Food Stamp Participation and Employment among Adult-Only Households

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Abstract

Several recent changes in the Food Stamp Program have been directed toward households without children. Some, including new work requirements for able-bodied adults without dependents (ABAWDs), were intended to promote self-sufficiency, while others, including easier application and recertification procedures, were intended to increase participation among under-served groups, such as the elderly. Despite their relevance to policymakers, only a few studies have examined adult-only households. We use administrative records from South Carolina and event-history methods to investigate how spells of food stamp participation and non-participation and the incidence of employment for adult-only households vary with ABAWD provisions, recertification intervals, economic conditions and other characteristics. We find that households that were subject to ABAWD policies had shorter spells and lower rates of food stamp participation and slightly higher rates of employment than other households. We also find that households were much more likely to leave the Food Stamp Program at recertification dates than at other dates. Employment, education, marital status, race and gender are also associated with food stamp participation for adult-only households.

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1. Introduction

Recent legislative and administrative changes in the Food Stamp Program have brought new attention to the participation and employment behavior of adult-only households. The most profound legislative change was the enactment of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996, which established work requirements for able-bodied adults without dependents (ABAWDs) and limited people who failed to meet these requirements to three months of assistance in any three-year period. States also altered their administrative policies, such as the frequency at which they required households to recertify their eligibility for benefits. Several states also undertook new outreach efforts and streamlined their application procedures for vulnerable but under-served populations, like the elderly. The goal of these changes was to redirect assistance toward the truly needy by promoting self-sufficiency among people who could work and reducing barriers to participation among those who could not.

Food stamp researchers have largely overlooked this part of the caseload, perhaps because, on a per-person basis, the people in them make up a relatively small share of the food stamp population—22 percent of the caseload in 2002 (Cunnyngham 2004). Another reason adult-only households may have been overlooked is because they have better economic and material circumstances, on average, than other households. The U.S. Census Bureau reports that the poverty rate in 2003 was 5 percent for families without related children under age 18 but 14 percent for families with children.[1] Adult-only households were also more likely to be food secure than other households. Nord et al. (2004) estimate that 92 percent of adult-only households were food secure compared to only 83 percent of households with children.

[1] U.S. Census Bureau, "Detailed Poverty Tables—POV05: People in Families by Relationship to Householder," <http://pubdb3.census.gov/macro/032004/pov/new05_100_01.htm>, accessed March 22, 2005.

Several additional factors complicate an analysis of the relevant policies. Although many food stamp policies, such as benefit levels and the general ABAWD provisions, are set at the national level, the implementation and administration of the program are left to the states. This leads to considerable variation in the administrative landscape across states (Bartlett et al. 2003), even in what would seem to be narrowly constrained policies like the ABAWD requirements (Czajka et al. 2001). Information on these administrative procedures is difficult to obtain and categorize, and when policies can be measured, they often lack useful, independent variation. For example, a binary indicator for the general adoption of a policy by a state is not distinguishable from general controls for time effects. Identifying variation is important if an analysis is also going to account for influences from other changes, such as changing economic conditions.

In this article we examine patterns of exit from and re-entry into the Food Stamp Program and patterns of employment among adult-only households over the period 1996-2003 using administrative case records from the state of South Carolina. Using personal and household descriptors from the administrative files and augmenting these with county-level measures, we examine how economic, demographic, and policy factors affect food stamp participation and employment.

Our study contributes to the research on food stamp caseloads in several ways. First, it exploits a detailed, comprehensive, and highly accurate data source—administrative records from South Carolina's caseload management and Unemployment Insurance (UI) systems—that is representative of all adult-only households that began a spell of food stamp receipt in the state after the enactment of the PRWORA. The data are longitudinal, which allows us to examine dynamic behavior. This is an improvement over static analyses that have only examined the incidence of food stamp participation but have not considered flows into or out of the program.

Policies, such as ABAWD time limits or the length of recertification intervals, are likely to affect flows out of the program differently from flows into the program. The data are also very accurate; they indicate the exact dates when participation spells began and ended and are not subject to the recall, under-reporting, and non-response problems of survey data. The data also contain a large number of cases, which provides us with statistical power to disaggregate the data and to incorporate numerous explanatory variables in multivariate analyses.

Second, although we only consider a single state, several policies in that state applied to identifiable groups of people in different ways, which enables us to identify effects. One set of policies involved the ABAWD restrictions. The PRWORA and later legislation allowed states to exempt ABAWDs from the work rules under certain conditions. South Carolina generally applied its exemptions on a county-by-county basis, with the set of counties changing over time. In addition, because the restrictions only applied to people under age 50, it is possible to use households in which all of the members were older than this as pseudo-controls to see if other features of the exempt counties were associated with changes in participation and work behavior.

South Carolina also has a measurable set of recertification policies. Until October 2002, the state required food stamp recipients with variable incomes to recertify their eligibility every three months and recipients with fixed incomes to recertify every twelve months. After October 2002, the interval for people with variable incomes grew to six months. Because recertification dates are tied to when a case begins, they can be distinguished from other calendar effects.

Third, our empirical analyses employ a sophisticated event-history methodology. Specifically, we estimate models of the determinants of exits from food stamps, re-entry into food stamps, and employment in UI-covered jobs as a joint system. We apply Lillard's (1993) simultaneous hazards procedure to account for the endogeneity of employment in the food stamp

exit and re-entry models and to address problems of omitted variables. The model allows for repeated spells of program participation and non-participation. It also allows for the flexible estimation of spell duration patterns, which helps us to identify detailed timing effects associated with ABAWD and recertification policies.

The remainder of this article is organized as follows. Section 2 summarizes the results from previous empirical studies that have either examined the adult-only caseload or that bear on this population. Section 3 discusses the food stamp policy environment in South Carolina. Section 4 describes the administrative data that we use in our empirical analyses. A non-parametric, descriptive analysis of food stamp spells follows in Section 5. Section 6 describes our multivariate model of food stamp dynamics and employment, and section 7 reports the estimation results. Concluding remarks appear in Section 8.

2. Previous Research

Adult-only households have received much less attention than other groups from food assistance researchers. Indeed, many studies of food stamp participation have excluded these households altogether and instead focused on single-parent households (Blank and Ruggles 1996, Fraker and Moffitt 1988, Keane and Moffitt 1998, Mills et al. 2001) or on single- and married-parent households (Ribar et al. 2005a). Other studies, such as Kabbani and Wilde (2003), Staveley et al. (2002) and Wallace and Blank (1999), have examined the caseload as a whole without distinguishing between adult-only and other households or considering policies that are unique to adult-only households. If the circumstances and behavior of adult-only and other households were similar, these studies might help to inform us about food stamp use among adult-only households. However, as we have already discussed, households with and without children differ in their economic well-being, food hardships, program requirements, and

participation rates; so, a special focus on adult-only households is warranted.

The small set of studies that have been more informative about the participation behavior of adult-only households have fallen into three types:

- studies that examine participation behavior among the general caseload but include controls for adult-only households or policies that are relevant for these households,
- studies that examine participation among different types of households but apply a common methodology to estimate the determinants of behavior, and
- studies that focus on adult-only households or special segments of the adult-only caseload, such as elderly households or ABAWDs.

Studies of the general caseload. Bartlett et al. (2003), Farrell et al. (2003) and McKernan and Ratcliffe (2003) used household-level data to estimate multivariate models of the determinants of food stamp participation, which included dummy-variable controls for ABAWD households. They all found that ABAWD households were less likely than other households to participate in the Food Stamp Program. The samples that Bartlett et al. (2003) and Farrell et al. (2003) examined also included households with elderly members; however, neither set of researchers uncovered strong evidence of differences in participation between elderly and non-elderly households. The study by Bartlett et al. (2003) needs additional mention because it also gathered detailed information on administrative policies, such as outreach efforts and operating hours, and administrator and staff attitudes across food stamp offices in different localities. Bartlett et al. found that these administrative characteristics influenced participation behavior.

Wilde et al. (2000) and Ziliak et al. (2003) examined food stamp participation using aggregate state-level data. Their models included controls for policies that are relevant for adult-only households, like the percentage of the ABAWD caseload that was exempt from work

requirements. Both studies found that exemptions were positively associated with food stamp use, which indicates that the ABAWD rules reduced participation.

Disaggregated studies. As with the present study, Gleason et al. (1998) estimated hazard models of exits from and re-entry into the Food Stamp Program. They estimated these models separately for households in which all of the members were either elderly or disabled, households with at least one ABAWD and no children, and households with children. Gleason et al. found some similarities across groups, such as that higher levels of income reduced participation. However, they also found some differences. For instance, the exit behavior of ABAWDs appeared to be especially sensitive to changes in local economic conditions.

Currie and Grogger (2001) used data from the Current Population Study to estimate models of program participation for different groups of households. They found that adult-only households increased their food stamp participation when unemployment rates rose, but that adult-only households were less responsive to this variable than households with children. Currie and Grogger examined several policies, including the average frequency of recertifications and the implementation of electronic benefit transfer (EBT) systems, but did not find strong associations between these policies and food stamp receipt for adult-only households.

Kornfeld (2002) used state-level data to estimate models of food stamp participation for households with no children or elderly members, households with only elderly members, and other types of households. He also found that food stamp participation among adult-only households increased with the unemployment rate but that the relationship was stronger for non-elderly than elderly households. In contrast to Currie and Grogger, Kornfeld found that non-elderly households responded to changes in recertification intervals, while elderly households responded to the implementation of EBT systems and to high administrative error rates. A

surprising finding from both studies was that food stamp participation among adult-only households was associated with the waiver and TANF reforms to cash assistance programs, even though such households were categorically ineligible for the programs.

Studies of ABAWDs. Stavrianos and Nixon (1998) examined food stamp eligibility, participation and employment among ABAWDs using pre-PRWORA data. They predicted that a large proportion of ABAWDs would lose their food stamp eligibility and that few ABAWDs would have strong enough work skills to become economically self-sufficient.

Czajka et al. (2001) investigated characteristics of ABAWDs and surveyed states about their specific ABAWD policies. They found that ABAWDs comprised a tiny fraction of the caseload—about 2.5 percent of all food stamp participants in 2000. Consistent with the predictions of Stavrianos and Nixon, they found that many ABAWDs were terminated from the Food Stamp Program because of time limits and that many also confronted employment barriers.

Richardson et al. (2003) surveyed ABAWDs who had left the Food Stamp Program in South Carolina. The interviews occurred approximately one year after the people initially left the program and identified people who lived in counties with and without exemptions to the ABAWD work requirements. They found that employment rates among ABAWDs were low; only about half were working a year after leaving food stamps. They also found that exemption status was not strongly correlated with subsequent employment or re-entry into the Food Stamp Program, suggesting that the ABAWD rules had little effect on behavior. A shortcoming with this study, however, is that most of the "ABAWD leavers" it identified were youths who had recently moved out on their own.

Studies of elderly households. Hollonbeck and Ohls (1984) examined participation among elderly households in three states who were informally screened for eligibility and found

that food stamp participation declined with age, income, embarrassment over receiving assistance, and distance to a food stamp office. When asked their reasons for not participating, many non-participants stated that they believed they were ineligible, thought they did not need the benefits, or felt that participating was too much trouble.

More recently, Haider et al. (2003) used 1998 and 2000 Health Retirement Survey data to examine eligibility and participation. They found that although eligibility for food stamps increased with age, take-up rates decreased. Their estimates indicated that participation was negatively related to income and home ownership and positively related to SSI receipt. Oddly, however, they also found that take-up was negatively related to food stamp benefit amounts.

Finally, Cody (2004) reported results from county-wide demonstrations conducted in six states to increase participation among the elderly. The demonstrations included simplified application procedures (Florida), assistance completing applications (Arizona, Maine and Michigan) and the provision of commodities instead of a food stamp benefit (Connecticut and North Carolina). The researchers used a comparison-site methodology to evaluate the demonstrations. For most of the demonstrations, participation increased significantly more in the demonstration counties than in the comparison counties. For instance, the simplified application procedure in Florida was estimated to increase participation among the elderly by 7 percentage points after 12 months and 19 percentage points after 21 months.

3. Food Stamp Program in South Carolina

The South Carolina Department of Social Services (SC DSS) administers the state's Food Stamp Program. As in other states, the program permits participating low-income households to obtain a more nutritious diet, through normal channels of trade, by increasing their food purchasing power. While program eligibility is limited by income and wealth, an important goal

is to reach as many eligible households as possible and to maintain participation in the program for as long as eligibility lasts. The state has recently undertaken a number of steps to reduce administrative barriers and encourage participation among all eligible households. It has also implemented several policies aimed squarely at households without children.

One policy that affects all households participating in the Food Stamp Program is the frequency of recertification. Technically, food stamp eligibility is determined on a monthly basis, and households are supposed to inform their caseworkers immediately about changes in their resources or needs. As a more detailed check on eligibility, states also require that households periodically participate in a formal process of recertification. South Carolina has recently streamlined its recertification requirements. Until October 2002, the state required food stamp recipients with variable sources of income, such as earnings, to recertify their eligibility quarterly with mail-in forms and annually through face-to-face interviews. For clients with fixed sources of income, the state set a longer recertification period—effectively a year (elderly and disabled clients were allowed to certify for 24 months but received an interim contact at 12 months). Since October 2002, the state has lengthened the period between mail-in recertifications for households with variable incomes from three months to six months. The recertification interval for households with fixed incomes has remained at 12 months.

Since the spring of 2000, the SC DSS has also encouraged greater participation among the general population of eligible households by engaging in numerous outreach activities. Specific efforts have included conducting local demonstrations using a workshop format, promoting the use of USDA nutrition programs, and developing brochures. Some of these projects involved contracted services with providers to conduct outreach activities, a social marketing campaign, and grant funding for special outreach demonstration projects.

In an effort to address the needs of adult-only households, South Carolina has used regulatory options, waivers and demonstration project authority to tailor its Food Stamp Program. Three categories of adult clients have received particular attention: ABAWDs, disabled clients, and elderly clients.

ABAWD policies. The PRWORA imposed a new requirement on childless, able-bodied adults, aged 18-49 that limited them to three months of benefits in a three-year period unless they worked at least 20 hours a week or participated in an approved work or training program. The PRWORA gave states the option to exempt ABAWDs from these requirements if they lived in areas with high unemployment (local unemployment above ten percent) or an insufficient number of jobs (local unemployment at least one percent above the national average). Following enactment of the PRWORA, South Carolina immediately applied to exempt ABAWDs from work requirements in areas meeting these definitions. The Balanced Budget Act of 1997 introduced another exemption provision, allowing states to directly exempt up to 15 percent of their ABAWD cases from work requirements, using state-determined criteria. South Carolina subsequently received exemptions for several counties under this "15 percent" rule.

The number of areas exempted for high unemployment ranged from 2 to 9 over the period, while the number exempted for insufficient jobs ranged from 14 to 21. Most of these areas were counties, but a few were cities. South Carolina initially used its authority under the "15 percent" rule to exempt the balance of a county from the work requirements when a major city was already exempted under another provision. Starting in April 2000, the state began using its discretionary authority to continue exemptions in counties that had previously been economically distressed but that subsequently experienced improved conditions. From August 1999 until March of 2001, a total of 24 counties in the state were exempt under the different

provisions. In April 2001, the number of exempt counties increased to 25. Beginning in October 2002, exemptions were extended to all 46 counties in the state, first through the "15 percent" rule and later through a federal waiver.

Disabled clients. In 1995, the state created an innovative outreach program for Supplemental Security Income (SSI) and Social Security Disability Insurance (SSDI) recipients called the South Carolina Combined Application Project, or SCCAP. SCCAP is a cooperative effort between the SC DSS, the USDA, and the U.S. Social Security Administration, which simplifies the application process for SSI or SSDI recipients who have no earned income and either live alone or purchase and prepare meals separately from others in a household.

Elderly clients. In 2001, the state's "expanded categorical eligibility determination" began allowing elderly households to maintain resources accumulated through their work-life for emergency situations, such as medical, extended care, and burial, and to receive food assistance as long as their income was below 130 percent of the poverty line.

In September 2004 (after the period that we consider in our empirical analysis), South Carolina implemented a new Elderly Simplified Application Project (ESAP). ESAP was intended to "reinvent" the food stamp application process for clients age 60 and over. These clients have very stable eligibility characteristics because most are on fixed incomes with few reportable changes in household composition or deductions. However, as mentioned earlier, their take-up of benefits tends to be low.

Summary. As the discussion indicates, food stamp policy in South Carolina is multi-faceted and evolving. Several policies lend themselves to direct measurement, and several policies only apply to adult-only households. These features, in turn, affect the way that we structure our investigation. For instance, we use measures based on the length of time that has

elapsed since a spell of food stamp participation began to examine recertification policies and use indicators for whether a household was located in a county with an ABAWD exemption to examine ABAWD policies. To account for changes in other policies and conditions over time, our multivariate analyses rely on a flexible set of time-trend variables.

4. Analysis Data

The primary data for the empirical analysis come from two administrative systems: one describes participants in South Carolina's assistance programs, while the other describes covered earnings in the state's Unemployment Insurance program. The study draws records from these systems covering the period from October 1996 until December 2003.

The units of analysis for our study of program participation and non-participation are spells. Households can experience repeated, alternating spells of food stamp participation and non-participation in which the end date for one type of spell is immediately followed by the start date for the other type of spell.

While spells all necessarily begin and end at some time, the records that we observe may be complete, right-censored, or left-censored. Complete spell records contain both the start and end dates of spells and provide exact information on the spell duration. Right-censored spells are those for which the end date is missing. In this study, spells that were ongoing on December 31, 2003 are right-censored, and hazard procedures are used to address the resulting loss of information. Spells that were ongoing as of October 1, 1996 are left-censored and missing earlier information about explanatory variables. Because it is relatively difficult to account for the missing data for the explanatory measures, we drop these program spells from our analysis.

Spells should refer to continuous periods of participation or non-participation. However, the administrative records contain numerous breaks and short spells. In processing the data for

each household, we smooth the information by combining spells of program participation that are separated by a month or less and ignoring spells of participation that last a month or less. This kind of smoothing is commonly applied in studies of caseload dynamics and is intended to eliminate artificial transitions associated with administrative "churning."

For each household, the assistance program records designate a "primary informant" (PI), who is the person responsible for the household's financial decisions and in a position to provide caseworkers with information about its members. We extract data from the assistance program records on the PI's personal characteristics and use these as explanatory variables.

We also extract quarterly records on the PI's earnings from the state's UI database. The UI database records earnings from most private, non-agricultural employers. However, it overlooks government employment and some types of private-sector jobs, such as agricultural and domestic work, that may be relevant for food stamp recipients. It also misses informal employment and employment by people who commute out of the state to work.

We sum the PI's earnings from all jobs reported in a given quarter and create an indicator for whether the earnings exceeded $250. The figures for different years are adjusted to constant 2003 dollars using the Consumer Price Index for Urban Workers. The $250 threshold, which is approximately the amount in real terms that a minimum-wage employee would earn in 40 hours, was selected after some experimentation. For our analyses, we consider the discrete, quarter-by-quarter realizations of the earnings/employment indicator. Because so many earnings histories were left-censored at the start of our observation window and because spells of joblessness could easily be masked within or across quarters, we only analyze the incidence of employment.

From the personal information for the PIs, we construct separate indicators for whether the person was female or black. To describe educational attainment, we construct two mutually

exclusive indicators for whether the person completed high school but did not go on to college or whether the person completed at least some college; the excluded category consists of those who did not complete high school. Our analyses include two mutually exclusive indicators for whether the primary informant is currently or formerly married; the omitted category is never married. The data also indicate the informant's age and whether all of the household members are age 60 or older. All of these indicators are measured as of the beginning of the spell.

We use information on the household's county of residence to link the administrative records to a set of economic, demographic, geographic and policy measures. We merge in quarterly measures of the county unemployment rate as indicators of economic opportunities. We use the county's population density to capture the degree of urbanization and development. As a partial control for missed coverage in the UI employment variable, we include an indicator for counties along the state's border. As a policy measure, we include a time-varying indicator for whether ABAWDs in the county were exempt from the PRWORA work requirements. In the empirical analyses, the time-varying county-level measures are updated within spells.

The universe for our analysis sample is the set of adult-only households in South Carolina who began a spell of food stamp participation between October 1, 1996 and December 31, 2003. The extract is representative of all *new* participation spells that began over that period. However, because it omits spells that were ongoing as of October 1, 1996, it is not representative of all spells that might have been observed and may disproportionately exclude long spells.

There are more than 150,000 households in the administrative data system that fit the definition of the universe, which are far too many to analyze. To reduce the size of the analysis file, we use a sampling approach. We extract records for all households with new spells who had been selected for inclusion in the food stamp leaver surveys conducted by Richardson et al.

(2003).[2] We then supplement these with records for one out of every 11 remaining families. In all of our statistical analyses, we weight the observations to reflect these different sampling rates.

Our analysis sample excludes a small number of additional observations with (a) inconsistent spell information, (b) missing demographic information, (c) PIs who change over time, and (d) PIs who are younger than 18 or older than 85 years of age when they were first observed receiving food stamps. These exclusions result in the loss of just over three percent of the sample. The final analysis extract contains information for 13,814 households and includes 18,783 food stamp participation spells, 12,463 non-participation spells, and 203,444 quarterly employment observations. On average, each case was followed for just under four years, experienced 1.4 spells of food stamp participation, experienced 0.9 spells of non-participation, and held a covered job 19 percent of the time.

In our empirical analyses, we separately examine 9,264 adult-only households with any members under the age of 50 who were potentially ABAWDs and 4,550 households whose members were all age 50 and older. Appendix A lists the means of the variables in our sample separately for the households with younger and older members. Means for the time-varying measures are computed from the quarterly employment observations, which span the observation period for each household. The PIs in younger households were more likely to be men, more likely to be black, more educated, and less likely to be currently or formerly married than the informants in older households. The younger group also spent less time on food stamps and more time working than the older group.

5. Descriptive Analysis of Spell Data

Figure 1 displays nonparametric Kaplan-Meier estimates of the hazard and survival

[2] A companion analysis (Ribar et al. 2005b) uses the survey data to examine food security and other material well-being outcomes among food stamp leavers.

functions for spells of food stamp participation from the South Carolina administrative data. The hazard functions give the probabilities of leaving the program at different times during a participation spell conditional on having remained in the program up until those times. The survival functions give the probabilities of spells lasting beyond given points of time.

The source data for the spells are recorded at a daily level; however, to smooth the figures and reduce the number of computations that we needed to make, the estimates in Figure 1 are calculated using six-day periods (our subsequent multivariate analyses use the daily resolution). The estimates incorporate weights that adjust for the study's sampling methodology.

In Figure 1, separate estimates are calculated for households that began their food stamp spells before 2000 and those that began their spells after June 2002. Households from the first cohort were subject to quarterly or annual recertification for at least their first 30 months on the Food Stamp Program, while households from the later cohort were subject to semi-annual or annual recertification for the duration of their spells. Spells that began in the intervening period from the start of 2000 until the middle of 2002 were subject to different recertification policies at different points in their durations; for brevity and to maximize the contrasts in behavior, we do not display the hazard estimates for spells in the intervening period.

In addition to the spell start dates, the estimates in Figure 1 also distinguish between adult-only households with members under age 50 and households with all members age 50 and older. For comparison purposes, Figure 1 also displays hazard estimates from Ribar et al. (2005a) for the same period for South Carolina households with children.

[Figure 1 about here]

The most striking feature of the estimated hazard functions for all groups is the pronounced saw-tooth pattern. All of the hazard functions exhibit sharp upward spikes at three-,

six- or twelve-month intervals, which coincide with the dates when the households would have been required to recertify their eligibility. The estimates indicate that households are several times more likely to leave the Food Stamp Program in recertification months than at other times.

The top left panel displays the estimated hazard function for households with potential ABAWD members that began food stamp spells before 2000. The exit probabilities for these households rise sharply in the third month on the program, which is consistent with the both the three-month ABAWD time limit and possible quarterly recertification requirements. There are other large spikes in the exit probabilities at the sixth, ninth and twelfth months, which are consistent with quarterly and annual recertification intervals. After the twelfth month, the exit probabilities fall off noticeably, which may indicate that the remaining recipients are persistent but may also reflect spurious negative duration dependence associated with heterogeneity.

The upper right panel shows the hazard function for similar households with food stamp spells that began in the second half of 2002. These households were required to recertify their eligibility semi-annually or annually and would have been receiving benefits at a time when the ABAWD time limits were waived across the entire state. Consistent with these changes, the spikes in exit probabilities in the third and ninth months from the previous graph disappear, leaving only the spikes at the sixth and twelfth months.

The second row of graphs shows hazard functions for food stamp exits for households in which all of the members were 50 years old or older. These households do not include any ABAWDs and are more likely than younger households to have fixed incomes. Because of these differences, we expect the duration patterns for older households to be dominated by annual spikes, and this is exactly what the graphs show. Except at annual recertification periods, older adult-only households have remarkably low exit probabilities.

The third row of graphs shows hazard functions for households with children. For the households that entered the Food Stamp Program before 2000, exit probabilities are highest at quarterly and annual intervals. For the households that entered after June 2002, exit probabilities are highest at semi-annual and annual intervals. These patterns are again consistent with the recertification regime. Households with children clearly have higher exit probabilities than older adult-only households. Comparisons between households with children and younger adult-only households produce mixed results; households with children have somewhat lower exit probabilities early in their spells but higher exit probabilities later.

The graphs at the bottom of Figure 1 show the survival functions that are associated with the preceding hazard functions. For the early cohorts of younger adult-only households and households with children, the survival probabilities plummet during the third month. Among younger adult-only households, 29 percent of the participation spells that began prior to 2000 ended within three months, while only 9 percent of the spells for older adult-only households did so. The median spell length for younger adult-only households in the first cohort was six months, while the median spell lengths for households with children and older adults were 8½ and 20½ months, respectively.

Exit probabilities fell, and spell durations rose on average for all three types of households after 2002 when the recertification intervals for households with variable incomes were extended and the ABAWD time limits were waived state-wide. To the extent that these were more applicable to younger adult-only households and households with children than older adult-only households, we would expect to observe disparate changes in exit behavior. Consistent with this, we see that the percentage of spells lasting three months or less fell four percentage points (to 5 percent) for older adult-only households, 17 points (to 6 percent) for

households with children, and 22 points (to 7 percent) for younger adult-only households. The median spell lengths for households with children and younger adult-only households each increased to just under a year. Overall, the spell distributions for households with children and younger adult-only households became indistinguishable after the middle of 2002.

Figure 2 displays hazard functions that are estimated separately for adult-only households that began their food stamp spells with fluctuating or fixed incomes. The indicators for variable or fixed incomes come directly from the program records but are only available in the administrative data system after July 2001. Figure 2 reports estimates for two entry cohorts:

- spells that began in the second half of 2001 – these were potentially subject to more frequent (three-month/twelve-month) recertifications for their first year and less frequent (six-month/twelve-month) recertifications thereafter, and
- spells that began in or after the second half of 2002 – these were subject to the longer recertification policy for their entire duration.

For simplicity, the estimates do not distinguish between younger and older households.

[Figure 2 about here]

The graphs provide more evidence that recertification policies are responsible for the serrated patterns in the hazard functions. From the left panels of Figure 2, households that began food stamp spells with fluctuating incomes in the second half of 2001 had hazard functions with quarterly spikes in their first year and semi-annual spikes thereafter, while households that began spells with fluctuating incomes after the middle of 2002 had hazard functions with only semi-annual spikes. From the right panels, households that began food stamp spells with fixed incomes had hazard functions with annual spikes, regardless of the spell start date.

In Figure 3 we examine hazards that are estimated separately for adult-only households

(a) located in counties with and without ABAWD exemptions and (b) that do and do not include younger members. The four-way comparison is motivated by a concern that geographic differences in exit behavior might not only reflect differences in the treatment of ABAWDs but also differences in the economic and other circumstances that led to the ABAWD exemptions. The idea behind the analysis is that older households should not be affected by ABAWD policies, so differences by county exemption status for this group may reveal whether there are other confounding influences.

[Figure 3 about here]

The top panel in Figure 3 indicates that exit timing for younger households differs with exemption status. Younger adult-only households in non-exempt counties were more likely to leave the Food Stamp Program during the first few months of their spells than similar households in exempt counties. For younger households that managed to stay on the food stamp program for more than four months, there were no subsequent differences in exit behavior. The bottom panel in Figure 3 indicates that there were no appreciable differences in exit behavior for older households at any time during their spells. The specific finding that living in a non-exempt county hastens exits from the Food Stamp Program only among younger households and only during the initial months of their spells strongly indicates that the patterns represent the impact of ABAWD policies and not something else.

Survival estimates (not shown) reveal that the reductions in participation from the ABAWD work rules were substantial. In counties with the work rules, 30 percent of food stamp spells among younger adult-only households ended within three months, and the median spell length for these households was six months. In counties without the rules, only 18 percent of participation spells for younger adult-only households ended within three months, and the

median spell length was eleven months.

6. Econometric Specification

For our multivariate analyses, we estimate hazard models of exits from and re-entry into the Food Stamp Program and binary choice models of employment. To examine the timing of exits from food stamps, we estimate a continuous-time log hazard model

$$\ln h_{FS}(t) = A_{FS}'T_{FS}(t) + \delta_{FS} E(t) + B_{FS}'X_{FS}(t) + \eta. \quad (1)$$

In equation (1), $T_{FS}(t)$ represents a vector of duration variables; $E(t)$ is an indicator for employment; $X_{FS}(t)$ is a vector of other observed and possibly time-varying explanatory variables, and η is an unobserved, time-invariant variable.

The presence of unobserved heterogeneity in the hazard function is a substantial complication. Failure to account for such heterogeneity can lead to biased estimates of the coefficients and to spurious indications of negative duration dependence. Following Lillard (1993), we assume that the unobserved heterogeneity term, η, is normally distributed with mean 0 and variance σ_η^2. We then use a maximum likelihood procedure that accounts for the distribution of food stamp participation spells under this assumption. The procedure is similar to the one developed by Butler and Moffitt (1982) for random-effect panel probit models in that it specifies the hazard function conditional on η and then integrates over the distribution of η.

A second complication is that employment is an endogenous measure. We address this problem by estimating models of food stamp participation and employment jointly and by allowing the unobserved determinants of these outcomes to be correlated. The key assumption underlying this approach is that the source of bias is a time-invariant unobserved variable. This is similar to the assumption that is invoked when longitudinal fixed effects estimators are used to address endogeneity. The correlated random effects approach, however, is more restrictive than

a fixed effects estimator, because it requires the omitted variables to be conditionally independent of the observed variables in $X_{FS}(t)$.

Along with the model for exits from food stamps, we also estimate a hazard model of the timing of re-entry into food stamps (equivalently, exits from non-participation),

$$\ln h_{NF}(t) = A_{NF}'T_{NF}(t) + \delta_{NF}E(t) + B_{NF}'X_{NF}(t) + \mu, \quad (2)$$

where $T_{NF}(t)$ is a vector of duration variables, $E(t)$ is defined as before, $X_{NF}(t)$ is a vector of other observed variables, and μ is an unobserved, time-invariant variable. The unobserved variable μ is assumed to be normally distributed with mean 0 and variance σ_μ^2. The analysis allows for multiple, alternating spells of food stamp participation and non-participation.

A discrete-time, binary-choice specification is used to model employment. In the model, the net benefits of employment for the PI at time t are specified to be a linear function such that

$$E^*(t) = B_E'X_E(t) + \nu + \varepsilon(t) \quad (3)$$

where $X_E(t)$ is a vector of observed variables, ν is a normally distributed, time-invariant, unobserved variable with mean 0 and variance σ_ν^2, and $\varepsilon(t)$ is a normally distributed, transitory error with mean 0 and variance 1. We assume that the PI works to earn more than \$250 if the net benefits are positive and does not work this much otherwise. The transitory error $\varepsilon(t)$ is assumed to be serially uncorrelated and independent of the other unobserved variable ν. With this assumption, employment is modeled as a random-effects probit.

The transitory error is also assumed to be independent of the other two time-invariant, unobserved variables, η and μ. However, η, μ, and ν are allowed to be freely correlated (the correlation coefficients are $\rho_{\eta\mu}$, $\rho_{\eta\nu}$, and $\rho_{\mu\nu}$). The two log hazard models and the random effects probit model are estimated jointly as a single system using the aML software package (Lillard and Panis 2003). The aML package employs Gaussian quadrature to evaluate the integrals over

the three sources of time-invariant, unobserved heterogeneity. We report estimates from models that used ten quadrature points in each dimension, or 1,000 points total.

7. Multivariate Estimation Results

Specification issues. The multivariate estimation methodology is exceedingly flexible in the ways it can both model duration dependence patterns and incorporate controls for unobserved variables. Because of this flexibility, it is important before reporting our estimation results to discuss how we specified the models and how we checked the specifications. An initial discussion of specification issues is also necessary because the complexity and size of the models make it cumbersome to report detailed results from more than a few specifications.

We begin with a discussion of the duration controls. The food stamp exit and re-entry models are specified as proportional hazard models. An initial step in estimating the models is to specify the functional forms of the baseline hazards. Each of the log hazard models includes a piece-wise linear function that is defined relative to the start of the spell to account for baseline duration effects. The number of segments and the connecting points (knots) in the functions differ across the exit and re-entry models. The duration splines in the food stamp exit models have 15 segments: twelve three-month segments covering the first three years of a participation spell, two six-month segments covering the fourth year of a spell and a final linear segment covering subsequent years. The duration splines in the food stamp re-entry models have eight segments that connect at months 2, 5, 9, 13, 18, 24 and 36. The number of segments and locations of the connecting points were selected after some initial specification testing.

Recall that we estimate our models separately for adult-only households that have members under age 50 and households that only have older members. For the younger group, we estimate separate duration splines depending on whether the household did or did not live in a

county with an ABAWD exemption. We saw in the descriptive analysis that the ABAWD provisions were associated with differences in exit behavior early in a spell but not later. Our model allows for such differences by including separate duration specifications for households in exempt and non-exempt counties; tests confirmed that different specifications were appropriate.

The hazard models also include piece-wise linear duration functions that are defined relative to the beginning of our observation window, rather than relative to the beginning of the spell. The specifications of these "calendar" splines are common across all of our hazard models with initial nine-month segments that extend from October 1996 to June 1997 and a series of six-month segments thereafter. We include the calendar splines to capture general trends that might arise from unmeasured national or state-wide changes in economic, demographic or policy conditions. Tests indicated that half-year segments fit the spell data better than longer segments.

In addition to the linear splines for duration dependence and calendar effects, the food stamp exit models include four dummy-variable controls corresponding to potential recertification months—indicators for every third and twelfth month of a spell that occur before October 2002 and indicators for every sixth and twelfth month of a spell that occur after that. Each indicator is set relative to the start date of a spell and covers a 31-day window that extends from 28 days before the potential recertification date to two days afterward. Our examination of the nonparametric hazards and preliminary testing guided the specification of these indicators.[3]

To approximate the differences in recertification policies associated with fixed versus fluctuating incomes, the food stamp exit models also include interactions of the recertification dummy variables with an indicator for whether the household began its spell with covered earnings. Households with initial earnings should be subject to shorter recertification intervals. For the analysis sample of older adult-only households, we also include interactions of the

[3] We tested for the presence of quarterly spikes after October 2002 but found no evidence of such spikes.

recertification dummy variables and an indicator for whether everyone in the household was over age 60. Households with older members are more likely to rely on fixed incomes and, consequently, to face longer recertification intervals.[4]

A second general specification issue involved the inclusion and distribution of the unobserved heterogeneity terms, η, μ and ν. Initial specification tests confirmed that controls for unobserved heterogeneity were necessary and that the heterogeneity terms were correlated across some of the equations. In the results that follow, the models all include complete sets of controls for unobserved heterogeneity and correlations among the heterogeneity terms.

Estimation results for younger adult-only households. Coefficient estimates from the three-equation system for adult-only households with at least one member under the age of 50 are reported in Table 1. From left to right, the columns in Table 1 list results from the food stamp exit hazard, food stamp re-entry hazard, and covered employment probit models. The first ten rows of the table list coefficients for measures of the household's and primary informant's observed characteristics. The next four rows list coefficients for the county-level variables. Coefficients for the recertification-month dummies and the interactions of these variables with the initial employment indicator for the food stamp exit model appear in the next eight rows. These are followed by the estimated slopes of the linear splines for calendar effects. Estimates of the variance and correlation parameters for the heterogeneity terms appear at the bottom of the table. To conserve space, intercepts and estimated parameters for the duration splines in the hazard models are not reported (complete results are available upon request).

[Table 1 about here]

The estimates from Table 1 indicate that the food stamp policy variables are statistically

[4] The administrative data system notes whether households have fixed or fluctuating incomes; it also records the households' sources of income. However, these data are not available across the entire period of our study; so, we instead rely on the initial employment and age composition variables in the multivariate analyses.

and substantively important, even after controlling for other characteristics. Younger adult-only households were much more likely to leave the Food Stamp Program in recertification months—at quarterly and annual intervals prior to October 2002 and at half-yearly and annual intervals subsequently—than in other months. The coefficients on the uninteracted recertification dummy variables give the exit pattern for households that were not initially working. As expected, these households are more likely to leave at annual intervals than at shorter intervals.

For households that were initially working, we need to consider both the uninteracted and interacted coefficients. When we do this we see that households that were initially working were more likely to leave at annual intervals than at shorter intervals; however, the exit probabilities at the shorter intervals are higher than those for initially non-working households. These patterns are consistent with the way that we would expect the recertification policy to operate.

There are also significant differences in program participation and employment between younger adult-only households living in counties with exemptions from the ABAWD restrictions and households living in other counties. The estimates indicate that the food stamp re-entry hazards for younger households living in exempt counties are roughly ten percent higher than the corresponding hazards for households living in non-exempt counties. The probabilities of employment are about ten percent lower (2 to 3 absolute percentage points) in exempt counties.

The hazard model for food stamp exits includes a dummy variable for exemption status along with interactions of exemption status and the baseline hazard; however, Table 1 does not report the coefficients for the interactions. Calculations based on the estimates indicate that the exit hazard probability is initially 35 percent lower for households in exempt counties than for households in non-exempt counties. Calculated differences at other points during the first nine months of a spell appear below.

Differences in exit hazards for younger adult-only HHs living in exempt & non-exempt counties

month:	0	1	2	3	4	5	6	7	8	9
difference:	35%	34%	33%	32%	26%	19%	11%	8%	4%	0%

The difference in hazard rates falls slightly across the first three months of a food stamp spell but falls rapidly thereafter. By the ninth month, there are no differences in the exit hazards between households living in exempt and non-exempt counties. The pattern is similar to what we observed in the descriptive analysis: younger adult-only households in exempt counties have substantially lower food stamp exit hazards but only in the first few months of their spells.

The estimates from Table 1 indicate that employment is associated with faster exits from food stamps and slower returns to the programs for younger adult-only households. These associations are substantively large—earning $250 or more in a quarter increases the food stamp exit hazard by 58 percent and reduces the re-entry hazard by 22 percent. Increased schooling is associated with faster exits from food stamps, slower returns to the program, and greater chances of employment. On average, younger adult-only households with female and black informants experience longer spells of food stamp participation and shorter spells of non-participation than similar households with male or non-black informants; however, female and black informants are also more likely to work in a covered job. Younger currently-married households have higher exit probabilities and higher employment rates than other households. Exit probabilities and employment probabilities decrease with age.

Living in a county with a high unemployment rate reduces the probability that the primary informant in a younger adult-only household works and also increases the probability of a household returning to the Food Stamp Program. Living in a densely populated county increases the probability of exiting food stamps and of working. Living in a border county is

also associated with a higher exit probability.

The controls for calendar effects are jointly significant in the program and employment models. The coefficients in the employment model are consistent with the observed trends: employment increased through 1999, decreased in 2000 and 2001, and started to rebound in 2002. It is harder to see a consistent trend pattern in the food stamp exit and re-entry models.

The unobserved characteristics of households that hasten exits from food stamps (the characteristics represented by the factor η) are not strongly correlated with the unobserved characteristics that hasten returns to the program (represented by μ). However, η and μ are each significantly, positively correlated with the unobserved characteristics that lead to employment (represented by ν). The results indicate that factors that contribute to employment also contribute to more turbulent program behavior for younger adult-only households.

Estimation results for older adult-only households. Results from the food stamp and employment models estimated for households with all members age 50 and above are reported in Table 2. The models for older adult-only households are specified slightly differently than the models for younger households. The models for older households (a) employ a different age spline, (b) include an indicator for all members being age 60 or over, (c) include interactions of the age 60 indicator with the recertification variables in the food stamp exit hazard, and (d) do not interact the ABAWD exemption status variable with the baseline hazard in the food stamp exit equation. Initial specification tests supported these changes.

[Table 2 about here]

As with the estimates from Table 1, the results for the recertification variables in the food stamp exit model are statistically and substantively significant. The estimates for the uninteracted coefficients indicate that older households who were initially without earnings and

who initially had members under the age of 60 were more likely to leave at quarterly and especially annual intervals before October 2002 and at semi-annual and annual intervals after October 2002. The quarterly pattern before October 2002 is stronger among older households who initially had earnings. The annual pattern is stronger before and after October 2002 for households in which all members were over age 60. The results are consistent with recertification policies regarding people with different types of incomes and elderly recipients.

The coefficients for the indicator of county ABAWD exemption status are not significant in any of the models. We did not expect that the ABAWD provisions would have an effect for older households, but there was a possibility that exempt and non-exempt counties were different in other ways that might affect participation. From these results, it appears that there were no such differences, at least for older households.

Many of the other results for older adult-only households are similar to those for younger households. Earning more than $250 in covered wages in a quarter sharply increases the hazard for exiting food stamps and sharply reduces the hazard for re-entering food stamps. The results for the gender, race, schooling, and marital status variables are also mostly similar to the results from Table 1, as are the estimates for the relationships among the unobserved variables.

One notable difference between the estimates for younger and older households is that older households are generally less sensitive to changes in the local economic and demographic variables. While the unemployment variable in the food stamp exit equation has a significantly negative coefficient, all of the other county-level variables are statistically insignificant. Some of the loss in significance is associated with the reduced power and larger standard errors from the smaller sample. However, there are also reductions in the magnitudes of some coefficients.

Simulations. There are numerous statistically significant results in Tables 1 and 2.

However, owing to our use of non-linear specifications, interactions and overlapping duration variables, it is difficult to gauge the magnitudes of some of the relationships. To show what the duration patterns in the estimated hazard functions look like and demonstrate how they differ with key variables, we use the coefficients from Tables 2 and 3 (including the suppressed baseline hazard coefficients) to calculate hazard functions for several hypothetical cases.

Figure 4 displays predicted hazards for leaving the Food Stamp Program for a hypothetical non-black, childless, married woman who is 38 years old at the start of her food stamp spell. In all of the predictions, we assume that the woman has a high school diploma and lives in a non-border county with a population density of 2,000 people per square mile and a six percent unemployment rate. We alter other characteristics in the predictions, however. Specifically, we consider how spells from the short recertification regime compare with spells from the long recertification regime by simulating hazards with start dates of January 1, 1997 and July 1, 2002, respectively. We also consider how spells differ between women who were and were not working and between women who were living in exempt and non-exempt counties.

[Figure 4 about here]

The top panel in Figure 4 shows the simulated hazards for a food stamp spell that began on January 1, 1997 in an exempt county. The dark line shows the simulated hazard when the PI does not work, while the solid line shows the hazard when she works continuously. The first thing that we notice is that the simulated hazards capture the recertification pattern that was evident in the descriptive analysis. For the simulation without employment, there are small but detectable spikes at quarterly intervals and much larger spikes at annual intervals. For the simulation with continuous employment, the quarterly spikes become more prominent. In addition to altering the shape of the hazard functions, continuous employment also clearly raises

the level of the hazard function. At all points in a simulated spell, households are substantially more likely to exit food stamps if the PI works.

The middle panel in Figure 4 repeats this exercise but changes the start dates of the spells to July 1, 2002. With the later start dates, the simulated hazards now have spikes at six- and twelve-month intervals. Once again, continuous employment is associated with a higher exit hazard and a stronger semi-annual pattern.

The hazards in the last panel in Figure 4 set the start dates back to January 1, 1997 and assume that the primary informant does not work. Instead of altering work status, the simulations alter whether the household is located in an exempt or non-exempt county, represented by dark and dashed lines, respectively. The simulations indicate that a household in a county with ABAWD exemptions has a lower hazard rate over the first few months of a food stamp spell than a household in a non-exempt county. Beyond a few months, there is little difference in the hazards between households in exempt and non-exempt counties.

Figure 5 displays simulated hazards for exiting the Food Stamp Program for adult-only households with older members. These simulations use the model coefficients from the first column of Table 2. The simulations change the age of the primary informant to 62 but keep most of the other characteristics the same. All of the simulations in Figure 5 assume that the household is in a county that is exempt from the ABAWD provisions. The simulations alter the start dates between January 1, 1997 (top panel) and July 1, 2002 (bottom panel). They also alter the work status of the primary informant and the household composition. In each panel, the dark solid line indicates a household in which the primary informant does not work and at least one member is under age 60. The thin solid line indicates a household with a continuously working primary informant and at least one member under age 60, while the dashed line indicates a non-

working household with all members age 60 or above.

[Figure 5 about here]

The simulations once again show the expected recertification patterns. Non-working households, especially those with all older members have very small quarterly or semi-annual spikes in their exit hazards but large annual spikes. Quarterly and semi-annual spikes are higher among working households. The figures also show that employment is associated with a substantially elevated food stamp exit hazard, while the presence of older household members is associated with an attenuated hazard.

8. Conclusion

Adult-only households have been at the center of several important changes in food stamp policy. Despite gaining the attention of policymakers, these households have been overlooked by most food assistance researchers. In this report, we examine food stamp participation and employment for adult-only households using post-PRWORA administrative data from South Carolina. We conduct descriptive analyses of food stamp spells. We also estimate multivariate models of policy, economic and demographic factors that contribute to food stamp exits, food stamp re-entry, and employment among adult-only households. In our analyses, we distinguish between households that do and do not have members under the age of 50—that is, households with and without members in the ABAWD age range.

The analyses produce two important direct policy findings. First, exits from South Carolina's Food Stamp Program are strongly associated with the timing of recertification. Exits are much more likely to occur in recertification months than in other months. South Carolina lengthened the recertification intervals for some households in October 2002, and this change is plainly evident in the data. Our analyses indicate that the longer recertification intervals led to

more persistent participation spells and contributed to an increase in the food stamp caseload. Other differences in recertification policy associated with the type of income a household receives and the age composition of its members also produce differences in the timing of exits.

A second specific policy finding is that the ABAWD work requirements and time limits imposed by the PRWORA substantially reduced food stamp participation and only slightly increased employment among younger adult-only households. South Carolina obtained exemptions from the ABAWD requirements for different counties at different times. Estimation reveals that younger adult-only households were more likely to leave the Food Stamp Program if they lived in a county that imposed the ABAWD requirements. The differences in the probability of exit between households in exempt and non-exempt counties all occurred in the first few months of a spell—around the time that we would expect to see a time limit effect. As a sensitivity check, we compared outcomes across exempt and non-exempt counties for adult-only households with no members in the ABAWD age range but found no statistically detectable differences in program behavior or employment. The findings that the differences in exit, re-entry and employment behavior only appeared for the at-risk group and that the differences for exit behavior only appeared in the first few months of spells provide strong evidence that these are results of the ABAWD policies and not some other correlate of a county's exemption status.

In addition to the results for specific policy measures, the empirical analyses generate findings for other economic and demographic variables. For instance, the analyses show that adult-only households are much more likely to end a spell of food stamp receipt and much less likely to return to the program if they are working in a UI-covered job. The association between earnings and food stamp exits operates through several channels: earnings reduce a household's eligibility for food stamps; they reduce benefits, which reduces the attractiveness of

participating; they alter the recertification schedule because they are considered a variable source of income, and they increase the opportunity costs of complying with program rules. All of these channels work to make earnings less compatible with food stamp participation and diminish the program's utility as a work support program.

The empirical results also show that particular groups face elevated risks of program dependence. Less-educated adults and unmarried adults appear especially likely to remain on food stamps and to return to the program; these groups also have low levels of employment. Women and African-Americans also have longer spells of food stamp participation and shorter spells of non-participation; however, they have higher probabilities of employment.

While the empirical analyses produce a number of strong and useful findings, it is important to keep some of the limitations in mind. The biggest limitation is that the administrative data that we examined from South Carolina's Food Stamp Program only describe households who participated at some point in the program. We do not examine households who may have been eligible for food stamps but never elected to participate. We also do not examine the many households that, despite having low wages and little wealth, worked hard enough to have incomes above the eligibility cut-off. Another limitation of the analyses of program outcomes is that they only consider participation and non-participation. These are important outcomes to be sure, but they do not let us distinguish between eligibility, program take-up and compliance effects. For example, our analyses do not tell us whether the patterns of food stamp exits at recertification intervals reflect the detection of ineligible households or discouragement among eligible households. Future research should address this issue.

References

Bartlett, Susan, Nancy Burstein and William Hamilton with Ryan Kling. "Food Stamp Program Access Study." E-FAN Report no. 03-013-3. Washington, DC: U.S. Department of Agriculture, November 2004.

Blank, Rebecca, and Patricia Ruggles. "When Do Women Use Aid to Families with Dependent Children and Food Stamps?" *Journal of Human Resources* 31 (Winter 1996): 57-89.

Butler, J.S., and Robert Moffitt. "A Computationally Efficient Quadrature Procedure for the One-Factor Multinomial Probit Model." *Econometrica* 50 (May 1982): 761-64.

Cody, Scott. "Food Stamp Program—Elderly Nutrition Demonstrations: Interim Report on Elderly Participation Patterns." E-FAN Report no. 04-009. Washington, DC: U.S. Department of Agriculture, June 2004.

Cunnyngham, Karen. "Trends in Food Stamp Program Participation Rates: 1999 to 2002." Alexandria, VA: Food and Nutrition Service, U.S. Department of Agriculture, September 2004.

Currie, Janet and Jeffrey Grogger, "Explaining Recent Declines in Food Stamp Program Participation." *Brookings-Wharton Papers on Urban Affairs* (2001): 203-44.

Czajka, John, Sheena McConnell, Scott Cody and Nuria Rodriguez. "Imposing a Time Limit on Food Stamp Receipt: Implementation of the Provisions and Effects on Food Stamp Program Participation. Volume I." Alexandria, VA: Food and Nutrition Service, U.S. Department of Agriculture, September 2001.

Farrell, Mary, Michael Fishman, Matthew Langley and David Stapleton. "The Relationship of Earnings and Income to Food Stamp Participation." E-FAN Report no. 03-011. Washington, DC: U.S. Department of Agriculture, November 2003.

Fraker, Thomas, and Robert A. Moffitt. "The Effect of Food Stamps on Labor Supply: A Bivariate Selection Model." *Journal of Public Economics* 35 (February 1988): 25-56.

Gleason, Philip, Peter Schochet and Robert Moffitt. "The Dynamics of Food Stamp Program Participation in the Early 1990s." Report to the U.S. Department of Agriculture. Princeton, NJ: Mathematica Policy Research, Inc., April 1998.

Haider, Steven J., Alison Jacknowitz and Robert Schoeni. "Food Stamps and the Elderly." *Journal of Human Resources* 38 (Supplement 2003): 1080-111.

Hollenbeck, Darrell, and James C. Ohls. "Participation Among the Elderly in the Food Stamp Program." *The Gerontologist* 24 (December 1984): 616-21.

Kabbani, Nader, and Parke Wilde. "Short Recertification Periods in the U.S. Food Stamp Program." *Journal of Human Resources* 38 (Supplement 2003): 1112-38.

Keane, Michael, and Robert Moffitt. "A Structural Model of Multiple Welfare Program Participation and Labor Supply." *International Economic Review* 39 (August 1998): 553-89.

Kornfeld, Robert. "Explaining Recent Trends in Food Stamp Program Caseloads." E-FAN Report no. 02-008. Washington, DC: U.S. Department of Agriculture, March 2002.

Lillard, Lee. "Simultaneous Equations for Hazards: Marriage Duration and Fertility Timing." *Journal of Econometrics* 56 (March 1993): 189-217.

Lillard, Lee and Constantijn Panis. *aML Multilevel Multiprocess Statistical Software, Version 2.0.* Los Angeles, CA: EconWare, Inc. 2003.

McKernan, Signe-Mary, and Caroline Ratcliffe. "Employment Factors Influencing Food Stamp Program Participation." E-FAN Report no. 03-012. Washington, DC: U.S. Department of Agriculture, November 2003.

Mills, Bradford, Sundar Dorai-Raj, Everett Peterson and Jeffrey Alwang. "Determinants of Food Stamp Program Exits." *Social Service Review* 75 (December 2001): 539-58.

Nord, Mark, Margaret Andrews and Steven Carlson. "Household Food Security in the United States, 2003." Food Assistance and Nutrition Research Report no. 42. Washington, DC: U.S. Department of Agriculture, October 2004.

Ribar, David, Marilyn Edelhoch and Qiduan Liu. "South Carolina Food Stamp and Well-being Study: Transitions in Food Stamp Participation, TANF Participation and Employment among Families with Children." Unpublished manuscript. Washington, DC: The George Washington University, November 2005a.

Ribar, David, Marilyn Edelhoch and Qiduan Liu. "South Carolina Food Stamp and Well-being Study: Well-being Outcomes among Food Stamp Leavers." Unpublished manuscript. Washington, DC: The George Washington University, November 2005b.

Richardson, Philip, Gregg Schoenfeld, Susan LaFever, Frances Jackson and Mark Tecco. "Food Stamp Leavers Research Study—Study of ABAWDs Leaving the Food Stamp Program in South Carolina: Final Report." E-FAN Report no. 03-002. Washington, DC: U.S. Department of Agriculture, March 2003.

Staveley, Jane, David Stevens and Parke Wilde. "The Dynamics of Food Stamp Program Entry and Exit in Maryland." Unpublished manuscript. Baltimore, MD: University of Baltimore, August 2002.

Stavrianos, Michael and Lucia Nixon. "The Effect of Welfare Reform on Able-Bodied Food Stamp Recipients." Alexandria, VA: Food and Nutrition Service, U.S. Department of Agriculture, July 1998.

Wallace, Geoffrey, and Rebecca Blank. "What Goes Up Must Come Down? Explaining Recent Changes in Public Assistance Caseloads." In *Economic Conditions and Welfare Reform*,

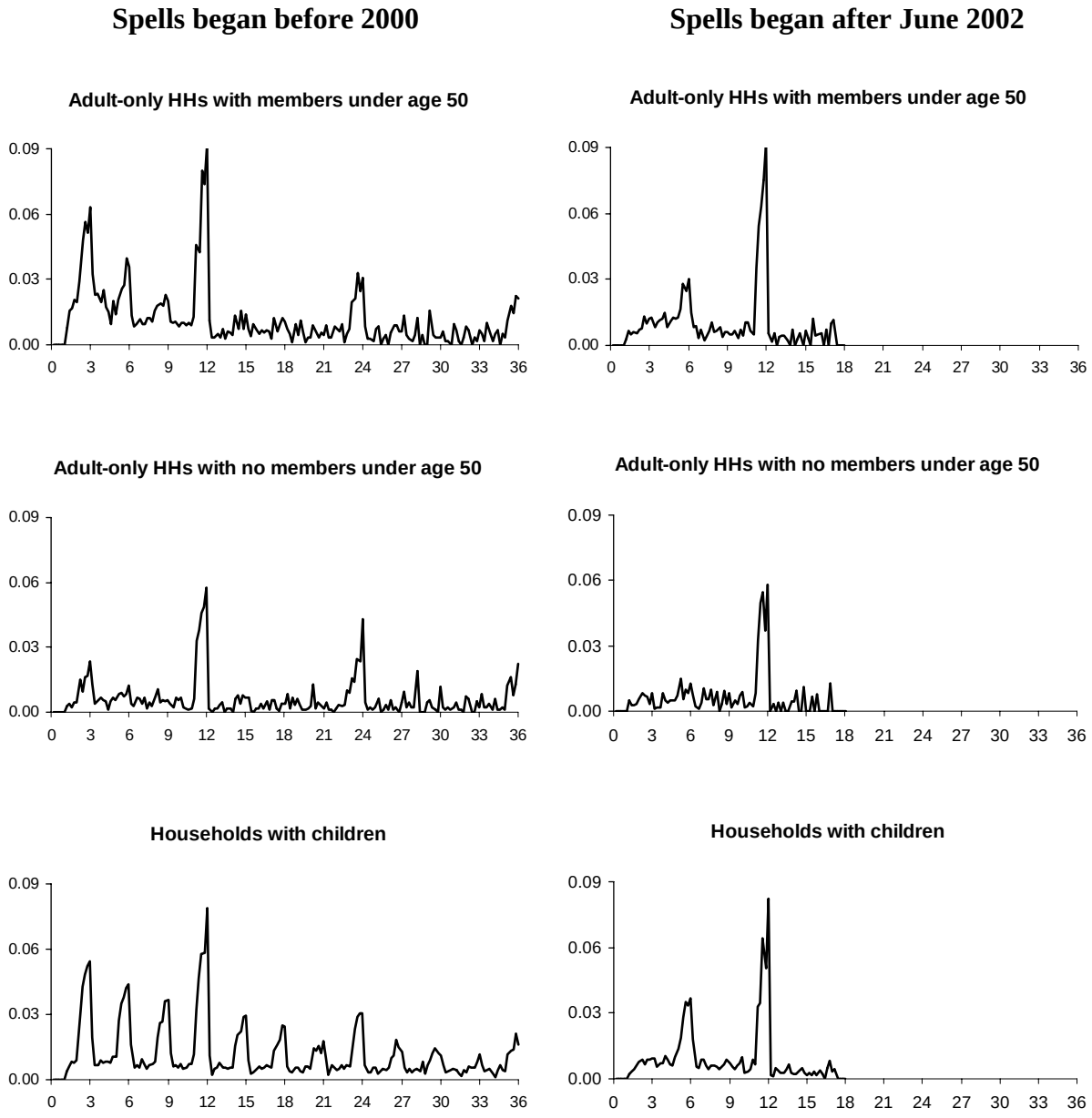
Sheldon Danziger, editor. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 1999, pp. 49-89.

Wilde, Parke, Peggy Cook, Craig Gundersen, Mark Nord and Laura Tiehen. "The Decline in Food Stamp Program Participation in the 1990's." Food Assistance and Nutrition Research Report no. 7. Washington, DC: U.S. Department of Agriculture, June 2000.

Ziliak, James, Craig Gundersen, and David Figlio. "Food Stamp Caseloads Over the Business Cycle." *Southern Economic Journal* 69 (April 2003), 903-19.

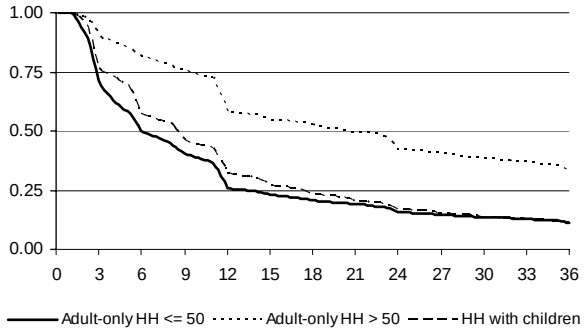
Figure 1. Nonparametric Event History Analysis of Food Stamp Program Exits for Different Entry Cohorts of Households

a. Hazard functions

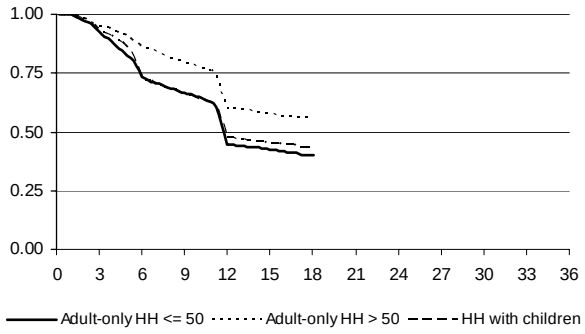


b. Survival functions

Spells began before 2000

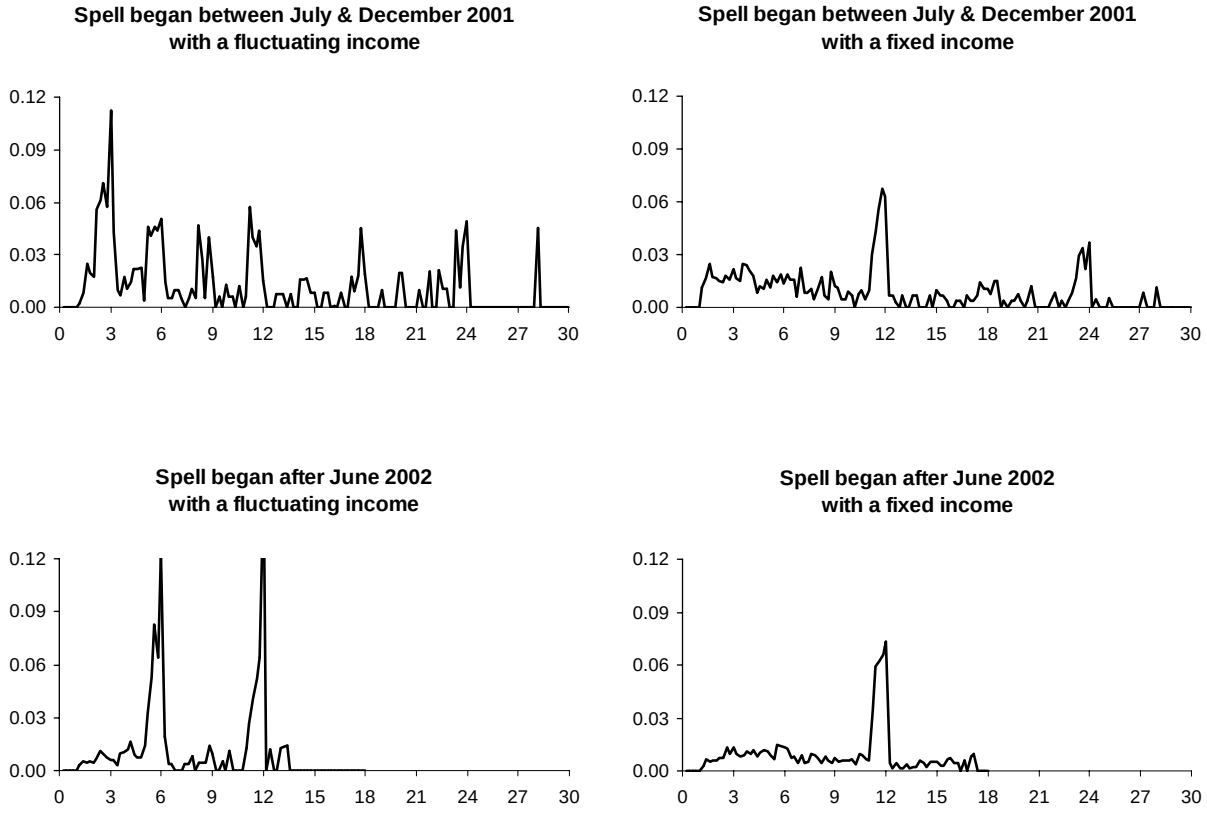


Spells began after June 2002



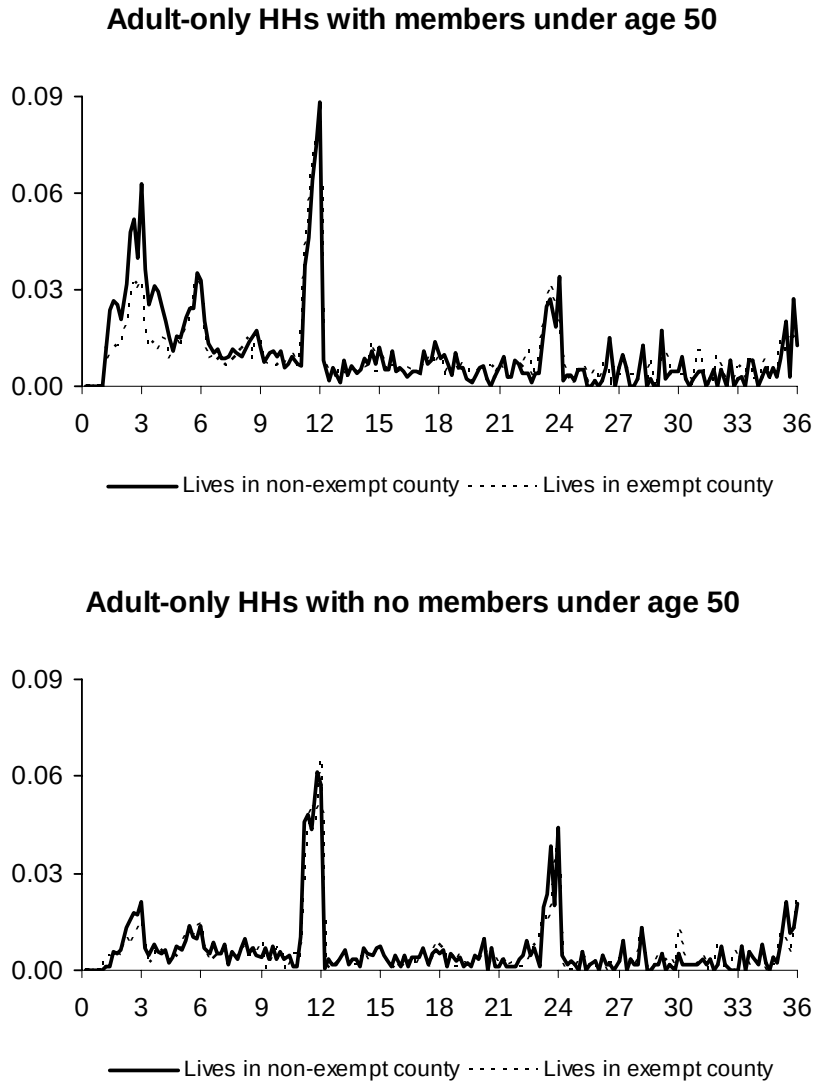
Note: Figures are Kaplan-Meier hazard and survival functions, calculated using 6-day frequencies. The figures are computed using weighted administrative data from the South Carolina Department of Social Services. Figures for households with children are taken from Ribar et al. (2005a).

Figure 2. Nonparametric Hazards of Food Stamp Program Exits for Different Entry Cohorts of Adult-Only Households Conditional on Initial Income Status



Note: Figures are Kaplan-Meier hazards, calculated using 6-day frequencies. The figures are computed using weighted administrative data from the South Carolina Department of Social Services.

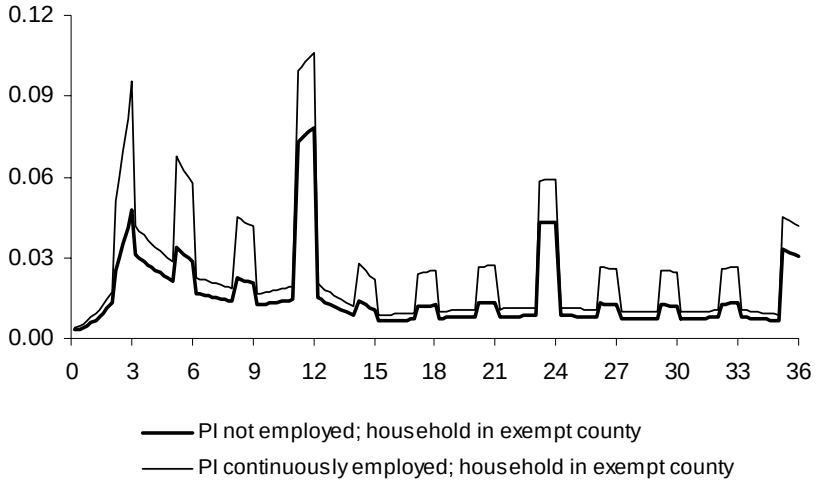
Figure 3. Nonparametric Hazards of Food Stamp Program Exits for Adult-only Households Living in Counties with and without ABAWD Exemptions



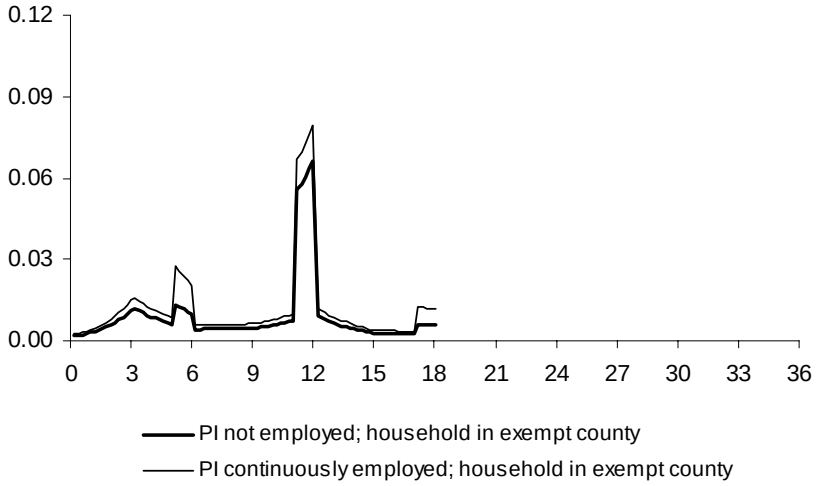
Note: Figures are Kaplan-Meier hazards, calculated using 6-day frequencies. The figures are computed using weighted administrative data from the South Carolina Department of Social Services.

Figure 4. Simulated Hazards of Food Stamp Program Exits for Adult-only Households with Members Under Age 50

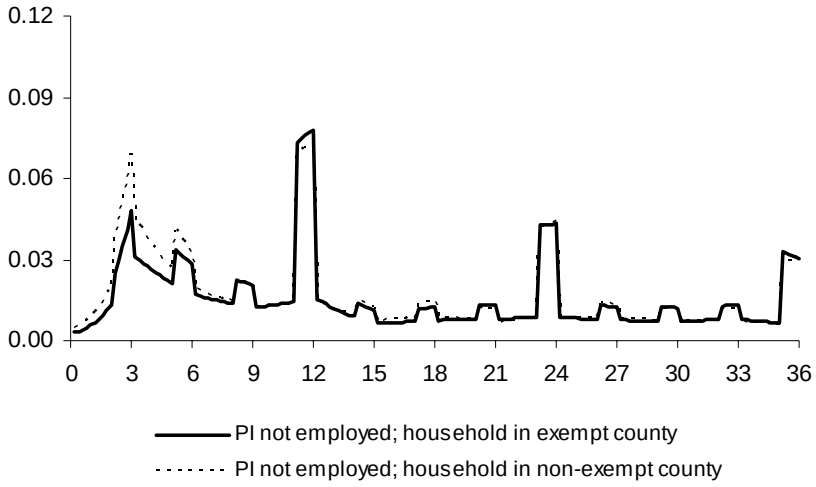
a. Simulated change in initial employment status – spell begins in January 1997



b. Simulated change in initial employment status – spell begins in July 2002



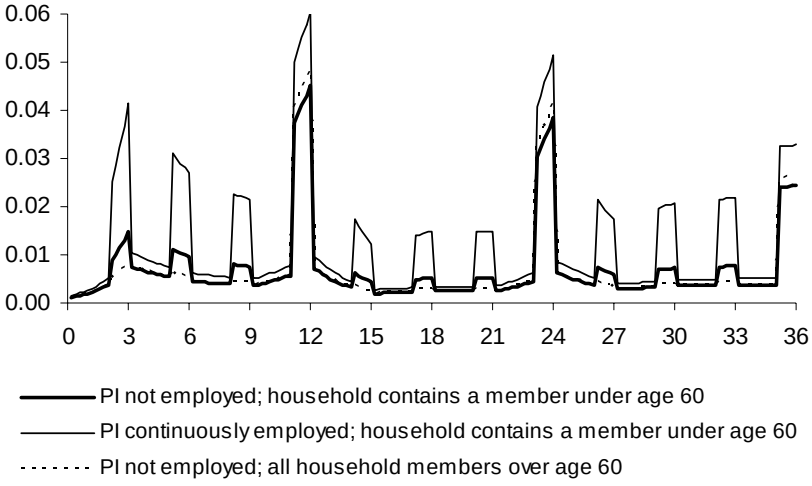
c. Simulated change in ABAWD exemption – spell begins in January 1997



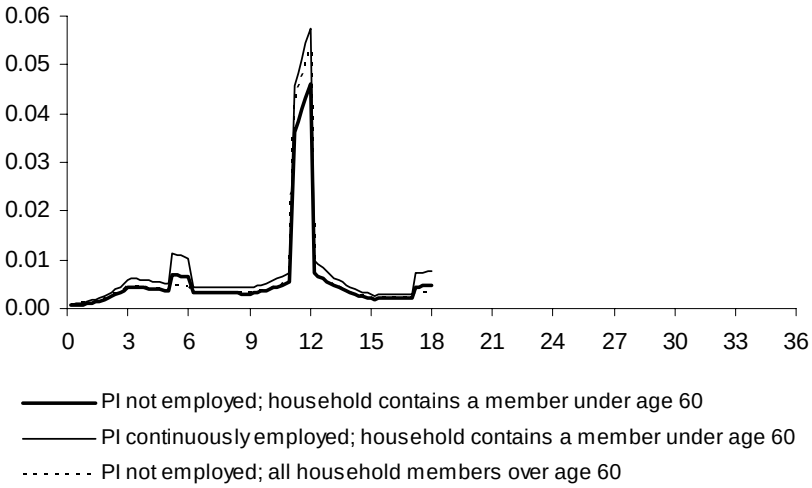
Note: Simulations are based on estimates from Table 1 and use a 6-day resolution. Simulations assume that the primary informant was a white female, age 38, married, with a high school education, living in a non-border county with 2,000 people per square mile, and a 6 percent unemployment rate. Simulations in panels a and b assume that household is in a non-exempt county. Simulations in panel c assume that primary informant is not employed.

Figure 5. Simulated Hazards of Food Stamp Program Exits for Adult-only Households with No Members Under Age 50

a. Simulated changes in initial employment status and age composition – spell begins January 1997



b. Simulated changes in initial employment status and age composition – spell begins July 2002



Note: Simulations are based on estimates from Table 2 and use a 6-day resolution. Simulations assume that the primary informant was a white female, age 62, married, with a high school education, living in a non-border county with 2,000 people per square mile, a 6 percent unemployment rate and an ABAWD exemption.

Table 1. Models of Food Stamp Transitions and Employment: Adult-Only Households with Members under Age 50

	Food stamp exit	Food stamp re-entry	UI-covered earnings >$250
PI and household characteristics			
Age spline through age 25	-0.0171	0.0418 **	-0.0668 ***
	(0.0108)	(0.0201)	(0.0094)
Age spline after age 25	-0.0171 ***	0.0035	-0.0364 ***
	(0.0018)	(0.0029)	(0.0021)
Female	-0.3470 ***	0.2357 ***	0.2885 ***
	(0.0279)	(0.0442)	(0.0414)
African-American	-0.1228 ***	0.4625 ***	0.4075 ***
	(0.0285)	(0.0488)	(0.0435)
Completed high school	0.2226 ***	-0.1942 ***	0.4624 ***
	(0.0283)	(0.0455)	(0.0322)
Completed some college	0.3173 ***	-0.4133 ***	0.6796 ***
	(0.0441)	(0.0721)	(0.0513)
Formerly married	0.0172	0.0262	0.0214
	(0.0310)	(0.0513)	(0.0329)
Currently married	0.2707 ***	-0.1032	0.1466 ***
	(0.0467)	(0.0777)	(0.0390)
Earned $250 or more in quarter	0.4562 ***	-0.2443 ***	
	(0.0317)	(0.0415)	
Was earning $250 or more at start of spell	-0.1613 ***		
	(0.0415)		
County characteristics			
Unemployment rate	0.0076	0.0387 ***	-0.0158 ***
	(0.0053)	(0.0079)	(0.0031)
Population density	0.5171 ***	-0.0509	0.4418 ***
	(0.1213)	(0.1941)	(0.1093)
Border county	0.0506 *	0.0200	-0.0419
	(0.0275)	(0.0445)	(0.0323)
Exempt from ABAWD requirements	-0.4310 ***	0.1022 **	-0.0678 ***
	(0.1475)	(0.0505)	(0.0154)
Spell period dummies			
End of quarter (before 10/02)	0.5065 ***		
	(0.0322)		
End of year (before 10/02)	1.1429 ***		
	(0.0769)		
End of 6-months (after 10/02)	0.8346 ***		
	(0.0874)		
End of year (after 10/02)	1.1850 ***		
	(0.1166)		
End of quarter (before 10/02) x earnings status at spell start	0.4220 ***		
	(0.0511)		
End of year (before 10/02) x earnings status at spell start	-0.3934 ***		
	(0.0929)		

End of 6-months (after 10/02) x earnings status at spell start	0.4354 *** (0.1173)		
End of year (after 10/02) x earnings status at spell start	-0.5383 *** (0.1548)		
Calendar time spline			
October 1996 - June 1997	-0.0112 (0.0219)	-0.1111 (0.1220)	0.0204 *** (0.0036)
July 1997 - December 1997	-0.0764 *** (0.0157)	0.1073 *** (0.0414)	
January 1998 - June 1998	-0.0058 (0.0150)	-0.0420 (0.0303)	0.0176 *** (0.0026)
July 1998 - December 1998	0.0362 ** (0.0145)	0.0234 (0.0271)	
January 1999 - June 1999	-0.0055 (0.0144)	-0.0648 *** (0.0251)	0.0065 *** (0.0022)
July 1999 - December 1999	-0.0060 (0.0144)	0.0379 (0.0245)	
January 2000 - June 2000	-0.0029 (0.0145)	-0.0101 (0.0232)	-0.0080 *** (0.0020)
July 2000 - December 2000	-0.0118 (0.0145)	0.0583 *** (0.0221)	
January 2001 - June 2001	-0.0010 (0.0141)	-0.0452 ** (0.0198)	-0.0231 *** (0.0027)
July 2001 - December 2001	-0.0376 *** (0.0132)	0.0328 * (0.0192)	
January 2002 - June 2002	0.0319 ** (0.0124)	-0.0178 (0.0179)	0.0082 ** (0.0037)
July 2002 - December 2002	-0.1558 *** (0.0135)	0.0147 (0.0182)	
January 2003 - June 2003	0.0704 *** (0.0136)	0.0065 (0.0176)	0.0061 (0.0048)
July 2003 - December 2003	-0.1036 *** (0.0166)	-0.1463 *** (0.0267)	
Variance/covariance parameters			
σ_η^2, σ_μ^2, σ_ν^2	0.6237 *** (0.0319)	0.9011 *** (0.0396)	1.9652 *** (0.0271)
$\rho_{\eta\mu}$, $\rho_{\eta\nu}$, $\rho_{\mu\nu}$	-0.0439 (0.0484)	0.4750 *** (0.0162)	0.3285 *** (0.0266)
Log likelihood		-137816.54	
Cases		9264	
Spells/outcomes	13331	9271	133425

Note: Estimates based on weighted administrative data from the South Carolina Department of Social Services. Models calculated using Guassian quadrature with 10 points in each dimension. Intercepts and coefficients for piecewise linear duration dependence patterns in hazard models are not reported. Asymptotic standard errors in parentheses.

* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

Table 2. Models of Food Stamp Transitions and Employment: Adult-Only Households with No Members under Age 50

	Food stamp exit	Food stamp re-entry	UI-covered earnings >$250
PI and household characteristics			
Age spline through age 65	-0.0451 ***	-0.0378 ***	-0.1168 ***
	(0.0077)	(0.0136)	(0.0081)
Age spline after age 65	-0.0046	-0.0566 ***	-0.1426 ***
	(0.0067)	(0.0123)	(0.0151)
All members over age 60	0.0101	-0.2763 **	-0.4362 ***
	(0.0925)	(0.1353)	(0.0524)
Female	-0.4077 ***	0.1819 **	0.0056
	(0.0483)	(0.0768)	(0.1023)
African-American	-0.1384 ***	0.3477 ***	0.4086 ***
	(0.0467)	(0.0790)	(0.1046)
Completed high school	0.2875 ***	-0.0552	0.9936 ***
	(0.0527)	(0.0867)	(0.0947)
Completed some college	0.3927 ***	-0.0599	1.0074 ***
	(0.0946)	(0.1483)	(0.1868)
Formerly married	0.0014	-0.0560	-0.0233
	(0.0603)	(0.0969)	(0.1174)
Currently married	0.3791 ***	-0.2577 *	0.3867 ***
	(0.0815)	(0.1399)	(0.1290)
Earned $250 or more in quarter	0.5961 ***	-0.4954 ***	
	(0.0763)	(0.1231)	
Was earning $250 or more at start of spell	-0.2741 ***		
	(0.0986)		
County characteristics			
Unemployment rate	-0.0197 **	0.0240	0.0106
	(0.0091)	(0.0155)	(0.0070)
Population density	0.0850	0.0967	-0.0325
	(0.2057)	(0.3495)	(0.2870)
Border county	0.0267	-0.0142	0.0253
	(0.0459)	(0.0764)	(0.0950)
Exempt from ABAWD requirements	-0.0568	0.0028	-0.0124
	(0.0545)	(0.0929)	(0.0400)
Spell period dummies			
End of quarter (before 10/02)	0.7371 ***		
	(0.0687)		
End of year (before 10/02)	1.1224 ***		
	(0.1137)		
End of 6-months (after 10/02)	0.6746 ***		
	(0.1755)		
End of year (after 10/02)	1.1875 ***		
	(0.2002)		
End of quarter (before 10/02) x earnings status at spell start	0.7344 ***		
	(0.1199)		

End of year (before 10/02) x earnings status at spell start	-0.7538 *** (0.1672)		
End of 6-months (after 10/02) x earnings status at spell start	0.1607 (0.2699)		
End of year (after 10/02) x earnings status at spell start	-0.2486 (0.3219)		
End of quarter (before 10/02) x all members over age 60	-0.5708 *** (0.1032)		
End of year (before 10/02) x all members over age 60	0.6377 *** (0.1150)		
End of 6-months (after 10/02) x all members over age 60	-0.3687 (0.2702)		
End of year (after 10/02) x all members over age 60	0.5139 * (0.2910)		
Calendar time spline			
October 1996 - June 1997	-0.0894 ** (0.0451)	0.2474 (0.3207)	0.0031
July 1997 - December 1997	-0.0217 (0.0306)	0.0047 (0.1216)	(0.0083)
January 1998 - June 1998	-0.0790 *** (0.0276)	0.0873 (0.0768)	0.0017
July 1998 - December 1998	0.1068 *** (0.0258)	-0.0555 (0.0561)	(0.0060)
January 1999 - June 1999	-0.0249 (0.0233)	-0.0030 (0.0497)	0.0165 ***
July 1999 - December 1999	0.0406 * (0.0227)	0.0176 (0.0462)	(0.0053)
January 2000 - June 2000	-0.0492 ** (0.0230)	0.0067 (0.0457)	-0.0170 ***
July 2000 - December 2000	0.0074 (0.0231)	-0.0182 (0.0462)	(0.0048)
January 2001 - June 2001	0.0270 (0.0233)	0.0143 (0.0451)	-0.0308 ***
July 2001 - December 2001	-0.0346 (0.0221)	0.0051 (0.0408)	(0.0061)
January 2002 - June 2002	0.0048 (0.0219)	0.0164 (0.0357)	0.0135 *
July 2002 - December 2002	-0.0320 (0.0240)	-0.0099 (0.0366)	(0.0080)
January 2003 - June 2003	0.0364 * (0.0208)	0.0127 (0.0367)	-0.0070
July 2003 - December 2003	-0.0880 *** (0.0273)	-0.1705 *** (0.0591)	(0.0099)
Variance/covariance parameters			
σ_η^2, σ_μ^2, σ_ν^2	0.7443 *** (0.0700)	0.5898 *** (0.0843)	2.6291 *** (0.0734)
$\rho_{\eta\mu}$, $\rho_{\eta\nu}$, $\rho_{\mu\nu}$	0.0801 (0.1517)	0.5567 *** (0.0278)	0.7418 *** (0.0756)

Log likelihood		-40819.98	
Cases		4550	
Spells/outcomes	5452	3192	70019

Note: Estimates based on weighted administrative data from the South Carolina Department of Social Services. Models calculated using Guassian quadrature with 10 points in each dimension. Intercepts and coefficients for piecewise linear duration dependence patterns in hazard models are not reported. Asymptotic standard errors in parentheses.

* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

Appendix A. Means of Analysis Variables

	Households with members under age 50	Households with no members under age 50
Primary informant and household characteristics		
Female	0.48	0.62
African American	0.60	0.55
Age	37.62	61.99
Completed high school	0.45	0.25
Completed some college	0.12	0.06
Currently married	0.10	0.13
Formerly married	0.38	0.72
All household members age 60 or older	—	0.50
Months observed on food stamps	15.89	25.07
Months observed off food stamps	25.54	19.86
Quarters with earnings above $250	3.60	1.32
Quarters with earnings below $250	10.66	14.09
County characteristics		
Unemployment rate	6.42	6.30
Population per square mile (000s)	0.20	0.20
Border county	0.41	0.44
Exempt from ABAWD restrictions	0.64	0.62

Note: Estimates computed using weighted administrative data from the South Carolina Department of Social Services. Means for gender, program participation and employment variables calculated from household-level observations. Means for other variables calculated from quarterly earnings observations.