AID TO FAMILIES WITH DEPENDENT CHILDREN:

A SYSTEM DYNAMICS MODEL

by

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The Background

In 1935, under the Social Security Act, Congress approved a small program known as Aid to Dependent Children (ADC). In 1950, when less than 3% of the country's children were dependent upon it,[1] the program, renamed Aid to Families with Dependent Children (AFDC) was restructured to also assist one adult relative of a child who was deprived of a second parent living in the household.* By 1978, AFDC had become the largest category of public assistance,[2] supporting the poorest people in the country - children and single-parent female-heads of families.[3] Assistance consisted of cash income as well as non-cash services, always including free medical care and frequently including food stamps.

After the program had been restructured in 1950, the number of applicants that qualified for AFDC assistance began to regularly increase, the number of administrators also increased. It was not until the mid-sixties that legislators, sensing a crisis, designed strategies which attempted to reduce the dependency of recipients. Their intent was not to alter the existent program, but merely to refocus the attention of dependent families on an additional program which offered to assist them to support themselves. This strategy failed to accomplish the objective and the AFDC program failed to diminish in size.[4] (Today, by concentrating on only financial aspects of the policy,) legislators can successfully diminish or increase the program size, by, for example, lowering the poverty level, allowing fewer assets to a family, or not adjusting maintenance payments for inflation. What legislators have not altered is the eligibility qualification that relates to the family's structure. This structure must include a child, under 18, who must, with few exceptions, be deprived of a second parent in the household.

* - In this paper we will consistently refer to the program as AFDC, before and after 1950.

Over the years of AFDC 's existence, academicians and politicians have attempted to shed light on the problems. Survey and secondary data abound, yet no consistent definition of the problem has been formulated, and primary research is scarce. One six month study, of one family's perception of how it must live in its world, revealed an elusive view - that having a child was interrelated with a woman's gaining support for herself. Statistical research indicates that this pattern is common; however, to confirm that the phenomena is related to AFDC is impossible. On the difficulty of knowing how welfare interrelates with the lifestyles of recipients, Senator Moynihan said:

> ...apart from gross statistics on the number of recipients, and characteristics such as age, sex, and place of residence, there is astonishingly little dependable information. The actual process of welfare dependency - how it comes about, what it is, how it is sustained, what diminishes it - remain virtually unexamined.[5]

Since system dynamics has the capacity to sort out and analyze not only quantitative but qualitative data, we used this method to seek consistency in the diversity of data and opinion that exists.

The Purpose

The purpose of this model is to gain insight into the relationship between poverty and AFDC assistance, to diagnose and explain causes and - on the basis of these findings - to test policy alternatives to alleviate poverty.

The Model

Overview:

The model was conceived to replicate the historic pattern of the low-income segment of society which has been eligible for AFDC and the AFDC legislation from its beginning in 1936 and is based on statistics, social and economic theories, and qualitative data. This information was structured into feedback systems and then transferred into the computer-simulation model. The resultant computerized equations, after validation against history, are capable of explaining how people behave under present policies, and how they may behave under new policies.

In order to analyze the problem, it was essential to clearly determine

which of many possible causes were the key elements capable of simulating the history, and so, to enable us to make the model endogenous. Describing this concept, Professor Forrester says:

> "Certain components interact to create the kinds of responses being studied. These, by definition, lie within the boundary. Anything that is not essential to creating the behavior of interest is, by that lack of essentiality, on the outside in the unspecified environment."[6]

The historic pattern was achieved by limiting the data in the model to only AFDC and the low-income segment of society. Elements such as urban decay, discrimination, migration, unemployment, and technological change, which very likely may have influenced AFDC's history, were excluded. Important socio-cultural characteristics of the low-income population are implicitly aggregated in the model.

Elements:

1) Low-income population:

The model includes only that segment of society which in 1935 was the below poverty level population - approximately 3 million families. The model assumes that this is the portion of the national population which was the most susceptible to AFDC assistance. It assumes also that this segment increased only from population growth, not from an influx of people from the rest of the society: out-flow cancels in-flow.

There are three levels or subsets of the low-income population families: 1)employed, 2)non-employed and 3)AFDC.

Levels are characterized as follows:

¶ Employed low-income families signify couples or two-parent families. Support is from work. Children (if they exist) grow up in an environment that is relatively stable. Typical characteristics include: self-confidence, motivation, responsiblity, and education.

¶ Non-employed families signify underemployed families. In the model they are always female-headed, single-parent families and have at least one child. Support from work is only erratic. Children experience an unstable environment because of their parent's social relationships and poverty. Typical characteristics include: a higher-than-average proportion of never-married mothers; a higher-than-average proportion of teen-age mothers; a higher-than-average fertility rate; a

lower-than-average level of self-confidence, motivation, responsibility and education.

¶ AFDC families are a portion of the non-employed families, the same as underemployed families. In the model, they are classified as AFDC families when they are recipients of the AFDC assistance program.

Non-employed is an umbrella term which includes both underemployed families and, when applicable, AFDC families. When the term is used it is for the purpose of contrast with employed families.

2) AFDC:

The model assumes that AFDC is some combination of legislators' perceptions of the needs of non-employed families, and non-employed families' perceptions that affect their choices to become AFDC families. Families are accepted into the AFDC program only from the non-employed family category.

Functions & Tests:

The purpose is to show how the number of families in each level affects the model's equilibrium. Fig. 3.2 shows how the level of each category is influenced by the level of the others. Underemployment is the portion of the non-employed subset that is left when the AFDC subset is operating in the model. In describing the model's equilibrium, we are always referring to one of these three levels or subsets even though we may use one of the following adjunct terms: family, category, group, sector, or portion.

Testing with only two levels - employed and non-employed families:

To observe the resilience of equilibrium between the employed and non-employed families, we first test the model without the AFDC subset. The model assumes that, when only the employed and non-employed subsets operate, the two are in equilibrium at 75% - 25%. Although individual families may change, the model assumes that the proportions do not. Any increase in either category is from population growth only.

We begin testing the two by initiating each on a par with the other, 50%

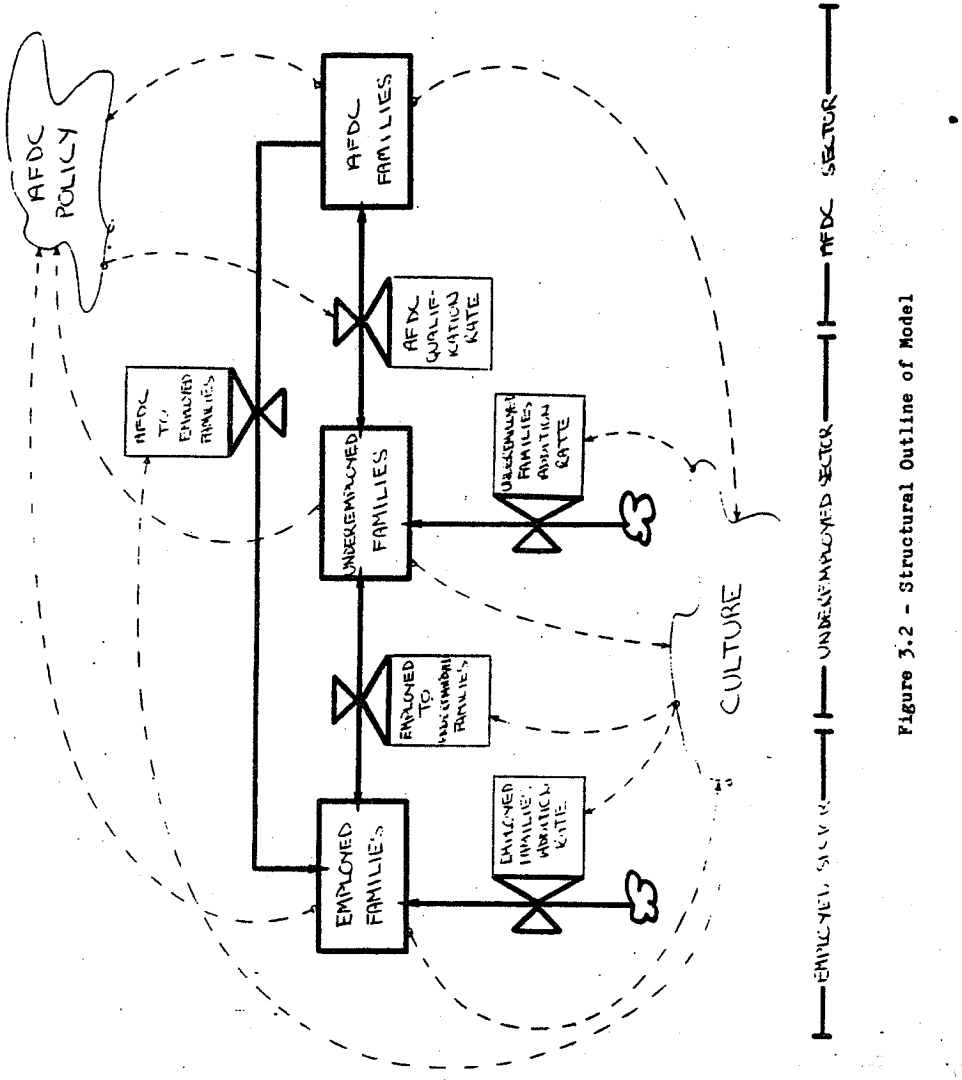

Figure 3.2 - Structural Outline of Model

- 50%, allowing each sector the potential to enlarge or diminish. Although change is only gradual, employment steadily rises. By the end of the model, non-employment has declined and equilibrium (75% - 25%) is reinstated. This result can be explained by the following model assumptions: If the non-employed family sector is not larger than the employed sector, if it is elevated only as high as equal, and only for a sudden jolt, equilibrium will return within the 45-year lifetime of the model. However, if non-employed families remain at least equal for an extended time, the characteristics and values typical to that group will gradually become self-reinforcing, and eventually increase to predominate in the model low-income population. This generally reflects a breakdown in education among the families, and dashed hopes for rising out of poverty.

In contrast to the moderate test, we observe equilibrium when we initially make non-employed families five times greater than employed families. In this case, the jolt of non-employment is enlarged to such an extent that self-reinforcement has great momentum. It functions to overtake employed families to the extent that equilibrium does not return in the lifetime of the model.

Testing with all three levels - employed, non-employed, and AFDC families: We test the model in a number of different ways to observe AFDC's effect on employed and non-employed families. In Fig. 3.10, we fix the equilibrium between employed and non-employed families (75% to 25%) and introduce AFDC, not fixed, to 25% of the non-employed families. The result is that the percentage of non-employed families receiving AFDC grows but the rate slows down. This is because the model assumes that when AFDC families grow to some sizeable proportion of the non-employed, AFDC legislation constrains the increase and changes AFDC assistance to no more than approximately 50% of the non-employed families by the end of 45 years.

In Fig.3.12, we employ the same procedure but instead of introducing AFDC

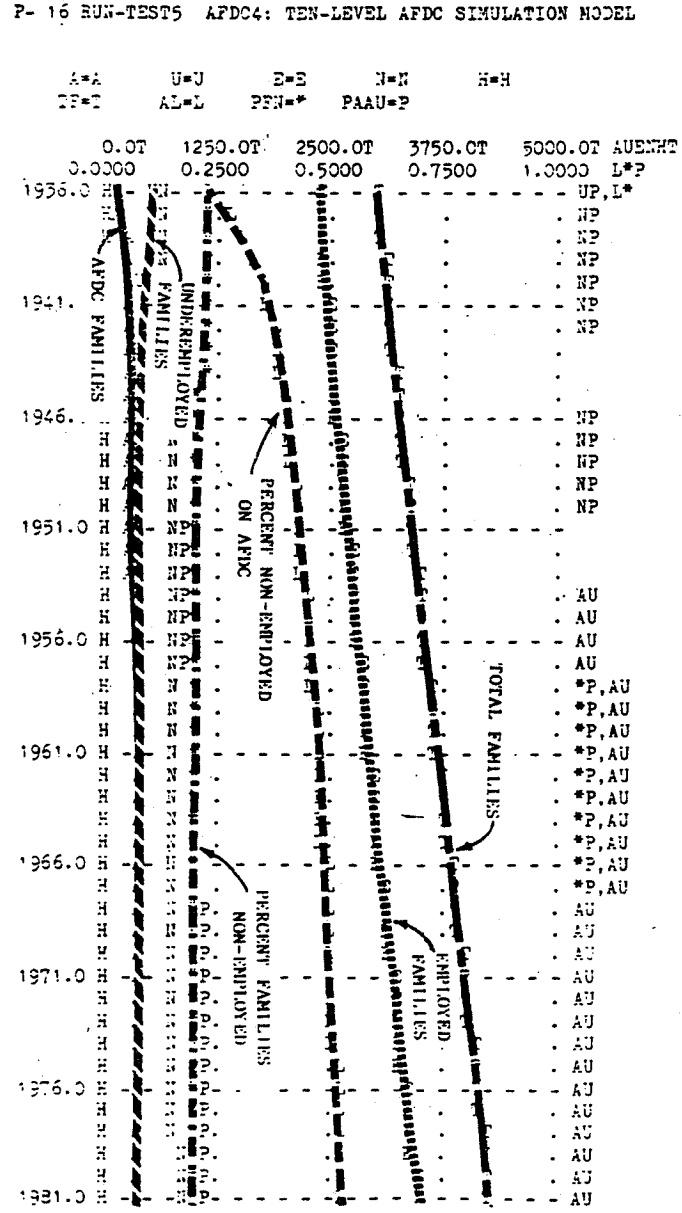

Figure 3.10 - Simulation of AFDC Growth in Unchanging Population

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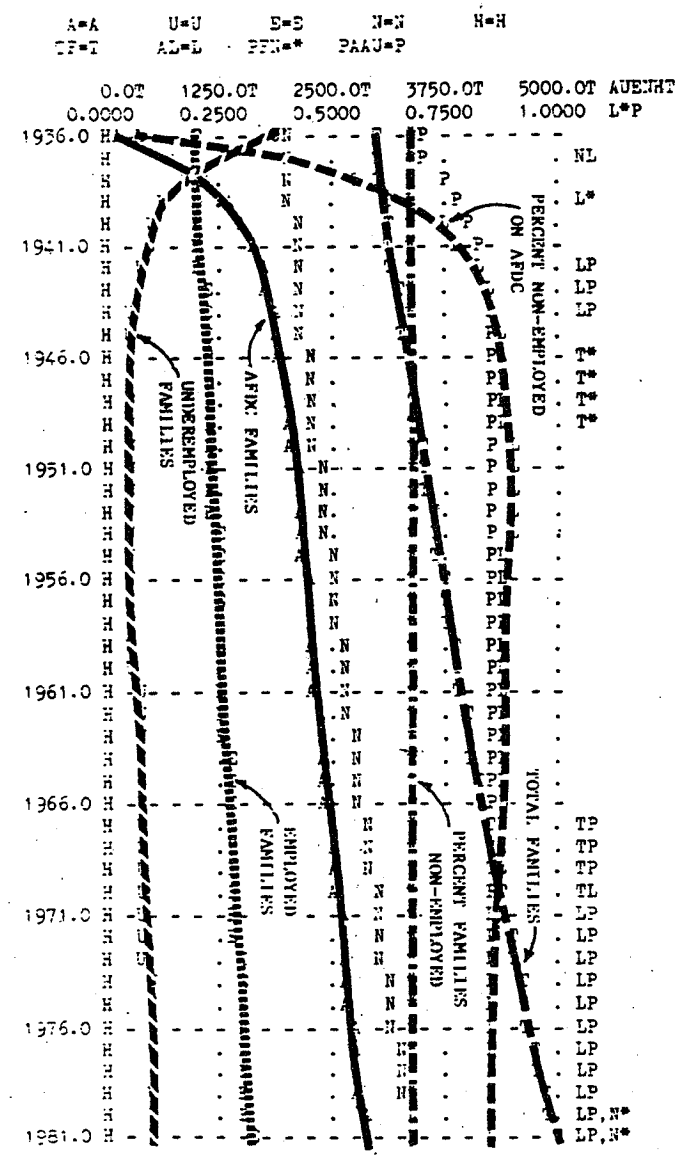

Figure 3.12 - Simulation of AFDC Growth with Nonemployment Increased

to 25% of the non-employed families at equilibrium, we reduce AFDC to 10% and fix the proportions of employed to non-employed at 30% and 70%, respectively. Changing the balance, to suddenly fix non-employed families at such a high level, prompts legislators in the model to rapidly relax qualifications and to increase assistance. In less than ten years, the program is assisting 85% of non-employed families. In absolute terms, the AFDC program grows to almost five times its size from the former test.

The Full Model:

Fig 4.6 is the full model run over a longer period of time. To observe the operation of the section constructed from historic data, note the section from 1935 to 1981. In this run all of the levels are permitted to change; (none are constrained as they are, alternately, in the experiments where the purpose is to examine the interaction under controlled circumstances.) Each of the dynamics that occurs in the full model is explained by the same dynamics that occur in the experiments.

Since a system dynamics model is constructed on the basis of feedback loops, we use the Causal Loop Diagram in Figure 4.3 to explain the structure of the model. The first loop depicts the behavior underlying the model structure. In 1936 when the model run begins, AFDC is assisting 25% of the non-employed category of families. At that time, the proportion of low-income employed to non-employed families is in equilibrium at 75% to 25%. By 1961, the number of non-employed families, though increased, is still less than 50% of the population, but 60% of those families are absorbed into the AFDC program. AFDC assistance increases to meet family demands, and that cycle of expanded assistance causes the program to grow. This is a positive self-reinforcing loop.

The second feedback loop, positive and self-reinforcing, exists simultaneously with the first one. It pertains to the families' behavior. As

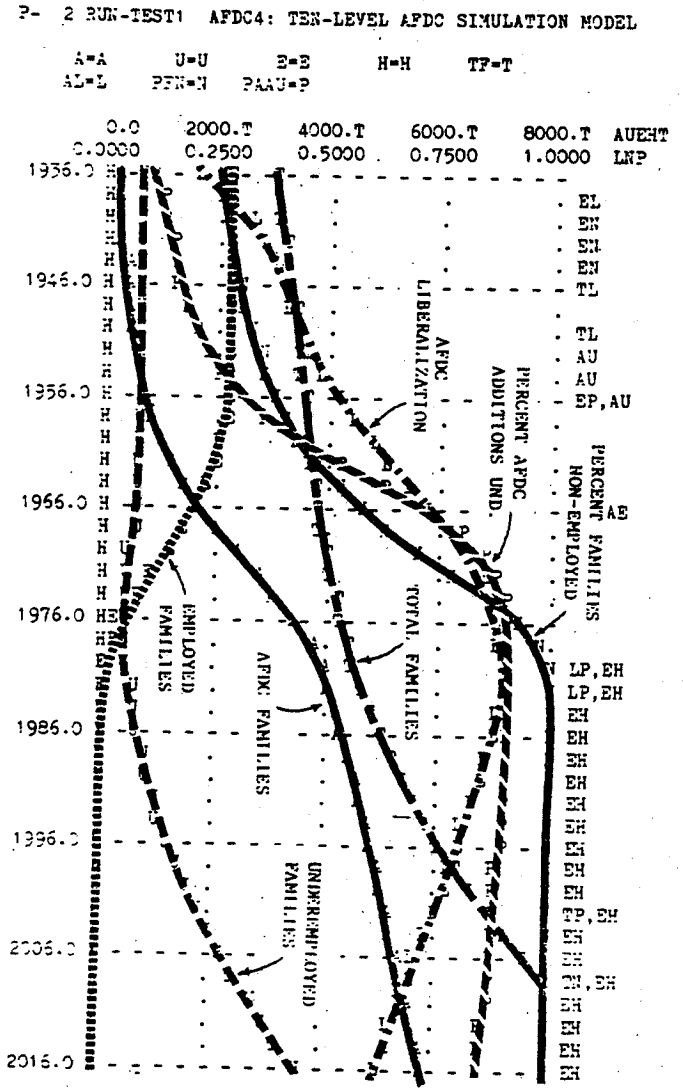

Figure 4.6 - Full Model Simulation thru 2016

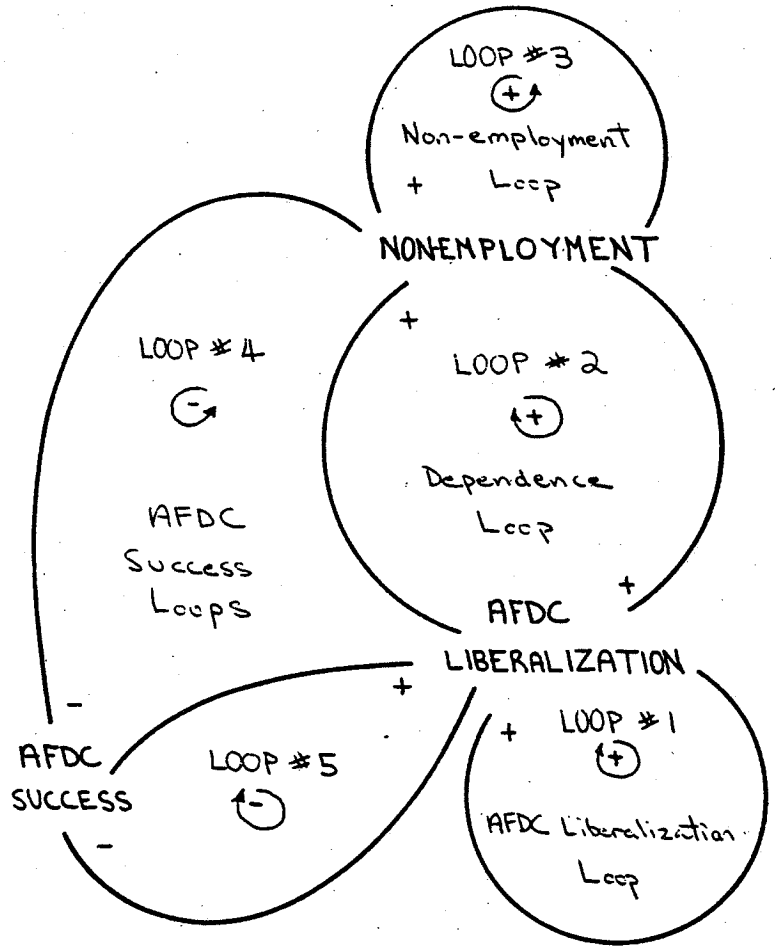

Figure 4.3 - Causal Loop Diagram of AFDC Model

non-employed families increasingly accept and request AFDC assistance, the sector of non-employed families grows. Between 1936 and 1961, the effect is hardly evident in the low-income employed families sector although some of these families must have been moving to the non-employment sector, since in this same time, the non-employed families sector doubles. The non-employed sector can increase from the population growth of both sectors, and from the increase in number of families who have come into that category from the low-income employed sector - an indication that AFDC is weakening the incentive of those families to work.

The period between 1961 and 1971 is a period of transition, the period when the rate of growth of AFDC families reaches a maximum and then slows down. Something in the system changes. In fact, it is the latter half of the period that corresponds to the historic welfare crisis. (The model provides a means to examine dynamics of this event.)*

The third feedback loop is positive. Due to the continued self-reinforcement in this loop, the limit of this process is reached. In twenty-five years, between 1936 and 1961, the number of non-employed families has doubled. Yet in only ten more years it doubles again, becoming 75% of the low-income model population.

This self-reinforcing process effects the AFDC assistance program. At the end of the first 25 years, the program had already increased to assist 50% of the expanded sector of non-employed families, 25% of the entire low-income population. Yet in the next ten years, it was assisting 66% of the still more inflated sector of non-employed families - 50% of the entire low-income model population. By this time, non-employed (underemployed) families that were not

* Apart from this system dynamics explanation, we include here theories social scientists and politicians use to explain the crisis: 1)Welfare was weakening family relationships.[7] 2)Benefits from AFDC increased at a faster rate in the 1960s than wages.[8] 3)The crisis was caused by government regulation of the poor, as in Piven and Cloward's theory.[9] This theory explains that government gives relief to avoid political protest during periods of mass unemployment; then legislators withdraw relief when unrest subsides and the economy is more receptive to labor.

AFDC families became the smallest proportion ever of the non-employed category of families, and the families dependent on AFDC are greater in number than at any time in the 45 year history of the program. AFDC and non-employed families cannot continue to grow at such an accelerated rate indefinitely. The number of families, potentially eligible for AFDC, is finite. The program rate decreases but the number of families receiving aid remains up. Momentum slows down.

The fourth feedback loop, a negative loop, is non-self-reinforcing. It signifies the pressures within AFDC legislation that arise to constrain the program's growth.

The fifth feedback loop is also negative and non-self-reinforcing. It explains that cutting back on AFDC assistance does not cause a decline in the number of non-employed families. As the percentage of AFDC assistance declines, the number of families growing poor increases.

An Historical Perspective:

It is interesting to compare the simulation with the timing of actual changes in the AFDC program from 1935 to 1981. At first, (in 1936) ADC was available only to eligible children. That program was expanded, in 1950, to also provide assistance to one needy relative with whom the dependent child was living. The program picked up momentum. Between 1950 and 1978, the number of AFDC recipients grew 4.6 times from 2.2 to 10.3 million, and AFDC surpassed all other public assistance programs in size, according to the Census Bureau.[10] The model simulation is imposed on historic data, in Fig. 4.2, showing the number of AFDC families from 1935 to 1981. The line on the graph, although historically abrupt, is smoothed in the simulation.

The departure of traditional family patterns drew public and private attention from many sources: Comparing family structures between 1950 and 1978, the Census Bureau claims that changes became noticeable among white families, but became particularly pronounced among black families. The portion of black children, under 18 years old, living in two-parent homes

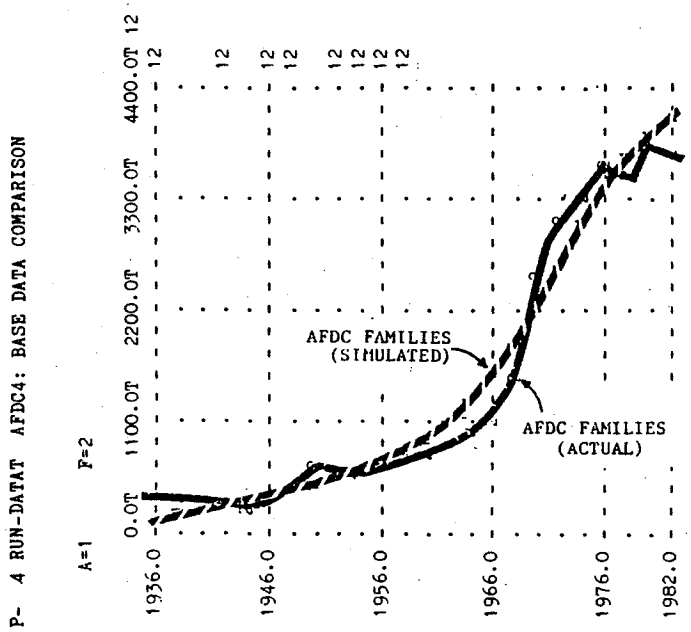

Figure 4.2 - Simulated AFDC Families v. Actual AFDC Families

dropped from 70% to only 44%. The proportion living in single female-headed households rose, in that time period, from 21% to 43%.[11] By 1978, the median-income of a female-headed black family was just $5,888, about one-third of the $15, 913 earned by two-parent black families.[12] In 1975, the share of all children dependent upon AFDC rose from 3.4% to 11.9%.[13] "More than one-fourth of all children in the United States now live in near-poverty households."[14] In 1979, only 15% Of all households in the nation were headed by women, but of that portion, 81% were AFDC households.[15]

From the age-old problems of poverty and unemployment, more complex problems have become evident. While the problems are perceptible at any level of society, they are disproportionately common to individuals in AFDC families. For example, "...more than half of all Aid to Families with Dependent Children (AFDC) assistance in 1975 was paid to women who were or had been teenage mothers."[18] In 1979, 58% of the mothers receiving AFDC had not graduated from high school.[19] "In New York City, [from 1972-75] half of the school dropouts, half of the juvenile delinquents, and half of the younger drug users were from families receiving AFDC."[20] Little, if any new evidence, indicates that these characteristics are receding.

The Full Model Projects:

Extending runs of the model to the year 2016, (using the same equations) (Figure 4.6), we project that poverty continues to worsen. AFDC legislation continuously diminishes aid; thus, the proportion of non-employed families become underemployed and poor.

Policy Alternatives:

The purpose of this model, in addition to analyzing causes of past problems, is to investigate the effects new policies might have on the low-income model population. We test new possibilities using the base model equations. We experiment with AFDC, by itself, and in combination with other policies; and new policies, without AFDC.. All policy changes begin in the

model in 1986 and continue until 2016. Family formulae are unchanged. The policy tests are projections; they are not predictions.

What would happen if:

1) AFDC were halted in 1986 without new policy legislation to address the low-income model population.?

As one might imagine even without seeing this run, the results of this policy are devastating. Unemployment is almost universal throughout the model population. Except for an almost imperceptible rise, employment does not return during the model lifetime.

2) a universal family planning program were instituted to offer everyone the benefit of both information and services to plan their families while at the same time the AFDC policy were to continue?

This policy assumes that women are having children they do not want, that the policy might end unwed teenage motherhood, that it might prevent unwanted motherhood for women who become single-parent heads-of-families.

Results: This program is ineffective in changing the pattern from the extended base case. What it did was only to slightly reduce the scale of the model population.

3) a universal ideal quality education program were available to all family members while at the same time the AFDC policy were to continue?

This policy assumes that today's education is inadequate, that this new policy would effectively motivate and educate the population, that individuals in the families would become self-supporting, that the need for dependence on AFDC would diminish.

Results: The policy has a positive effect on employment (Fig. 5.3). The number of employed families rises, but not until the year 2000. The percentage of non-employed families is less severe than in the base model projection in Fig. 4.6.; the number of AFDC families is the same. Non-employed families remain the largest sector of the model. Since characteristics of the model population are not quickly altered, the time

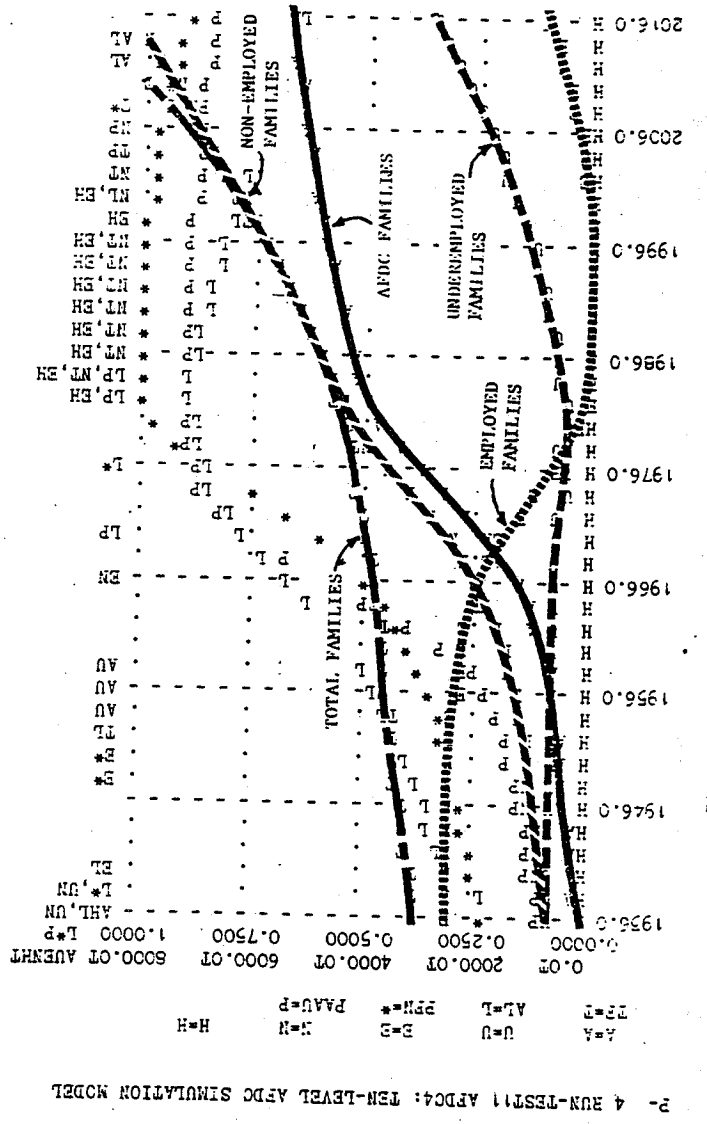

Figure 5.3 - Policy Test #3: Educational Programs

the policy would need to become effective is beyond the projection of this model.

4) a policy were instituted that combined each of the above three changes: a termination of AFDC, addition of a universal information and service family planning program, and addition of a universal ideal quality education program?

This policy change assumes that families would both use and benefit from sound assistance that could possibly enable them to work to support themselves.

Results: At first poverty is universal in the model population. However, this policy shows many positive changes (Fig. 5.4). Non-employment peaks in 2000. Then, moving steadily downward, non-employment drops sharply in 2016 - at the same time, employment has been rising, steadily. This policy shows universal hardship followed by strong recovery both of employment and of the characteristics and values typical to families that are employed.

Comparative analysis between this policy and the base case projection: The differences are remarkable between this policy and the base case, as shown in Fig. 4.6. In 1986, when everyone in this combination policy is in poverty, only a few families in the base case are in poverty even though everyone in the base case is unemployed. In that policy, AFDC is assisting a very large proportion of the model population. The number receiving assistance is large, but the percentage of families supported by AFDC has been falling since 1980. Thus the unassisted (underemployed) portion of non-employed families is rising. In the base case almost the entire population has been non-employed since 1980; in that model's lifetime, employment makes absolutely no recovery. The difference between the policies is that in the base case, poverty is rising; in the combination policy, poverty is falling. By the time the model ends, in the base case, employment shows no sign of recovery. At that time in the

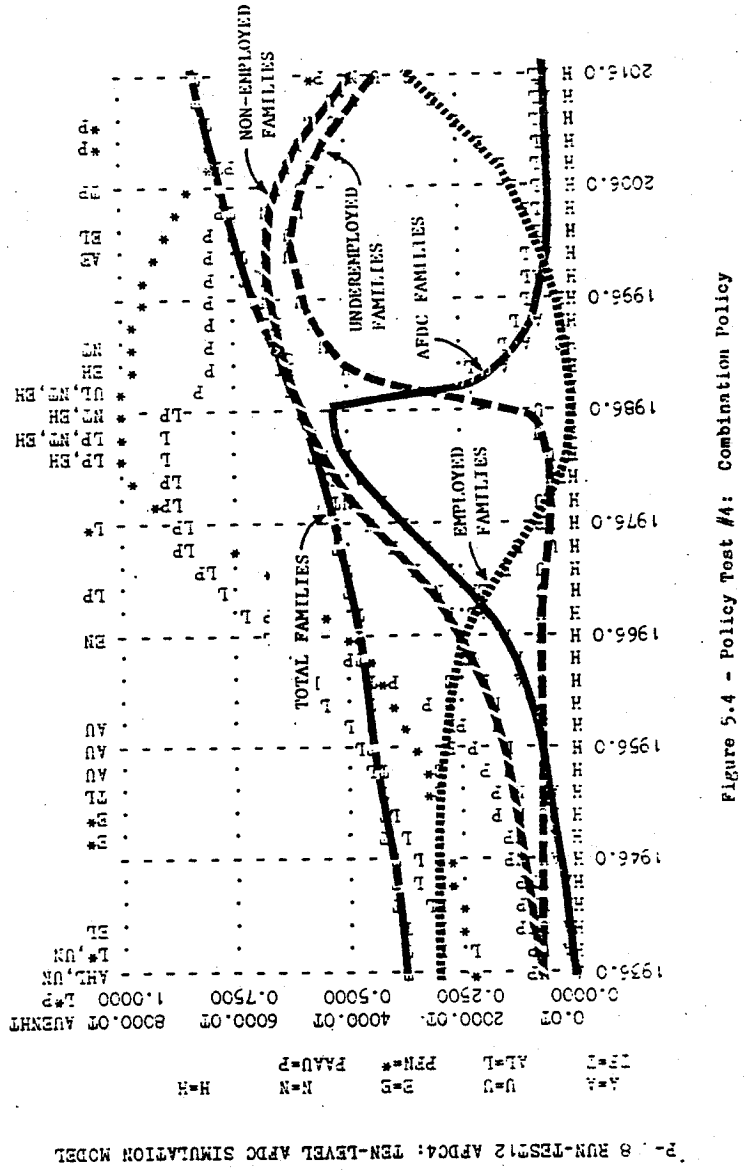

Figure 5.4 - Policy Test #4: Combination Policy

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combination policy, the numbers of employed families are rising, and only just short of surpassing the numbers of non-employed families, which are falling sharply.

5) an habilitation program were instituted in place of AFDC? A minor habilitation program would comprise 15% of AFDC families or 100,000 families; a major program would encompass 90% of all AFDC families.

This policy generally assumes that the program, while offering sustenance, would hasten the transition period for overcoming characteristics and values associated with non-employed families that prevent work success. This character-building thrust would be integrated into an ideal quality education and vocation program - and end with a job. These habilitation policies assume that, rather than inflict the hardships that a termination of AFDC would cause, they would enable AFDC dependents to become capable of supporting themselves.

The minor habilitation policy assumes that before launching a large scale program, pilot testing is a logical approach.

Results: The minor habilitation policy is unsuccessful. Despite an intitial high enrollment, the dropout rate is 80%. Even among those who complete the program, only a few maintained jobs. The program fails because it is offered only to a small portion of the non-employed population; thus, the work-related characteristics it successfully engenders are unable to withstand the non-work-related characteristics which are overwhelmingly reinforced by the majority of the model population - people who are underemployed and on AFDC.

The rationale for the major habilitation policy assumes that a widespread, major build-up of families would adequately and quickly overcome the non-employment characteristics that interfere with employment, that it would have the force to reintroduce

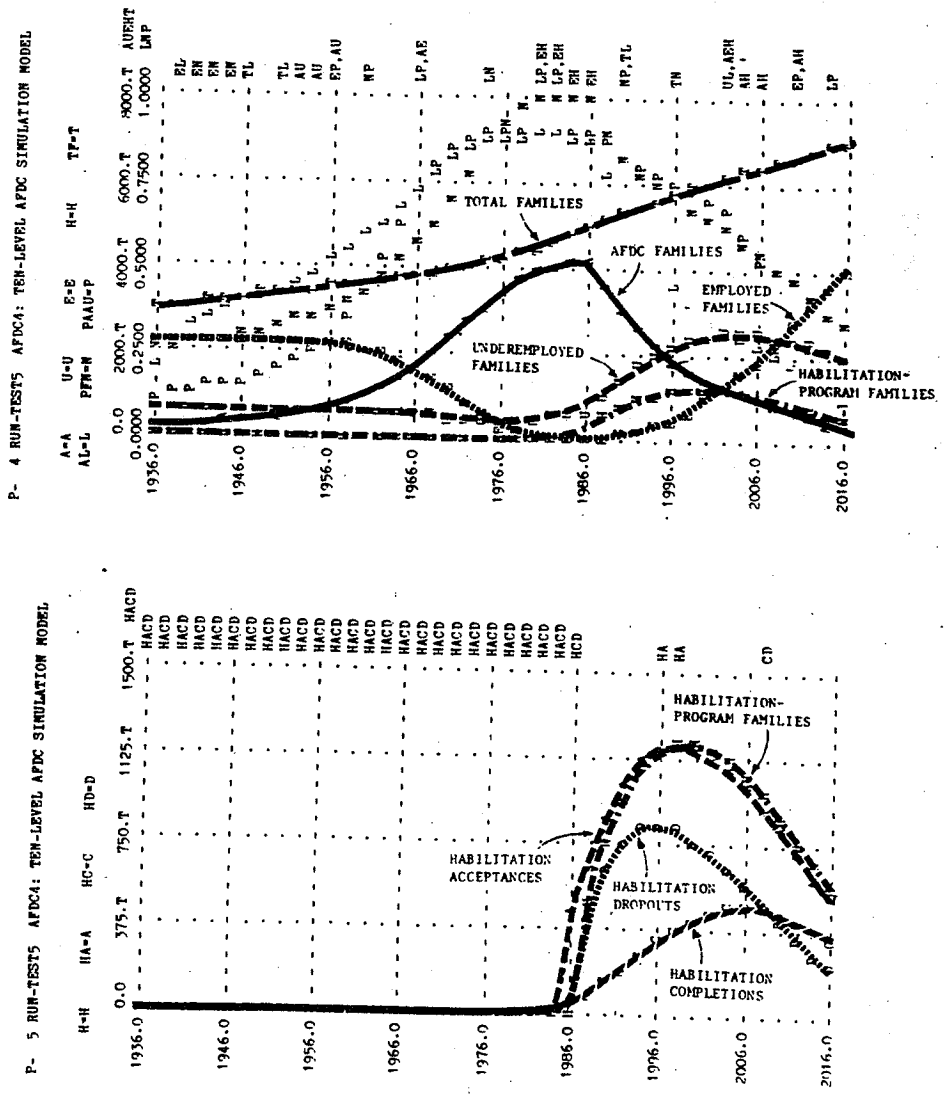

Figure 5.7 - Policy Test #6: Major Habilitation Program

employed-families' characteristics, that the policy would overcome non-employment.

Results: Benefits from the major habilitation policy begin quickly, in the first decade, as seen in Fig. 5.7. Benefit is clearly greater in twenty years. Improvement continues throughout the model.

Conclusions:

In the conclusions we use findings of the model in an attempt to explain the historical causes of AFDC's problems. Then, based on the model test runs, we offer policy alternatives.

In the model, the welfare crisis begins when AFDC families are allowed to exceed one-half the proportion of the population susceptible to its assistance. Had the size of the program been maintained at less than half of the target population, neither the program nor the population would have had the momentum to increase as it did.

As applications to AFDC increase, AFDC responds, accepting even more participants. The more the program expands, the more applicants apply. Deprived, dependent children are initially a characteristic of the family problem AFDC was attempting to remedy, typical of only a minor portion of the low-income population. In time, this characteristic and more complex derivitives become typical of the major portion of the population. Responding to demands from an ever increasing portion of the population, legislators are communicating confidence to this public that the program can be counted on, always, to tend to its needs. Thus, demands continue and the self-reinforcing process builds. By the time the AFDC program increases to include half the model population, the population has already gained a sufficient proportion of new families to increase by its own inertia.

By now, reducing or even removing assistance from such a major sector of the population would no longer restrain its growth. Self-perpetuating characteristics, such as unemployment, single parent families, never-married

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mothers, and children-raising-children will continue to increase more rapidly as far as the model projects. Were AFDC to be terminated tomorrow, this unemployed segment of the population would increase far into the future.

The preliminary finding of the first phase of this system dynamics approach to AFDC indicate that if certain new policies were present the AFDC dilemma might be overcome. However, no program we tried could be immediately effective, nor effective without both personal hardship and public expense. Three basic principles underlie these potentially effective policies:

1) Any program would need to be sufficiently large to include the greater part of the low income population; the larger the proportion the more effective the result.

2) Dependency on the AFDC program would need to be severed. To accomplish this however, does not at all mean that assistance programs should simply end. This would be devastating to both the low-income population and to the nation as a viable social and economic environment. The model shows two approaches to this principle: One would completely immerse AFDC families in education, character building and vocational training, while at the same time providing sustenance; the other approach (the combination policy) would provide similar features, but focus on education. It calls also for universal information and availablity of services of family planning, but provides no public assistance. (See discussion on pp. 11-12, comparing projections into the future of current AFDC policy with this combination policy.) In the combination policy, employment would rise and unemployment would fall beginning in 2000. Unemployment would fall, in 2016, in the combination policy, to just the point where, in the AFDC policy, it would be steadily rising. The combination policy shows that

by that year, the number of employed families are only just short of surpassing the number of non-employed families, which are falling sharply.

3) The program would need to be sufficiently comprehensive and intensive to become effective quickly. In this way the program would have the potential to build positive characteristics more quickly than non-productive characteristics could increase to counter the effort.

Recommendations:

¶ The sooner AFDC is replaced, the less widespread the resultant problem will be.

¶ The transition from the old to new policy must be swift.

¶ The new program must be available to over half of the low-income population.

¶ Continuation of AFDC assistance to a limited portion of the population is feasible. The limit must be no more than a minor proportion of the low-income population.

¶ An additional phase of research on this model would permit further testing of its validity. This would make possible new equations to test new boundaries, new assumptions, and other ideas.

¶ An additional phase of the model would permit further disaggregation of family structures and characteristics, and further investigation of humane and effective methods for assisting the public.

NOTES:

1. U.S. Department of Health, Education, and Welfare, Social Security Administation, Bureau of Public Assistance. Characteristics of Families Receiving Aid to Dependent Children, 1953, p. 2.

2. U.S. Department of Commerce, Bureau of Commerce, Bureau of the Census. Social Indicators III. Washington, D.C.: U.S. Government Printing Office, 1980, p. 369.

3. Daniel Patrick Moynihan, in an address to the Young Presidents' Organization (YPO), March 22, 1983. The Senator claimed that children and working age people are the poorest in the U.S..

4. Jane K. Boorstein, Review of "Dilemmas of Welfare Policy: Why Work Strategies Haven't Worked," by Mildred Rein. Transaction/Society, no. 1 (1983):120-122.

5. Daniel Patrick Moynihan, The Politics Of A Guaranteed Income. New York: Random House, 1973.

6. Jay W. Forrester, Urban Dynamics. Cambridge: MIT Press, 1969. p. 17.

7. Mildred Rein, Dilemmas of Welfare Policies: Why Work Strategies Haven't Worked. New York: Praeger Publishers, 1982.

8. Ibid.

9. Francis Fox Piven & Richard A. Cloward, Regulating The Poor. New York: Pantheon Books, 1971.

10. Social Indicators III, op. cit., p. 369.

11. Ibid. p.6.

12. J.A. Parker, ed., "State of The Black Family" in Lincoln Review, Winter 1983, p. 4.

13. Social Indicators III. p. 369.

14. "Sharp Rise is Seen in Poor Children," in The New York Times, 4/29/83. A quote by Alice Rivlin, then Director of the Congressional Budget Office.

15. "Typical AFDC Familiy Smaller Than 10 Years Ago; Average Number of Children Fell from 3 to 2" in Family Planning Perspectives 15:32.