The Dynamics of Poverty Spells: Updating Bane and Ellwood

By Ann Huff Stevens*

Policymakers interested in poverty are frequently concerned with the length of time individuals spend below the poverty line. Discussions of the "underclass" and of dependency on public assistance often make distinctions between the short- and long-term poor. Mary Jo Bane and David Ellwood (1986) first used a spell-based approach to study the dynamics and duration of poverty in the United States between 1970 and 1981. This paper extends their analysis through 1987. In addition, it examines changes over time in exit rates from poverty and explores the frequency of multiple spells of poverty.[1]

I. Data and Methodology

The data and basic methodology used here follow closely those used by Bane and Ellwood (1986). The data come from the 1968–1988 waves of the Panel Study of Income Dynamics (PSID). Persons are classified as poor in any year in which their household's money income is less than 1.25 times the official Census Bureau poverty line. This use of 1.25 times the poverty line is meant to account for the consistently lower rates of poverty estimated from the PSID, thought to be the result of more thorough reporting of income than in the Current Population Survey. Following Bane and Ellwood, I exclude persons poor in the initial year of the survey from much of the analysis, since the length of poverty spells already in progress at the start of the survey is unknown.

Poverty spells begin during the first year total household money income falls below the poverty cutoff, and end when income rises above the poverty line. Because some movements across the poverty line may be due to small, random changes in income, Bane and Ellwood eliminated one-year spells into and out of poverty that resulted from income changes of less than half the needs standard. I have not made this adjustment since selection of a cutoff point for small income changes is somewhat arbitrary and because I separately examine repeated spells of poverty. Exit probabilities are calculated over all spells with observed beginnings. Spells in progress at the time an individual left the sample are included in the calculations in all prior years.

I next adapt this framework to look for changes in the probability of escaping poverty over time. First, I estimate hazard rates for ending poverty spells using a logit specification, including series of dummy variables for the duration of the spell and for the calendar year in which the spell is currently observed.[2] This is expressed as

$$(1) \qquad P_{dt} = \frac{\exp(\alpha_d + \beta_t)}{1 + \exp(\alpha_d + \beta_t)}$$

†*Discussants:* James Walker, University of Wisconsin; Maria Hanratty, Princeton University; Bruce Meyer, Northwestern University; John Fitzgerald, Bowdoin College.

*Department of Economics and Population Studies Center, University of Michigan, Ann Arbor, MI 48109. Thanks to Gary Solon, Marianne Page, David Jaeger, Charles Fleischman, and participants in the labor seminar at the University of Michigan for helpful comments. Financial support from an NICHD training grant is gratefully acknowledged.

[1]While the results here are in terms of exit rates, these exit rates can be used to estimate distributions of spell durations, as shown in Bane and Ellwood (1986).

[2]Because the PSID oversamples low-income households, all estimates are weighted by the inverse sampling probabilities. Standard-error estimates reflect the use of weights and the sample design of the survey.

where P_{dt} is the exit probability in year t for an individual with current spell duration d. The estimates of β_t represent year-specific effects on poverty exit rates that are likely to vary with business-cycle conditions. To distinguish macroeconomic effects from trends, the estimated year effects can be decomposed as

$$\beta_t = \delta_0 + \delta_1 t + \delta_2 C_t + \varepsilon_t \quad (2)$$

where C_t is a business-cycle indicator. In estimating equation (2) below, I use the percentage change in real gross national product as the cycle indicator. Taking the derivative of equation (2) with respect to the cycle and trend terms, and using the chain rule, the marginal effects on exit rates of business-cycle conditions and the trend are equal to the coefficients from equation (2) multiplied by $P_{dt}(1 - P_{dt})$.

TABLE 1—DECOMPOSITION OF YEAR EFFECTS (1970–1987) ON POVERTY EXIT RATES

Category	Coefficient	Standard error	R^2
All spells			0.64
Trend	−0.023	(0.007)	
Cycle	0.066	(0.015)	
White males			0.64
Trend	−0.015	(0.010)	
Cycle	0.105	(0.021)	
Black males			0.12
Trend	−0.015	(0.017)	
Cycle	0.039	(0.034)	
White females			0.45
Trend	−0.038	(0.012)	
Cycle	0.047	(0.025)	
Black females			0.31
Trend	−0.034	(0.014)	
Cycle	0.030	(0.028)	

Note: Categories refer to race and gender of household head at the start of the poverty spell.

II. Exit Rates from Poverty Spells

I begin by replicating the Bane and Ellwood (1986) results on exit rates by spell duration, pooling all years from 1970 through 1987. Eliminating some one-year spells into and out of poverty as Bane and Ellwood did, the estimated exit probabilities are almost identical to those Bane and Ellwood reported for 1970–1981. Without this adjustment, the estimated probability of escaping poverty is 0.53 during the first year of a spell; this probability falls to 0.36 in the second year, and to 0.2 or less after five years in poverty. These exit rates also vary substantially across demographic groups. Exit rates for persons living in households headed by white males are highest, while those for households headed by black females are much lower, ranging from only 0.4 in the initial year of a spell to less than 0.2 after four or more years in poverty.

I next look at year-to-year variation in exit rates by estimating equation (1). These results show relatively large differences in the likelihood of escaping poverty from year to year. For one-year spells of poverty, the estimated exit rates vary from a low of 0.44 in 1980, to a high of 0.65 in 1973. (Both exit rates have an estimated standard error of 0.04.) Variation in exit rates seems to correspond to economic conditions. In the recession years of 1975 and 1982, for example, the exit rates were 0.47 and 0.45, while in 1984 the exit rate was 0.58.

To summarize the effects of business cycles and trends on exit rates, results from ordinary least-squares (OLS) estimation of equation (2) are shown in Table 1.[3] The estimation of equation (1), on which these results are based, included controls for age of the person, and race and gender of household head, in addition to the year and duration effects, to control for potential changes in the composition of the poverty population over time. These results indicate a negative trend in exit rates from poverty, holding constant the growth rate of GNP. The estimated trend term implies an annual decrease in the probability of exiting poverty of -0.006, evaluated at $p = 0.5$, or of -0.004 evaluated at a probability of 0.2, more appropriate for longer spells. Evaluated at a probability of 0.5, a 1-percent

[3]Standard diagnostic tests for serial correlation and heteroscedasticity in the estimation of equation (2) confirm that OLS estimation is appropriate here.

increase in real GNP increases the probability of ending a poverty spell by 0.017.

One concern with the above approach is that it assumes a proportional shift in the hazard function across all spell durations over time. It is possible that short and long poverty spells might respond differently to both secular and cyclical influences. To test this hypothesis, interaction terms between calendar years and durations were added to the estimation of equation (1), and the resulting year effects for spells of a given duration were decomposed according to equation (2). The trend effect is slightly larger in absolute value for longer spells, but there were no statistically significant differences in the trend or cycle coefficients for short versus long spells.

Variation over time in mobility out of poverty for different demographic groups is next explored, and the results are shown in the last four sections of Table 1. The trend in exits is not statistically significant for households headed by black or white males. Households headed by white females experienced the largest decrease in mobility from poverty over this period, and those headed by black females show a similar pattern. Among persons living in households headed by females, the likelihood of ending a poverty spell has decreased by approximately one percentage point per year over this period. Some differences across racial groups appear in the relationship between exit rates and economic growth. The growth rate of real GNP does not have a significant impact on mobility out of poverty for households headed by blacks. Similarly, Rebecca Blank (1991) finds that the responsiveness of the poverty rate among blacks to economic growth during the 1970's and 1980's is much lower than the responsiveness of the white poverty rate.

Given the decreased mobility among female-headed households, exits from these poverty spells were explored further. Inclusion of controls for age of the household head and for the ages and number of children did not alter the basic result. Following Bane and Ellwood (1986), I examined the events associated with starting and ending these poverty spells. This could be important since differences in the events leading into poverty (e.g., changes in the head of household) were shown by Bane and Ellwood to be related to different average durations. There were only very small changes over time in the distributions of beginning and ending events among female-headed households, however. The decreased mobility out of poverty is not easily explained by changes in personal characteristics of female-headed households, or by differences in the events leading into or out of poverty.

TABLE 2—SURVIVAL PROBABILITIES FOR NONPOVERTY SPELLS, PERSONS PREVIOUSLY POOR, 1970–1987

Length of time above poverty line	Probability of returning to poverty	Survival rate above the poverty line
1 year	0.269	0.732
2 years	0.159	0.616
3 years	0.108	0.549
4 years	0.089	0.501
5 years	0.080	0.461
6 years	0.073	0.427
7 years	0.059	0.402
8 years	0.042	0.385
9 years	0.049	0.366
10 years	0.041	0.351

III. Multiple Spells

One shortcoming of focusing on single spells is that it ignores the tendency for persons to experience repeated episodes of poverty. One way to assess the importance of repeated spells of poverty is to examine the duration of subsequent nonpoverty spells. In the same manner as for spells of poverty, exit rates were calculated using only noncensored observations. Table 2 shows these estimates of the likelihood of returning to poverty by time elapsed since the end of the last poverty spell. After one year out of poverty, 27 percent of those previously poor have started a new poverty spell. Of those that survive nonpoor for a second year, 16 percent will fall back into poverty during the next year. The second column of Table 2 reports the fraction of persons remaining nonpoor for a given number of

years. Of persons escaping poverty, more than half of them will return to poverty within five years.

Repeated spells of poverty are particularly common for those who have recently ended long poverty spells. For those exiting short poverty spells, about half remain above the poverty line for five or more years. Among persons escaping poverty after five or more years poor, fewer than one-third remain above the poverty line for the next five years.

Finally, to examine temporal variation in the probability of reentering poverty, calendar-year terms were included in the estimation of these probabilities, and these year effects were used to estimate equation (2). The results indicated no overall trend in the probability of reentering poverty. However, when separate year effects were estimated by race and gender of the household head, the results for white females showed a significant upward trend. This effect was estimated at 0.034 (SE = 0.016) and indicates an annual increase in the probability of returning to poverty of approximately 0.006 (evaluated at a probability of 0.25) for persons in households that were headed by white females.

IV. Conclusion

Given concern over the persistence of poverty, changes in the length of time spent below the poverty line can be viewed as an important measure of changes in the extent of poverty. I find that mobility out of poverty spells, conditional on business-cycle conditions, decreased over the period from 1970 through 1987. This decline in mobility was concentrated among female-headed households and has occurred for poverty spells of all lengths.

Additionally, I find that exits from individual spells of poverty often do not imply permanent transitions out of poverty, with half of all those who escape poverty again falling below the poverty line within the next five years. This tendency to experience repeated spells of poverty has increased over the period studied here for persons living in households headed by white females. These findings suggest the importance of further research on the factors associated with more permanent transitions out of poverty, particularly for persons in households headed by women.

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