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ALTERNATIVE SAMPLES FOR WELFARE DURATION IN SIPP: DOES ATTRITION MATTER?

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Alternative Samples for Welfare Duration in SIPP: Does Attrition Matter?

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ABSTRACT

The Survey of Income and Program Participation (SIPP) has become an important tool for studying how long people stay on welfare programs (i.e., welfare durations) because it has monthly data on use of various welfare programs. This paper focuses on the impact of alternate treatment of sample attrition when defining spells of welfare receipt by unmarried mothers. The analysis compares a sample that excludes those who miss an interview to one that does not exclude such cases. The latter sample is 60 percent larger. The comparison is based on non-parametric estimates of the probability of remaining on welfare at specified intervals (the survivor function) and hazard models with covariates reflecting the recipient personal characteristics (age, race, education, and children) and policy variables (AFDC benefit levels and unemployment rates). The comparison shows that, while attrition affects sample means, conditional estimates from behavioral models are less affected. The paper concludes that attrition may not be a large problem for welfare duration models using SIPP. The paper also compares samples with and without amputations and finds little difference.

KEYWORDS

welfare duration, attrition bias, amputations

1. INTRODUCTION AND BACKCKGROUND

Policy makers have long been concerned with the causes and consequences of welfare program use. In the last decade, a number of studies have investigated the dynamics of welfare use. Using longitudinal data on individuals and hazard models, researchers have sought to identify why some persons or groups stay longer on welfare than others. The Survey of Income and Program Participation (SIPP) is one important source of data for this work because it includes monthly measures of recipiency for a variety of welfare programs. This paper focusses on the impact of alternative treatment of sample attrition and amputations when defining welfare spells in SIPP, where a spell means successive months of welfare receipt.

The paper first discusses past work and conceptual issues. We then discuss alternative samples and present empirical results.

A. Past Welfare Studies

Most work on welfare dynamics is fairly recent. The main welfare program of interest is the Aid to Families with Dependent Children program (AFDC), the largest cash welfare Program in the U.S. It primarily serves unmarried mothers.[1] Several studies have used annual data. See Hutchens (1981), Plotnick (1983), Bane and Ellwood (1983) and extension by Ellwood (1986), and part of O'neill, et al. (1984). Annual data can lead to over-statement of welfare dependency since one month of welfare receipt in each of two different years can result in a two year spell of recipiency by the definitions usually used in these studies.

Monthly data on recipiency has been used by O'neill, et al., in addition to their work cited above, who used administrative records from 1969-1982. Blank (1989) uses monthly data as well, from the control group of the Seattle/Denver Income Maintenance Experiments (SIME/DIME) from the mid 1970's. Fitzgerald (1991) compares results on welfare spells from the 1984 Panel of SIPP to those of Blank and finds them quite similar. Ruggles (1989), and Long and Doyle (1989) also use estimates from SIPP.

For our current purposes, we want to focus on how SIPP has been used. Ruggles (1989) and Long and Doyle (1989) restrict their interest to welfare spells by persons who completed all interviews of the 1984 SIPP panel. Thus anyone who missed an interview is dropped. Fitzgerald (1988, 1991) used a sample of all persons without dropping non-interviews (hereafter called the total panel sample) treating persons who drop from the sample as being censored--that is, contributing no further information--as of the interview missed. These alternative assumptions are our focus.

B. Attrition in SIPP

As with any longitudinal survey, SIPP sample attrition and non-response problems have received much attention. It has been documented that attrition acts selectively over the course of a panel so that the average characteristics of those completing all interviews, hereafter called complete panel persons, are different from initial average characteristics (McCarthur and Short 1985; Short and McCarthur 1986; Ernst and Gillman 1988). Weights are provided so that computations can be performed which correct for this attrition, under the assumption that those remaining in the panel can represent those who dropped out.

Weights can serve other functions as well, such as aiding in specification tests, but we do not propose to enter that debate. Our concern is simply how treatment of sample attrition will affect empirical models of welfare spells. Even if the mean characteristics from the complete panel sample were very different from the total panel sample, behavioral models of welfare use

[1] Roughly half of the states have also adopted the AFDC-U program which provides aid to two-parent families where the primary earner is unemployed. AFDC-U familes constitute less than seven percent of the total AFDC caseload (Committee on Ways and Means, 1989, p. 402, 426).

estimated conditional on the observed covariates could be the same.

II. ATTRITION AND CENSORING IN DURATION MODELS

In a certain sense, loss of information due to inability to follow individuals is natural in duration models. We are interested in the length of time that a person remains in a particular state, say receiving welfare. Even if all persons in a panel were completely interviewed over the panel, some would still be receiving welfare as the panel ends. For these persons, we do not know the length of their spell due to our inability to continue to interview them. They contribute censored (on the right) spells of recipiency. Censoring of this type, as by the end of the panel or a random sample cut, is considered a random event and is routinely handled.[2] In a maximum likelihood framework, censored spells contribute information that a spell is at least a given length.

A stronger result is that more general schemes for censoring can also be ignored (that is, treated as above) when estimating hazard models, provided that the censoring meets a "quasi-independence" condition (Lawless 1982, pp. 38-43; Kalbfleisch and Prentice 1980, pp.119-122; cf. Williams and Lagakos 1977, for a general treatment). Essentially, this condition states that, conditional on all covariates, the censoring process is not selectively terminating spells that are in particularly high or low risk of ending normally. In our context, sample attrition censoring is not selectively censoring people according to some unmeasured (or unobservable) covariate related to their exit probability. Non-independent censoring would occur if persons who were just about to end their welfare spells leave the sample, for example. Lawless (1982, p. 479-484) and Cox and Oakes (1984, p. 144-146) discuss problems with testing this assumption. It is normally not testable without strong, arbitrary assumptions on the true functional form of the relationship.

A related question more relevant for our comparison is whether problems are caused by selecting the subsample of complete panel members, those that missed no interviews. This type of sampling scheme, called selection by virtue of survival,[3] raises issues similar to those above. Hoem (1985) presents a good discussion of the issue and how it relates to the question of the appropriateness of weighting in an event history context. He argues that this type of selection can be ignored when it meets a particular condition. The condition states that, conditional on the measured covariates, the probability of attrition (non-selection) does not vary according to the current situation of the person (i.e., whether on welfare or not). Again, the issue is whether unmeasured covariates that determine whether the person survives the panel are related to transition probabilities. Hoem notes that if selection is not ignorable, weighting can be used to counteract the selection bias if the spells have a known probability of inclusion in the target sample.

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[2]Recipiency spells can also be censored on the left, that is, ongoing at the beginning of the panel. Work with these spells, drawn from the "length-bias" distribution, requires arbitrary assumptions. (Heckman and Singer 1984, p. 103) Previous work on welfare duration has ignored such spells, and we do likewise as noted later.

[3]Hoem (1985) attributes this phrase to Ryder (1965).

A choice that faces users of SIPP for event history analysis is whether the ease of using the complete panel members and associated panel weights, which provide some guard against the nonignorable selection by survival, outweighs the gain in sample size available if one is willing to use the total panel. The total panel can be used without weights, or weights could be developed to weight individual spells based on their sample inclusion probability.

Our approach to questions raised above is descriptive and simple. We adopt a null hypothesis of independent censoring and ignorable selection. Under this null hypothesis, we estimate models using usual methods from alternative samples, one including only cases that complete all interviews and one including only attrition cases. We then test whether estimated parameters from the different samples are equal. Differences are evidence against ignorable selection.

III. DATA AND SAMPLE DESCRIPTION

A. SIPP

SIPP is a longitudinal sample of households representing the non-institutionalized population of the U.S. It includes monthly information on income, use of government programs, labor force participation, and demographic characteristics. Interviews are conducted every four months during the panel asking about activity in the previous four months. The 1984 panel includes about 20,000 households and interviews began in October, 1983. It consists of eight or nine interviews (32 to 36 months), although some households were dropped after five or six interviews.[4] For more details on SIPP, see Nelson, McMillen, and Kasprzyk (1985). We work with the 1984 Longitudinal Research File which potentially includes 32 months of data, and has been longitudinally edited for consistency (SIPP, 1989, pp. B-1 to B-19).

B. Welfare Recipiency

We selected a subsample of unmarried women with children (female heads of families) who received welfare or foodstamps at any time during the 1984 panel. We selected this group because female heads are of primary policy interest, and secondly, because the welfare data on this group may be more reliable.[5] Welfare receipt can be defined in a number of ways. Our interest is in the AFDC program and we considered two methods of identifying recipients. Our first definition codes a woman as a recipient if she reports receiving AFDC income during a given month; our second definition codes her as a recipient if she reports receiving either AFDC or General Assistance. Our second definition includes women who misreport their AFDC receipt as

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[4]About 15 percent of the sample was cut, in a random design, to save costs.

[5]Problems with misreporting of recipiency have been documented by Coder and Ruggles (1988) and others. Work leading to Fitzgerald (1988) showed that many married couples with income and many men report receiving AFDC. These persons would ordinarily be ineligible. The sample of female heads is categorically eligible due to being unmarried with children.

General Assistance, a known problem (Marquis and Moore 1989). This second definition is probably more reliable and we present these results.[6]

A spell of welfare receipt is defined as the length of time that a woman continuously receives welfare income (AFDC or General Assistance). The spell can occur at any time during the panel. To further guard against misreporting, we performed consistency checks to insure that the woman was AFDC eligible, i.e., unmarried and a parent or guardian.[7]

Persons who miss interviews during the panel or refuse to answer specific items may have data imputed to them. For the main results given in the text, we excluded all imputed recipiency data from our analysis. Persons who missed interviews were considered censored at that interview. Appendix tables contain results that use imputed data. Generally, the results are quite similar. We contrast the imputed and non-imputed data results near the close of each section.

C. Sample Definitions and Counts

Before discussing the counts, some definitions are in order. Completed spells require that we see a month of non-receipt on each side of the spell. Left censored spells are ongoing at the beginning of the panel, or begin immediately after a missed interview. Right censoring, where the woman leaves the panel while still on welfare, occurs in two distinct ways. First, the spell can be censored by the end of the panel or by the sample cuts at the fifth or sixth interview; we call this "independent" right censoring since it occurs randomly. Second, the spell can be censored by attrition, i.e., a missed interview; this type of censoring is potentially non-independent since the censoring process could be related to unobservables associated with leaving AFDC.

Table 1 shows the welfare spells by female heads in the 1984 panel disaggregated by censoring status. This table shows 1172 spells by unmarried mothers, including multiple spells by the same person. Panel A shows that our decision to work with only complete and right censored spells reduces sample size considerably; we have 500 complete and right censored spells by female heads. To avoid complications due to multiple spells for some women, but not all, we selected the first observed spell for each woman. Finally, we drop persons who joined the panel after the

[6]We reason that unmarried women with children who report receiving general assistance are most likely receiving AFDC. An administrative record check supports this assumption. Kent Marquis and Jeff Moore of the Census Bureau kindly prepared an analysis for us comparing recorded receipt of AFDC from state administrative records for a four state convenience sample, to reported receipt of (a) AFDC alone and (b) AFDC or General Assistance. To the extent possible the analysis worked with unmarried adult women with children in their households. The analysis showed false report of non-receipt, that is where SIPP showed no AFDC receipt and the "true" recipiency from administrative records showed receipt, fell dramatically (to 5 percent from 35 percent) under definition (b). Definition (b) does lead to a slight rise in false reports of receipt (to 6 percent from 3 percent), but this does not outbalance the former error reduction.

[7]We eliminated spells where (1) for more than one month of the spell, the woman has no children living with her, and (2), the woman was married for other than the first or last month of the spell. We allowed the one-month inconsistencies in order to prevent timing of reported events within a month from causing us to drop spells.

first wave by entering an interviewed household ("associated persons"). This gives our final sample of 384 spells.

We next define an indicator FULL for whether the person completed all interviews, described as complete panel members above. Persons who were present in all 32 months of the panel and who have a positive panel weight are assigned FULL=1, and FULL=0 otherwise. Something similar to the FULL=1 sample has been used by Ruggles (1989) and Long and Doyle (1989) in studying welfare recipiency.

The bottom panel shows disaggregation by FULL. Note that we lose 37 percent of our spells if we work with the FULL=1 subsample. The panel also shows the potential severity of the nonindependent censoring problem. Of the 384 spells, 41 are censored by attrition.

Appendix Table A-1 shows counts for spells using imputed data. Imputations lead to a larger number of spells overall, but also larger numbers of left censored and both left and right censored spells. In panel B, one can see that the number of first observed complete or right censored spells is 383, nearly the same as the 384 without imputed data. We find that results for these first observed spells are similar for imputed and non-imputed samples; results that would use left censored data right find bigger differences.[8]

D. Time on Welfare: Survivor Functions

With the data on first observed spells, we can begin to compare the FULL=0 and FULL=1 subsamples, hereafter called the "attrition" sample and "complete" sample, respectively. Table 2 presents Kaplan-Meier estimates of the survivor function for time on welfare. Three weighting options are shown: (1) unweighted, (2) weighted by the, cross-sectional weight relevant to the first interview[9] and (3) weighted by the panel weight. Few analysts will be pleased by the second option; it is our attempt to give a weight to everyone in the file, using readily available weights. It does provide some control for initial non-interviews but does not control for subsequent attrition.

Based on Table 2, the attrition sample has somewhat shorter spells, i.e., a lower survivor function. The unweighted median spell length, where the survivor function hits 50 percent, is between 11 and 12 months for the complete sample; and 9-10 months for the attrition sample.

[8] The reader may wonder why the imputed data has disproportionately more FULL=0 cases. There are two reasons: (1) using imputations causes more FULL=1 spells to be linked back to the beginning of the panel, thus becoming left censored and not included; (2) using imputations produces more short imputed spells for the FULL=0 sample. These short spells are fully imputed (i.e. no non-imputed AFDC is ever reported by these women). We presume that these cases are in our sample because they receive food stamps. In retrospect, we question whether these fully imputed cases should be used.

[9] The weight used is fnlwgt5, the cross-sectional weight for the interview month, from the first wave of the 1984 Panel. Note that this is not a calendar year weight available in the Longitudinal Research File. The Wave 1 weights were extracted from the wave by wave SIPP files and appended to the Longitudinal Research File data.

The survivor functions diverge as the data thins out in the tails, but the difference is within sampling error. A log-rank test for equality of the survivor functions between these two samples cannot reject that the survivor functions are the same.[10] This test does not take into account the clustered sampling of the SIPP design, but this effect may not be important in our case. (See footnote 14.) Weights have a negligible impact for the complete samples.

Results using imputed data, shown in Table A-2, lead to similar conclusions. Interestingly, the overall survivor functions are nearly the same for the imputed and non-imputed data, suggesting that the imputations do not affect estimated spell length.

Whether the survivor functions differ or not, the attrition and complete samples could have identical exit rate hazards conditional on measured covariates, a point to which we now turn.

IV. CONCEPTUAL AND EMPIRICAL MODEL OF WELFARE HAZARDS

A. Conceptual Model

The conceptual model that underlies estimation of exit rates from AFDC is a model of choice: a woman on AFDC chooses between the option of staying on or getting off welfare. In these discrete choice models, a woman chooses the option that maximizes the present value of her expected utility given her current constraints. The non-welfare option is often taken to be getting a job, increasing current work hours, or marrying. The expected returns on these options can vary through time, as job offers are obtained for example, producing a sequence of decisions giving rise to spells. See Blank (1989) for an example.

Based on this framework, the exit from AFDC would depend on the value of the welfare option relative to job or marriage options through time. This is usually taken to depend on personal characteristics such as mother's age and education (affecting her wage), number and age of her children (affecting the value of home production and cost of child care), the availability of other income (property income), the AFDC benefit level, and job prospects as measured by the unemployment rate.

B. Variable Definitions

The brief discussion above suggests a parsimonious set of covariates that are relevant for a welfare duration model. Multivariate hazard models are presented in the next section. This section describes the relevant variables and shows how they differ between the attrition sample and the full sample.

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[10] For log-rank test on the unweighted sample, we obtained a Chi-square statistic of .408 with 1 degree of freedom, giving a p-value of .52. Our SAS statistics package could not produce this test for a weighted sample. For the unweighted sample using imputed data, the Chi-square was .30 (p-value .58).

Table 3 shows descriptions of the variables and means taken at the beginning of the spell. Most are self-explanatory. State-level variables were assigned to persons based on state of residence.[11] State welfare benefits are measured by the maximum AFDC payment for a family of four. This is an indicator of the relevant components of a state's welfare package. Obviously, it also picks up effects of other correlated, but unmeasured, state specific attributes (Ellwood and Bane 1985). The unemployment rate, UNEMP, is an annual rate by state.

The means reveal several differences between the attrition sample and the complete sample. Those in the complete sample are somewhat more likely to be black and have higher average age, but most characteristics are quite similar. The slightly higher proportion black in the complete sample is puzzling since other tabulations from SIPP using different samples show higher attrition among blacks (Short and McCarthur 1986; Ernst and Gillman 1988). But it could simply reflect sampling variability with our small sample size. Other sample differences are consistent with these earlier tabulations. Differences in unemployment and AFDC benefit levels reflect geographic residence differences and calendar time differences.

Imputed data means in Table A-3 are similar, although they show proportionately more blacks in the attrition sample. We believe that this change reflects that blacks are more likely to be imputed with AFDC.

V. HAZARD SPECIFICATION AND RESULTS.

We estimated several types of reduced form hazards and duration models. In this paper we report our estimates from two specifications. First we show a log-normal regression model for spell length, based on covariates measured at the beginning of the spell.[12] Second, we show a discrete time hazard for exit rates from welfare. The latter model is preferred for two reasons: it allows a fairly flexible specification for the shape of the hazard and it allows time-varying covariates.[13]

A. Log-normal Distribution

Let the (uncensored) length of spell for individual i be T_i. If $Y_i = \log(T_i)$ is normally distributed then spell length is log normally distributed. We assume that the conditional mean of Y_i equals $\beta' X_i$ where X_i represents the beginning of spell covariates. Construction of the

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[11]We linked our data files to internal Census files that identify state of residence for each sample member. Public use files for SIPP only identify 38 separate states. The rest are grouped for confidentiality or are not sampled.

[12]We also ran Weibull and log-logistic hazards and found results quite similar to those of the log-normal.

[13]We ignore a well known problem in SIPP, the “seam” problem whereby transitions are reported more frequently between interviews than within interview (Burkhead and Coder 1985; Jabine 1990, pp. 58-60). Fitzgerald (1991) attempts to control for the problem by using dummy variables to indicate transitions at the seams, and finds that the correction makes little difference for AFDC spell data. We hope to pursue better corrections in future work.

likelihood under the assumption of independent censoring can be found in many texts (e.g. Lawless 1982, p. 314).

Table 4 shows three sets of results: unweighted, weighted by the first interview weight, and weighted by the panel weight. Comparison between the complete panel sample (FULL=1) and the total sample (FULL=0 or 1) gives an indication of both the difference in the coefficients and the effect of the larger sample size. Asymptotic standard errors are computed from the information matrix. While these standard errors are biased because we do not take into account the sample clustering in SIPP, this design effect may not be large in our case.[14] Further, taking account of clustering would likely increase the measured standard errors, i.e., remove downward bias in variances, and make it more likely that we would accept a hypothesis of no difference between samples.

The coefficients in the table have signs that we expect. Higher education shortens spells, while being black, having young children, and being in a high benefit state lengthens spells. The remaining coefficients are statistically insignificant, although the point estimates have reasonable interpretations in light of our conceptual model.

Coefficients appear roughly similar between the complete and total sample, although the coefficients in the total sample are somewhat attenuated toward zero, particularly for BLACK and NKIDS. To see if there is a significant difference overall, we ran a likelihood ratio test for the restriction that the coefficients are equal between the attrition (FULL=0) and complete (FULL=1) samples. For the unweighted sample, we found that the coefficients are not significantly different. For the sample weighted by the first interview weight (Fnlwgt), we can reject that the coefficients are the same.[15] Thus there is some evidence that the samples differ, but this is the only test in the paper where we see an overall statistically significant difference.

By comparing standard errors between the complete and total sample, a moderate gain in precision can be seen from using the larger total sample. But, based on t-tests at conventional levels, the overall picture is similar. This is because attenuation of the coefficients balances the gain in precision. The exception is that the coefficient on black becomes insignificantly different

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[14]To give a rough idea of the extent of clustering for our sample of spells, we ran a simple test suggested by Bob Fay of the Census Bureau. We ran the test on data from the 1985 panel--we are simultaneously working with this data--since we do not have the strata codes in the 1984 longitudinal file at this time. We conjecture that the 1984 results would be similar. We classified the observations (persons) into cells based on the half-sample code and (public-use) pseudo strata codes provided in SIPP for variance estimation. We computed a Chi-square test for independence across the cells. For the sample of all persons with welfare spells, we obtained a Chi-square statistic of 85.9 with 71 degrees of freedom. This gives a p-value of .109, not highly significant. For the sample of persons with first observed, complete or right censored spells, the p-value is .078. This suggests that the spells are not heavily clustered, which gives us some confidence in our standard errors.

[15]For the unweighted sample the Chi-square statistics has a value of 10.8 with 10 degrees of freedom (10 restrictions); this is not significant at a 10 percent level. For the sample weighted by the first interview weight (Fnlwgt), the statistic equals 20.2, also with 10 degrees of freedom, which is significant at a five percent level.

from zero in the total sample.

To see the effect of the three weighting schemes, note that the coefficients and standard errors are fairly similar across all three schemes for the complete samples. Lastly, the imputed data sample in Table A-4 produces nearly the same results as above. For the imputed data sample, the likelihood ratio test for equality of coefficients between the complete and attrition sample cannot reject that they are equal.[16]

B. Discrete Hazard Model

A discrete time hazard model assumes that failure and censoring times are observed in intervals. Define the discrete time hazard rate as

$P_i(t) = \text{Prob}\,(T_i = t \mid T_i >= t, X_i(t))$

where T_i is a discrete random variable for (uncensored) spell length, and $X_i(t)$ are the covariates at time t. The sample likelihood function is the product of individual likelihood pieces which are one of two kinds. Persons with complete spells contribute

$$Prob(T_i = t \mid X_i(t)) = P_i(t) \prod_{j=1}^{t-1} (1 - P_i(t))$$

Pensions with censored spells contribute

$$Prob(T_i > t \mid X_i(t)) = \prod_{j=1}^{t} (1 - P_i(t))$$

We chose to specify the hazard as a complementary log-log form:

$P(t) = 1\text{-}\exp\,(-\exp\,(\alpha\,(t) + \beta' X(t)))$.

This form arises from grouping data from a continuous time proportional hazard model into discrete intervals. See Prentice and Gloeckler (1977) or discussion in Allison (1982). The parameters α (t) represent the underlying hazard and can be an arbitrary function of time, allowing flexibility.

We chose to let the step function α (t) have four steps (a constant and three time

[16]For estimates from the imputed data sample, the likelihood ration Chi-square statistics were 9.3 and 9.2 for the unweighted cases, respectively. Neither are significant at a ten percent level.

dummies) . While a greater number of steps would have been desirable for flexibility, more steps would probably have caused estimation (convergence) problems for the smaller attrition sample.

Table 5 presents the hazards. Note that the signs are opposite of those in the last table because we are now looking at the effect of covariates on exit rates, not spell length. The time-dummies T2,T3, and T4, correspond to the height of the step of the hazard at 5-8, 9-12, and 13 plus months, respectively. The constant Corresponds to 1-4 months. The estimated hazard declines through time, although part of the decline could be due to unmeasured heterogeneity.

The estimated effects of covariates and their precision are very similar to those for the log-normal model. Table 5 shows results for three samples: attrition (FULL=0), complete (FULL=1), and total (FULL=0 or 1). This detail allows us to see that the attrition and complete coefficients do look somewhat different. The coefficient on BLACK is positive for the attrition sample, but negative and precisely estimated for the complete sample. The coefficient on BLACK for the attrition sample has a large standard error, however, so we should not over-emphasize its sign. The coefficients on UNEMP and NKIDS also change sign, but both are imprecisely estimated. In spite of these apparent differences, a likelihood ratio test for equality of coefficients between the attrition and complete sample shows no significant difference.[17]

Generally, as before, the coefficients for the total sample are attenuated relative to those of the complete sample, and the standard errors are moderately smaller for the larger, total sample. Regarding weights, we see that weighting does not appear to make a large difference. Finally, Table A-5 presents imputed data results which are very similar to the above non-imputed results.

VI. CONCLUSION

Using duration models of spells of AFDC recipiency by unmarried mothers, we have used three samples to investigate the effects of attrition. One restricts itself to persons who complete all interviews in the 1984 panel of SIPP, called the complete sample. This sample potentially suffers from selection by virtue of survival through all interviews. The second sample called the attrition sample, uses spells by persons who were initially interviewed, and later dropped out. The third sample, called the total sample, combines the first two. The total sample is 59 percent larger than the complete sample (384 spells compared to 242).

We have several conclusions. One, overall (unconditional) Kaplan-Meier estimates of spell length show that the complete sample has somewhat longer spell lengths, although the difference is not statistically significant. Two, if we use (behavioral) models of spell length that allows us to condition on relevant covariates, estimated effects of covariates are generally similar,

[17]The unweighted sample likelihood ratio test yields a Chi-square statistic of 8.9 with 12 degrees of freedom. The fnlwgt weighted sample yields a statistic of 8.1 with 12 degrees of freedom. Thus we cannot reject that the coefficients are equal at even a 10 percent level. For the imputed data samples, the Chi-squares were 13.4 and 6.9 for the unweighted and weighted tests, respectively. Neither are significant at a 10 percent level.

with some exceptions, notably race. Moreover, using a likelihood ratio test, one generally cannot reject that coefficients are the same for the spells from the complete sample versus the spells from the attrition sample. (There was a statistically significant difference in one the eight such tests reported here.) We should add that we are dealing with moderate to small sample sizes, and larger samples might better detect differences. Three, the much larger sample size of the total sample does give a moderate improvement in precision for effects of covariates. However, overall t-values do not change much since the total sample coefficients are smaller relative to the complete sample. Four, weights do not have a large impact. Five, redefining spells using imputed data produces results that are remarkably similar to those that exclude imputed recipiency data.

Even though attrition can alter sample means for some characteristics, our model-based results suggest that attrition may not be a large problem for welfare duration models using SIPP. Those who want to use readily available panel weights can work with the complete sample, and not suffer large loss of efficiency. Those who prefer to depend on models and work with unweighted samples can enjoy the benefits of 60 percent larger samples if the total sample is used. For those who want weights for the larger sample, improved weighting schemes for this type of spell data in SIPP must be developed.

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Table 1. Welfare Spells bv Female Heads in 1984 SIPP Panel
Sample Counts (Non-imputed Data)

Panel A: All Spells

		AFDC Only		AFDC or General Assistance	
		Count	Percent	Count	Percent
I.	All Spells (including multiple)	1214	--	1480	--
II.	Spells by Eligible Women (unmarried with Children)	1056	100.00	1172	100.00

A.	Complete	1	176	16.67	243	20.73
B.	Right Censored	2	233	22.06	257	21.93
C.	Left Censored	3	176	16.67	283	24.15
D.	Both Right and Left Censored	4	471	44.6	1189	33.19

Panel B: AFDC or General Assistance Sample
Disaggregate by Full

	FULL=0	Full=1	Total
I. Complete			
Count	65	123	188
Column Percent	45.77	50.83	48.96
II. Right Censored			
1. Independently Censored			
Count	36	119	155
Column Percent	25.35	49.17	40.36
2. Censored by Attrition			
Count	41	0	41
Column Percent	28.87	0.00	10.68
III. Total			

Count	142	242	384
Row Percent	36.98	63.02	100.00

Note: Authors' computation. Sample of spell by women who were unmarried mothers, on (a) AFDC alone or (b) AFDC or General kssistance, at some time during 1984 Panel of SIPP. Full-1 sample completed all interviews; Full-0 missed at least one. Panel B shows tabulations for the first complete or right censored spell.

Table 2. Survival Functions
for the First Observed Spell of AFDC by Female Heads
(Non-Imputed Data)

Spell Length (Month)	Unweighted		Weighted by Fnlwgt		by Pnlwgt
	Full=1	Full=0	Full=1	Full=0	Full=1
0	1.00000	1.00000	1.00000	1.00000	1.00000
1	0.90909	0.89732	0.91468	0.87433	0.91430
2	0.79493	0.82717	0.80590	0.82084	0.80242
3	0.74688	0.76589	0.75085	0.75965	0.74445
4	0.66540	0.65535	0.66743	0.64684	0.66555
5	0.63165	0.63636	0.63708	0.62929	0.63612
6	0.60227	0.58585	0.60945	0.57343	0.60817
7	0.59215	0.55331	0.59973	0.54214	0.59986
8	0.56125	0.54128	0.57083	0.52859	0.56943
9	0.54968	0.51421	0.56015	0.50523	0.55796
10	0.54383	0.49993	0.55202	0.49506	0.54623
11	0.53147	0.48431	0.54042	0.47739	0.53372

12	0.49396	0.44971	0.50065	0.45921	0.49470
13	0.48719	0.49307	0.48871	.	.
14	0.48033	0.48805	0.48348	.	.
15	0.47316	0.41759	0.48004	0.42735	0.47640
17	0.46406	0.47377	0.47063	.	.
18	0.45478	0.46155	0.46005	.	.
19	0.44550	0.45324	0.45312	.	.
20	0.40178	0..40646	0.40722	.	.
22	0.37586	0.37805	0.37791	.	.
23	.	0.00000	.	0.00000	.
25	0.35498	.	0.35768	.	0.35280

Notes: Author's computations for sample of unmarried women with children receiving AFDC or General Assistance, from 1984 Panel of SIPP.

Table 3. Means for Sample of Female Heads
at Beginning of First Observed Spell of AFDC
(Non-Imputed Data)

Variable	Unweighted		Weighted by Fnlwgt		by Pnlwgt
	Full=1 Complete	Full=0 Attrition	Full=1 Complete	Full=0 Attrition	Full=1 Complete
AGE (at spell beginning)	29.1859	27.8521	29.1442	27.8515	28.8311
EDUC (highest grade completed)	10.8388	10.8873	10.8648	10.8879	10.9507
BLACK (1=black, 0=white or other)	0.3884	0.3661	0.3920	0.3480	0.4295
PROPINC (property income)	1.8016	0.0704	1.5857	0.0693	1.2636
NKIDS (number of kids age < 19)	1.7396	1.6760	1.7167	1.6028	1.6874

KID5 (number of kids age < 6)	0.7520	0.7676	0.7557	0.7504	0.7507
AFDCMHX (maximum benefit level for family of four, by state, $100)	4.3683	4.2316	4.3709	4.1562	4.3696
UNEMP (percent)	8.6404	9.2485	8.5907	9.2410	8.6141
Median Spell Length (from Survival Function)	11-12	9-10	12-13	9-10	11-12
Sample Size	242	142	242	142	242

Note: Authors' computation. Sample of unmarried mothers receiving AFDC or General Assistance, from 1984 Panel of SIPP.

Table 4
Log-Normal Regression for Welfare Spell Length by Female Heads
Maximum Likelihood Estimation Allowing Censoring (Non-Imputed Data)

	Unweighted		Weighted by Fnlwgt		by Pnlwgt
	Full=1 Complete	Full=0+l All	Full=1 Complete	Full=0+l All	Full=1 Complete
CONSTANT	2.0773***	1.8586***	2.0352***	1.8581***	1.9547***
	(0.7400)	(0.5817)	(0.7303)	(0.5738)	(0.7383)
AGE	-0.0013	-0.0030	-0.0013	-0.0045	0.0005
	(0.0144)	(0.0117)	(0.01436)	(0.0116)	(0.0148)
EDU	-0.0777***	-0.0574***	-0.0737***	-0.0601***	-0.0683***
	(0.0253)	(0.0190)	(0.02484)	(0.0186)	(0.0252)
BLACK	0.5849***	0.2818	0.5703***	0.2399	0.5109**
	(0.2281)	(0.1751)	(0.2251)	(0.1740)	(0.2253)

PROPINC	-0.0051 (0.0037)	-0.0054 (0.0036)	-0.0051 (0.0040)	-0.0054 (0.0038)	-0.0054 (0.0046)
NKIDS	0.0758 (0.1086)	0.0778 (0.0882)	0.0875 (0.1104)	0.0935 (0.0897)	0.0532 (0.1129)
KID5	0.4345** (0.1928)	0.2712* (0.1464)	0.4780** (0.1944)	0.2934** (0.1485)	0.4778*** (0.1983)
AFDCNAX (in $100)	0.1400** (0.0600)	0.1500*** (0.0500)	0.1370** (0.0670)	0.1600*** (0.0500)	0.1300** (0.0600)
UNEMP (percent)	0.0630 (0.4980)	0.2130 (0.3790)	0.0454 (0.4966)	0.2480 (0.3760)	0.0750 (0.5030)
SCALE	1.4658*** (0.1012)	1.4346*** (0.0798)	1.4533** (0.1011)	1.4375*** (0.0794)	1.4753*** (0.1029)
LOG- LIKLHD	-295.411	-454.122	-291.608	-462.077	-291.950
SAMPLE SIZE	242	384	242	384	242

Note: Authors' computation. Standard errors are shown in the parentheses. Sample of first observed complete or right censored spells by unmarried mothers on AFDC or General Assistance from 1984 Panel of SIPP. Stars indicate that the coefficient was significantly different from zero at a 10 percent level (*), 5 percent level or 1 percent level

Table 5. Parameter Estimates
from the Discrete Hazard Model
(Non-Imputed Data)

	Unweighted			Weighted by Fnlwgt		by Pnlwgt	
PARS	Full=0	Full=1	Full=0+l	Full=0	Full=1	Full=0+l	Full=1
const	-1.1088 (0.8588)	-2.0359 (0.6357)	-1.7260*** (0.5051)	-1.2701 (0.8349)	-2.0276*** (0.6376)	-1.7924*** (0.5039)	-2.0006*** (0.6300)
AGE	-0.0084 (0.0215)	0.0000 (0.0120)	-0.0014 (0.0102)	-0.0018 (0.0211)	0.0006 (0.0119)	0.0012 (0.0102)	0.0004 (0.0120)
BLACK	0.09278 (0.2652)	-0.4846***- (0.1963)	0.2716* (0.1556)	0.1893 (0.2693)	-0.4638*** (0.1960)	-0.2345 (0.1561)	-0.4166** (0.1906)
EDU	0.04425 (0.0285)	0.0587*** 0.0506*** (0.0195)	0.0624** (0.0157)	0.0570*** 0.0550*** (0.0279)	0.0522*** (0.0194)	(0.0156)	(0.0194)
NKIDS	0.0063 (0.1592)	-0.1295 (0.0995)	-0.0947 (0.0818)	-0.0383 (0.1649)	-0.1492 (0.1033)	-0.1189 (0.0846)	-0.1280 (0.1029)
KID5	-0.1152 (0.2294)	-0.3615** (0.1693)	-0.2765** (0.1338)	-0.0534 (0.2334)	-0.3849** (0.1719)	-0.2737** (0.1360)	-0.3442** (0.1696)
PROPINC	0.2139 (0.2572)	0.0645 (0.0671)	0.0793 (0.0651)	0.0639 (0.2854)	0.0643 (0.0672)	0.0681 (0.0684)	0.0695 (0.0697)

AFDCMAX	-0.1967*** (0.0809)	-0.1276** (0.0570)	-0.1440*** (0.0462)	-0.2198***- (0.0808)	0.1253** (0.0573)	-0.1520*** (0.0466)	-0.1273** (0.0570)
UNEMP	-0.0686 (0.0616)	0.0273 (0.0431)	-0.0056 (0.0349)	-0.0830 (0.0600)	0.0285 (0.0438)	-0.0083 (0.0352)	0.0267 (0.0438)
T2	-0.7601** (0.3376)	-0.7648*** (0.2474)	-0.7838*** (0.1992)	-0.7600** (0.3328)	-0.8309*** (0.2554)	-0.8283*** (0.2024)	-0.8681*** (0.2558)
T3	-0.8526* (0.4399)	-1.1031*** (0.3246)	-1.0529*** (0.2606)	-1.1626*** (0.4988)	-1.0557*** (0.3196)	-1.1263*** (0.2680)	-1.0191*** (0.3109)
T4	-1.3421* (0.7321)	-1.5451*** (0.3036)	-1.5616*** (0.2766)	-1.4195** (0.6933)	-1.5073*** (0.3032)	-1.5506*** (0.2137)	-1.5725*** (0.3046)
Sum of Log-lik	-223.148	-440.159	-667.762	-220.967	-435.017	-660.025	-439.175
Sample Size	899	2334	3233	2334	3233	2334	

Note: Authors' computation. Standard errors are shown in the parentheses. Sample of first observed complete or right censored spells by unmarried mothers on AFDC or General Assistance from 1984 Panel of SIPP. Stars indicate that the estimated coefficient was significantly different from zero at a 10 percent level 5 percent level (**), or 1 percent level

Table Al. Welfare Spells by Female Heads in 1984 SIPP Panel
Sample Counts (Imputed Data Included)

Panel A: All Spells

		AFDC Only		AFDC or General Assistance	
		Count	Percent	Count	Percent
I.	All Spells (including multiple)	1276	--	1574	--
II.	Spells by Eligible Women (unmarried with children)	1102	100.00	1232	100.00
	A. Complete	216	19.60	246	19.97
	B. Right Censored	263	23.87	279	22.65
	C. Left Censored	206	18.67	231	18.75
	D. Both Right and Left Censored	417	37.84	476	38.64

Panel B: AFDC or General Assistance Sample
Disaggregate by Full

	FULL=0	Full=1	Total
I. Complete			
Count	75	113	188
Column Percent	46.58	50.90	49.09
II. Right Censored			
1. Independently Censored			
Count	39	109	148
Column Percent	24.22	49.10	38.64
2. Censored by Attrition			
Count	47	0	47
Column Percent	29.19	0.00	12.27
III. Total			
Count	161	222	383
Row Percent	42.04	57.96	100.00

Note: Authors' computation. Sample of spell by women who were unmarried mothers, on (a) AFDC alone or (b) AFDC or General Assistance, at some time during 1984 Panel of SIPP. Full=1 sample completed all interviews; Ful=-0 missed at least one. Panel B shows tabulations for the first complete or right censored spell.

Table A2. Survival Functions
for the First Observed Spell of AFDC bv Female Heads
(Imputed Data Included)

Spell Length (Month)	Unweighted		Weighted by Fnlwgt		by Pnlwgt
	Full=1	Full=0	Full=1	Full=0	Full=1
0	1.00000	1.00000	1.00000	1.00000	1.00000
1	0.90541	0.89441	0.91132	0.88269	0.91224
2	0.78468	0.85436	0.79728	0.85060	0.79553
3	0.73654	0.79334	0.74243	0.78659	0.73911
4	0.65137	0.65167	0.64996	0.66183	0.65082
5	0.62010	0.63474	0.62165	0.64560	0.62339
6	0.58830	0.59004	0.59180	0.59432	0. 59361
7	0.57730	0.56054	0.58125	0.56493	0.58473
8	0.56032	0.50664	0.56580	0.51530	0.56788
9	0.54144	0.48193	0.54937	0.49306	0.55123
10	0.53507	0.46890	0.54051	0.48340	0.53863
11	0.52152	0.45469	0.52782	0.46665	0.52513
12	0.48721	0.42334	0.49391	0.44948	0.48936
13	0.47994	.	0.48580	.	0.48302
14	0.47256	.	0.48042	.	0.47748
15	0.46481	0.39843	0.47181	0.42277	0.46996
16	.	0.36997	.	0.40000	.
17	0.45551	.	0.46542	.	0.46412
18	0.44602	.	0.45297	.	0.45341
19	0.43653	.	0.44450	.	0.44639
20	0.42661	.	0.43176	.	0.43420
21	0.40223	.	0.40783	.	0.41083
22	0.38926	.	0.39311	.	0.39753
25	0.36636	.	0.37081	.	0.36972

Notes: Author's computations for sample of unmarried women with children receiving AFDC or General Assistance, from 1984 Panel of SIPP.

Table A3. Means for Sample of Female Heads
at Beginning of First Observed Spell of AFDC
(Imputed Data Included)

Variable	Unweighted		Weighted bv Fnlwgt		by Pnlwgt
	Full=1 Complete	Full=0 Attrition	Full=1 Complete	Full=0 Attrition	Full=1 Complete
AGE (at spell beginning)	28.5855	27.9627	28.5549	27.8874	28.3171
EDUC (highest grade completed)	10.9549	11.0869	10.9949	11.0481	11.0611
BLACK (1=black, 0=white or other)	0.3783	0.4099	0.3825	0.3653	0.4213
PROPINC (property income)	4.0000	0.3664	4,6007	0.1307	4.0607
NKIDS (number of kids age < 19)	1.6351	1.6335	1.6146	1.5665	1.6004
KID5 (number of kids age < 6)	0.7432	0.7577	0.7474	0.7469	0.7427
AFDCMAX (maximum benefit level for family of four, by state, $100)	4.2994	4.2196	4.3049	4.1625	4.3117
UNEMP (percent)	8.6130	9.1776	8.5715	9.1233	8.5824
Median Spell Length (from Survival Function)	11-12	8-9	11-12	8-9	11-12
Sample Size	222	161	222	161	222

Note: Authors' computation. Sample of uranarried mothers receiving AFDC or General Assistance, from 1984 Panel of SIPP.

Table A4

Log-Normal Regression for Welfare Spell Length by Female Heads
Maximum Likelihood Estimation Allowing Censoring
(Imputed Data Included)

	Unweighted		Weighted by Fnlwgt		by Pnlwgt
	Full=1 Complete	Full=0+l All	Full=1 Complete	Full=0+l All	Full=1 Complete
CONSTANT	2.5620*** (0.7990)	2.2934*** (0.5760)	2.4499*** (0.7857)	2.0612*** (0.5824)	2.3413*** (0.7917)
AGE	-0.0120 (0.0151)	-0.0099 (0.0114)	-0.0104 (0.0150)	-0.0089 (0.0116)	-0.0091 (0.0154)
EDU	-0.0722*** (0.0270)	-0.0540*** (0.0184)	-0.0687*** (0.0265)	-0.0559*** (0.0187)	-0.0599** (0.0268)
BLACK	0.5516** (0.2459)	0.2794 (0.1719)	0.5645** (0.2430)	0.3232* (0.1766)	0.4939** (0.2419)
PROPINC	-0.0023 (0.0025)	-0.0028 (0.0023)	-0.0019 (0.0023)	-0.0021 (0.0022)	-0.0019 (0.0025)
NKIDS	0.0475 (0.1212)	0.0347 (0.0916)	0.0380 (0.1234)	0.0238 (0.0961)	0.0139 (0.1251)
KID5	0.4345** (0.2022)	0.2967*-* (0.1444)	0.4848*** (0.2032)	0.3537*** (0.1490)	0.4810** (0.2067)
AFDCMAX (in $100)	0.1200* (0.0700)	0.1200*** (0.0500)	0.1200* (0.0700)	0.1400*** (0.0500)	0.1200* (0.0700)
UNEMP (prcnt)	-0.0320 (0.5390)	0.0760 (0.3660)	-0.0160 (0.5360)	0.2600 (0.3750)	0.0010 (0.5450)
SCALE	1.5001*** (0.1082)	1.4162*** (0.0784)	1.4881*** (0.1080)	1.4355*** (0.0803)	1.5121*** (0.1097)
LOG- LIKLHD SAMPLE	-274.096	-450.152	-271.470	-4448.693	-274.319

SIZE	222	383	222	383	222

Note: Authors' computation. Standard errors are shown in the parentheses. Sample of first observed complete or right censored spells bv unmarried mothers on AFDC or General Assistance from 1984 Panel of SIPP. Stars indicate that the coefficient was significantly different from zero at a 10 percent level (*) 5 percent level (**) or 1 percent level (***).

Table A5. Parameter Estimates from the Discrete Hazard Model (Imputed Data Included)

	Unweighted		Weighted by Fnlwgt			by Pnlwgt	
PARS	Full=0	Full=1	Full=0+l	Full=0	Full=1	Full=0+1	Full=1
const	-1.5232*	-2.7958***	-2.2703***	-1.4758	-2.7025***	-2.1323***	-2.5844
	(0.8124)	(0.6973)	(0.5172)	(0.8109)	(0.6977)	(0.5260)	(0.6895)
AGE	-0.0008	0.0103	0.0060	0.0009	0.0090	0.0062	0.0080
	(0.0184)	(0.0121)	(0.0099)	(0.0194)	(0.0121)	(0.0101)	(0.0122)
BLACK	-0.0447	-0.4993***	-0.2930*	-0.0673	-0.5024***	-0.3318** -0.4360**	
	(0.2422)	(0.2082)	(0.1541)	(0.2567)	(0.2082)	(0.1586)	(0.2036)
EDU	0.0421	0.0617*** 0.0513***	0.0644**	0.0604*** 0.0553***	0.0515***		
	(0.0260)	(0-0206)	(0.0155)	(0.0278)	(0.0205)	(0.0158)	(0.0205)
NKIDS	0.0338	-0.0975	-0.0468	0.0607	-0.0887	-0.0433	-0.0658
	(0.1360)	(0.1071)	(0.0828)	(0.1550)	(0.1105)	(0.0875)	(0.1098)
KID5	-0.1978	-0.3608**	-0.2872**	-0.1588	-0.3977**	-0.3009**	-0.3666**
	(0.2131)	(0.1714)	(0.1317)	(0.2249)	(0.1731)	(0.1347)	(0.1722)
PROPINC	0.1083	0.0020	0.0022	0.0483	0.0017	0.0016	0.0017
	(0.0808)	(0.0017)	(0.0016)	(0.1629)	(0.0016)	(0.0015)	(0.0017)
AFDCMAX	-0.1474*	-0.1198**	-0.1227***	-01898*** -0.1244**	-0.1382***	-0.1273*	
	(0.0753)	(0.0595)	(0.0459)	(0.0767)	(0.0600)	(0.0466)	(0.0601)
UNEMP	-0.0635	0.0693	0.0135	-0.0947*	0.0678	-0.0013	0.0637
	(0.0530)	(0.0464)	(0.0342)	(0.0536)	(0.6471)	(0.0354)	(0.0476)
T2	-0.5068*	-0.9080***	-0.7611***	-0.4991*	-0.9810***	-0.7957	-1.0251**-
	(0.2965)	(0.2709)	(0.1992)	(0.2976)	(0.2799)	(0.2035)	(0.2820)
T3	-0.8265*	-1.0187***	-0.9851***	-1.1156**	-1.0394***	-1.0864	-0.9793***
	(0.4371)	(0.3265)	(0.2607)	(0.4907)	(0.3296)	0.2723	(0.3177)
T4	-1.5730**	-1.6815*-	-1.7043**	-1.7427	-1 .6640***-	-1.7155	-1.7591
	(0.7269)	(0.3280)	(0.2946)	(0.7268)	(0.3284)	(0.2938)	(0.3357)
Sum of Log-lik Sample	-255.203	-401.060	-662.967	-244.913	-395.948	-644.328	-396.538

Size	1024	2138	3162	1024	2138	3162	2138

Note: Authors' computation. Standard errors are shown in the parentheses Sample of first observed complete or right censored spells by unmarried mothers on AFDC or General Assistance from 1984 Panel of SIPP. Stars indicate that the coefficient was significantly different from zero at a 10 percent level (*), 5 percent level (**), or 1 percent level (***).