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Marital Breakups in the Seattle-Denver Income Maintenance Experiment: A Different Conclusion

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ABSTRACT

In considering reforms in the nation's system of welfare assistance to low-income families, a negative income tax plan that covers intact (husband-wife) families had been expected to increase marital stability relative to the existing system of Aid to Families with Dependent Children, which basically denies welfare assistance to families with a father present. Between 1977 and 1983, however, a series of research papers reported that the negative income tax plans in the Seattle-Denver Income Maintenance Experiment increased marital dissolutions. This finding and research challenged existing beliefs among economists and had a great influence in public policy debates about welfare reform and in research methodology in the social sciences. In our analysis we claim to refute the major conclusion from this research: We find no effect of practical significance of the negative income tax on the rate of marital breakups when comparing treatment and control families in the experiment. We use and extend the statistical techniques of event history analysis that were pioneeringly adopted in the original research. Simple economic ideas motivate our analysis and interpretations. Although we believe we have resolved the major puzzle created by the original finding of a destabilizing effect on marriage, there remain challenges to an economic explanation for other experimental outcomes, such as the surprising result that marital breakups are less likely to occur the larger are the expected payments that the wife would receive if she separated from her husband.

This discussion paper differs from our previous paper DP 857-88 in two respects. (a) This paper focuses on the economic model underlying the relation of income maintenance laws and marital stability and estimates models with close attention to the economic components of the incentives in the laws. (b) This paper does not give a detailed examination of the previous research about marital outcomes in the Seattle-Denver experiment. See DP 857-88 for a discussion of why our results differ from those of the original researchers.

Marital Breakups in the Seattle-Denver Income Maintenance Experiment: A Different Conclusion

Quotations from *Hearings, Subcommittee on Public Assistance of the Committee on Finance, 95th Congress, 2d Session*, November 15-17, 1978.

Dr. Jodie Allen, Department of Labor: "...there are reasons to think that the [behavioral effects of the] experiments, particularly the marital stability findings, are higher relative to what you would find even if extrapolated to more modest programs.... I think it is important to remember that what was observed are marginal influences" (p. 26).

Senator Daniel P. Moynihan: "A 60 percent increase over the control group where there is a lot [of marital breakups] to begin with—is that marginal, ma'am?" (p. 26).

Moynihan: "If it turned out that we have a program [for income maintenance] that reduced work effort by 3.2 hours per week among white males, I think the world would go on and it would not be any great disaster. But breaking up families is a large event" (p. 289).

THE PUZZLE AND THE CHALLENGE

Most of the attention in the economic journals that was given to the negative income tax (NIT) experiments that took place between 1968 and 1981 was devoted to the issue of labor supply response [1] Among all the behavioral outcomes of the experiment, however, the findings about marital stability had the largest political impact; specifically, the finding that the NIT plans caused an increase in marital

[1]Citations to descriptions of the four experiments in negative income taxation and an extensive bibliography are found in Moffitt and Kehrer (1981).

breakups relative to the existing program, Aid to Families with Dependent Children (AFDC). This was the startling conclusion from the Seattle-Denver Income Maintenance Experiment (SIME-DIME), reported in a series of articles between 1977 and 1983 by three sociologists, Lyle Groeneveld, Michael Hannan, and Nancy Tuma.[2] SIME-DIME was the last and largest of four NIT field experiments, and its conclusions on marital stability have dominated all discussions of the experimental results on this subject.

For reasons discussed below, this result was the opposite of what was expected by economists and of what was hoped for by advocates of the NIT. The political damage to legislative proposals for NIT-like reforms in the welfare system was immediate and long-lasting.[3] This experimental outcome has received little attention from economists.[4] In fact, no dissenting investigation of the research results has appeared in the social science literature from the time of the first published report (Hannan. Tuma, and Groeneveld, 1977).

One obstacle to reanalyzing the experimental data from SIME-DIME is the complicated design of the experiment. Despite random assignments of low-income families to treatment and control groups, a number of features, discussed below, complicate the analysis. Also, the statistical techniques of hazard models and event

[2]Citations to over 20 articles and papers by these authors appear in the final report (Groeneveld, Hannan, and Tuma, 1983).

[3]In addition to the Congressional *Hearings* quoted at the beginning of this paper, see Steiner (1981, pp. 100-112) and Lynn and Whitman (1981, pp. 247-249) for a discussion of the policy impact of the experimental findings on marital breakups. Recent citations of these experimental results as evidence for opposing welfare reforms that provide income support to husband-wife families are found in Lenkowsky (1986, p. 182) and Murray (1984, pp. 124-125, 157-166).

[4]Two exceptions are Bishop (1980) and Keeley (1987), but both accepted and reinforced the conclusions reached by Groeneveld, Hannan, and Tuma.

history analysis that were used by Groeneveld, Hannan, and Tuma were unfamiliar to most economists when the research first appeared, but this is no longer true.[5]

A good reason for economists to be interested in the experimental research about marital stability is the prevailing belief that the economic incentives of AFDC have increased marital instability and the number of families headed by single mothers. AFDC provides cash payments and other benefits to a mother with dependent children if the father is absent but not, with infrequent exceptions, if the father is present.[6] Economists have been prominent among advocates for welfare reforms, especially an NIT, which had been, until 1977, favorably viewed as a way of neutralizing the anti-marriage incentives of AFDC. Furthermore, although most research on marriage, including the experimental research, has been conducted by sociologists, the conclusion of Groeneveld, Hannan, and Tuma that an NIT increases marital breakups rested mainly on an economic theoretical framework.

In this paper we reanalyze the data from SIME-DIME and claim to refute this conclusion. We find no effect of practical significance of the NIT plan on the rate of marital breakups. We use simple economic ideas to justify our analysis and interpretations, but some of our results seem inconsistent with straightforward economic hypotheses. Thus, although we believe we have resolved the major puzzle created by the original finding of the NIT's destabilizing effect on marriages (relative to AFDC), there remain challenges to an economic explanation for other experimental outcomes.

[5]Kiefer (1988) gives an extensive bibliography of recent economic research that uses these statistical techniques.

[6]AFDC-UP, with UP standing for "unemployed parent," is an optional program offering AFDC to poor married couples whose principal earner is unemployed. Now adopted by about half the states, the program nevertheless has a very small number of couples participating.

COMPARING AFDC AND NIT IN THEIR EFFECTS ON MARITAL STABILITY

General considerations.

Equation (1) shows a simplified prototype of an AFDC income maintenance plan in effect during the 1970s when SIME-DIME was being conducted. Let $AFDC(n)$ be the transfer payments received by a family of size n, composed of a mother and dependent children; let $G(n)$ be the government's guaranteed level of transfer payments granted to the family if it has no other income; and let Y be the income the family receives (during the time period relevant for the AFDC payments) from its own earnings or from other private sources, such as child-support payments. In the 1970s an offset rate (or tax) of .67 per dollar of Y was in effect that reduced the transfer payments for the AFDC mother with other income. The plan may be expressed:

$$AFDC(n) = G(n) - .67Y, \tag{1}$$

for $Y < Y_b = G(n)/.67$, with Y_b as the "breakeven" level of income, where the AFDC payments decline to zero.

In reality, the AFDC plan was (and is) more complicated, involving tests for eligibility depending on asset ownership, integration with other government welfare programs, the ages and school attendance of children, varying tax rates for certain types of nonlabor earnings, consideration of special circumstances to allow higher (or lower) payments, possible deductions of certain expenses of working from the earnings (Y) used to calculate AFDC payments, and other regulations. Nevertheless, the dominant consideration about AFDC in terms of its relation to marital status is that the program covered poor mothers with no husband present, whereas poor husband-wife families were and are not covered, with some unimportant exceptions.[7] The economic argument for why AFDC is expected to destabilize marriages is simply that it lowers the cost of a marital breakup, particularly to poor husband-wife families with children. It lowers the cost to the mother, who is assumed to retain custody of the children and to have low alternative earnings, and it lowers the cost to the father, who may be unable or unwilling to make adequate child-support payments. AFDC is decidedly nonneutral regarding marital status.

An NIT program, such as those in SIME-DIME, provides an income maintenance plan and transfer payments to all poor families, regardless of whether the husband (father) is present and regardless of the employment status of the adults in the family. An NIT may be expressed as follows, where we distinguish the values of the key parameters, G and the tax t, by a subscript j to denote the particular plan:

$$NIT_j(n) = G_j(n) - t_j Y, \tag{2}$$

for $Y < Y_j = G_j(n)/t_j$, where Y_j is the breakeven level of income for the jth plan.

In comparison to AFDC, the NIT would appear to promote marital stability unambiguously if G and t were set so that a divorced mother would receive NIT payments that were *no higher* than those she would receive under AFDC. In this case, if the wife and husband stay together they are better off with an NIT, because they have the income security of the plan and receive transfer payments if their income is low enough. If their marriage breaks up, their economic well-being is unchanged. Either NIT payments to the mother equal the payments available under AFDC, or, if lower, she will select AFDC, which we assume is still available, as

[7] In particular, in the early 1970s AFDC-UP in the states of Colorado and Washington (where SIME-DIME took place) included only a tiny proportion of poor intact families. See Spiegelman (1983, p. 17 and footnote 5).

it was in SIME-DIME.[8] Strictly speaking, this expected stabilizing effect of NIT, compared with an AFDC that offers the same (or higher) payments to a separated wife, assumes that being married is not an inferior good.

Consider now an NIT that is more generous than AFDC, by virtue of having either a higher G, a lower t, or some combination of G and t that offers higher NIT payments for a specified level of Y. Such an NIT has an ambiguous effect on marital stability relative to AFDC. An NIT that offers higher payments to an intact family obviously enhances the family's economic status relative to the zero payments it receives from AFDC, and the payments may promote stability by easing the financial strain that may be the source of marital discord. At the same time, however, higher NIT payments to the separated wife than she would receive from AFDC lower the cost of a marital breakup and for this reason promote instability.

In comparing AFDC and NIT in terms of their generosity to the separated wife, we should note that one or the other program may be more generous at one level of the separated wife's income and less generous at another income level. If we assume that the wife, as the mother of dependent children, will have very low earnings, then we can focus on the guarantee levels (G) of the plans to compare her alternative economic states. It should be noted that employment rates of wives in low-income husband-wife families are low and were even lower in the 1970s than they are today.

In SIME-DIME there were three levels of G. The lowest offered $3,200 to a

[8] If AFDC were not available, then an NIT plan that offered payments lower than AFDC to the mother would promote marital stability for this reason as well. In this discussion we also assume that the NIT plan either does not provide payments to the departing husband or that the transfer payments from NIT are so low for a single man that his income would be too high to permit him to receive the payments. In SIME-DIME the single man's NIT plan was, in annual terms, $NIT = \$1,000 - .5Y$, so any income of $2,000 or more bars him from receiving any payment.

mother with two children and no husband present, and this level was about the same as that available to her in the AFDC program existing at the time the experiment began in 1971. Two other G levels were more generous: $4,200 and $5,000. In 1988 dollars, adjusting for the rise in the CPI since 1971, these amounts would be about $9,600, $12,600, and $15,000. The tax rates, t_j, in SIME-DIME were .5, .7, and .8, although the latter two rates were, for some treatment groups, reduced by .05 percentage points for each $1,000 of income earned. (Table 1, discussed below, shows the NIT plans assigned in the experiment.)

Two questions about the impact of an NIT on marital stability among husband-wife families, in comparison to the existing state of an AFDC program and no NIT, are suggested by the above discussion. First, given the NIT plans under analysis, do marital breakups increase or decrease? The answer from the SIME-DIME experiment is that the NIT increased the rate at which marriages dissolved. In the words of the original investigators: "the negative income tax (NIT) plans tested in SIME-DIME dramatically increased the rates at which marriages dissolved among white and black couples..." and "the NIT treatments significantly increased marital dissolution rates among whites and blacks (by 40 to 60 percent...)" (Groeneveld, Hannan, and Tuma, 1983, pp. 259, 357). Second, given the variation in the generosity of the NIT plans, do the NIT plans that provide the same or smaller benefits than AFDC increase marital stability relative to NIT plans that are more generous than AFDC? The implied economic prediction of this question was refuted, because Groeneveld, Hannan, and Tuma report that the "most generous NIT treatments have the least effect on dissolution rates..." (p. 357).

Economic factors specific to SIME-DIME

We discuss four complications in the design and operation of SIME-DIME that pertain to our economic analysis

1. Multiple treatments.

There were four major experimental groups of husband-wife families in SIME-DIME, including the control families. One group was enrolled in an NIT, with varying G and t levels that are shown in columns 2 to 3 in Table 1, using a four-person husband-wife family to illustrate the dollar amounts of the guarantee and the breakeven level of income. The plans are listed in order of their generosity for a separated wife (with two children) who earns less than $4,000 a year in 1971 dollars. Columns 5 to 7 show what her total income would be and the amount of NIT payments she would receive.

A second group of families was offered a training, education, and job counseling program, subsidized at three different levels. In our analysis, we do not examine the variation in subsidies, and we will refer to this treatment simply as the training program, abbreviated as TR. The training program was intended to increase the earnings and employment of the trainees. Its expected effect on marital stability is not obvious, but by increasing the earnings capacity and, therefore, the potential economic independence of the wife, it could have a destabilizing effect on marriages, if wives undertook the training. In fact, about the same number of wives took part in the program as husbands.[9]

The third and largest treatment group was offered a program that combined the training and NIT plans. The sample design, therefore, implies an interaction

[9]Dickinson and West (1983, pp. 211-212) report that "despite the fact that nearly two-thirds of the wives were out of the labor force prior to enrollment [in the experiment], participation rates of wives were similar to those of husbands. For husbands and wives, the proportion attending counseling ranged from 40 percent to 60 percent, and the proportion receiving [training and education] subsidies ranged from 21 percent to 36 percent."

Table 1

Experimental NIT Plans in SIME-DIME in 1971 for a Husband-Wife Family of Four Persons and for a Separated Wife with Two Children

	Husband-Wife Family			Separated Wife: Income and (Payments)[b]					Sample Size[c]	
NIT Plan[a] (1)	Guarantee (2)	Tax (3)	Breakeven Income (4)	With $0 Earnings (5)	$2,000 Earnings (6)		$4,000 Earnings (7)		With Training Program (TR/NIT) (8)	No Training Program (NIT) (9)
1	$3,800	.8[d]	$5,802	$3,200	$3,700	($1,700)	$4,400	($400)	49	37
2	3,800	.7	5,429	3,200	3,800	(1,800)	4,400	(400)	56	38
3	3,800	.7[d]	7,367	3,200	3,900	(1,900)	4,800	(800)	72	37
4	3,800	.5	7,600	3,200	4,200	(2,200)	5,200	(1,200)	96	70
5	4,800	.8[d]	8,000	4,200	4,700	(2,700)	5,400	(1,400)	76	41
6	4,800	.7	6,867	4,200	4,800	(2,800)	5,400	(1,400)	96	49
7	4,800	.7[d]	12,000	4,200	4,900	(2,900)	5,800	(1,800)	94	43
8	4,800	.5	9,600	4,200	5,200	(3,200)	6,200	(2,200)	93	51
9	5,600	.8[d]	10,360	5,000	5,500	(3,500)	6,200	(2,200)	103	54
10	5,600	.7	8,000	5,000	5,600	(3,600)	6,200	(2,200)	85	30
11	5,600	.5	11,200	5,000	6,000	(4,000)	7,000	(3,000)	50	23
TOTAL									870	473

[a]The plans are listed in order of increasing generosity, using the payments to the separated wife as the criterion.

[b]"Income" refers to the wife's annual income from the combined sources of the NIT payments and her earnings (if any). "Payments" refers to the NIT payments she would receive, depending on her earnings. The payment amounts are shown in parentheses, except in column (5) where payments = income.

[c]Sample sizes refer to husband-wife families with children present at the beginning of the experiment. The number of control husband-wife families is 547. In addition there were 544 treatment families who were assigned to a training program without NIT payments.

[d]A declining tax rate, which increases the generosity of the plan by increasing payments if the recipient has earnings and by increasing the breakeven level of income for the recipient. (Compare plans 2 and 3 and plans 6 and 7.)

between TR and NIT. (We will abbreviate this third program as TR/NIT.) An economic justification for the interaction is that training is made more appealing (a) because any loss in market earnings (or in home-produced goods) from spending time in the program is substantially offset by NIT payments, and (b) the NIT tax on earned income, which ranged from 50 to 80 percent, effectively lowers by these percentages the opportunity cost of the earnings forgone by the trainees (or school attenders). The proportions of wives and husbands who participated in the training program were slightly larger in the TR/NIT group than in the TR group (Benus, Halsey, and Spiegelman, 1979, p. 46).

The number of husband-wife families with children who were assigned to the two types of NIT treatments is shown in columns 8 and 9 in Table 1. Although the training programs are of policy interest, there is an evident cost in reduced sample sizes for the "pure" NIT treatments. A small sample size is especially troublesome when the outcome of interest is a relatively rare event such as a marital breakup. Among couples with children present at the beginning of the experiment, 547 were in the control group, 544 were in the training (TR) group, 473 were in the "pure" NIT group, and 870 were in the TR/NIT group.

Another disadvantage of experimenting with training, education, and counseling is that such programs are inherently more idiosyncratic than a formula-based NIT program, if only because the personalities and quality of the instructors and counselors play a larger role in the success or failure of the programs. We note that the counseling treatment involved a "self-assessment process" aimed at "improving their [the participants'] self-concepts, assessing their past performances, and developing labor market goals" (Dickinson and West, 1983, p. 203).

2. Different time lengths of the treatments.

A second complication in the design of SIME-DIME was the designation of at first two and later three lengths of time of the experimental treatments. At the beginning of the experiment 69 percent of the NIT, TR. and TR/NIT groups were assigned to a three-year program and 31 percent were assigned to a five-year program. Later, after the experiment had been running for some 30 months, 6 percent of the sample was transferred to a 20-year plan: some continuing as controls, some continuing in their NIT plans, and others among the control group shifting to an NIT plan. Data for the 20-year group was actually collected only through the sixth and seventh years of the experiment.

Previous field experiments in negative income tax plans had run for three years. The 5-year and 20-year components in SIME-DIME were intended to assess the potential biases in using short-duration experiments for inferences about nationally legislated programs that would presumably last much longer. The biases have been discussed in the earlier literature on the experiments (for example. Metcalf, 1973), but the essential ideas are as follows.

The first bias is that a smaller response is expected from a short experiment because its full benefits are necessarily smaller than those of a program that runs for a long period. Thus the presumed effect of income toward stabilizing an intact marriage is reduced because the present value of benefits is less. Alternatively, if the income payments are to support a wife's separation, then the long-run destabilizing effect of the program would be understated. Reinforcing this bias of understating the effect are the arguments that some types of behavior involve learning and entail various start-up costs, and that the outcome itself is sustained for a longer period of time than the length of the experiment. Changing one's occupation is an example of such an outcome pertaining to the analysis of labor-supply responses. A change in one's marital status or having a child are other examples of long-lasting responses.

The second type of length bias stems from intertemporal substitution, and this works in the opposite direction, exaggerating the response. The argument here is that a short experiment changes the relative price of certain states or activities, such as the price of leisure or, for our purposes, the cost (or price) of being married. However, the price change is temporary, and the respondents know this. One way to take advantage of the temporary subsidy to the activity is to bunch one's longer-run response into the experimental time period. Moreover, if the activity is discrete and major, like buying a house or obtaining a divorce, there is likely to be an accumulation of potential "customers" at any point in time before the experiment begins. The initiation of a new program, even if it were permanent, could produce a larger response soon after the program begins—a response measured in terms of the rate of purchase per unit of time—than the response in the long run.

In analyzing marital breakups in SIME-DIME, the rate of marital breakups per unit of time is the outcome of interest (see below), and the more generous NIT plans offered a subsidy to a separated wife and her children that sharply declined in present value with the passage of time. Considerations of both a pent-up demand for separation and the economic incentive to maximize the receipt of transfer payments by separating early compel us to examine the time pattern of breakups. Are high rates of breakup in the early periods of the experiment offset by low rates of breakups later? We find evidence that this occurred.

In summary, the treatment plans lasting five (or twenty) years should have a larger response than the 3-year plan because the present value of the income payments is larger. On the other hand, the 3-year program should show a larger response because of more intertemporal substitution of the subsidized activity.[10]

[10] A numerical example may be useful. Assume the experimental time lengths are one and two years and that each experiment involves 100 couples. Now assume that six divorces would occur in the long run and that the only effect of the experiment is to shift the incidence of these divorces into the years when the experimental

The net effect of the different lengths of time of the plans is uncertain.

3. Attrition bias.

Some attrition of respondents is inevitable in a survey panel that requires lengthy interviews every four months for a period of three to seven years. In SIME-DIME 18 percent of the wives in the control group and 12 percent of the wives in the treatment group dropped out. Clearly, the experimental benefits of income and training subsidies were a reason for the lower attrition in the treatment groups. Economic incentives can also explain the lower dropout proportion in the treatment groups receiving NIT payments, 11 percent, compared to the training group, 13 percent. Furthermore, among the groups receiving NIT payments, the more generous plans tended to have the lowest proportions dropping out. Using the guarantee (G) levels for four-person families to define generosity, Spiegelman (1983, pp. 31-32) reports that attrition was 9 percent for the $5,600 plans, 12 percent for the $4,800 plans, and 16 percent for the $3,800 plans.

Economic incentives as explanations for attrition are particularly important in analyzing attrition bias in estimating marital breakups. Supplementary evidence and informed opinion lead to the expectation that marital breakups are more frequent among those who drop out in the control group. Attrition is associated with stressful situations, such as applying for AFDC, having mental and physical health problems, moving from the community, and experiencing a marital breakup (Kershaw and Fair, 1976, pp. 119-227). Thus we may expect a higher rate of marital breakups per period at risk among couples in the control group who drop out than among couples in the control group who do not drop out.

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subsidy is provided. Thus, six divorces occur in year one in the first experiment, producing a divorce rate of .06 per year. In the second experiment assume that the six divorces are evenly spread over two years. The divorce rate would be .03 per year in the first year and .031 (= 3/97) in the second year.

The situation is quite different in the treatment group, particularly the TR/NIT and NIT groups. Most of the wives in the SIME-DIME sample do not hold market jobs, so a wife who separates from her husband and who is participating in an NIT plan is likely to receive substantial transfer payments from the experiment. Even if the NIT payments are smaller than those available in AFDC, the payments would be received immediately and with no requirement of filing to get on the AFDC rolls. Thus, a wife facing a divorce or separation would be unlikely to drop out, which is the opposite of the expectation for the control group.

As shown below, our adjustment for attrition bias will slightly increase the rate of marital breakups in the "full sample" of control couples, because we assume a higher rate for the 18 percent who dropped out. Our adjustments slightly decrease the rate of marital breakups of the "full sample" of NIT families, because we assume a lower rate of marital breakups for the 12 percent who dropped out.

4. Reconciliation and remarriage

A fourth complication in SIME-DIME arises from the differences in reporting, and in the economic incentives to report, marital breakups between control and TR couples on the one hand and NIT and TR/NIT couples on the other hand. A marital separation was recorded for both groups on the basis of an interview administered every four months, so a separation that lasted less than four months might be unreported (Waksberg, 1979, p. 7). However, couples in the plans providing NIT payments also reported their marital status every month as part of the information system for determining the amount of NIT payments they were to receive. Any change in marital status appearing in the monthly reports of the NIT families was brought to the attention of the interviewers, who were instructed to verify the change (Christophersen, 1983, p. 80). Thus, the NIT couples had more opportunities to report marital breakups, and they had a financial incentive to report even short-term separations because their NIT payments would generally increase.[11] Indeed, an incentive existed to *misreport* changes in family composition if these would increase the family's NIT payments, but the original investigators concluded that fraud was not an important source of bias in reports of marital breakups (Groeneveld, Hannan, and Tuma, 1983, p. 313).

If short-term marital separations are spuriously more prevalent among NIT families, then attention to reconciliation should reduce this bias. Consider also that by accounting for reconciliations and remarriages we can calculate the proportion of time that children are with two parents. This is useful information because the presence of the father (or stepfather) in the family is likely to enhance two goals of welfare reform, increasing the well-being of the children and reducing the costs of welfare payments to families headed by women.

In summary, each of the foregoing complications in the design and operation of the SIME-DIME experiment needs to be dealt with in the econometric analysis of the impact of the experimental treatments on marital instability. The model and the procedures of the analysis are discussed next.

THE HAZARD RATE MODEL AND EMPIRICAL RESULTS

The Methodology

The statistical techniques of event history analysis are particularly useful for examining marital breakups, because the focus is on the rate of breakups—the number of breakups per unit of time. Note that attrition, the different time lengths of the treatments, and the reassignment of families to different treatment groups all

[11]The wife or husband was required to sign a statement testifying that the separation was permanent, but the separation could be as short as one month. Waksberg (1979, p. 24) states that obtaining the "Affidavits of Separation" was "done in a nonrigorous fashion."

imply that the time of exposure to the risk of a breakup varies across the sample. A rate measure self-adjusts to this variation. For example, an annual rate can be calculated for each of the 3-year, 5-year, or 20-year plans. A second advantage of the technique is that observations (couples) that are in the data set for a longer time will contribute more weight to the estimation. A couple who drops out after three months has an appropriately lower weight than a couple who is observed for five years. The dropout cases are included in the analysis, but the attrition biases mentioned above persist.

A third important advantage of the hazard rate model is that the rate at a particular point in time can be allowed to depend on the values of the independent variables at that time, thereby making effective use of independent variables that vary over time. In particular, the shift by some couples from the control group to the 20-year NIT plan is handled simply by allowing the change in the independent variable measuring the treatment status.

We follow Groeneveld, Hannan, and Tuma in using a continuous-time hazard rate model. We are indebted to them for their methodological work and for much of the preparation of the data tapes that we use.[12] The calendar date of the beginning of the experiment and the date of any marital breakup (or reconciliation or remarriage) for each couple are recorded. The marriage spell, which is measured in days, is defined to begin with the experiment, but the duration of the marriage before the start of the experiment is one of the independent variables. Our general model of the rate of marital breakups, r_t, has the following log-linear form:

$$\ln r_t = \mathbf{E}_t'\alpha + \mathbf{X}_t'\beta + \gamma t + \mathbf{E}_t'\Gamma t. \qquad (.3)$$

[12] Others who helped us in getting the data are Anne Cooper, Katherine Dickinson, John Flesher, Mario Lopez-Gomez, Philip Robins, and Richard West.

(a) $\mathbf{E_t}$ is vector of experimental treatment variables, which may shift over time. The treatment variables are usually specified as dummy variables. (b) $\mathbf{X_t}$ is a vector of personal and family variables, including the variables used to stratify the sample—site, income, and ethnicity—and a constant term. These variables may also shift over time. (c) t is a scalar time variable (measured in days). (d) The last term allows an interaction between t and $\mathbf{E}$. The vectors α, β, γ, and Γ are parameters to be estimated. The ethnic stratifications were for blacks (33 percent), Hispanics (21 percent), and (non-Hispanic) whites (46 percent). In some specifications we use interactions between $\mathbf{X}$ and $\mathbf{E}$, such as allowing different experimental effects for each ethnic group, and we try different functional forms for time. Subscripts denoting individual observations are deleted for brevity. Maximum likelihood methods are used to estimate the rate that is most likely to obtain the marital outcomes recorded in the sample, given the log-linear function. We used the BMDP program for our estimations.[13]

Our sample consists of 2,365 couples who were married (or living together in consensual unions) and who had children present at the beginning of the experiment. We refer to all of these couples as married. We excluded a small number of couples in cases where one of the spouses died during the experiment or if the couple dropped out in the first 15 days of the experiment.

Results Showing Overall Treatment Effects

Table 2 presents the results of estimating equation (3) in the column headed Model 2, which is distinguished from Model 1 by including time effects, specifically

[13] We also estimated discrete-time models, using 6-month time periods. These models were useful for obtaining starting values for the estimation of the continuous-time models, for checking on the robustness of our findings, and for trying several complicated specifications that are cumbersome to estimate with continuous-time models. For the discrete models, we used the GLIM statistical package.

Table 2

Estimated Effects of Independent Variables on Rates of Marital Breakup, Log-Linear Hazard Models, with and without Allowance for Time[a]

Independent Variables[b]	Mean or Percent of Sample[c]	MODEL 1. Without Allowance for Time (Constant Rate Model) Coefficient (Standard Error)	MODEL 1. Multiplier[d]	MODEL 2. With Allowance for Time Effects Coefficient (Standard Error)	MODEL 3. Cox Partial Likelihood Allowance for Time[e] Coefficient (Standard Error)
Control, 20 years[f]	.029	-.37 (.30)	.69	-.28 (.32)	-.53 (.38)
NIT, 3 years	.097	-.02 (.17)	.98	.12 (.24)	.13 (.24)
NIT, 5 years	.080	.28 (.16)	1.32	.52 (.25)*	.61 (.25)*
NIT, 20 years	.039	-.12 (.29)	.91	.54 (.49)	.50 (.51)
TR/NIT, 3 years	.203	.42 (.13)*	1.52	.65 (.20)*	.69 (.20)*
TR/NIT, 5 years	.110	.08 (.15)	1.08	.48 (.23)*	.59 (.24)*
TR, 3 years	.135	.19 (.15)	1.21	.23 (.22)	.26 (.24)
TR, 5 years	.077	-.10 (.19)	.90	.00 (.27)	.14 (.30)
Time (days) (coeffs. x 10^{-4})[g]		...		-1.00 (1.91)[g]	...
Time x NIT		...		-3.15 (2.81)	-4.08 (2.98)[g]
Time x TR/NIT		...		-5.43 (2.68)*	-6.92 (2.89)*
Time x TR		...		-1.19 (2.83)	-2.75 (3.39)
With Child < 6 years	.639	-.36 (.11)*	.70	-.35 (.11)*	-.35 (.11)*
Previous AFDC	.176	.29 (.10)*	1.34	.29 (.11)*	.28 (.11)*
White	.464	-.44 (.09)*	.65	-.43 (.09)*	-.43 (.09)
Hispanic	.205	-.29 (.12)*	.75	-.28 (.12)*	-.30 (.12)
Denver	.589	.01 (.10)	1.01	.01 (.10)	.01 (.10)
Duration of marriage	8.2	-.06 (.01)*	.94	-.06 (.01)*	-.06 (.01)*
Wife's age	29.9	-.02 (.01)*	.98	-.02 (.01)*	-.02 (.01)*
Wife, high school	.510	-.21 (.09)*	.81	-.20 (.09)*	-.21 (.09)*
Wife > high school	.020	-.36 (.37)	.70	-.37 (.38)	-.39 (.36)
Normal Income[h]					
$0 - $1,000	.068	-.21 (.23)	.81	-.20 (.24)	-.21 (.26)
1 - 3,000	.179	-.21 (.22)	.81	-.21 (.22)	-.22 (.24)
3 - 5,000	.274	-.33 (.22)	.72	-.33 (.23)	-.34 (.24)
5 - 7,000	.271	-.52 (.23)*	.60	-.51 (.23)*	-.53 (.25)
7 - 9,000	.167	-.36 (.24)	.70	-.36 (.25)	-.37 (.26)
9 - 11,000	.011	-.18 (.48)	.83	-.18 (.49)	-.18 (.48)
> 11,000	.003	-.82 (1.03)	.44	-.81 (1.05)	-.82 (1.03)
Constant	...	-6.50 (.34)		-6.46 (.37)	...
Sample size		2365		2365	2365
Log likelihood		5513.98		5504.41	4331.58

- Table, Continued -

Table 2, Continued

[a]The sample consists of 2,365 couples, already married and with children at the beginning of the experiment. Couples who experienced a death of a spouse during the experiment are excluded, as are couples who dropped out of the experiment in the first 15 days of the experiment. The length of time in a marriage spell is measured in days since the start of the experiment.

[b]The treatment variables are time-varying for those couples who shifted plans. All other variables are measured as of the beginning of the experiment. All variables except six are dummy variables, and the omitted dummy variables should be clear. The six continuous variables are duration of marriage and wife's age, both measured in years, and the four time variables, measured in days.

[c]The means of dummy variables measure the proportion of the sample in the category. The percentages for the eight treatment variables are adjusted to measure the proportion of person-years used in the analysis. Thus, the 5-year plans show a larger proportion of person-years than their proportions of couples enrolled in these plans.

[d]The multiplier expresses the factor by which the rate of marital breakup for the couples with the characteristic exceeds (or is less than) that of the couples in the omitted category, in this case the control group (except for the control couples assigned to the 20-year plan). The multiplier equals the natural number e raised to the power of the coefficient. Thus, the "TR/NIT, 3 years" group experienced a rate of marital breakup that is 1.52 [equal to exp (.42)] times as large as that of the omitted control group, whereas the "NIT, 3 years" group experienced a breakup rate that is 2 percent less, or .98 times as large.

[e]The Cox-Partial-Likelihood method of allowing for time imposes no functional form on time but instead is based on the order of the marital breakup among the couples. The coefficients and standard errors of the time/treatment interaction terms are expressed at 10^{-4}.

[f]The 20-year control couples are merely regular control couples who were designated to be followed into the sixth and seventh years of the experiment. They were so designated at the time when the 20-year NIT group was assigned, after the experiment was in operation for about 30 months. Both 20-year groups are, therefore, nonrandom in the sense that they demonstrated "stability" by not having dropped out, but the two 20-year groups can be compared with each other.

[g]Time is measured in days and the coefficients and standard errors are expressed at 10^{-4}. In Model 2 the additive time effect for all couples is estimated to be -.000100 per day, which is, therefore, the effect for control couples. The time effect estimated for the NIT couples is -.000100 + (-.000315) = -.000415 per day, and similarly for the other two treatment groups. The equivalent annual percentages by which the marital breakup rates decline for the four groups are: 3.6 percent for controls, 8.0 percent for TR, 14.1 percent for NIT, and 20.9 percent for TR/NIT.

[h]Normal income is in seven categories, with "unclassified" as the omitted category, and is defined as "expected family income for the year prior to the start of the experiment, and was derived from preenrollment interview data." Regression estimates of normal income were used for calculating expected income, and reported income in the year preceding the experiment was one of the predictor variables (Christophersen, 1983, p. 61).

[i]A log likelihood ratio test shows that the four time variables are jointly statistically different from zero. Twice the difference in the log likelihood function for the restricted and unrestricted models is 19 [= 2(5513.98 - 5504.41)], which with four degrees of freedom yields a chi-square that is statistically significant at the 99.9 percent level.

*Statistically significant at the 95 percent level (two-tail test).

γt and $\mathbf{E}_t'\Gamma t$. Model 1, without any time variables, imposes a constant rate of marital breakups. Models 1 and 3, discussed below, serve mainly as comparisons to Model 2.

In all three models seven dummy variables are used to specify the three main experimental treatments (TR, NIT, and TR/NIT) and their assigned time lengths (the 3-, 5-, and 20-year plans). Models 2 and 3 also include three variables for treatment/time interactions. It is hard to translate even the seven treatment coefficients in Model 1 into overall treatment effects, and we will use Table 3 to summarize the results. One aid in interpreting the coefficients estimated in Model 1 is the adjacent column of "multipliers." Because each coefficient is an estimated exponent (see equation 3), the numerical evaluation of exp (coefficient) shows the multiplicative factor by which the rate of marital breakups is increased or decreased for a one-unit change in the independent variable. When the variable is a dummy variable for a group, the exp (coefficient) gives the factor by which the rate of marital breakups is increased or decreased for that group relative to the omitted control group (excepting the small number of 20-year controls, who constitute a separate variable). To illustrate, the largest treatment effect is for the TR/NIT, 3-year group, which shows a rate of marital breakups that is 1.52 [= exp (.42)] times as large as that for the omitted control couples. Thus, if the rate for the controls were 6 percent per year, the estimated rate for the TR/NIT, 3-year group would be about 9 percent per year.

The estimated effects of the treatments in Model 2 are more complicated, because their calculation requires specifying the elapsed time after the experiment begins. A literal interpretation of the coefficient of the treatment variable by itself is that it estimates the treatment's effect on marital breakups on the first day of the experiment, which has no practical meaning. The overall treatment effects based on Model 2 are also summarized in Table 3 and will be discussed below.

Model 1 reveals several general points: (a) The coefficients of the treatment variables indicate mostly positive (destabilizing) effects,[14] but (b) the sizes of the coefficients vary widely and their standard errors are relatively large—partly owing to small sample sizes for the treatment categories. (c) The TR/NIT, 3-year plan shows a large destabilizing effect on marriages that is statistically significant at the 95 percent level. (d) The assigned length of the plan (3, 5, or 20 years) has no consistent relation with the size of the treatment effect. We report elsewhere that the treatment effects vary widely among the three main ethnic groups (Cain and Wissoker, 1988).

We focus on Model 2. The four time coefficients are negative, and the general time trend, which represents the trend for controls, has a coefficient of $-.0001$ (see footnote g in Table 2). Time is measured in days, so the coefficient translates into a yearly decline in the rate of marital breakups of a modest 3.6 percent [$= \exp(-.0001)(365) - 1$]. The yearly declines for the three treatment groups are -7.7 percent for TR, -14.1 percent for NIT, and -20.9 percent for TR/NIT. For example, to calculate the TR percent:

$-.0001 + (-.000119) = -.000219$, and $\exp(-.000219)(365) - 1 = -.077$.

The time trends demonstrate that more separations early on by treatment couples tend to be offset by fewer separations later. The differences in the proportions of control couples and treatment couples who separate is sharply narrowed after just

[14] Note that the NIT, 3-year coefficient of $-.02$ is actually indicative of a small positive effect on marital breakups, because this effect should be viewed relative to the estimated rate of marital breakups for the omitted group of 3- and 5-year controls *combined with* the 20-year controls. Given that 11.8 percent of the controls were in the 20-year group, the base coefficient of all controls is $-.04[= .118(-.37) + .882(0)]$. The NIT, 3-year effect relative to all controls is, therefore, $.02[= -.02 - (-.04)]$. The 20-year controls are discussed below in more detail.

a few years, as will be shown in Table 3.

Let us clarify our interpretation of the time effects in Model 2. The negative coefficient of time for the control group may be viewed as a mix of (a) duration dependence for couples with identical propensities to break up their marriages and (b) unobserved heterogeneity in this breakup propensity, which simply means that couples that are more prone to separate will do so earlier. Important sources of variation in the propensity to break up are already controlled for in the model by variables for the number of years the couple has been married, the presence of young children, and the age, ethnicity, income, and educational attainment of the wife. Nevertheless, a cautious interpretation of the negative sign of time is that it is partly attributable to some unobserved heterogeneity among control couples.

Now consider the *incremental* (or *extra*) negative time effects that are estimated for the treatment groups. The hypothesis of intertemporal substitution, based on the larger payoff to earlier separations, is a straightforward explanation for why interactions between treatments and time produce larger negative effects of duration dependence. The hypothesis of a pent-up demand explains a treatment interaction with unobserved heterogeneity in the propensity to break up. However, it is not obvious that a separate identification of the two sources of the incremental time/treatment interactions is necessary. Indeed, with experimental data for the full time period of the effect of an NIT on marital breakups—10 years?, 20 years?—we need not worry whether the time effects of the treatment groups are attributable to duration dependence, unobserved heterogeneity, or both. The random assignment of the treatment and control groups is sufficient to validate the outcomes that would be measured at the end of the relevant full period. However, the experiment provides data for only three, five, and seven years. The projections of the estimated time effects depend, therefore, on having the correct functional form for time. We discuss functional form below.

The collection of four time variables in Model 2 is highly significant statistically (see footnote i in Table 2). The three time/treatment interactions, by themselves, are marginally significant, at the 84 percent level. (These results are not shown.) However, the economic hypothesis about the three time/treatment interactions is that they are negative and, furthermore, increasingly negative as the programs are more generous and increase the payoff to earlier separations. One way to test this hypothesis is to assign a dollar value to the three treatment benefits and create a single variable scaled in dollar units; specifically, by using an estimated value of the training and education subsidies for TR, using the average amount of cash payments for NIT, and using the sum of the two for TR/NIT. We adopt an even simpler scale. We define $\mathbf{E}^*$ as a linear ranking of the generosity of the experimental groups: 0 for controls, 1 for TR, 2 for NIT, and 3 for TR/NIT, and we test for a negative sign of the interaction term, $t \times \mathbf{E}^*$. Adding $t \times \mathbf{E}^*$ to the model that includes the additive terms, t and the treatment dummy variables, we find the coefficient of $t \times \mathbf{E}^*$ to be negative and statistically significant at the 98 percent level (one-tail test). These results are not shown, and we do not use this specification for any purpose other than as a test of statistical significance for a negative time/treatment interaction.

To be sure, a linear specification of time and time/treatment interactions is, itself, a simplification. We also estimate an alternative specification: dummy variables for each year in the experiment, interacted with the four experimental groups. The coefficients of these interaction variables, of which there are 20 when using four experimental groups times five one-year periods, are estimated imprecisely and show a jagged pattern. Nevertheless, the declining trends are evident, and the trend is particularly strong for the TR/NIT group. Appendix 1 shows the coefficients of five dummy variables for five years of the experiment for the full sample and the coefficients of 15 interaction variables for the (five) years $\times$ (three) treatment groups. A graph of a moving average (for smoothing) of these coefficients is also shown.[15]

Another check on the sensitivity of using linear time trends is our use of the Cox partial likelihood method, in Model 3. This technique imposes no functional form on time, because chronological time is replaced by the rank-order of the marital breakup events. It is widely used to determine whether the coefficients of interest are sensitive to a particular parameterization of time. As shown in the last column of Table 2, the coefficients in Models 2 and 3 are similar. In Model 3 the coefficients of the additive treatment terms are slightly larger, and the coefficients of the treatment/time interaction terms are slightly more negative. All other coefficients are nearly the same.

Two remaining points about Table 2 are noteworthy. The first concerns the dummy variable for the 20-year controls. As background, the treatment groups were randomly selected and randomly assigned (within stratifications by site, ethnicity, and normal income), except for the 20-year NIT's. Because this group was assigned after about 30 months of the experiment had elapsed, these couples must be considered relatively "stable" for having stayed with the experiment for this length of time. However, both control 20's and NIT 20's were similarly selected, so we can compare their relative performance. Unfortunately, the sample sizes are too small for reliable estimates of the 20-year plan.

A similar problem arises with the designation of the 3-year and 5-year control couples. In Seattle the 5-year controls were not distinguished from the 3-year controls until after the experiment was in operation for three years (Waksberg, 1979,

[15]We also have a table and graph for seven years, but there are so few couples in the sixth and seventh years that we cannot estimate these year $\times$ treatment effects reliably. There are, for example, only 30 control couples and 46 NIT couples remaining in the experiment at the start of the seventh year.

p. 29), so the 5-year controls are presumably more stable than the full sample of original controls. We simply pool the 3-year and 5-year couples; together they are a randomly selected group. When comparing the treatment groups to the control group for summary purposes, we can again pool all the controls or we can use a weighted average of the 20-year controls and all other controls. In Table 2 we separate the 20-year controls and, therefore, we use a weighted average to compute statistics for all controls.

Table 2 also reports estimated effects of the personal and family variables. There are few surprises. Normal income appears weakly and unsystematically related to marital breakups. Among other variables we note that the breakup rates of whites are 65 percent of those for blacks and about 87 percent (.65/.75) of those for Hispanics. Having young children and having more schooling are negatively related to marital instability. A marriage of 10-years duration relative to a marriage of 5-years duration (at the beginning of the experiment) was 74 percent as likely to break up, controlling for the age of the wife and the other independent variables. As befits the random assignments, the coefficients of the personal and family variables are very stable regardless of what treatment variables are used.

We turn next to Table 3 for a summary of treatment effects on marital breakups in SIME-DIME. The summary measures from Model 1 are obtained by computing a weighted average of the two (or three) coefficients for each treatment-by-length-of-plan and calculating the ratio of this average to the weighted average of the 20-year controls and the omitted control group. To illustrate, .638 of the person-years in the TR group are in the 3-year plan and .362 of the TR person-years are in the 5-year plan. Based on the log-linear hazard function, the overall TR effect, relative to the omitted controls, is: $.085 = (.19)(.638) + (-.10)(.362)$. Allowing for the 20-year controls, who constitute 11.8 percent of all controls, lowers the

Table 3

Summary Measures of Treatment Effects on Marital Breakups, Expressed as Treatment/Control Ratios of the Estimated Rate of Marital Breakups or as the Proportion of Breakups, Based on the Coefficients in Table 2, with and without an Adjustment for Attrition

Treatment Group	Treatment/Control Ratio of Estimated Marital Breakups[a]: Three Ethnic Groups Pooled:[b] (Model 1)	Projected Ratios, Allowing for Time Dependence[c] (Model 2): 3 Years	5 Years	7 Years
NIT	1.13	1.22	1.10	1.01
TR/NIT	1.35*	1.36	1.16	1.03
TR	1.13	1.11	1.07	1.03
	With Adjustment for Attrition[d]			
NIT	1.05	1.08	.98	.90
TR/NIT	1.25	1.24	1.05	.94
TR	1.10	1.07	1.02	.98

[a]A ratio of 1.00 would indicate no effect of the treatment; that is, identical rates of marital breakup for the treatment and control groups in the constant-rate model. A ratio of 1.00 in the model allowing for time effects would indicate an identical proportion of cumulative marital breakups at the specified point in time.

[b]These ratios are derived from Model 1 in Table 2. See text, pp. 22-23, for an explanation and example of how the ratios are calculated.

[c]The proportion of (accumulated) marital breakups is estimated assuming an elapse of 3, 5, and 7 years, using Model 2 from Table 2. See text, pp. 23-24, for an explanation and example of how the ratios are calculated.

- Notes continued -

Table 3, Continued

[d]The adjustment for attrition assigns a rate of breakups that is 25 percent higher among control dropouts than the rate among control couples who did not drop out. A 50 percent smaller rate of marital breakups is assumed for NIT and TR/NIT dropouts. The rate of marital breakup among TR dropouts is assumed to be the same as among TR couples who did not drop out. These adjustments are calculated separately for each ethnic group. See the text, pp. 24-25, for more discussion of the adjustment procedure for attrition bias.

*Statistically significant at the 90 percent level (two-tailed test). The test is conducted by estimating the log-linear model with and without the two (or three) dummy variables specifying the treatment being tested, and then determining whether the change in the log likelihood indicates that the two (or three) coefficients in the full model are statistically significant. The individual coefficients and their standard errors are reported in Table 2.

exponent-coefficient for controls from zero [that is, exp (0)] to $-.041 [= (0)(.888) + (-.37)(.112)]$. Subtracting $-.041$ from .085 gives .126, which, in turn, leads to a multiplier of 1.13 as the ratio of the rate of marital breakups of the TR group to that of the control group. This result, which appears in Table 3, is based on Model 1. which does not include time. The NIT and TR/NIT ratios are calculated in the same way.

Our presentation offers an easily interpretable summary of the experimental results, while allowing certain a priori assumptions about distinct (interactive) treatment effects for the three ethnic groups (shown in Cain and Wissoker, 1988) and about the different assigned lengths of plan (shown in Table 2). Another way of summarizing the impact of the treatments is to impose zero effects of the assigned plan lengths by pooling the two (or three) plan lengths for each treatment and to estimate the model with these restrictions. The models in Table 2 merge the three ethnic groups and simply allow for additive effects of ethnicity. Our overall results are similar when we estimate these alternative models.

Again, our primary emphasis is on the model that allows for time effects, and these are shown in the last three columns of Table 3. The first step here is to predict the proportion of breakups for each of the nine experimental groups in Model 2 for each year of elapsed time. The nine groups are the omitted controls, the 20-year controls, and the seven treatment groups. The proportions are estimated by evaluating the personal and family variables at their sample means, specifying the elapse of years 1 (day 365) to 10 (day 3,652), and integrating over the estimated hazard function. The second step is to calculate a weighted average of the two (or three) proportions of the assigned plan length for each treatment, using as weights the proportion of person-years in each plan length. Finally, the ratio of the breakup proportions, treatment/control, is calculated. and these ratios are displayed for the three points in time: after three, five, and seven years. (We do not show the results for the other years from one to ten.)

To help interpret the results, consider the ratios for the "pure" NIT group. After three years, the proportions of marital breakups among control and NIT couples are estimated to accumulate to .172 and .210, respectively, and .210/.172 = 1.22, as shown in Table 3. If, contrary to fact, the proportions reflected constant annual rates of breakup, the implied rates per year would have been .061 and .076, respectively. However, because the rates decline, and decline more rapidly for the NIT group, the estimated accumulated proportions of breakups after two more years become .262 and .289 for control and NIT couples, yielding the ratio 1.10. By the end of the seventh year, the proportions of breakups are similar: .336 for controls and .341 for the NIT group. In summary, all the projected ratios of proportions of marital breakups for the treatment groups after five to seven years are modest, certainly drastically less than the 60 percent increase (a ratio of 1.60) that troubled Senator Moynihan in the quotation cited at the beginning of the paper. Even the result at the end of three years is quite small.

These ratios, already close to unity, are reduced further by our adjustment for attrition bias. As shown in the bottom panel of Table 3, the NIT effect in Model 1 is close to zero, and all the treatment effects based on Model 2 are essentially zero after an elapse of five to seven years. The experiment lasted five years for only about a third of the experimental group and lasted seven years for only about 6 percent of the original sample, but the trends and other estimated parameters are based on the entire sample. Projections beyond seven years do not seem warranted.

The adjustment for attrition bias is simple and may be explained briefly. For each of the four experimental groups and for each ethnic group the number of person-years of missing data is calculated, assigning a half-year to the dropout couple in the year of their dropping out. If a marital breakup occurs before the couple drops out, the couple is not counted as a dropout because we already have complete information about their marital breakup. To the sum of the missing person-years among dropouts we assign the following rates of marital breakups: a 25 percent higher rate for the control dropouts than the observed average rate among control couples who did not drop out; a 50 percent lower rate for the NIT and TR/NIT dropouts than the observed average rate among NIT and TR/NIT couples who did not drop out; and the same rate is assumed for TR dropouts as for the TR couples who did not drop out. There was no monetary incentive for a separated mother to stay with the experiment if she was in the TR group, and she may have already availed herself of the training, education, and counseling services.

Now assume that we measure a .06 annual rate of marital breakups for the 90 percent of the NIT couples with complete information. The assumed rate for the 10 percent who are dropouts is .03, and the estimated rate for the full sample is, therefore, .057[= (.9)(.06) + (.1)(.03)]. Assume further that the observed breakup rate for the 80 percent of the controls who did not drop out is .05, so the assigned rate for the 20 percent who are dropouts is .0625[= (1.25)(.05)], and the full sample estimate is .0525[= (.8)(.05) + (.2)(.0625)]. The old ratio of 1.20[= (.06)/(.05)] is reduced by 10 percent to 1.086[= (.057)/(.0525)].

This numerical example is similar to the adjustments for attrition biases that we use. As shown in Table 3, the adjustment for attrition bias in the first two columns reduces the unadjusted ratio for the pure NIT group by 7 percent, from 1.13 to 1.05. In results not shown, the adjustment is less for whites, 6 percent, than for blacks, 8.5 percent, because the attrition proportion is smaller among whites. These adjustments are, in fact, very close to those recommended by Groeneveld, Hannan, and Tuma, who used a different procedure. They stated that "reasonable adjustments for attrition bias are on the order of 10 percent for blacks and 5 percent for whites" (1983, p. 310).

Our conclusion that the NIT had no effect on the rate of marital breakups relative to the control group is borne out by the results in Table 3. The strongest evidence for a null effect is shown by Model 2, which allows for time effects. The ratios expressing treatment effects for the NIT and TR/NIT plans after five to seven years range between 1.01 and 1.16 without an adjustment for attrition and between .90 and 1.05 with this adjustment. Our analysis of reconciliations and remarriages strengthens our conclusion. Before presenting this analysis, which uses a somewhat different procedure, we turn to an analysis of economic factors at work within the NIT and TR/NIT treatments, which involve plans of varying generosity.

Results for Treatment Effects by Generosity of Plan

As shown in Table 1, there were eleven NIT plans in SIME-DIME, varying in their guarantee and tax levels. Since there were also three plan lengths and an NIT program with and without a training component, it is necessary to simplify the specification of the NIT variables to have enough observations to estimate each NIT parameter. We focus on the economic benefits the wife obtains if she does or does not separate, and we first use the exogenously assigned guarantee (G) levels by using dummy variables for plans with low, medium, and high benefits. These G-levels are $3,200, $4,200, and $5,000 (in 1971 dollars) for a separated wife and two children. Later we analyze the transfer payments received by the NIT families.

1. Exogenously Assigned Guarantee Levels

In our previous discussion of the economic influences of income maintenance plans on marital stability, we noted that by providing more income the generous plans could promote stability, but by providing more potential income to the wife if she separates the generous plans could be destabilizing. The lowest plan in SIME-DIME should be stabilizing relative to AFDC, however, because it offers no more income support to the wife than does AFDC; in fact, it probably offers lower benefits if we allow for the permanency of AFDC and possible assistance from AFDC for medical care and housing.

Table 4 summarizes our results from estimating two models that include variables for low, medium, and high payment plans for NIT and TR/NIT. Model 4 has (a) dummy variables for the three G-levels separately for each treatment, NIT and TR/NIT; (b) four other experimental variables: TR, the 5- and 20-year plans (as additive variables), and the 20-year control group; and (c) the personal and family variables listed in Table 2. Model 5 specifies three additive G-levels (not interacted with NIT and TR/NIT) but adds six terms for time effects: time, three time/treatment interactions, and two time/G-level interactions.

The summary results translate the coefficients (not shown) for the treatment and G-level variables into average multipliers, expressed as ratios, showing the factor by which the rate of marital breakups for the treatment or G-level group exceeds (or is less than) that of the control group. The results for Model 4, shown in the first column, are unexpected. The least generous NIT and TR/NIT plan has the largest destabilizing effect. The multipliers, 1.33 and 1.50 of NIT,LOW and TR/NIT,LOW, are statistically significant and large, implying that the control group's rate of marital breakup, about .06 per year, is increased to .08 and .09 by these plans. The most generous plan has a small stabilizing effect. These results are counter to our expectation that higher payment plans would be more destabilizing (or less stabilizing), and they are counter to our contention that the least generous plan should only be stabilizing, given that the AFDC alternative dominates the destabilizing effect that stems from the benefits available to a wife who separates.

Table 4

Summary Measures of Treatment Effects on Marital Breakups by Three Levels of Generosity (G-Levels) of NIT Plan. Summaries Are Expressed as Treatment/Control Ratios, with and without Time Interactions (No Adjustment for Attrition Bias)[a]

Treatment Group	MODEL 4. (No Time Dependence)	MODEL 5. (Time Dependence) Projected Ratio after Year:[b]			MODEL 5. Coefficients (Stand. Err.) x 10^{-4} of Time, Time x Treatment, and Time x G-Level[b]		
		3	5	7	Treatment x Time	G-Level x Time	Annual Change in Rate[c]
NIT, LOW	1.33*	1.31	1.18	1.08	-3.55 (3.58)	...	-.187
NIT, MED	1.13	1.23	1.20	1.18	same	3.37 (3.13)	-.080
NIT, HI	.84	.89	1.03	1.17	same	8.13 (3.70)**	.094
TR/NIT, LOW	1.50**	1.52	1.26	1.09	-7.78 (3.39)**	...	-.303
TR/NIT, MED	1.44	1.41	1.24	1.13	same	3.37 (3.13)	-.211
TR/NIT, HI	.97	1.00	1.02	1.00	same	8.13 (3.70)**	-.062
TR	1.08	1.09	1.04	1.00	-1.46 (3.29)		-.122
Control	1.00	1.00	1.00	1.00	-2.11 (2.19)		-.074

[a]The ratios in this table are based on estimations of log-linear models similar to those shown in Table 2, but with the following changes:

Model 4 is like Model 1 except that (a) the assigned lengths of plan are specified by two additive dummy variables (for 5-year and 20-year plans); (b) NIT is specified by three dummy variables: NIT,LOW; NIT,MED; and NIT,HI, where LOW, MED, and HI refer to the NIT plans offering guarantee levels of $3200, $4200, and $5000, respectively (for a separated wife with two children); (c) TR/NIT is specified by three dummy variables: TR/NIT,LOW; TR/NIT,MED; and TR/NIT,HI.

Model 5 is like Model 2 except that (a) the 5-year plan is specified by an additive dummy variable; (b) the treatment variables (not including the time interactions) are specified by seven dummy variables: TR; NIT; TR/NIT; NIT, 20-year; MED plan; HI plan; and 20-year controls; (c) five time/treatment interaction variables are specified, along with the additive time variable: TR x t, NIT x t, TR/NIT x t, MED x t, and HI x t. Note that the NIT, LOW plan is estimated by the NIT and NIT x t variables.

[b]The five time/treatment interaction variables, when added to the model that has only the additive time variable, are statistically significant at the 99 percent level. The treatment x time interactions are specified as additive across G-Levels and the G-Level x time interactions are specified as additive across the NIT and TR/NIT treatments. Time is measured in days, and all time coefficients are expressed in 10^{-4} units. See Footnote c for further interpretation of the coefficients of the time and time/treatment variables.

- Notes, Continued -

Table 4, Continued

[c]The interpretation of these values is that the time trend of the rate of marital breakup is:

i) declining by .000211 per day for controls or -7.4 percent per year.

ii) declining by .000357 per day for TR (= -.000211 -.000146) or -12.2 percent per year.

iii) declining by .000566 per day for NIT, LOW (= -.000211 -.000355) or -18.7 percent per year.

iv) declining by .000229 per day for NIT, MED (= -.000211 -.000355 +.000337) or -8.0 percent per year.

v) increasing by .000247 per day for NIT, HI (= -.000211 -.000355 +.000813) or 9.4 percent per year.

vi) declining by .000989 per day for TR/NIT, LOW (= -.000211 -.000778) or -30.3 percent per year.

vii) declining by .000652 per day for TR/NIT, MED (= -.000211 -.000778 +.000337) or -21.1 percent per year.

viii) declining by .000176 per day for TR/NIT, HI (= -.000211 -.000778 +.000813) or -6.2 percent per year.

*Statistically significant at the 90 percent level (two-tail test).

**Statistically significant at the 95 percent level (two-tail test).

One possible explanation for this unexpected result is that attrition bias, which we believe to exaggerate a treatment's destabilizing effect, is more severe in the low G-level plans. As noted on page 12 there was more attrition in the low plans (among NIT couples). Another explanation for the anomaly is that couples in the low plans merely had marital breakups sooner in the experiment. Although AFDC provides the separated wife with higher benefits than does the least generous NIT plan, the NIT payments are received immediately; there is no waiting period as there is with getting on the AFDC rolls. This explanation is tested in Table 4.

In Model 5 time is interacted with three levels of generosity of the NIT and TR/NIT plans, and the last column in Table 4 shows the annual change in the rate of marital breakups for each of eight experimental groups. The low G-level plans do have the largest negative time effects. For example, the annual change of -.187 for NIT,LOW implies that a marital breakup of .08 would decline to .065 after one year, to .053 after two years, and so on. The estimated coefficients of variables involving time in the log-linear hazard function are also shown in Table 4, and the calculations that translate the coefficients into annual changes are shown in note c of Table 4. In the second-to-fourth columns of Table 4 we see that the projected destabilizing effects of all the plans, including the LOW plans, nearly disappear after seven years. Finally, there is no monotonic order in the projected G-level effects on marital breakups by the fifth year. Recall that our measure of effect in the tables showing the elapse of time is the *accumulated* proportion of original couples who have divorced or separated.

The five time/treatment and time/G-level terms are statistically significant at the 99 percent level (two-tail test). However, some of the individual coefficients have relatively large standard errors, and the model's linearity of the time terms is an assumption of convenience and simplicity, justified in part by our previous tests for the sensitivity of relaxing this assumption. Finally, we do not have a good explanation for why the low G-level has a larger negative interaction with time than the high G-level.

2. Expected Payments from the NIT Plans

One advantage in using the G-levels of the NIT plans in the estimation models is that the G-levels are randomly assigned. There are, however, two disadvantages. First, even the complete specification of the NIT plan by its G and t levels does not tell us the amount of transfer payments that the families actually receive, because this amount depends on a family's income level in conjunction with the plan. For example, if the family earns above the breakeven level of income (see Table 1), the family will receive no payments from the NIT plan.

A second drawback in specifying plans by their generosity is that this does not permit a separation of and test for the stabilizing and destabilizing influences. Higher payments to an intact family are expected to be stabilizing, controlling for the payments the wife would get if she separates. Correspondingly, higher payments to the wife were she to separate are expected to be destabilizing, controlling for the payments the couple would get if they stay together. The problem with dealing with these two types of expected payments, hereafter called "family's expected payment" and "wife's expected payment," is that the only way to break their perfect collinearity (see Table 1) is by allowing for earnings variation, and earnings reflect behavior that may be endogenous with respect to the experimental treatments. Thus, the family's expected payment may decline if the husband works and earns more. Because his work has no necessary effect on what the wife would receive if she separates, assuming payments for child support are negligible, there can be a low correlation between the family's expected payments and her expected payments. Similarly, the wife's expected payments are primarily determined, for a given NIT plan and a given number of children, by her earnings, and her earnings may have only a modest effect on family income, which, in turn, determines the family's expected payment.

In our analysis below we have chosen not to control for the work and earnings of the husband, on grounds that this labor supply response is the key endogenous variable in the experiment. We do control for the wife's earnings, measured as an average over a six-month period, but with a one-year lag so that earnings are not simultaneous with the decision to separate. Also, we attempt to avoid simultaneity in payment amounts and the decision to dissolve the marriage by defining the expected payments on the basis of the same lag of one year.

Panel A of Table 5 shows the effects on the rate of marital breakups of the wife's earnings. the wife's expected payments, and the family's expected payments. The three variables are all time-varying. The log-linear rate model used is like Model 1 of Table 2 in the specification of other independent variables, although an additional variable is the number of children present at the time when the expected payments are calculated. Time variables are not included. The model's treatment variables, in addition to the two variables measuring expected payments, are five dummy variables: NIT, TR/NIT, TR, and the 5-year and 20-year plans. (The estimated coefficients for the full model are not shown.)

Table 5 is mainly interesting because of the coefficients in Panel A. We report in Panel B the usual overall indicators of treatment effects, which are the ratios of treatment-to-control estimated rates of marital breakup, here evaluated at the means of the two expected payment variables. The ratios show nothing new, essentially repeating the results from Model 1 that are summarized in column 1 of Table 3. (Remember that the model used in Table 5 is like Model 1 from Table 2 in that time is not controlled for.)

Table 5

Effects on Marital Breakups of Lagged Values of Wife's Earnings, Expected Family Payments from NIT, and Wife's Expected Payments from NIT If She Separates, and Resulting Ratios of Marital Breakup Rates, Treatment/Control

Panel A. Effects of Lagged Economic Variables[a]

Independent Variable	Coefficient (Standard Error) (1)	Multiplier, Evaluated at Mean[b] (2)
Wife's Earnings, Lagged (Mean = \$82, month)	.00263 (.00123)**	1.24
Wife's Expected Payment Lagged (Mean = \$310, month)	-.00085 (.00058)	.77
Family's Expected Payment Lagged (Mean = \$137, month)	.00132** (.00061)	1.20

Panel B. Ratios of Treatment-to-Control Estimated Rates of Marital Breakup, Evaluated at Means of Expected Payments. (No Allowance for Time and No Adjustment for Attrition)

Treatment	
NIT	1.10
TR/NIT	1.39**
TR	1.11

[a]The full model from which the coefficients in Panel A are taken includes the personal and family variables listed in Table 2, with the addition of numbers of children as a time-varying independent variable, three treatment dummy variables (NIT, TR/NIT, TR), two length-of-plan dummy variables (5-year, 20-year plans), and a dummy variable for the 7 percent of wives with missing data for wife's earnings. No time variables were included.

[b]The multipliers are obtained by evaluating the coefficient of each variable at its mean. For example, for the wife's earnings: 1.24 = exp (.22), where .22 = (.00263)(82).

**Statistically significant at 95 percent level (two-tailed test).

Panel A shows, as expected, that earnings of the wife, lagged one year, are associated with an increase in marital breakups. Evaluating the variable at its mean of $82 a month (averaged over all wives, including nonearners), the rate of marital breakups is estimated to be 24 percent higher than the rate for wives with zero earnings (see column 2). Causality is not implied, because wives who intend to divorce may choose to get a job in anticipation of leaving their husbands.

Controlling for the wife's earnings and the other variables in the model, we see the surprising results that the wife's expected NIT payments (lagged) are negatively related to marital breakups, while the family's expected payments (lagged) are positively related to marital breakups. The coefficient of the wife's expected payments is not statistically significant at conventional levels, but it is large in magnitude. Neither of the two results for the expected payment variables supports the economic hypothesis that marital breakups respond to the incentive of money payments from income maintenance plans. Perhaps the potential endogeneity of the two variables is a source for the unexpected results. For example, if a husband loses his job for reasons that have nothing to do with the NIT, this event will lead to higher NIT payments and may as well cause a marital breakup, thus imparting a spurious positive relation between family's expected payments and marital breakups. We have already noted that the wife's earnings may rise in anticipation of a divorce, and the higher are her earnings the lower will be the wife's expected payments. Perhaps earnings lagged one year is a weak measure of the earnings that really matter to the wife who separates from her husband; namely, her actual earnings after the breakup. These rationalizations of the results in Panel A are intended only to support the general point about the problem of endogeneity in the variables measuring expected payments. As the results stand, they strike us as a puzzle.

Treatment Effects on the Estimated Proportion of Time Married

We now widen the analysis to include estimation of the rate of ending the wife's spell of marital separation, using two events to mark the spell's end: (a) a reconciliation with the husband to whom she was married at the beginning of the experiment, or (b) either a reconciliation or a remarriage. Reconciliations and remarriages were more frequent among treatment couples.

Assuming time begins at the start of the experiment, an estimate of the rate at which marriages end permits an estimate of the expected length of the marriage. Also, an estimate of the rate at which the spell of being unmarried (or separated) ends permits an estimate of the expected length of this spell. Given the estimated lengths of time married, l_m, and of time unmarried, l_u, we can calculate the wife's proportion of time unmarried as $l_u/(l_u + l_m)$, it being understood that "married" may be defined either as being married to her original husband or to anyone. Clearly, this proportion conveys more information than the rate of marital breakups, which is only one component of the proportion.

The advantages of focusing on the proportion of time unmarried have been mentioned earlier (see page 14). We would like to distinguish between a permanent divorce and a separation of a few months followed by a reconciliation. More reconciliations among couples in the NIT groups may reflect more short-term separations as a result of reporting differences (relative to controls), or they may reflect a true excess of short-term separations by NIT couples.

Unfortunately, several problems arise in constructing the proportion measure. Although the fraction of marital separations in SIME-DIME that were observed to reconcile or remarry is large, 29 percent, the actual numbers who reconciled (134) or who remarried (28) are too few to obtain reliable treatment effects.[16] Another problem is that the proportion we have described is based on a single spell of marriage and a single spell of separation. This ignores the incidences of multiple spells for a given wife, and there are too few of these cases to permit reliable estimates of the rates of ending such higher-order spells.

Our compromise solution to these problems is to construct two measures of marriage length for the "original" wife. One is the length of time with the original husband, calculated as the sum of the time in the original marriage spell (beginning with the experiment) and the time (if any) in a reconciliation spell. Our second measure of marriage length is the sum of time in the original marriage plus the time (if any) in a subsequent spell of either a reconciliation or a remarriage. The estimation method of the rate of ending these "summed" spells is the same as that used in Tables 2-5, when the first spell of marriage was analyzed, except that the event that ends the summed spell is the second breakup. (If there is only one spell of marriage, then of course the event that ends it, if it does end, is the first breakup.) Define this rate as r_{mu}, the transition rate from married to unmarried. As before, the contribution of an event to the likelihood function for the hazard takes account of whether the wife is with her original (or second) husband in the last period of observation.

Now consider the rate of ending the wife's first period of separation for the 553 cases (in our sample) in which a marital breakup occurred. Define this rate as r_{um}. With so few observations our estimated time effects had large standard errors, and we simplified the analysis by assuming a constant-rate model. The event that can

[16] Groeneveld, Hannan, and Tuma (1983, pp. 311-312) report that 713 of their total sample of 2,770 couples (including childless couples) separated in the first five years of the experiment. Of the 713 separations, 184 (26 percent) reconciled and another 83 (12 percent) remarried.

end the separation is a reconciliation (or remarriage), and the likelihood function takes account of whether the wife is married or separated in the last period of observation.

For the sake of brevity we report only two parts of this analysis in Table 6. Panel A shows the summary effects of treatments on the rate of ending the first spell of separation. Panel B shows the estimated proportions of time unmarried, which combine Panel A's length of spells of separation with the new variants of the estimated lengths of spells in a married state.

For Panel A a log-linear constant-rate model is estimated that is similar to Model 1 except that the hazard refers to ending a spell of separation. In row 1 the spell is defined to end when the woman is reconciled with her original husband. Relative to the control group the rate of ending these spells is 20 percent higher for the NIT group and 12 percent lower for the TR/NIT and TR groups. Thus, the r_{um} for NIT divided by the r_{um} for controls is 1.20. In row 2 the estimated mean length of a spell of separation, l_u, is given, where $l_u = 1/r_{um}$. In row 3 the spell is defined to end when the woman is either reconciled or marries a new husband. The rates of ending these spells are slightly higher, by 12 and 3 percent, for the NIT and TR/NIT groups and is 17 percent lower for the TR group. The interpretation is that the "pure" NIT group, with ratios above unity, had more reconciliations (and remarriages) and shorter spells of separation relative to the control group.

We do not report the estimated treatment effects on the rates of ending unreconciled separations or of ending "summed" periods of marriage, because the results for the constant-rate model are not much different from the results shown in Table 2 for Model 1. We use these results, along with the results in Panel A, to calculate the expected lengths of marriage spells, $l_m = 1/r_{mu}$, and the expected lengths of separation spells, $l_u = 1/r_{um}$, to estimate the proportion of time unmarried,

Table 6

Effects of Treatments on the Rate of Ending Spells of Separation and on the Estimated Proportions of Time Unmarried, Allowing for Reconciliations and Remarriages

Outcome	Experimental Group NIT	TR/NIT	TR	Control
Panel A. Treatment/Control Ratios (T/C) of the Rates of Ending a Separation Spell and Estimated Lengths of Separation Spells[a]				
1. T/C of the rate of ending the separation spell by reconciliation	1.20	.88	.88	...
2. Estimated length of above spell (years)	5.9	8.8	8.9	7.8
3. T/C of the rate of ending the separation spell by reconciliation or remarriage	1.12	1.03	.83	...
4. Estimated length of above spell (years)	5.8	6.3	7.8	6.5
Panel B. Effects of Treatments on Estimated Proportions of Time Unmarried, Allowing for Reconciliations and Remarriages[b]				
5. Estimated proportion of time not married to original husband[c]	.267	.394	.344	.282
6. T/C ratio of above proportion	.95	1.40	1.22	...
7. Estimated proportion of time not married[c]	.246	.294	.310	.233
8. T/C ratio of above proportion	1.06	1.26	1.33	...

[a]The separation spells are first separations and have two definitions, one that ends when the woman is reconciled with her original husband (at the start of the experiment) and a second that ends when the woman either reconciles or remarries. The estimation uses a constant-rate model with the usual treatment-by-plan-length dummy variables and the personal and family variables shown in Table 2. Estimated lengths of the separation are calculated as the reciprocal of the expected value of the rate of ending the spell and are converted into years. Expected values for the rates are obtained by evaluating the log-linear rate model at the sample means of the personal and family independent variables.

-Table, Continued-

-Table 6, Continued-

[b]The entries in this table are derived from the log-linear rate models that were estimated and reported in Cain and Wissoker [1988, pp. 47-48]. In the "reconciliations only" case, the spell of marriage is defined as the time in the first spell of marriage to the original husband plus the time in the first spell of reconciliation. In the "reconciliation and remarriage" case, the spell of marriage is defined as the first spell of marriage to the original husband plus the time in the first spell of either a reconciliation or a remarriage. A marriage spell is considered to be censored in the "reconciliations only" case if the woman is with her original husband at the end of the experiment. In the case of reconciliation or remarriage, the marriage spell is considered to be censored if the woman is married at the end of the experiment. In the same source we show our estimates of the rate of ending a first spell of separation by wives who experienced a separation. A separation spell is considered to be censored if the woman is not reconciled (or is not remarried) at the end of the experiment.

[c]The proportion is $\frac{\ell_m}{\ell_m + \ell_u}$, where the expected length of marriage, ℓ_m, is the reciprocal of r_{mu}, the estimated constant rate of transition from being married to being unmarried. See note b for the two definitions of a marriage spell. The expected length of time not married, ℓ_u, is the reciprocal of r_{um}, the estimated constant rate of transition from being unmarried (after a first dissolution occurs) to being either reconciled only or to being reconciled or remarried.

$l_u/(l_m + l_u)$.

Row 5 in Panel B presents the estimated proportions of time that the wife is not with her original husband for the four experimental groups. The striking finding is that couples in the "pure" NIT program show a slightly larger estimated proportion of time together than the controls. The difference of 5 percentage points, shown in row 6, is too small to be considered statistically or practically significant, but note that there is no adjustment for attrition nor for time dependence.[17] Rows 7 and 8 show that the proportion of time unmarried is slightly larger for the "pure" NIT group than for controls, but again, a difference of 6 percentage points is unimportant.

The training program, TR, shows for the first time a relatively large destabilizing effect on marriage. The combined program, TR/NIT, has an effect on the two proportions that is about the same size as it was in Model 1 of Table 3, when there was no adjustment for attrition and no allowance for time dependence. The emphasis we have placed on estimating the effect on marital stability of the "pure" NIT program leads us to view the allowance for reconciliations and remarriage as further evidence against the conclusion that the NIT effect is destabilizing.

CONCLUSION

Our main conclusion is that the Seattle-Denver Income Maintenance Experi-

[17]The argument presented earlier for why attrition bias serves to overstate marital breakups among NIT groups relative to the control group also applies to the rate of ending a spell of separation. A separated wife who is covered by an NIT plan is unlikely to drop out of the experiment if she stays separated, because of the NIT payments available to her. If she reconciles or remarries, however, this financial incentive to stay with the experiment is generally sharply diminished, because her income is likely to rise, which reduces or eliminates her NIT payments. Thus, the dropouts among separated NIT wives are more likely to become remarried relative to those who do not drop out. No such incentive exists among the separated wives in the control group.

ment does not show that a negative income tax program, which provides income support payments to intact families, increases marital breakups relative to the existing AFDC program. This conclusion is opposite to that of Groeneveld, Hannan, and Tuma, whose pioneering research on this topic has dominated the debate on this issue for the last ten years. Just why their conclusion and their empirical results from the experiment are so different from ours is the subject of another paper (Cain and Wissoker, 1988), but the most important differences in our approach are the following: (a) we distinguish between the "pure" NIT treatment and the NIT treatment that included an experimental program of counseling, education, and training; (b) our results reflect the full seven years of experimental data and emphasize all three assigned lengths of plan; (c) we take into account the timing of marital breakups and then emphasize the estimated proportion of couples whose marriages broke up after five to seven years elapsed.

Our second conclusion, which is less distinct, is that economic incentives have no consistent relation to marital stability within the context of the Seattle-Denver experiment. On the one hand, both attrition and the timing of marital breakups can be explained by economic incentives. Specifically, the opportunity to obtain transfer payments discourages attrition and induces an intertemporal substitution toward "earlier" rather than "later" marital breakups. On the other hand, we find no relation between the generosity of the NIT plans and marital breakups after allowing for time dependence. Without allowing for timing, the least generous NIT plan is unexpectedly associated with the largest rate of marital breakups. Why the least generous plan shows a strong pattern of many "early" breakups and few "late" breakups is not clear to us.

The most puzzling of our findings is that the expected transfer payments to a family if it stays together and the expected payments to a wife if she separates have the "wrong" signs. Disentangling the endogenous behavior that produces the variation in expected payments remains to be done. One aspect of behavior that we tested involves our finding that earnings by the wife, which cause her expected payments (if she separates) to decline, are positively associated with a future marital breakup.

SIME-DIME had a complicated design, and other analysts may handle its complications differently. While we are convinced of our main conclusion, the quantitative estimates for our findings may not be very robust. Adjustments for attrition bias are necessarily partially hypothetical. We are not confident about the correct parameterization of time. The statistical techniques of hazard functions, while perhaps indispensable for this experiment's design, given the different plan lengths and shifts in treatments, are no substitute for a longer experiment for purposes of analyzing long-run behavior. To paraphrase Senator Moynihan, breaking up families is not only a large event but an event that runs its course for a long period of time. Even in SIME-DIME, the largest of four negative income tax experiments, a relatively small sample, about 700 families with children, were followed for five years. In light of the different treatments and the fact that a marital breakup is a relatively rare event, 700 is probably too small a sample, even if five years were considered long enough.

A final perspective on the issue of marital breakups and welfare reform is prompted by consideration of two main goals of welfare reform, the well-being of children and the reduction of transfer payments (and their burden on taxpayers). Clearly, the first goal is not directly studied when examining marital breakups, and economists are not experts on the matter. The second goal is addressed, because marital breakups among low-income families are almost certain to affect AFDC rolls and expenditures. We should keep in mind, however, that breakups by already-married couples are not the main source of the AFDC caseload. Instead, the main demographic sources are births to single women, the unmarried mother's decision about marrying, the divorced woman's decision about remarrying, and the living arrangements of mothers without husbands present. Even if we focus on divorce and separation in husband-wife families, there is an econometric problem in dealing with already-married couples, because the decision to marry may itself be endogenous and affected by the welfare reforms.[18] All these demographic sources of changes in marital status and family composition are likely to be influenced by welfare reforms that provide cash transfer payments to husband-wife families. We are far from understanding how such welfare reforms affect these several types of demographic change.

[18]For further discussion of these points see Albrecht (1986) and Cain (1987).

Appendix 1

Time Patterns. (Five Years of Experiment)
Coefficients of Yearly Time Dummy, and Interactions
of Yearly Time Dummy and Treatment Dummy, and
Moving Averages of Time Effects

	Controls		NIT			TR/NIT			TR		
Year	Coefficient[a] (Standard Error) (1)	Moving Average[b] (2)	Coefficient[c] (Standard Error) (3)	Time Effect (1)+(3) (4)	Moving Average (5)	Coefficient[c] (Standard Error) (6)	Time Effect (1)+(6) (7)	Moving Average (8)	Coefficient[c] (Standard Error) (9)	Time Effect (1)+(9) (10)	Moving Average (11)
1	.000	-.043	.210	.210	.174	.404*	.404	.398	.130	.130	.118
			(.227)			(.198)			(.230)		
2	-.130	.010	.233	.103	.080	.517*	.387	.333	.224	.094	.105
	(.253)		(.260)			(.225)			(.259)		
3	.298	.016	-.393	-.095	-.008	-.143	.155	.062	-.195	.103	-.258
	(.244)		(.262)			(.226)			(.258)		
4	-.402	-.259	.457	.055	-.200	-.048	-.450	-.546	-.931	-1.333	-.774
	(.360)		(.426)			(.464)			(.734)		
5	-.532	-.489	-.285	-.817	-.526	-.908	-1.440	-1.110	-.000	-.532	-.799
	(.391)		(.566)			(.637)			(.612)		

Note: The full model from which these coefficients are taken is Model 2 of Table 2, except that this dummy-variable specification of time replaces the linear specification.

[a]Coefficient applies to all observations (see note c).

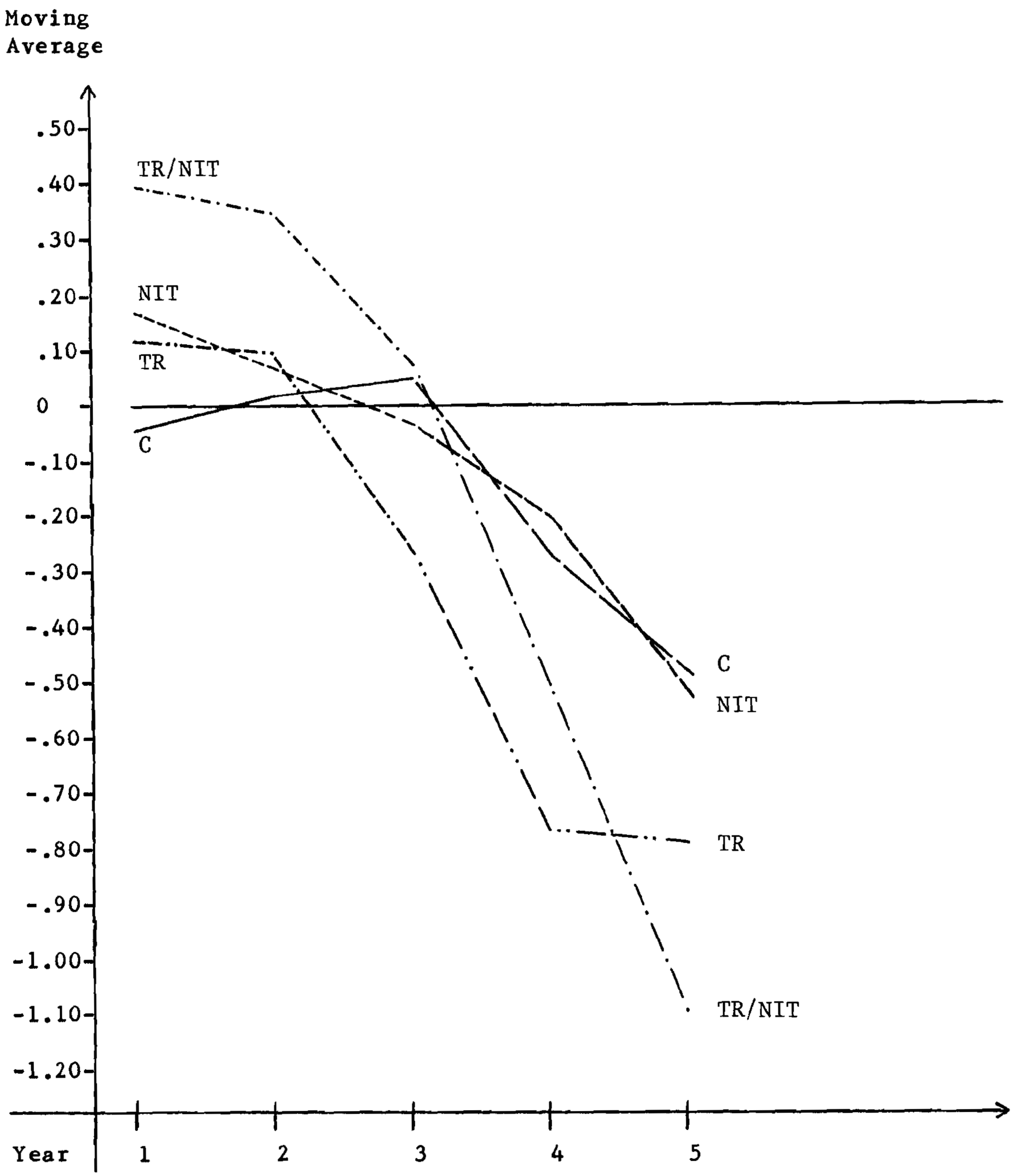
[b]Moving average for year 1 = $(2t_1 + t_2)/3$
Moving average for years 2-4 = $(t_{-1} + 2t_0 + t_1)/4$
Moving average for year 5 = $(2t_5 + t_4)/3$
See graph for the moving averages

[c]Coefficients of Year x Treatment dummy variables are incremental and are added to "control" coefficients for time effects.

*Statistically significant at 90 percent level (two-tail test).

Appendix 1, Continued

Graph of Moving Averages of Coefficients of Interaction
Dummy Variables--Year and Year x Treatment
5 Years of Experiment*



*Note: About 30 percent of sample were followed through the 4th and 5th years.

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