2.03
		(6.25)		(241.17)	(0.07)		(5.99)	(0.08)	(11.16)				
	GA												
3.6	T_t		-48.63**	-604.17*		0.36**	20.60***	0.17***	49.31*	6,36	220.50	0.97	1.58
			(24.96)	(371.05)		(0.21)	(9.96)	(0.06)	(32.61)				

[a]Standard errors are presented below the estimates of the coefficients. d.f. is degrees of freedom, F is the F statistic, R^2 is the coefficient of determination, and D-W is the Curbin-Watson statistic for tests of autoregression. The asterisks above the estimates of the coefficients give the level of significance; *denotes significance at better than the 10 percent level, **at better than the 5 percent level, and ***at better than the 2.5 percent level.

TABLE 3.2.--Time Series Analysis of New Recipients Coming Into Michigan's AFDC-R, AFDC-U, and GA Programs.[a]

Eqn.	Dep. Var.	Independent Variables						d.f.	F	R^2	D-W
		W_t[b]	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}				
3.7.a	N_t^{AFDC-R}	-2.54* (1.87)	-0.49 (0.87)	-0.16** (0.10)	0.54*** (0.24)	96.32*** (44.31)	13.96 (15.65)	6,35	20.35	0.85	1.37
3.8.a	N_t^{AFDC-U}	-5.85** (3.20)	3.12 (5.84)	-0.45*** (0.17)	1.85*** (0.41)	-108.97* (82.99)	0.43 (9.28)	6,35	6.61	0.54	2.07
3.9.a	N_t^{GA}	-20.85** (12.60)	16.08* (10.85)	0.08 (0.33)		-244.94* (166.24)	80.46* (50.28)	6,36	3.81	0.35	1.33

[a]Standard errors are presented below the estimates of the coefficients. d.f. is degrees of freedom, F is the F statistic, R^2 is the coefficient of determination, and D-W is the Durbin-Watson statistic for tests of autoregression. The asterisks above the estimates of the coefficients give levels of significance; *denotes significance at better than the 10 percent level, **at better than the 5 percent level, and ***at better than the 2.5 percent level. Coefficients for the constant are not presented.

[b]W_t is the composite polynomial lag variable, which will be expanded in the text. It represents a 7 month quadratic polynomial for AFDC-R, and AFDC-U, and a 5 month quadratic polynomial for GA.

Although some variables in the terminations equations have the expected signs, some seem to be inconsistent with expectations. The coefficient of the expected wages variable (EW_t), for example, is consistently negative. Even though it is only significant at the 10 percent level for AFDC-R and GA, this result is disturbing. Similarly, the negative coefficient of the demand for labor variable ($ENMI_t$), significant at better than the 5 percent level, for the GA terminations is surprising. The only coefficient that is significant for all categories and exhibits the hypothesized relationship with terminations is that of caseloads. Grant levels also seem to affect terminations in the expected direction for AFDC recipients.

Before getting into the implications of the estimates the expansion of the (W_t) terms into current and lagged unemployment rates will be useful, as the coefficients of the (W_t) term by themselves give us no information about the impact of past labor market conditions.[16]

$$N_t^{AFDC-R} = -8227.63+20.32U_t+35.56U_{t-1}+45.72U_{t-1}+45.72U_{t-2}+50.80U_{t-3}$$
$$+50.80U_{t-4}+46.72U_{t-5}+35.56U_{t-6}+20.32U_{t-7}$$
$$+0.49NFLF_{t-1}-0.16EXB_{t-1}+0.54TR_t+96.32EW_{t-1}$$
$$+13.96G_{t-1}+e_t. \qquad (3.7b)$$

This tells us that the unemployment rate of 3 to 4 months ago has the most impact on current flows into the AFDC-R category.

The lag structure for the AFDC-U new recipient equation is the same as that for AFDC-R, however, the unemployment rate is seen to affect this program more.

$$N_t^{AFDC-U}=-8041.73+48.80U_t+81.90U_{t-1}+105.30U_{t-2}$$
$$+117.00U_{t-3}+117.00U_{t-4}+105.30U_{t-5}$$
$$+81.90U_{t-6}+48.80U_{t-7}+3.12NFLF_{t-1}$$
$$-0.45EXB_{t-1}+1.85TR_t-108.97EW_{t-1}$$
$$+0.43G_{t-1}+e_t. \quad (3.8b)$$

Labor market conditions, as measured by the unemployment rate, seem to have the greatest impact on GA recipients, with the situation 2 to 3 months ago being most influential.

$$N_t^{GA}=-34266.82+125.10U_t+208.50U_{t-1}+250.20U_{t-2}$$
$$+250.20U_{t-3}+208.50U_{t-4}+125.10U_{t-5}$$
$$+16.08NFLF_{t-1}+0.08EXB_{t-1}-244.94EW_{t-1}$$
$$+80.46G_{t-1}+e_t. \quad (3.9b)$$

Implications

Even though some of our results, particularly for the terminations equations, do not seem theoretically plausible, the fact that this is what the data points to is in itself significant. Are the measures of labor market conditions accurate? Are they appropriate for welfare recipients? Unfortunately we cannot give an emphatic "yes" to either question. Even more important, however, is the question of specification. Have we postulated the correct relationships? Do welfare recipients behave in this manner? All that can be hoped for is that we have come close enough to reasonably approximate what we wish to explain.

Terminations

Contrary to Saks'[17] result for New York City that a significant relationship did not exist between labor market conditions and the probability of an AFDC-R case terminating, we suggest that an increase in the demand for labor (WSE_t, for example) will significantly increase terminations from AFDC-R, and AFDC-U. This result, however, does not hold for GA. Although the coefficient for the demand for labor variable ($ENMI_t$) is significant at better than the 5 percent level, it is negative.[18] An increasing demand for labor resulting in less terminations is quite inconsistent with what we would expect. Although employment may not be the only reason for terminating, there are some people who do so for employment-related reasons.

One explanation of this phenomenon is provided by Saks.[19] He suggests that welfare payments may only provide a tolerable existence when supplemented by private transfers, e.g., financial assistance from friends and relatives. As the demand for labor increases, a resultant increase in private transfers may be expected causing terminations from GA to decline. Although this would seem to hold, particularly for GA recipients since they receive a relatively small grant, it is not supported by existing data.[20] Either the data are misleading, which would imply a high level of fraud in reporting income, or we must seek the explanation elsewhere such as in the possibility of a dual labor market.

The next labor-market variable of interest is expected wages (EW_t). The tentative implications drawn from our estimates are again contradictory to those of Saks.[21] His results indicate that expected wages are important in pulling women off of welfare. Although only significant at the 10 percent level for AFDC-R and GA, terminations for all programs are negatively related to expected wages. As was explained above, the possibility of increased levels of transfer payments resulting from higher wages might make welfare more tolerable and thereby reduce the number of terminations. On the tenuous assumption that marginal productivity factor pricing applies, when the going wage exceeds the marginal products of employable welfare recipients, increasing wages may also result in fewer people terminating from public assistance.

The coefficient for the interaction term $(EW_t)(D_t)$ proved to be statistically insignificant in the AFDC equations and, although significant at better than the 5 percent level for GA, the magnitude of the effect is sufficiently small so as not to change the implications mentioned above. Specifically,

$$\frac{\partial T^{GA}}{\partial ENMI_t} = -48.63 + 0.36\ EW_t$$

$$\frac{\partial T^{GA}}{\partial EW_t} = -604.17 + 0.36\ ENMI_t,$$

and if we use the mean values of (EW_t) and $(ENMI_t)$ we get

$$\frac{\partial T^{GA}}{\partial ENMI_t} = -48.63 + (0.36)(85.54) = -17.84$$

$$\frac{\partial T^{GA}}{\partial EW_t} = -604.17 + (0.36)(1408.98) = -96.93.$$

Thus, the direction of the relationships remain the same, although the impacts of the coefficients are somewhat reduced.

Michigan's non-farm labor force $(NFLF_t)$ has the postulated relationship with terminations from AFDC-R and

AFDC-U (an increase in the supply of labor causes a reduction in terminations.) However, the coefficients are not statistically significant. For GA, we again have an unexpected result; the coefficient for the ($NFLF_t$) variable, the supply of labor, is statistically significant and positive. This result is unexpected, but the possibility of having misspecified the model must also be considered. If the number of terminations from GA happened to be an argument in the labor supply function, such a relationship would be possible as terminated GA recipients would end up in the labor force and the non-farm labor force figure would thus increase.

The opportunity cost of terminating from public assistance is given by the respective average monthly grant levels. The coefficients for these variables are statistically significant and have the expected negative signs for AFDC-R and AFDC-U. These are consistent with Saks'[22] results: the higher the benefits received by being on AFDC, the less willing recipients are to forego them. The point elasticity of terminations with respect to changes in the grant level is -5.66 for AFDC-R and -21.32 for AFDC-U.[23] The difference in magnitudes is also in line with Saks who suggests that this may be due to relatively lower day care costs for AFDC-U families so that a one dollar increase in the grant level would induce more of them to stay on welfare. Here again the implied behavior of GA recipients differs: the higher the monthly grant, the greater the number of terminations from the program. The reason for this result may again be found either in model specification or administrative peculiarity. Higher GA grants may imply more effort by counties to get recipients off of welfare by transfers to other public assistance programs or outright removal.[24] Counties, operating within fixed budgets may also vary the grant levels according to caseload size, e.g., increase benefits when caseloads are smaller. Of course the possibility of spurious correlation must also be considered.

New Recipients

Brehm and Saving's pioneering article was the first of relatively few empirical studies of public assistance.[25] As mentioned earlier in the review of theoretical models, they analyze the demand for General Assistance (GA) as a special case of the demand for leisure and estimate the parameters of their demand equation in an econometric study.[26] Their results indicate that the demand for public assistance is positively and significantly related to the level of benefit payments rather than to labor market conditions.

As pointed out by Albin and Stein,[27] the dependent variable in the Brehm-Saving equations is described as the number of GA recipients as a percentage of the state's population, whereas what was actually used was the number of GA cases. Since definitions of a GA case differ from state to state, a case cannot be identified with a decision unit such as a household or a family. Given the considerable state-to-state variation in the number of persons per case, Albin and Stein[28] adjust the case data to a recipient basis and recalculate the Brehm-Saving regressions. Their results indicate that the relationship between recipients and benefit levels disappears, thus throwing into question the theoretical underpinnings of the Brehm-Saving model. They conclude that the variation in the proportion of the population receiving GA benefits is better explained by labor market conditions as measured by the insured unemployment rate.

In their reply to Albin and Stein's comment, Brehm and Saving[29] concede to the error pointed out by the authors but do not agree with their "correction." They make a valid point by explaining that the removal of potentially employable recipients from GA with the implementation of the AFDC-U program caused Stein and Albin to estimate a model which did not perform well as it was not applicable to the recipients to whom the data applied. After correcting the "correction" by adjusting the data to a recipient basis, eliminating single-person cases, and using pre-AFDC-U data, they come up with results similar to their original ones.

The implications of our estimates are more in line with those of Albin and Stein. Although the coefficient for the grant level (G_{t-1}) is positive for GA cases, it is only significant at the 10 percent level. For all categories, however, the prime labor market variable, current and lagged unemployment rates, have the postulated relationships and are statistically significant (at better than the 5 percent level for AFDC-U and GA, and at better than the 10 percent level for AFDC-R).

Our results with respect to grant levels, are also corraborated by Saks.[30] His coefficients for AFDC-R and AFDC-U grant levels have the expected positive signs, but are not statistically significant in explaining the probability of receiving welfare. Similarly, we get positive but statistically insignificant grant-level coefficients in our AFDC-R and AFDC-U new recipient equations. Although the coefficients are not statistically significant, the presentation of grant elasticities of demand for welfare might give some insight into the problem. Evaluated at the means, the point elasticities are respectively 0.87, 0.12, and 1.09 for AFDC-R, AFDC-U, and GA.[31] A percentage increase in the grant level seems to induce more than a percentage increase in new recipients only for GA. The impacts are quite small for the other two programs. However, recalling the grant elasticities of terminations, we see that a percentage increase in grant levels reduces the percentage of terminations by 5.66 percent for AFDC-R, and 21.32 percent for AFDC-U. Thus, even though changes in the grant levels do not induce proportionate flows into welfare, they do make it less probable for recipients to leave welfare.

The use of the insured unemployment rate, by Brehm and Saving[32] as well by Albin and Stein,[33] as a measure of labor market conditions relevant to public assistance recipients is highly questionable. As Kasper[34] points out, the long duration of this unemployment, the marginal industries where they work, and the relatively low wages received by welfare recipients would more than likely preclude their eligibility for unemployment insurance. Using various combinations of explanatory variables, Kasper[35] estimates a set of better specified models, particularly with respect to labor market conditions, and comes up with results similar to ours and contrary to those of Brehm and Saving with respect to the importance of labor market conditions versus grant levels in causing the flows into welfare. The fact that the unemployment rate of previous periods may explain the number of recipients presently on welfare is also put forth by Kasper and incorporated into his model by the use of variables such as the percentage change in total and insured unemployment rates. His results substantiate the thesis that the lag between the period when a loose labor market is confronted and when families have to resort to public assistance is quite long.

Further support of this is provided by Saks.[36] Taking a more sophisticated approach, he uses a quadratic Almon distributed lag and comes up with significant coefficients in equations that apply to AFDC-U applicants.

Our results imply that the unemployment rates of past periods are important determinants of new welfare recipients entering the AFDC-R, AFDC-U, and GA programs in the current month. The magnitudes of the impact of current and lagged unemployment rates on the different public assistance categories are also as we expected. Looking at Figure 3.2, we see that the largest impact is on potential GA recipients; the weights are smaller for AFDC-U and the least impact is on AFDC mothers. Furthermore, our data indicate that GA is characterized by very large inflows and outflows relative to the other programs. The shorter lag, five months, would tend to reflect this more volatile response.

Another labor market variable of interest is the expected wage (EW_{t-1}). Saks found that the expected wage is a powerful determinant of welfare applications.[37] This is also implied by our estimates for AFDC-U and GA. The coefficients for expected wages are negative and statistically significant at the 10 percent level for these two categories. Higher expected wages seem to reduce or defer the necessity for welfare benefits. The wage elasticities of demand for welfare are -9.59, and

WEIGHTS OF CURRENT AND LAGGED UNEMPLOYMENT RATES IN EXPLAINING FLOWS INTO AFDC AND GA

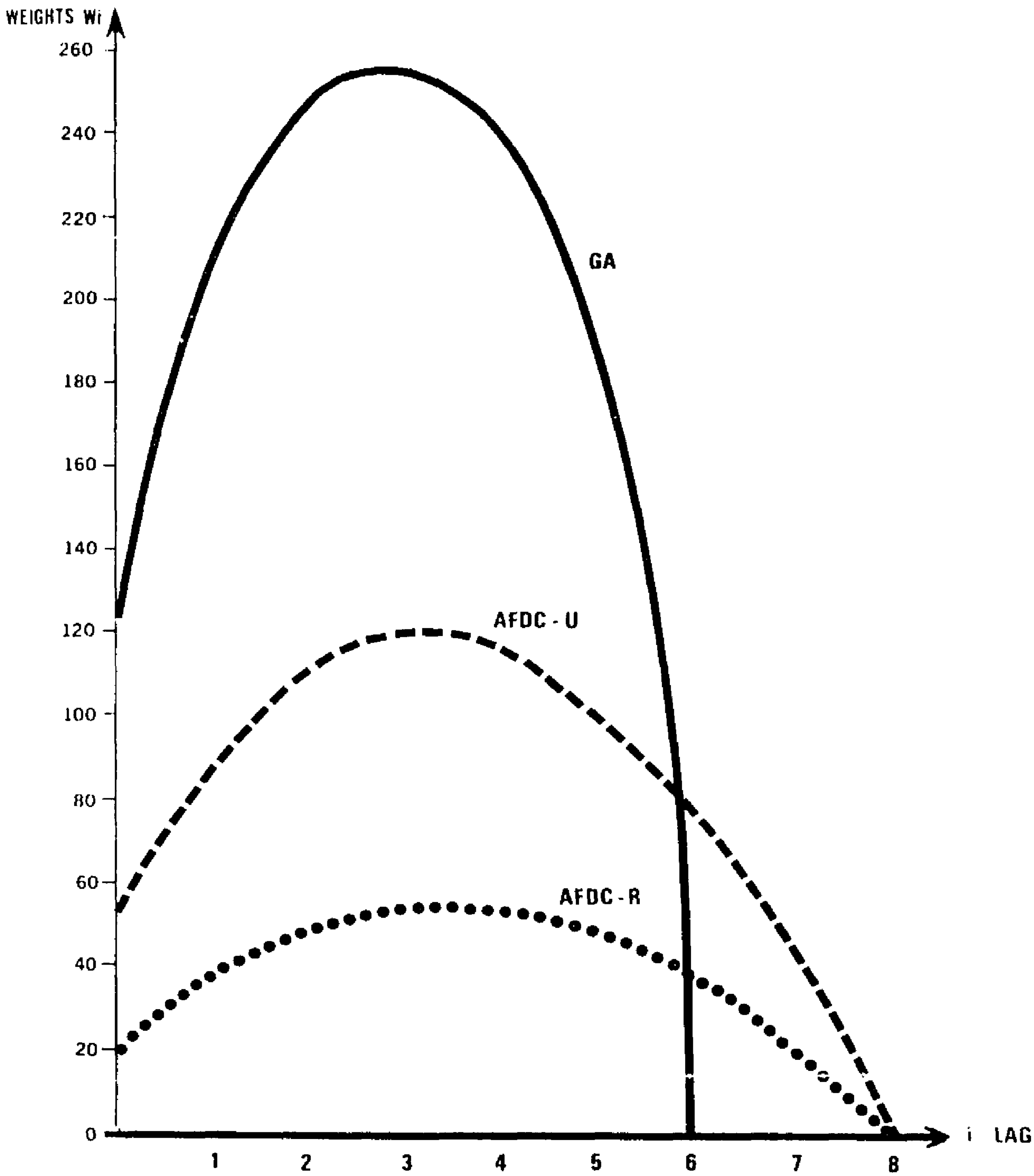

FIGURE 3.2

-2.30 for AFDC-U and GA recipients respectively.[38] These elasticities are quite high (especially when compared to those calculated by Saks[39]); however, as he points out, these results are comforting in that grant levels can go up by many more percentage points than the expected wages without affecting caseloads (the grant elasticities of demand were 0.12 for AFDC-U, and 1.09 for GA).

Given the fact that AFDC mothers are usually characterized by low skill levels and that their employment is usually concentrated in service industries and low skilled jobs, the significantly positive relationship between new AFDC-R recipients and expected wages is not too startling. The suggested explanations given to explain the unexpected relationship between terminations and expected wages may also apply to this result.

An increase in the supply of labor, a higher non-farm labor force ($NFLF_{t-1}$), has the expected positive relationship with inflows to AFDC-U and GA. Although only the coefficient for the GA equation is statistically significant, our hypothesis that looser labor market conditions, characterized by a higher excess supply of labor, induce a greater flow into the welfare sector seems to be consistent with the data.

The contention that potential AFDC mothers would not tend to be as responsive to labor market conditions as the other two categories might be reflected in the statistically insignificant coefficient for $(NFLF_{t-1})$ in the AFDC-R new recipients equation. Although the negative relationship is not in line with what we expected, it might be caused by $(NFLF_{t-1})$ being a demand rather than a supply variable. Furthermore, the "added worker" effect might be operating, in which case $(NFLF_{t-1})$ would be partially dependent upon the choice between welfare and labor force participation, and not vice versa.

One of the most perplexing results is the highly significant negative relationship between the number of people exhausting unemployment benefits (EXB_{t-1}) and inflows into AFDC-R and AFDC-U. Although, as Kasper[40] points out, the probability of a potential welfare recipient being eligible for unemployment benefits is quite small, it should not lead to such results. Incoming GA recipients exhibit the expected positive relationship with the (EXB_{t-1}) variable, however, the coefficient is not statistically significant.

The last implication to be drawn from the estimated equations pertains to the transfer variable, (TR_t), included in the two AFDC new recipient equations. The number of GA recipients being transferred to other public assistance programs are seen to play a significant role in determining AFDC-R and AFDC-U caseloads. Both equations show a statistically significant positive relationship between the transfers variable, (TR_t), and inflows to AFDC-R and AFDC-U.

FOOTNOTES TO CHAPTER III

[1]The sources of the data used are as follows:

C_t, N_t, T_t, G_t: Social Service Statistics published monthly by the Michigan Department of Social Services;

D_t, U_t, EW_t, $NFLF_t$: Michigan Manpower Review published monthly by the Michigan Employment Security Commission.

EXB_t: Welfare Review published monthly by the U.S. Department of Health, Education and Welfare.

[2]Michigan's total unemployment rate (U_t), wage and salary employment in Michigan (WSE_t), and employment in non-manufacturing industries in Michigan ($ENMI_t$) are used, and the ones that are statistically significant presented in the results.

[3]U.S. Department of HEW, Findings of the 1971 AFDC Study (Washington, D.C.: Center for Social Statistics, December, 1971).

[4]See David Franklin, "A Longitudinal Study of WIN Dropouts: Program and Policy Implications," (Los Angeles: Regional Institute in Social Welfare, April, 1972), (DOL Contract Number 51-05-70-05); Edward Opton, "Factors Associated with Employment Among Welfare Mothers," (Berkeley: The Wright Institute, 1971), (DOL Contract Number 51-05-69-04); Sydney Bernard, "The Economic and Social Adjustment of Low-Income Female-Headed Families," (The Florance Heller Graduate School for Advanced Studies in Social Welfare, Brandies University, May, 1964), (Grant Number 004); Samual Meyers and Jennie McIntyre, "Welfare Policy and Its Consequences for the Recipient Population: A Study of the AFDC Programs," (Bureau of Social Science Research, December 1969), (Grant Number 405-WA-OC-67-07); Elaine Burgess and Daniel Price, An American Dependency Challenge (Chicago: American Public Welfare Association, 1963); Lawrence Podell, "Families on Welfare in New York City," (New York: City University of New York, Center for the Study of Urban Problems, 1963).

[5]As was explained previously this generalization does not seem to hold for Michigan where the number of employed welfare recipients has been on the rise. However, we shall defer any further comments to the presentation of the empirical results.

[6]See Tilford Gaines, "Employment-Unemployment," Economic Report of Manufacturers Hanover Trust, April, 1972; Jacob Mincer, "Labor Force Participation of Married Women: A Study in Labor Supply," Aspects of Labor Economics, National Bureau of Economic Research (Princeton: Princeton University Press, 1962), pp. 63-105. Among labor supply responses to demand, the most noteworthy refer to "discouraged" and "added" workers. The "discouraged worker hypothesis" suggests that at any moment there exist a large number of people who are marginal workers in the sense that they accept employment when jobs are very easy to find, but stop looking when the demand for labor diminishes. A force working in the opposite direction and known as the "added worker hypothesis" applies to the same group of people and claims that when labor market conditions are bad and result in the primary wage earner in a family losing his job, then the secondary workers in the family enter the labor market to seek employment. These forces are said to apply particularly to housewives, retired people, and younger people.

[7]This assumption is verified by the distribution of employed welfare recipients in different industries given in Michigan Department of Social Services, Profile of Michigan's AFDC Caseload, Research Paper Number 1, (Lansing, Michigan: The Department, October, 1969).

[8]The weights were calculated from Profile of Michigan's AFDC Caseload quoted in the preceeding footnote. See Appendix to this chapter.

[9]See Daniel H. Saks, "Economic Analysis of an Urban Public Assistance Program: Aid to New York City Families of Dependent Children in the Sixties," (unpublished Ph.D. dissertation, Princeton University, 1973); and Hirschel Kasper, "Welfare Payments and Work Incentives: Some Determinants of the Rates of General Assistance Payments," Journal of Human Resources, III(Winter, 1968), pp. 86-110.

[10]The curve in Figure 3.1 touches the horizontal axis, becomes zero, at lag -1 and lag m+1. This implies that the unemployment rate of next month, lag -1, and the unemployment rate of m+1 months ago have no affect in the aggregate decision to enter welfare.

[11]See Jan Kmenta, Elements of Econometrics, (New York: The Macmillan Company, 1971), pp. 487-95.

[12]The number of transfers from GA could not be subtracted out of the appropriate programs because the data are not disaggregated.

[13]The "best" lag structure is defined as having the degree and length of lag that produces the highest value of $\bar{R}^2$, the coefficient of determination corrected for degrees of freedom, and positive weights for current and lagged unemployment rates.

[14]All of the estimated equations, (N_t) as well as (T_t), will be presented in the Appendix to this chapter.

[15]The correlation matrices for all equations presented in the results section can be found in the Appendix to this chapter.

[16]It should be noted that when a (W_t) coefficient is expanded its negative coefficient implies positive coefficients for each unemployment rate. See Kmenta, op. cit., p. 493.

[17]Saks, op. cit., Chapter V.

[18]The GA terminations equation was also run with the unemployment rate (U_t), and wage and salary employment (WSE_t) with identical results. See the Appendix to this chapter for the full set of estimates.

[19]Saks, op. cit., Chapter II.

[20]See Lynn Savage and Sherry Dahlke, "The General Assistance Program in Four Counties in Michigan," (unpublished study of the Michigan Department of Social Services).

[21]Saks, op. cit., Chapter V.

[22]Ibid., Chapter V.

[23]The elasticities are $(\partial T/\partial G_t)(\bar{G}/\bar{T})$, where $(\partial T_t/\partial G_t)$ is the coefficient for the grant level (G_t) and $\bar{T}$, $\bar{G}$ are the mean values for terminations and grant levels respectively.

[24]Savage and Dahlke, op. cit., observed that one county even attempted to inforce a mandatory maximum period that a GA family could receive assistance.

[25]C. T. Brehm and T. R. Saving, "The Demand for General Assistance Payments," American Economic Review, Vol. 54(December, 1966), pp. 1002-18.

[26]It can be seen from the specification of their model that they use cross-sectional observations from 48 states for each of nine years. Although they claim to be pooling cross-section and time series data and estimating via Zellners technique (Arnold Zellner, "An Efficient Method of Estimating Seemingly Unrelated Regressions and Test for Aggregation Bias," Journal of the American Statistical Association, Vol. 57(June, 1962), pp. 343-48) as it applies to Aitken's Generalized Estimation, this does not seem to be the case. In presenting their results Brehm and Saving give nine different estimates for each equation, i.e., they have either estimated different equations for each of the nine years, implying that they did not in fact pool cross-section and time series data, or they have pooled the data for each state and monthly data for each year and applied Generalized Least Squares to this. Thus, they have either presented their model in a misleading way, or have not used the estimation technique which they claim.

[27]Peter S. Albin and Bruno Stein, "The Demand for General Assistance Payments--Comment," American Economic Review, Vol. 57 (June, 1967), pp. 575-89.

[28]Ibid.

[29]C. T. Brehm and T. R. Saving, "The Demand for General Assistance Payments: Reply," American Economic Review, Vol. 57(June, 1967), pp. 585-88.

[30]Saks, op. cit., Chapter II.

[31]The elasticities are $(\partial N_t/\partial G_{t-1})(\bar{G}/\bar{N})$ where $(\partial N_t/\partial G_{t-1})$ is the coefficient for the grant level (G_{t-1}), and $\bar{G}$, $\bar{N}$ are the mean values for grant levels and new recipients.

[32]Brehm and Saving, op. cit.

[33]Albin and Stein, op. cit.

[34]Kasper, op. cit.

[35]Ibid.

[36]Saks, op. cit., Chapter II.

[37]*Ibid.*, Chapter II.

[38]These elasticities are also calculated at the means and are $(\partial N_t/\partial EW_t)(\overline{EW}/\overline{N})$.

[39]Saks, *op. cit.*, Chapter II.

[40]Kasper, *op. cit.*

CHAPTER IV

AN EMPIRICAL ANALYSIS OF THE EMPLOYED AFDC RECIPIENT: SOME EVIDENCE PROVIDED BY SURVEY DATA

Introduction

The replacement of the 100 percent welfare tax[1] by a less confiscatory 66 2/3 percent and the break-even levels of income[2] implied by the 1967 amendments to the Social Security Act[3] have resulted in a growing number of persons who are combining the alternatives of simultaneously working and receiving welfare.[4] This sub-group of the welfare population is of particular interest in light of the emphasis placed on employment by policy makers. Even though this group's labor force participation has not lead to self-sufficiency, the ultimate goal of many welfare reforms, the importance of this first step in the possible attainment of economic independence is obvious.

Available time series data on new recipients and terminations provide no information on the employed recipient. Furthermore, to our knowledge, there exists no other data on this sub-group in Michigan. Given this situation, we were faced with the alternative of completely excluding the employed welfare recipients from our empirical analysis or utilizing a cross-section survey that was available to provide insight into some factors that affect the probability of a recipient's employment.[5]

Many researchers have tried to isolate factors conducive and detrimental to employment and the use of a dichotomous dependent variable lends itself quite readily to such undertakings.[6] Models of this kind are usually referred to as "linear probability models" and have the following form:

$$Y_i = \alpha+\beta X_i + \varepsilon_i, \qquad (4.1)$$

where Y_i = 1 if the i^{th} individual is employed,

= 0 otherwise,

X_i = a vector of explanatory variables, and

ε_i = disturbance term.

In this chapter a linear probability model will be used for analyzing the employment probability of AFDC recipients. Although the elements of the X_i vector, to be specified below, could be more numerous and more relevant to the theoretical model, we were constrained by the availability of computer programs for categorizing a larger set of variables and by the information contained in the survey.

The Shortcomings of Ordinary Least Squares[7]

Consider the relationship given by Equation (4.1). This equation states that the conditional distribution of Y_i, given X_i, has a mean of $\alpha+\beta X_i$ and a variance equal to σ^2. However, since Y_i can only assume two different values, 0 and 1, we have, by the definition of mathematical expectation,

$$E(Y_i) = 1 x f_i(1)+0 x f_i(0) = f_i(1),$$

where $f_i(1)$ is the probability that an individual with characteristics represented by X_i is employed. Since $E(Y_i) = \alpha+\beta X_i$, the probability $f_i(1)$ will be different for different vectors of characteristics. We can, therefore, think of $E(Y_i)$ as measuring the proportion of all individuals with characteristics X_i who are employed. Thus,

$$0 \leq \alpha+\beta X_i \leq 1.$$

From Equation (4.1), we get

$$\varepsilon_i = Y_i-\alpha-\beta X_i$$

and since Y_i can only be equal to 0 or 1, it follows that for any given vector of characteristics, X_i, the disturbance ε_i can only take on two different values, $(-\alpha-\beta X_i)$ and $(1-\alpha-\beta X_i)$. This is a violation of the normality assumption of the classical normal regression model and ε_i is discretely distributed as:

ε_i	$f(\varepsilon_i)$
$-\alpha-\beta X_i$	f
$1-\alpha-\beta X_i$	$1-f$
	1

Since we are assuming that ε_i is distributed with zero mean, we can determine the probabilities f and (1-f) as follows:

$$(-\alpha-\beta X_i)f+(1-\alpha-\beta X_i)(1-f) = 0,$$

which after solving for f gives

$$f = 1-\alpha-\beta X_i.$$

Therefore the variance of ε_i is

$$\begin{aligned} E(\varepsilon_i^{\,2}) &= (-\alpha-\beta X_i)^2(1-\alpha-\beta X_i) \\ &\quad +(1-\alpha-\beta X_i)^2(\alpha+\beta X_i) \\ &= (\alpha+\beta X_i)(1-\alpha-\beta X_i) \\ &= E(Y_i)[1-E(Y_i)]. \end{aligned}$$

Hence, the variance of ε_i is dependent on $E(Y_i)$ and is therefore heteroskedastic. Although the least squares estimators of α and β will be unbiased, their estimated standard errors will have a bias so that classical tests of significance will not necessarily be reliable. Some of the researchers cited in the beginning of this chapter qualify their results by explaining that the assumption of homoskedasticity is violated. None, however, seem to note the non-normal and discrete distribution of ε_i.

The task at hand is to transform Equation (4.1) in such a way as to make it consistent with the classical assumptions of ordinary least squares estimation. We desire a monotonic transformation such as that shown in Figure 4.1.

MONOTONIC TRANSFORMATION OF A PROBABILITY TO THE RANGE $(-\infty,+\infty)$.

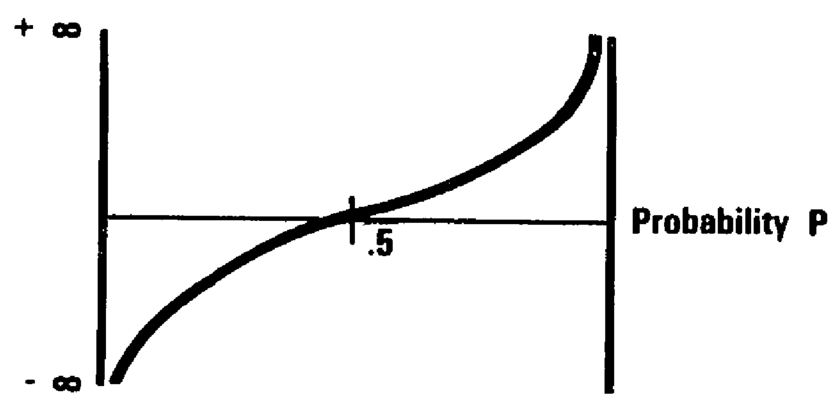

FIGURE 4.1

The probability, p, is measured along the horizontal axis and its transformation along the vertical axis. When p increases from 0 to 1, its transform increases from $-\infty$ to $+\infty$, thereby allowing us to correct the problem of finite range. There are an infinite number of transformations with this property, but the most populat are the probit, tobit, and logit transformations.[8]

As the logit model is the least theoretically complicated and computationally the easiest, we shall use it for our empirical analysis.

A Logit Model

Consider the following regression equation:

$$Y_i = \alpha+\beta X_i+\gamma Z_i+\delta U_i+\zeta W_i+\varepsilon_i \qquad (4.2)$$

where Y_i = 1 if the i^{th} AFDC recipient is employed,
= 0 otherwise;

X_i = 1 if the i^{th} recipient is white,
= 0 otherwise;

Z_i = 1 if the i^{th} recipient has children 0-5 years old,
= 0 otherwise;

U_i = 1 if the i^{th} recipient has at least a high school education,
= 0 otherwise;

W_i = 1 if the i^{th} recipient lives in a model cities neighborhood,
= 0 otherwise; and

ε_i = disturbance term.[9]

We can define the odds in favor of being employed as the ratio p/(1-p), where p is the probability of employment. The odds may be regarded as a monotonic transformation of p with range from 0 to ∞. As this excludes negative values, it is still restrictive, therefore we describe odds as a long-linear function of characteristics:

$$\ln\left(\frac{p_i}{1-p_i}\right) = \alpha+\beta X_i+\gamma Z_i+\delta U_i+\zeta W_i . \qquad (4.3a)$$

The left-hand side of (4.3a) is known as the logit of employment and is a transformation of probability illustrated in Figure 4.1:

$$\ln\left(\frac{p_i}{1-p_i}\right) = \begin{cases} -\infty & \text{at} \quad p=0 \\ 0 & \text{at} \quad p=.5 \\ +\infty & \text{at} \quad p=1 \end{cases}$$

The logit owes it name to the relationship with the logistic function, as seen when (4.3a) is solved for p_i:

$$p_i = \frac{1}{1+e^{-\alpha-\beta X_i-\gamma Z_i-\delta U_i-\zeta W_i}} . \qquad (4.3b)$$

Since our explanatory variables are dichotomous, we can display all combinations of possible states in Table 4.1. Using the elements in the first two rows of Table 4.1, our model becomes

TABLE 4.1.--Frequency Distribution of Sample with Respect to Characteristics Categories and Employment.

Categories*	(0000)	(0001)	(0010)	(0011)	(0100)	(0101)	(0110)	(0111)	(1000)	(1001)	(1010)	(1011)	(1100)	(1101)	(1110)	(1111)
Number of Cases	129	584	337	1203	41	138	244	370	881	522	1549	990	136	107	576	245
Number Employed	20	90	27	154	8	43	20	72	108	49	115	108	20	19	83	40
Relative Frequency	0.155	0.154	0.080	0.128	0.195	0.312	0.082	0.195	0.123	0.094	0.074	0.109	0.147	0.178	0.144	0.163

*The categories can be interpreted as follows:

(0000) = > X = 0, Z = 0, U = 0, W = 0 = > individuals who are black, have no children 0-5 years old, have no high school education, and do not live in model cities.

(0001) = > X = 0, Z = 0, U = 0, W = 1 = > individuals who are black, have no children 0-5 years old, have no high school education, and live in model cities.

(0010) = > X = 0, Z = 0, U = 1, W = 0 = > individuals who are black, have no children 0-5 years old, have high school education or more, and do not live in model cities.

.
.
.

(1111) = > X = 1, Z = 1, U = 1, W = 1 = > individuals who are white, have children 0-5 years old, have high school education or more, and live in model cities.

$$
\begin{bmatrix}
\ln [n_{21}/(n_{11} - n_{21})] \\
\ln [n_{22}/(n_{12} - n_{22})] \\
\ln [n_{23}/(n_{13} - n_{23})] \\
\vdots \\
\ln [n_{28}/(n_{18} - n_{28})] \\
\vdots \\
\ln [n_{2,16}/(n_{1,16} - n_{2,16})]
\end{bmatrix}
=
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 1 \\
1 & 0 & 0 & 1 & 0 \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
1 & 0 & 1 & 1 & 1 \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
\cdot & \cdot & \cdot & \cdot & \cdot \\
1 & 1 & 1 & 1 & 1
\end{bmatrix}
\begin{bmatrix}
\alpha \\ \beta \\ \gamma \\ \delta \\ \zeta
\end{bmatrix}
\begin{bmatrix}
\varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \vdots \\ \varepsilon_8 \\ \vdots \\ \varepsilon_{16}
\end{bmatrix}
\quad (4.4)
$$

where n_{ij} is the element in the i^{th} row and j^{th} column of Table 4.1.

Following Theil's lead, we assume that the relative frequencies in the third line of Table 4.1 are based on independent samples drawn from binomial distributions so that the εs are independent.[10] It can then be shown that the ε_i are asymptotically normally distributed with zero mean and variance equal to $[nik\ f_{3k}(1-f_{3k})]^{-1}$, where n_{1k} equals the total number of cases in the k^{th} column of the first row and f_{3k} equals the corresponding relative frequency in the k^{th} column of the third row.[11]

Estimation

Taking the natural logarithms of the relative frequencies assures the asymptotic normality of the disturbances and applying weighted least squares estimation to the transformed data eliminates heteroskedasticity. The weights are proportional to the reciprocals of the approximate standard deviations of the ε_i. Thus, the assumptions of the classical normal regression model are satisfied. Then by substituting $\hat{\alpha}, \hat{\beta}, \hat{\gamma}, \hat{\delta}$, and $\hat{\zeta}$ into Equation (4.3b), we can get implicit estimates of $\hat{p}_i$, i.e.,

$$\hat{p}_i = \frac{1}{1+e^{-\hat{\alpha}-\hat{\beta}X_i-\hat{\gamma}Z_i-\hat{\delta}U_i-\hat{\zeta}W_i}} . \qquad (4.3)$$

Results

Utilizing the data presented in Table 4.1 and applying Theil's transformation to purge heteroskedasticity to the resulting 16 observations gave the following estimated equation:

$$\ln[p_i/(1-p_i)] = -9.30 - \underset{(0.20)}{0.62}\, X_i + \underset{(0.26)}{1.03}\, Z_i - \underset{(0.20)}{0.85}\, U_i$$

$$- \underset{(0.20)}{0.14}\, W_i + e_i ; \; R^2 = 0.85. \qquad (4.5a)$$

As can be seen, we have a high coefficient of determination and three out of four coefficients are statistically significant at better than the 0.5 percent level. However, when we solve for $\hat{p}_i$,

$$\hat{p}_i = \frac{1}{1+e^{9.30+0.62X_i-1.03Z_i+0.85U_i+0.14W_i}} \qquad (4.5b)$$

we end up with nonsensical results. For example, the probability of a black person, with no preschool children, no high school education, and not living in model cities (X=0, Z=0, U=0, W=0) becoming employed is:

$$\hat{p}_i = \frac{1}{1+e^{9.30}} \simeq 0.00009,$$

which does not even come close to the observed relative frequency of 0.155 for this group.

The dilemma was partially resolved after we reestimated Theil's own example.[12] Ordinary least squares and weighted least squares estimates showed that the results presented in his example are not those of weighted least squares even though they are claimed to be so.

Another attempt at purging the data of heteroskedasticity, this time by a two step procedure, was undertaken but to no avail. Specifically, we ran ordinary least squares to obtain $\hat{Y}_i$s and, since $E(\varepsilon_i^2)=E(Y_i)[1-E(Y_i)]$, each observation was weighted by

$$w_i=[E(\hat{Y}_i)(1-E(\hat{Y}_i)]^{-\frac{1}{2}}$$

and reestimated by ordinary least squares. The results were just as nonsensical as those presented in Equation (4.5a).

Although the violation of the homoskedasticity assumption leads to insufficient estimates of the regression coefficients and biased estimates of the standard errors, which in turn affect the t-ratios, the estimated coefficients are unbiased and consistent. Therefore, we will use the ordinary least squares results for the logit model.

$$\ln[p_i/(1-p_i)] = \underset{}{-1.94} \underset{(0.14)}{-0.22} X_i \underset{(0.14)}{+0.48} Z_i \underset{(0.14)}{-0.39} U_i \underset{(0.14)}{+0.33} W_i + e_i; R^2=0.70 \quad (4.6a)$$

We see that β is significant at the 10 percent, δ at better than the 1 percent, and γ and ζ at better than the 0.5 percent level. However, as explained above, the estimated standard errors presented in parentheses below the estimated coefficients are biased. The classical tests of significance may still be reasonable approximations. Solving for $\hat{p}_i$, we get

$$p_i = \frac{1}{1+e^{1.94+0.22X_i-0.48Z_i+0.39U_i-0.33W_i}},$$

from which the entries in Table 4.2 have been computed. It shows that the estimated $\hat{p}_i$S approximate the observed relative frequencies in Table 4.1 quite closely.

Implications[13]

Due to the limited information contained in the data and the qualifications our estimates are subject to, the implications drawn are tentative and should only be taken as possible suggestions in identifying the factors influencing the probability of an AFDC recipient's employment.

TABLE 4.2.--Relative Frequencies and the Implicit Estimates of p_i.

Categories*	(0000)	(0001)	(0010)	(0011)	(0100)	(0101)	(0110)	(0111)	(1000)	(1001)	(1010)	(1011)	(1100)	(1101)	(1110)	(1111)
Actual Relative Frequency	0.155	0.154	0.080	0.128	0.195	0.312	0.082	0.195	0.123	0.094	0.074	0.109	0.147	0.178	0.144	0.163
Estimated p_i's	0.127	0.167	0.089	0.120	0.189	0.246	0.137	0.181	0.103	0.138	0.072	0.098	0.157	0.206	0.113	0.151

*The categories can be interpreted as follows:

(0000) = > X = 0, Z = 0, U = 0, W = 0 = > individuals who are black, have no children 0-5 years old, have no high school education, and do not live in model cities.

(0001) = > X = 0, Z = 0, U = 0, W = 1 = > individuals who are black, have no children 0-5 years old, have no high school education, and live in model cities.

(0010) = > X = 0, Z = 0, U = 1, W = 0 = > individuals who are black, have no children 0-5 years old, have high school education or more, and do not live in model cities.

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(1111) = > X = 1, Z = 1, U = 1, W = 1 = > individuals who are white, have children 0-5 years old, have high school education or more, and live in model cities.

First, we see that non-white AFDC recipients have a higher probability of being employed across all categories. Given that a large portion of the caseload is composed of AFDC mothers, it is easy to find other data confirming this conclusion. For example, the overall civilian labor force participation rate for women age 16 and over was 40.7 percent for whites and 49.3 percent for non-whites (in 1960). The higher participation rates of non-white women seems to hold for all age groups except teenagers and is most pronounced in the age brackets 25 to 34 and 35 to 44 (16.0 and 11.8 percentage points above that for white women, respectively).[14] The fact that two-thirds of all AFDC mothers fall between the ages of 25 to 44 lends more credence to our results.[15]

Although a number of reasons have been offered purporting to explain the higher labor force participation of non-white women, they are quite _ad hoc_ and uncorroborated propositions.[16] We will simply say that the higher probability of being employed for non-white AFDC recipients might be due to the relatively higher supply of labor that this group seems to offer.

A second implication of our results is that AFDC families with preschool children have higher probabilities of employment. This is contrary to the findings of other investigators as well as to the expected direction of the relationship. Cohen found that by far the single most important demographic characteristic influencing the labor force participation decisions of women was the presence and age composition of children.[17] Further, the presence of children under six was found to have the strongest inhibiting effect on labor force participation.[18] A peculiarity in the sample or some statistical quirk are the only explanations possible for our results.

The basic assumption underlying recent proposals and policy decisions with respect to welfare has been that if recipients are given the required education and training, jobs are readily available. A third implication of our estimates suggest the opposite. While there is much evidence that labor force participation rates are positively related to educational attainment for most demographic groups, the single important exception to this generalization is the group composed of non-white women. For this group, no systematic relationship appears to exist between labor force participation and educational attainment (except for higher rates for college graduates).[19] Further evidence is accumulating that for a broad range of occupations institutional training or educational attainment is a poor predictor of job performance.[20] By the same token, several studies suggest that the increase in the probability of employment is negligible, especially for minority group workers, when they are provided with vocational training and education.[21] Thus, our result that

AFDC recipients with less than high school education have a higher probability of being in the labor force does not run against the grain of these findings.

The affects of residing in a model cities area of a city is something about which little is known. The inclusion of this category into our analysis was based on the thought that special transportation, information, health, and other services available to model cities residents might act to increase employment. Although the results appear to support such a claim, this could also be due to the effect of poverty on labor force participation.[22] Model cities neighborhoods are, of course, the poorest acreas of cities and it is not possible to distinguish between the programs and the poverty in understanding the role of this variable.

FOOTNOTES TO CHAPTER IV

[1]A 100 percent welfare tax implies that the basic grant is reduced by one dollar for every dollar of income earned by a welfare recipient.

[2]The level of income at or above which a person is no longer eligible for public assistance is called the break-even level of income.

[3]Social Security Amendments of 1967, Sec. 201(C) (A), P.L. 90-248, January 2, 1968.

[4]See Vernon K. Smith and Aydin Ulusan, The Employment of AFDC Recipients in Michigan, Studies in Welfare Policy, Publication 163 (Lansing: Michigan Department of Social Services, 1972).

[5]The cross-sectional data were obtained from a survey conducted by the Michigan Department of Social Services of a sample of AFDC recipients in Ingham and Genesee counties in July, 1970. Besides obtained information on the employment status of individuals on welfare, other demographic, and economic characteristics were recorded.

[6]See, for example, Malcom S. Cohen, Samuel A. Rea, Jr., and Robert I. Lerman, "A Micro Model of Labor Supply," BLS Staff Paper 4, (Washington, D.C.: U.S. Department of Labor, 1970); Leonard J. Hausman, "The Impact of Welfare on the Work Effort of AFDC Mothers," in The President's Commission on Income Maintenance Programs, Technical Studies, (Washington, D.C.: U.S. Government Printing Office, 1970); Ronald E. Fine, Director, Final Report: AFDC Employment and Referral Guidelines, Minneapolis, Minnesota: Institute for Interdisciplinary Studies, June, 1972); and Daniel H. Saks, "Economic Analysis of an Urban Public Assistance Program: Aid to New York City Families of Dependent Children in the Sixties," (Unpublished Ph.D. dissertation, Princeton University, 1973).

[7]This section draws heavily on Jan Kmenta's Elements of Econometrics, (New York: The Macmillan Company, 1971), Chapter 11.

[8]For an application of the probit analysis model see, e.g., James Tobin, "Estimation of Relationships for Limited Dependent Variables," Econometrica, Vol. 26 (January, 1958), pp. 24-36; and for the logit model see Henri Theil, Principles of Econometrics, (New York: John Wiley and Sons, Inc., 1971), Chapter 12.

[9]Although all of the explanatory variables are dichotomous, this is not due to the use of the logit model. Continuous variables can also be used, however, we have had to make due with what was in the survey.

[10]Theil, op. cit., p. 635.

[11]Ibid., p. 635.

[12]Ibid., p. 635.

[13]I am grateful to Mr. Vernon K. Smith for his assistance in the preparation of this section. His valuable comments, and knowledge in the field were extremely helpful.

[14]U.S. Department of Labor, Statistics on Manpower, Supplement to Manpower Report of the President (Washington, D.C.: U.S. Government Printing Office, March, 1969), Table A-4.

[15]Michigan Department of Social Services, Profile of Michigan's AFDC Caseload, Research Paper Number 1, (Lansing: The Department, October, 1969), Table 16.

[16]See William G. Bowen and T. Aldrich Finnegan, The Economics of Labor Force Participation, (Princeton: Princeton University Press, 1969), pp. 252-259; and Glen G. Cain, Married Women in the Labor Force, (Chicago: University of Chicago Press, 1966), pp. 81-3, 103-4.

[17]Malcom Cohen, "Married Women in the Labor Force, An Analysis of Participation Rates," Monthly Labor Review, (October, 1969).

[18]Bowen and Finegan, op. cit., pp. 96-103.

[19]Ibid., pp. 122-7.

[20]See Daniel Diamond and Hrach Bedrosian, "Hiring Standards and Job Performance," Manpower Research Monograph No. 18 (Washington, D.C.: U.S. Department of Labor).

[21]See Edward Opton, "Factors Associated with Employment Among Welfare Mothers," (Berkeley, California: The Wright Institute, 1971), (DOL Contract Number 51-05-69-04); and Peter Doeringer, ed., Programs to Employ the Disadvantaged (Engelwood Cliffs, New Jersey: Prentice-Hall, Inc., 1969).

[22]See Joseph D. Mooney, "Urban Poverty and Labor Force Participation," American Economic Review, Vol. 57 (March, 1967), pp. 104-19.

CHAPTER V

FLOWS INTO AFDC-R: A LOGISTIC GROWTH MODEL

Introduction

The AFDC-R category has, by far, the largest caseload of any welfare programs. In December, 1971, there were 128,644 AFDC-R cases as compared to 11,766 AFDC-U and 45,712 GA cases.[1] Besides carrying the most weight in terms of the state's social services budget, it is one of the most rapidly growing public assistance programs. Given these facts, the importance of an accurate predictive model of the AFDC-R caseload becomes obvious.[2]

It was pointed out in Chapter II that many legal, political, and sociological factors were instrumental in the growth of welfare caseloads. Furthermore, most of these factors were seen to be non-quantifiable. One way of dealing with this would be to use a time trend as an explanatory variable in an equation explaining AFDC-R caseloads. This would not be satisfactory since a time trend implies indefinite growth. The use of dichotomous explanatory variables (e.g., $X_t=0$ before the increase in maximum AFDC grants, and $X_t=1$ after the increase) would, on the other hand, require a very large set of observations if there were to be <u>adequate degrees of freedom</u> since the number of events that would have to be dichotomized are so numerous. Even if most of these events could be dichotomized, such an analysis would only detect changes in the intercept and slope (if interaction is specified) of a linear model.[3] Therefore, we will attempt to predict AFDC-R caseloads by using a logistic growth model in which caseload asymptotically approaches some limit. The asymptote for the AFDC-R caseload is the number of female headed families and subfamilies with related children under 18 in Michigan. Although such an analysis could very well apply to AFDC-U and GA cases also, the definition of an asymptote for GA and AFDC-U cases would be almost impossible even if data on such an asymptote were available. Furthermore, the growth curve for AFDC-U and GA cases show many fluctuations whereas AFDC-R cases exhibit a smooth growth similar to the curve in Figure 5.1 presented below.

The Model

The model to be employed for predicting AFDC-R caseloads is a modified[4] logistic growth curve and can be specified as follows:

$$C_t = \frac{F_t}{1+e^{\alpha+\beta t+\varepsilon_t}}, \tag{5.1a}$$

where C_t = AFDC-R caseload in Michigan in month t,

F_t = female-headed families and sub-families with related children under 18 in Michigan in month t,

e = the natural logarithm base,

t = time, i.e., t=1, 2,...,42 (July 1968 to December 1971), and

ε_t = disturbance term.

The population regression line is given by the modified logistic growth curve shown in Figure 5.1.

A MODIFIED LOGISTIC GROWTH CURVE

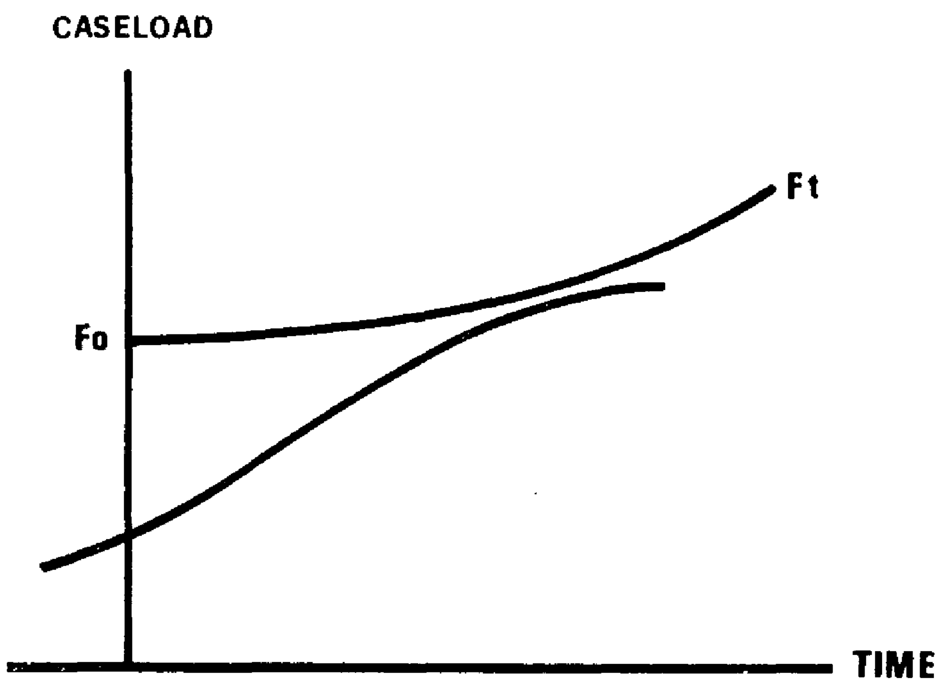

FIGURE 5.1

As we are dealing with female-headed AFDC families, the upper bound to the AFDC-R caseload is the total number of female-headed families and sub-families with related children under 18 in Michigan (F_t). We hypothesize that the dynamic processes previously mentioned led to a non-linear growth of AFDC-R caseloads as presented in Figure 5.1. The statistical test of significance, and the coefficient of determination, R^2, presented with the results will help to judge the soundness of this hypothesis. Furthermore, predicting caseloads and comparing them with actual figures will also be useful in determining the validity of our model.

Specification

The logistic model can be specified in two ways: one is the form given in Equation (5.1a), and the other is

$$C_t = \frac{F_t}{1+e^{\alpha+\beta t}} + \varepsilon_t. \qquad (5.2)$$

The values of C_t can extend from $-\infty$ to $+\infty$ if the model is specified as (5.2) and therefore the normality assumption of the classical normal regression model is not violated. Unfortunately obtaining maximum likelihood estimates for the parameters of this non-linear equation requires maximizing the following logarithmic likelihood function with respect to its parameters:

$$L = -\frac{T}{2}\ln(2\pi) - \frac{T}{2}\ln\sigma^2 - \frac{1}{2\sigma^2}\sum_{t=1}^{T}[C_t - \frac{F_t}{1+e^{\alpha+\beta_t}}]^2. \qquad (5.3)$$

This could be done on a computer; however, the returns from such an undertaking did not seem to be worth the costs it would entail. Therefore, the specification implicit in Equation (5.1a) was adopted, and

$$\ln(\frac{F_t}{C_t} -1) = \alpha+\beta_t+\varepsilon_t \quad (5.1b)$$

was estimated by ordinary least squares. As this means violating the normality assumtpion (since C_t can now only take on values between 0 and F_t), our results must be qualified. Although non-normality makes the least squares coefficients less efficient in small samples, they retain all desirable asymptotic properties. Furthermore, the distribution of the disturbances is not radically different from the normal and therefore classical tests of significance may be reasonable approximations.[5]

Estimation[6]

The estimation of Equation (5.1b) would be straight-forward if monthly data on female headed families and sub-families with related children under 18 were available. However, these figures are only published in each Decennial Census and we have two data points, 1960 and 1970, for our (F_t) variable. Although the number of marriages, divorces, desertions, and illegitimate children of single women, and other socio-economic and demographic factors determine the size of (F_t), the absence of data forces us to make the simplifying assumption that the growth rate of female-headed families between 1960 and 1970 was exponential:

$$F_t = F_o e^{rt}, \qquad (5.4a)$$

where F_t = number of female headed families and sub-families with related children in Michigan in month t,

F_o = initial value of F_t (in our case 1960),

e = natural logarithm base,

r = growth rate, and

t = time, i.e., t = 1,2,...,T.

As the rate of growth, r, is the only unknown, we can solve for it after expressing (5.4a) in logarithmic form as

$$r = \frac{\ln F_T - \ln F_o}{T}, \qquad (5.4b)$$

where F_T is the last observation, F_o the first observation, and T the number of months between the two. Thus,

$$r = \frac{\ln(142{,}435) - \ln(82{,}000)}{120} = 0.0046. \qquad (5.4c)$$

Now we can estimate the value of (F_t), say $(\hat{F}_t)$, for any month between 1960 and 1970 by entering the appropriate (t) into

$$\hat{F}_t = (82{,}000)e^{0.0046t} \qquad (5.5)$$

These estimates will be used in Equation (5.1b).

Results

The estimated logistic growth curve for Michigan's AFDC-R caseload is

$$\ln\left(\frac{\hat{F}_t}{C_t}-1\right)=0.967-\underset{(0.002)}{0.049t}+1t;\ R^2=0.93 \tag{5.6a}$$

Subject to the qualifications implied by the violation of the normality assumption, we see that the coefficient for (t) seems highly significant (the value of Student's t-statistic is -24.5) and 93 percent of the variation in the dependent variable is explained by the estimated relationship.[7] We can solve for $\hat{\hat{C}}_t$ (double hat because an estimate for F_t was used) to get

$$\hat{\hat{C}}_t = \frac{\hat{F}_t}{1+e^{0.967-0.049t+e_t}} \tag{5.6b}$$

The negative coefficient for time (t) implies that as time goes by (i.e. (t) increases), the ratio of the case-load to the asymptote will approach one. That is, in the limit

$$\text{as} \quad t \to \infty \quad , \ e^{0.967-0.049t} \longrightarrow 0$$
$$\text{and} \quad \hat{\hat{C}}_t \longrightarrow \hat{F}_t .$$

This, of course, is just for purposes of exposition as we would not expect F_t to retain the same growth rate or, for that matter, even the same shape. Socio-economic, demographic, and political changes would more than likely induce changes in the number of female headed families.

The estimated equation seems to support our reasons for the use of such a model. However, since our main purpose was to be prediction, generating caseload figures for months after December 1971 (our last data point used in estimation) and comparing them with actual caseload figures will give us a better idea of the model's performance. As can be seen from Table 5.1, the model performs quite well, with the highest percentage error being only 5.2. Given the extremely naive way the female-headed families were estimated, the predictions may be considered quite close. It is true that we seem to be consistently under-predicting caseload size. This may be attributed to misspecification or a host of other factors. However, the following explanation may also be valid. Since we are estimating the logarithmic transformation of Equation (5.1a) this might produce a bias in our estimates, since even though

$$E(Y_i) = \alpha+\beta X_i,$$

$$E(\ln Y_i) \neq \ln(\alpha+\beta X_i).$$

A Taylor series expansion of $\ln Y_i$ would make this clearer.[8]

Implications

As our goal is to predict AFDC-R caseload sizes, the obvious implication of the logistic growth curve is that it can be used to get reasonably accurate short run estimates of the size of this category of public assistance. The predicted caseload sizes for the year 1973 are given in Table 5.2. It can be seen that the growth

TABLE 5.1.--Predicted and Actual AFDC-R Caseload.

Month	Predicted Caseload ($\hat{C}_t$)	Actual Caseload (C_t)	Error ($C_t-\hat{C}_t$)	Percentage
January 1972	119,984	120,580	-596	-0.5
February	121,936	123,993	-2,057	-1.7
March	123,869	127,839	-3,970	-3.1
April	125,802	130,489	-4,687	-3.6
May	127,651	132,765	-5,114	-3.9
June	129,512	134,698	-5,186	-3.9
July	131,349	136,799	-5,450	-4.0
August	133,160	140,187	-7,027	-5.1
September	134,938	142,231	-7.293	-5.2
October	136,705	142,794	-6,089	-4.3
November	138,435	143,233	-4,798	-3.4
December	140,148	143,860	-3,712	-2.6

TABLE 5.2.--AFDC-R Caseload Projections for 1973

Month	Projected Number of AFDC-R Cases
January 1973	141,841
February	143,500
March	144,951
April	146,764
May	148,351
June	149,931
July	151,477
August	153,006
September	154,511
October	155,997
November	157,454
December	158,897

rate will diminish and the upper bound for AFDC-R cases, female headed families and sub-families with related children under 18, approached asymptotically. These results are only tentative and exploratory as they depend crucially on the not very realistic assumptions made about the asymptote, (F_t).

FOOTNOTES TO CHAPTER V

[1]This can also be compared with Aid to the Blind (AB), Aid to the Disabled (AD), and Old Age Assistance (OAA) cases which were respectively 1,555, 37,689, and 41,320 in December, 1971.

[2]Although all econometric models can be used for prediction, the use of a model such as the one presented in Chapter 3 would entail making predictions as to the future values of the explanatory variables. Therefore, the accuracy of the predicted dependent variable would depend upon the accuracy of the values assigned to the explanatory variables in future periods.

[3]See Jan Kmenta, Elements of Econometrics, (New York: The Macmillan Company, 1971), Ch. 11, pp. 409-25.

[4]It is modified in that the unmodified logistic growth curve has a horizontal asymptote whereas ours has an increasing one. Cf. Kmenta, *op. cit*., pp. 461-2.

[5]See E. Malinvaud, Statistical Methods of Econometrics, (Chicago: Rand McNally, 1966), pp. 195-197, and 251-254.

[6]Data for AFDC-R caseloads were obtained from Social Service Statistics, published monthly by the Michigan State Department of Social Services, Data on (F_t) were obtained from the 1960 and 1970 Decennial Census.

[7]The F-statistic with 1,40 degrees of freedom is 494.83.

[8]I am grateful to Dr. Jan Kmenta for pointing out this possibility.

CHAPTER VI

SOME CONCLUDING REMARKS

The purpose of this dissertation was to analyze the decision of choosing between welfare and other alternatives and to isolate some factors affecting this process. To this end, a conceptual model was presented to define the flows to and from Michigan's welfare sector. Then, the micro behavior implicit in the conceptual model was analyzed within the framework of a constrained optimization problem where individuals choose among the alternatives open to them. Finally, empirical models were formulated and hypotheses with respect to the welfare decision tested.

Data limitations and the particular aspects of the problem dictated the use of three separate econometric models. The first utilized time-series data in analyzing the aggregate decisions resulting in new welfare recipients and terminations from public assistance. The results, which are tentative, can be summarized as follows:

1. Although both labor market conditions and welfare benefit levels play important roles in the decision to leave or enter public assistance, their

impacts are not uniform over the different sub-groups examined. Terminating AFDC-R and AFDC-U recipients are seen to be influenced as expected by the measured demand and supply of labor, while nothing in this respect can be said for GA. Similarly, the level of welfare benefits has a definite and strong impact on the decision of terminating from AFDC-R and AFDC-U but not on the decision of new recipients. On the other hand, expected wages are an important determinant of the flows into welfare, but shows an unexpected and non-significant relationship with terminations.

2. Current as well as past labor market conditions have a significant influence on the decision to accept public assistance. The distributed lag structure specified in the new recipient equations yielded significant and expected results for all categories. Again, however, the magnitude of the impact is different for AFDC-R, AFDC-U, and GA.

As was pointed out earlier, some inconsistent results were obtained from the estimated relationships. This was particularly true for terminations and has reduced the validity of our results considerably. However, as the model, to our knowledge, is the second of only two attempts at an empirical analysis of terminations, we have presented the results as they stand.[1] A better specification and/or the employment of statistical techniques such as "principal components analysis" to alleviate the problems of multicollinearity could possibly lead to a better set of results.[2]

The probability of correlation across the new recipient and terminations equations for all categories is quite high. It is quite possible that terminations affect new recipients and that new recipients in one category influence the inflows into other programs. Given such a possibility, the gain in statistical efficiency implied by estimating the whole system jointly is worthy of consideration. A technique such as "Seemingly Unrelated Regressions" would be appropriate for such a future undertaking.[3] Similarly, the specification of a simultaneous equation system is also in the realm of possible improvements in analyzing the welfare choice.

The second econometric model analyzed the employment probabilities of welfare recipients. The results from the logit model specified in Chapter IV, can be summarized as follows:

1. Black AFDC recipients have higher probabilities of employment than whites. This result is consistent with other studies of labor force participation, suggesting that the possible reason for this is the greater supply of labor typically offered by black women.

2. Contrary to the primary goal of many proposals and policy changes, education by itself does not imply

higher probabilities of employment for AFDC recipients. This result is also supported, or at least not contradicted, by many studies. However, the problems of finding an appropriate estimator makes this one of our most tentative findings.

3. AFDC recipients living in model cities neighborhoods have higher probabilities of employment than non-model cities residents. This can be attributed to either the programs provided for model cities neighborhoods or the affects of the poverty so prevalant in those neighborhoods on labor force participation.

The last econometric model was specified to account for the gradual accumulation of non-quantifiable factors affecting the decision to enter the AFDC-R program and to provide a reliable means of predicting the caseloads of this category. Comparisons of caseloads generated by the estimated model indicate that it can be used with reasonable accuracy for this purpose.

FOOTNOTES TO CHAPTER VI

[1]Daniel H. Saks, "Economic Analysis of an Urban Public Assistance Program: Aid to New York City Families of Dependent Children in the Sixties," (Unpublished Ph.D. dissertation, Princeton University, 1972). This is the only study, to our knowledge, that examines terminations from welfare.

[2]For a discussion of principal components analysis, see Henri Theil, Principles of Econometrics, (New York: John Wiley and Sons, Inc., 1971), pp. 46-55.

[3]See Jan Kmenta, Elements of Econometrics, (New York: The Macmillan Company, 1971), pp. 517-29.

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APPENDICES

APPENDIX TO CHAPTER II

APPENDIX TO CHAPTER 2

IMPORTANT CHANGES IN MICHIGAN'S WELFARE POLICY

Effective Date	Policy Change
7-3-61	Simplified budgeting and increased maximum grants for AFDC.
9-1-63	AFDC Foster Care program began.
4-64	AFDC Unemployed Fathers program began.
8-15-66	Increase in maximum AFDC grants.
1-67	AFDC ceilings removed; laundry, special diets, telephone, upkeep of owned home, and household operations allowance added.
2-12-69	Step-parent income disregarded.
4-30-69	Emergency Assistance program began.
6-4-69	Durational residency requirement eliminated.
7-1-69	Income disregard implemented in AFDC; $24 WIN Training allowance.
7-1-69	Update of AFDC standards, $3 per person before receiving grant.
12-15-69	AFDC-Foster Care eligibility expanded per 1967 Social Security Act amendments.
1-20-70	Grandparent not legally responsible for support of grandchildren.
6-1-70	Expansion of AFDC-Foster Care to potential AFDC cases.
6-5-70	No grants cancelled because home unsuitable.
7-70	Per Act 88 of 1970, only relative responsibility is that of spouse for spouse, and parent for child under 21.
9-1-70	New shelter maximums.
9-1-70	Special needs items for laundry, telephone, special diet, and water incorporated into basic AFDC standards.

Effective Date	Policy Change
10-14-70	Per Act 89 of 1970, client's statement of age and relationship of children is prima facia evidence of eligibility for AFDC.
11-12-70	G.M. Strike; strikes eligible for GA, Food Stamps, AFDC, and Medicaid.
4-1-71	AFDC-Incapacity - 3 months duration no longer required; method of eligibility simplified.
7-27-71	Presumptive Eligibility program established in some counties.
9-13-71	Simplified Method of Eligibility Determination implemented statewide in AFDC.

APPENDIX TO CHAPTER III

APPENDIX TO CHAPTER 3

Table 3.A

Breakdown of Occupational Categories that AFDC Recipients Currently or Usually Belong To[a]

Current or Usual Occupational Class	Percent	
	AFDC-R (1)	AFDC-U (2)
Professional, semi-professional, proprietors, managers, and officials	1.1	1.4
Clerical, sales, and kindred workers	11.6	2.6
Craftsmen, formen, and kindred workers	0.7	4.2
Operatives and kindred skilled and semi-skilled workers	3.4	16.8
Service workers, except private household	23.5	3.7
Private household service workers	10.2	0.0
Unskilled laborers	14.4	30.2

[a]This table was constructed from Table No. 22 and 30 in Michigan Department of Social Services, Profile of Michigan AFDC Caseload, Research Paper No. 1 (Lansing, Michigan: the Department, October, 1969).

The first three categories were combined and manufacturing wages weighted by this proportion, and the weight derived from the last four categories were applied to service wages. The expected wages derived from Column 1 were used for AFDC-R, and those derived from Column 2 for AFDC-U and GA. It is true that the occupational and industrial classifications cannot be well matched in this way, but it was the best that could be done at the time.

Table 3.B

Estimated Regression Coefficients for the Terminations Equations Using Different Labor Market Variables[a]

Eq. No.	Dependent Variable	Independent Variables										R^2	F Ratio	Standard Error of the Estimate
		$ENMI_t$	UR_t	WSE_t	$(ENMI_t)(EW_t)$	$\left(\frac{UR_t}{EW_t}\right)$	$(WSE_t)(EW_t)$	EW_t	$NFLF_t$	C_t	G_t			
1.1	T_t^{AFDC-R}	7.87	---	---	-0.07	---	---	-0.76	0.51	0.08***	-41.46**	0.75	18.42	1,143.07
		(16.51)			(0.14)			(268.72)	(7.05)	(0.03)	(21.87)			
1.2	T_t^{AFDC-U}	14.55	---	---	-0.01	---	---	-50.51	-2.46	0.28***	-26.31***	0.62	9.76	1,556.24
		(23.53)			(0.19)			(324.73)	(9.51)	(0.10)	(13.24)			
1.3	T_t^{GA}	-48.63***	---	---	0.36**	---	---	-604.17*	20.60***	0.17***	49.31*	0.97	220.54	1,560.32
		(24.96)			(0.21)			(371.05)	(9.96)	(0.06)	(32.61)			
1.4	T_t^{AFDC-R}	---	-595.50**	---	---	-111.96	---	-71.37	4.28***	0.10***	-45.06***	0.78	21.83	1,070.69
			(257.33)			(118.17)		(76.46)	(1.89)	(0.02)	(20.49)			
1.5	T_t^{AFDC-U}	---	-112.99	---	---	33.11	---	11.69	1.80	0.27***	-28.76	0.62	9.74	1,557.11
			(533.04)			(178.22)		(77.62)	(1.54)	(0.10)	(13.01)			
1.6	T_t^{GA}	---	1053.59**	---	---	198.84	---	-120.36**	0.44	0.11***	34.62	0.97	232.14	1,521.73
			(546.65)			(172.81)		(72.65)	(1.58)	(0.05)	(29.19)			
1.7	T_t^{AFDC-R}	---	---	4.76**	---	---	0.00	-116.52*	-0.39	0.10***	-43.40***	0.78	20.82	1,090.77
				(2.67)			(0.00)	(75.62)	(3.09)	(0.03)	(20.84)			
1.8	T_t^{AFDC-U}	---	---	8.84*	---	---	0.07	-185.77	-5.90	0.34***	-33.18***	0.73	16.19	1,311.50
				(6.25)			(0.07)	(241.17)	(5.99)	(0.08)	(11.16)			
1.9	T_t^{GA}	---	---	-13.83**	---	---	0.09	-393.32	14.04**	0.16***	45.03*	0.97	221.18	1,557.99
				(7.59)			(0.09)	(333.74)	(7.25)	(0.06)	(31.57)			

[a]Standard errors are presented in parentheses below each coefficient.

*Significant at better than the 10 percent level.

**Significant at better than the 5 percent level.

***Significant at better than the 2.5 percent level.

Table 3.C

Estimated Regression Coefficients for the New Recipient Equations With a Four Month Second, Third, and Fourth Degree Polynomial Lag[a]

Equation Number	Dependent Variable	Independent Variables W_{t2}^4	W_{t3}^4	W_{t4}^4	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}	R^2	F Ratio	Standard Error of the Estimate
2.1	N_t^{AFDC-R}	1.07	---	---	-11.79***	-0.13*	0.65***	202.41***	15.41	0.84	30.23	741.47
		(5.53)			(2.82)	(0.10)	(0.21)	(41.44)	(13.49)			
2.2	N_t^{AFDC-U}	28.14	-4.44	---	-10.61***	-0.10	0.66***	195.69***	11.75	0.84	25.82	744.37
		(32.22)	(5.19)		(3.15)	(0.10)	(0.21)	(42.34)	(14.20)			
2.3	N_t^{GA}	28.95	-4.06	-0.04	-10.66***	-0.10	0.66***	195.23***	11.88	0.84	21.93	755.52
		(35.42)	(8.11)	(0.68)	(3.30)	(0.11)	(0.21)	(43.66)	(14.59)			
2.4	N_t^{AFDC-R}	-13.46	---	---	1.01	-0.43***	1.84***	-46.49	-1.51	0.51	6.00	1,504.73
		(11.13)			(5.80)	(0.19)	(0.43)	(85.22)	(9.40)			
2.5	N_t^{AFDC-U}	64.16	-12.73	---	4.12	-0.36***	1.78***	-68.43	-4.19	0.53	5.44	1,493.89
		(62.96)	(10.18)		(6.25)	(0.20)	(0.43)	(86.40)	(9.58)			
2.6	N_t^{GA}	123.97**	14.58	-2.99***	1.06	-0.53***	1.68***	-97.91	0.62	0.57	6.08	1,403.64
		(64.41)	(15.06)	(1.28)	(6.02	(0.20)	(0.40)	(91.13)	(9.23)			
2.7	N_t^{AFDC-R}	-35.61**	---	---	15.48*	0.02	---	-240.24*	81.32*	0.36	3.99	2,686.39
		(19.33)			(10.66)	(0.34)		(158.06)	(49.93)			
2.8	N_t^{AFDC-U}	-63.78	4.63	---	14.42	-0.01	---	-231.44*	83.38*	0.36	3.25	2,722.01
		(113.03)	(18.30)		(11.59)	(0.35)		(163.88)	(51.25)			
2.9	N_t^{GA}	-49.43	10.30	-0.64	13.69	-0.04	---	-238.13*	83.80*	0.36	2.72	2,758.84
		(126.48)	(28.16)	(2.40)	(12.06)	(0.38)		(167.97)	(51.96)			

[a]Standard errors are presented in parentheses below each coefficient.

*Significant at better than the 10 percent level.

**Significant at better than the 5 percent level.

***Significant at better than the 2.5 percent level.

Table 3.D

Estimated Regression Coefficients for the New Recipient Equations With a Five Month Second, Third, and Fourth Degree Polynomial Lag[a]

Equation Number	Dependent Variable	Independent Variables									F Ratio	Standard Error of the Estimate
		W^5_{t2}	W^5_{t3}	W^5_{t4}	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}	R^2		
2.10	N_t^{AFDC-R}	-0.90	---	---	-11.60***	-0.16**	0.63***	191.80***	16.45	0.84	30.26	741.18
		(3.53)			(2.84)	(0.09)	(0.20)	(42.68)	(13.34)			
2.11	N_t^{AFDC-U}	23.40	-3.12	---	-10.54***	-0.11	0.66***	187.99***	11.34	0.85	26.50	736.16
		(20.29)	(2.56)		(2.96)	(0.10)	(0.20)	(42.51)	(13.90)			
2.12	N_t^{GA}	26.23	-1.46	-0.12	-11.34***	-0.14	0.65***	187.11***	12.98	0.85	22.83	742.77
		(20.96)	(3.68)	(0.20)	(3.24)	(0.11)	(0.21)	(42.91)	(14.26)			
2.13	N_t^{AFDC-R}	-11.81**	---	---	1.99	-0.47***	1.82***	-78.38	-0.51	0.52	6.43	1,478.62
		(7.08)			(5.75)	(0.18)	(0.42)	(87.83)	(9.27)			
2.14	N_t^{AFDC-U}	35.46	-6.08	---	3.85	-0.39***	1.84***	-93.40	-1.65	0.55	5.88	1,462.29
		(38.48)	(4.88)		(5.88)	(0.19)	(0.42)	(87.65)	(9.22)			
2.15	N_t^{GA}	49.51	0.15	-0.49	1.28	-0.49***	1.89***	-108.60	-2.73	0.57	5.39	1,453.68
		(39.51)	(7.20)	(0.40)	(6.24)	(0.20)	(0.42)	(87.95)	(9.85)			
2.16	N_t^{AFDC-R}	-20.85**	---	---	16.08*	0.08	---	-244.94*	80.46*	0.35	3.81	2,709.08
		(12.60)			(10.85)	(0.33)		(166.24)	(50.38)			
2.17	N_t^{AFDC-U}	-70.49	6.42	---	14.09	0.00	---	-288.44*	82.75*	0.36	3.21	2,727.99
		(71.17)	(9.06)		(11.28)	(0.35)		(169.01)	(50.84)			
2.18	N_t^{GA}	-66.70	8.22	-0.14	13.38	-0.02	---	-231.42*	85.13*	0.36	2.68	2,766.35
		(74.88)	(13.20)	(0.74)	(12.03)	(0.38)		(172.10)	(53.06)			

[a]Standard errors are presented in parentheses below each coefficient.

*Significant at better than the 10 percent level.

**Significant at better than the 5 percent level.

***Significant at better than the 2.5 percent level.

Table 3.E

Estimated Regression Coefficients for the New Recipient Equations With a Six Month Second, Third, and Fourth Degree Polynomial Lag[a]

Equation Number	Dependent Variable	Independent Variables								R^2	F Ratio	Standard Error of the Estimate
		W^6_{t2}	W^6_{t3}	W^6_{t4}	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}			
2.19	N_t^{AFDC-R}	-1.44	---	---	-11.36***	-0.18***	0.62***	182.45***	16.59	0.84	30.60	737.70
		(2.29)			(2.85)	(0.09)	(0.20)	(42.65)	(13.17)			
2.20	N_t^{AFDC-U}	21.32*	-2.40*	---	-10.43***	-0.11	0.67***	184.18***	10.00	0.85	27.38	726.09
		(15.76)	(1.65)		(2.87)	(0.10)	(0.20)	(42.00)	(13.74)			
2.21	N_t^{GA}	22.13*	-2.15	-0.02	-10.65***	-0.12	0.67***	184.25***	10.33	0.85	23.29	736.57
		(16.51)	(2.09)	(0.08)	(3.13)	(0.11)	(0.20)	(42.60)	(14.05)			
2.22	N_t^{AFDC-R}	-8.59**	---	---	2.56	-0.47***	1.84***	-95.15	0.39	0.53	6.64	1,465.90
		(4.63)			(5.75)	(0.18)	(0.41)	(89.66)	(9.26)			
2.23	N_t^{AFDC-U}	12.05	-2.18	---	3.32	-0.42***	1.87***	-99.36	0.18	0.54	5.68	1,477.03
		(30.25)	(3.16)		(5.90)	(0.19)	(0.42)	(90.52)	(9.33)			
2.24	N_t^{GA}	13.32	-1.84	-0.02	3.06	-0.43***	1.88***	-100.92	0.67	0.54	4.83	1,498.85
		(32.17)	(4.13)	(0.18)	(6.29)	(0.21)	(0.43)	(92.60)	(10.17)			
2.25	N_t^{AFDC-R}	-12.60*	---	---	16.40*	0.14	---	-241.41*	82.00*	0.34	3.66	2,727.35
		(8.44)			(11.01)	(0.32)		(172.46)	(50.99)			
2.26	N_t^{AFDC-U}	-68.13	5.90	---	14.28	-0.00	---	-232.02*	83.53*	0.36	3.23	2,725.58
		(55.26)	(5.80)		(11.21)	(0.35)		(172.30)	(51.01)			
2.27	N_t^{GA}	-59.23	8.29	-0.16	12.64	-0.06	---	-240.38*	91.11**	0.36	2.75	2,754.58
		(58.45)	(7.47)	(0.31)	(11.77)	(0.37)		(174.89)	(53.60)			

[a]Standard errors are presented in parentheses below each coefficient.

*Significant at better than the 10 percent level.

**Significant at better than the 5 percent level.

***Significant at better than the 2.5 percent level.

Table 3.F

Estimated Regression Coefficients for the New Recipient Equations With a Seven Month Second, Third, and Fourth Degree Polynomial Lag[a]

Equation Number	Dependent Variable	Independent Variables								R^2	F Ratio	Standard Error of the Estimate
		W^7_{t2}	W^7_{t3}	W^7_{t4}	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}			
2.28	N_t^{AFDC-R}	-2.54*	---	---	-0.49	-0.16*	0.54***	96.32***	13.96	0.85	20.12	874.00
		(1.87)			(0.87)	(0.10)	(0.24)	(44.31)	(15.65)			
2.29	N_t^{AFDC-U}	18.40*	-1.75*	---	-8.50***	-0.10	0.70***	182.07***	6.70	0.84	25.09	753.37
		(12.96)	(1.17)		(2.86)	(0.10)	(0.21)	(44.84)	(14.50)			
2.30	N_t^{GA}	18.66*	-1.69	-0.00	-8.58***	-0.10	0.70***	182.41***	6.77	0.84	21.31	764.62
		(13.57)	(1.40)	(0.04)	(3.08)	(0.11)	(0.21)	(45.72)	(14.74)			
2.31	N_t^{AFDC-R}	-5.85**	---	---	3.12	-0.45***	1.85***	-108.97*	0.43	0.54	6.61	1,467.65
		(3.20)			(5.84)	(0.17)	(0.41)	(82.99)	(9.28)			
2.32	N_t^{AFDC-U}	-1.90	-0.36	---	3.30	-0.44***	1.86***	-97.91	0.36	0.53	5.51	1,488.52
		(23.92)	(2.14)		(6.04)	(0.19)	(0.42)	(92.39)	(9.42)			
2.33	N_t^{GA}	-4.01	-0.77	0.02	3.53	-0.42***	1.86***	-95.13	-0.28	0.53	4.71	1,508.83
		(25.23)	(2.56)	(0.08)	(6.17)	(0.21)	(0.43)	(94.10)	(9.78)			
2.34	N_t^{AFDC-R}	-8.29*	---	---	17.16*	0.18	---	-241.04*	82.70*	0.33	3.60	2,734.69
		(5.84)			(11.22)	(0.31)		(175.71)	(51.32)			
2.35	N_t^{AFDC-U}	-52.19	3.98	---	14.77*	0.02	---	-239.58*	83.22*	0.35	3.18	2,733.13
		(43.42)	(3.90)		(11.46)	(0.35)		(175.61)	(51.29)			
2.36	N_t^{GA}	-40.14	6.15*	-0.13	13.75	-0.09	---	-256.94*	92.48**	0.37	2.83	2,740.29
		(45.53)	(4.60)	(0.15)	(11.54)	(0.37)		(177.12)	(52.43)			

[a]Standard errors are presented in parentheses below each coefficient.

*Significant at better than the 10 percent level.

**Significant at better than the 5 percent level.

***Significant at better than the 2.5 percent level.

Table 3.G

Estimated Regression Coefficients for the New Recipient Equations With an Eight Month Second, Third, and Fourth Degree Polynomial Lag[a]

Equation Number	Dependent Variable	Independent Variables								R^2	F Ratio	Standard Error of the Estimate
		W^8_{t2}	W^8_{t3}	W^8_{t4}	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}			
2.37	N_t^{AFDC-R}	-1.24 (1.14)	---	---	-10.69*** (2.92)	-0.19*** (0.08)	0.60*** (0.20)	171.87*** (41.86)	14.84 (13.02)	0.84	31.42	729.56
2.38	N_t^{AFDC-U}	15.90* (10.03)	1.34** (0.79)	---	-7.94*** (2.87)	-0.10 (0.10)	0.68*** (0.21)	181.70** (44.39)	3.26 (14.67)	0.84	26.08	741.29
2.39	N_t^{GA}	15.56* (10.31)	-1.44* (0.92)	0.00 (0.02)	-7.88*** (2.92)	-0.10 (0.10)	0.69*** (0.21)	180.09*** (45.67)	3.56 (14.95)	0.84	22.18	751.58
2.40	N_t^{AFDC-R}	-3.95** (2.34)	---	---	3.51 (5.99)	0.43*** (0.17)	1.82*** (0.42)	-90.31 (91.66)	-0.26 (9.29)	0.53	6.45	1,477.27
2.41	N_t^{AFDC-U}	-6.35 (18.84)	0.19 (1.47)	---	3.33 (6.21)	-0.44*** (0.19)	1.82*** (0.43)	-91.24 (93.31)	-0.12 (9.49)	0.53	5.38	1,498.52
2.42	N_t^{GA}	-7.28 (19.30)	-0.11 (1.75)	0.01 (0.04)	3.23 (6.30)	-0.42*** (0.20)	1.86*** (0.45)	-92.90 (94.71)	-0.01 (9.62)	0.53	4.59	1,518.65
2.43	N_t^{AFDC-R}	-6.01* (4.21)	---	---	17.97* (11.39)	0.19 (0.31)	---	-241.37* (175.40)	80.42* (51.00)	0.33	3.61	2,733.84
2.44	N_t^{AFDC-U}	-38.59 (33.89)	2.58 (2.66)	---	15.49* (11.68)	0.04 (0.34)	---	-251.26* (175.85)	81.85* (51.07)	0.35	3.16	2,736.17
2.45	N_t^{GA}	-35.15 (34.69)	3.52 (3.11)	-0.04 (0.07)	15.79* (11.80)	-0.03 (0.37)	---	-251.77* (177.49)	82.95* (51.58)	0.36	2.71	2,761.66

[a]Standard errors are presented in parentheses below each coefficient.

*Significant at better than the 10 percent level.

**Significant at better than the 5 percent level.

***Significant at better than the 2.5 percent level.

Table 3.H

Correlation Matrix for Equation (3.4), Terminations from AFDC-R

T_t	WSE_t	EW_t	$(WSE_t)(EW_t)$	$NFLF_t$	C_t	G_t
1.000	0.750	0.778	0.731	0.753	0.835	0.767
	1.000	0.995	0.947	0.991	0.945	0.996
		1.000	0.947	0.906	0.972	0.999
			1.000	0.948	0.907	0.948
				1.000	0.951	0.998
					1.000	0.966
						1.000

Table 3.I

Correlation Matrix for Equation (3.5), Terminations from AFDC-U

T_t	WSE_t	EW_t	$(WSE_t)(EW_t)$	$NFLF_t$	C_t	G_t
1.000	0.326	0.346	0.345	0.330	0.658	0.274
	1.000	0.995	0.996	0.997	0.707	0.994
		1.000	0.997	0.996	0.757	0.994
			1.000	0.997	0.749	0.995
				1.000	0.719	0.994
					1.000	0.696
						1.000

Table 3.J

Correlation Matrix for Equation (3.6), Terminations from GA

T_t	$ENMI_t$	EW_t	$(ENMI_t)(EW_t)$	$NFLF_t$	C_t	G_t
1.000	0.971	0.978	0.978	0.970	0.979	0.974
	1.000	0.997	0.996	0.995	0.962	0.997
		1.000	0.995	0.996	0.977	0.997
			1.000	0.994	0.978	0.996
				1.000	0.960	0.996
					1.000	0.968
						1.000

Table 3.K

Correlation Matrix for Equation (3.7a), New Recipient to AFDC-R

N_t	W_t	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}
1.000	-0.807	0.265	0.680	0.771	0.839	0.748
	1.000	-0.260	-0.884	-0.758	-0.892	-0.779
		1.000	0.315	0.284	0.400	0.385
			1.000	0.719	0.804	0.752
				1.000	0.751	0.711
					1.000	0.822
						1.000

Table 3.L

Correlation Matrix for Equation (3.8a),
New Recipients to AFDC-U

N_t	W_t	$NFLF_{t-1}$	EXB_{t-1}	TR_t	EW_{t-1}	G_{t-1}
1.000	-0.408	0.297	0.252	0.632	0.361	-0.081
	1.000	-0.530	-0.884	-0.758	-0.892	-0.246
		1.000	0.481	0.532	0.709	0.192
			1.000	0.719	0.804	0.247
				1.000	0.751	0.064
					1.000	0.385
						1.000

Table 3.M

Correlation Matrix for Equation (3.9a),
New Recipients to GA

N_t	W_t	$NFLF_{t-1}$	EXB_{t-1}	EW_{t-1}	T_{t-1}
1.000	-0.528	0.373	0.486	0.459	0.399
	1.000	-0.549	-0.901	-0.892	-0.541
		1.000	0.481	0.709	0.319
			1.000	0.804	0.492
				1.000	0.649
					1.000