



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**AGE DIFFERENCES AND
MACROECONOMIC EFFECTS ON
FOOD STAMP PROGRAM PARTICIPATION**

by

So Yeong Lim, Susan E. Chen and Brigitte S. Waldorf

Working Paper #11-2

April 2011

Dept. of Agricultural Economics

Purdue University

It is the policy of Purdue University that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as veteran. Purdue University is an Affirmative Action institution.

AGE DIFFERENCES AND MACROECONOMIC EFFECTS ON FOOD STAMP PROGRAM PARTICIPATION

by

So Yeong Lim^a, Susan E. Chen^b and Brigitte S. Waldorf^a

^aDept. of Agricultural Economics, Purdue University
West Lafayette, Indiana 47907-2056

E-mail: lim47@purdue.edu; bwaldorf@purdue.edu

^bDept. of Economics Finance and Legal Studies, University of Alabama
Tuscaloosa, Alabama 35487

sechen@cba.ua.edu

Working Paper #11-2

April 2011

Abstract

This study examines Food Stamp Program (FSP) participation patterns with an emphasis on macroeconomic effects and age differences. Entry into and exit out of the program are examined with data from the Survey of Income and Program Participation 2004 panel using probit techniques. The results indicate that young adults easily enter the FSP but quickly move out. Older people are hesitant to enter the FSP but they stay on longer compared to their younger counterparts.

The estimation results confirm the common belief that economic dynamics and FSP participation are negatively related. When the unemployment rates rise, the likelihood of entry and continuation on food stamps increases. This study also documents that the macroeconomic effects on FSP transitions vary by age.

Keywords: Food stamps, Age, Macroeconomy, Transition

JEL Codes: I38, J64

Copyright © by So Yeong Lim, Susan E. Chen and Brigitte S. Waldorf. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Introduction

Over the past 10 years, the Food Stamp Program (FSP) has grown explosively in the United States. The average number of monthly participants has doubled over the period from 2000-2009. In 2009 alone, the FSP rolls grew to unprecedented levels with over 34 million recipients per month. At this level, approximately one in ten Americans rely on FSP benefits. The increase in the food stamp caseload over the last three years can be linked to the economic downturn which started with the financial crisis in late 2007. During this period, the unemployment rate doubled from 5.0 percent in December of 2007 to 10.0 percent in the last month of 2009 and the absolute number of unemployed workers sharply increased over the same period so that there were twice as many jobless workers in 2009 as in late 2007 (Bureau of Labor Statistics).

Low income populations are more severely affected by economic downturns than their high income counterparts because they are at high risk of unemployment and face reduced earnings in recessions. Mishel et al. (2005) reported a 4.1 percent decrease in earnings among families in the lowest fifth of the income distribution whereas families in the highest fifth experienced only a 0.9% decline in earnings with a 1% increase in unemployment over the period 1973-2000. The use of food stamp benefits and other types of welfare are one mechanism that families can use to buffer the economic shock brought about by income losses due to unemployment during a recession. As a result, during unfavorable economic conditions, low income households disproportionately rely on public assistance including food stamps. This research looks at the linkage between macroeconomic conditions and the demand for welfare benefits, focusing specifically on the FSP.

There is reliable and plentiful evidence that macroeconomic shocks affect participation patterns in welfare programs. In analyses conducted at both the state and the individual level, the literature has found that macroeconomic dynamics are correlated with FSP dynamics. For example, Figlio et al. (2000) find that a one percentage point increase in the unemployment rate is, on average, associated with a 4.3% increase in FSP caseloads. Moreover, the surge in demand for food stamps during recessions has been accompanied by a lengthened duration of participation in the program. Studies examining the impact of labor market conditions on the duration of welfare participation suggest that the lengthened participation spells occur when labor market conditions deteriorate (Hoynes, 2000; Fitzgerald, 1995; Ribar, 2005).

What is less understood are the differential effects of macroeconomic conditions on the participation propensities of different population subgroups. Of particular importance are differential effects by age. Depending on their age, poor workers are likely to experience different patterns of unemployment so that their welfare participation patterns also differ. For example, once older workers lose their jobs, their probability of re-employment is lower than that of their younger counterparts. A job loss at age 50 or over has substantial and long-lasting employment effects (Chanand Stevens, 2001). The reduced expectations of re-employment coupled with fewer opportunities to invest in re-training are discouraging to older unemployed persons, often implying that job losses for older workers are permanent, and eventually lead to long term reliance on welfare programs. In contrast, younger poor workers have comparatively higher chances of re-employment and exit from welfare.

Understanding variations in FSP participation propensities across age groups and their dependency on macroeconomic conditions is essential to predict future demand for food stamp

benefits and, by extension, other welfare programs. The FSP is a federal assistance program which requires significant governmental outlays, particularly during recessionary periods. We have already witnessed the strong correlation between the current rise in unemployment and the increasing costs of the FSP from administrative records, from 33 billion dollars in FY 2007 to 54 billion dollars in FY 2009. The continuing growth in FSP demand may point to unexpectedly large fiscal burdens for future taxpayers. Moreover, understanding differential effects of macroeconomic conditions on participation propensities for different groups will allow policy makers to better identify and reach genuine needy families.

Therefore, this study aims to investigate FSP participation patterns with a special emphasis on the differential impact of macroeconomic factors across several demographic groups with a particular focus on age cohort effects. Specifically, transitions into and out of FSP will be explicitly addressed using longitudinal data from the Survey of Income and Program Participation (SIPP) 2004 panel. The data are ideally suited to estimate transition models that speak to differential risks of entering and exiting the food stamp program among low income population, while controlling for the influence of macroeconomic conditions. To measure the impact of economic conditions, we match SIPP data with state level economic measures such as the unemployment rate and wages available from the Bureau of Labor Statistics.

This study departs from previous studies in two aspects. First, this study utilizes participation information contained in left censored data. A number of studies focusing on the duration of participation spells in welfare programs heavily depend on a hazard model making researchers drop ongoing spells, which results in a considerable loss of information (Blank and Ruggles, 1996; Fitzgerald, 1995; Hoynes, 2000; Ribar et al., 2009). Estimating movement into and off of the FSP from month to month applying probit technique, this study uses more observations from the SIPP sample than it could when using hazard models.

Second, this study adds important insight on FSP participation patterns among low income populations by examining age differences in entry into and exit from the FSP. We allow the responsiveness in a sequence of movements to differ across age cohorts so as to isolate the potential differences across cohorts in their response to macroeconomic shocks. The impact of macroeconomic conditions is, therefore, not only understood itself but by the composite impact of both the structure of the labor market and economic cycle. Older workers, say aged 50 to 60, are likely to stay unemployed for longer periods despite a lower risk of getting laid off compared to their younger counterparts. The differences in unemployment transitions by age may translate into different transition patterns across age groups. Specifically, this study hypothesizes longer participation duration among older people in comparison with younger people due to different unemployment patterns. Though previous studies of FSP entry and exit focus on some specific demographic groups such as able bodied adults without dependents (ABAWD) and single mothers under Temporary Assistance of Needy Families (TANF), age differences in FSP transition have rarely been addressed (Mills et al., 2001; Ribar et al., 2009).

Literature Review

Entry into and exit out of the Food Stamp Program

A sharp decline in the food stamp caseload occurring during the late 1990s motivated researchers to examine the drivers behind the dramatic changes in food stamp participation. One proposed hypothesis for the decrease was the administrative tension between the newly created TANF program and the food stamp program. The more stringent requirements instituted to get and maintain benefits on the TANF program may have had spillover effects on the food stamp programs thus discouraging participation. Mills et al. (2001) estimated a probit model of FSP exit during the year conditional on prior participation. They utilized the panel characteristics of the Current Population Survey (CPS) 1997-1999 by linking March surveys across years.¹ Since CPS does not identify individuals across surveys, they matched individual characteristics such as age, sex and ethnicity to follow the sample over two years. Their sample is composed of single mothers who were receiving TANF benefits in their initial year. They found that, controlling for changes in earnings of individuals and local economic conditions, leaving TANF increases the likelihood of departure from the FSP among 672 single mothers initially on food stamps. Those who moved out of TANF were 47 percent more likely to leave FSP than those who stay on TANF in the second year of study.

Cody et al. (2005) studied the increase in FSP caseloads growth in the early 1990s. They found that it was associated with an increase in replacement rates (defined as the number of new FSP entrants in a month divided by the previous month's caseload) and lengthened participation spells. On the other hand, the contraction of FSP caseloads was predominantly driven by a shortened period of participation. According to their analysis, FSP entry and exit behaviors are considered strongly related to the macroeconomy.

While the effect of economic conditions on FSP spell length has received less attention than their effect on participation duration of other types of welfare programs, the limited available evidence suggests that macroeconomic changes influence the length of the FSP participation spell. Gleason et al. (1998) extensively examined entry and exit from the FSP and the duration of FSP participation spells in explaining the dynamics of FSP participation in the early 1990s. They used the 1991 panel of SIPP for descriptive and econometric analyses. Their work indicates that the median length of FSP participation for the entire sample is nine months. While it decreases to eight months among those 18 to 59 years old, it increases for people younger than 18 years or older than 60 years up to 12 months. In addition, those who are employed and living in a household with higher income have the shortest participation spells. Gleason et al.'s (1998) estimation results imply that the state unemployment rate strongly affects the participation spell as a whole even though the macroeconomic effect is minimal for able-bodied, prime-aged adults without children.

Ribar et al. (2009) estimated hazard models to investigate how legislative and administrative changes in the FSP impacted the participation of households without children. Their primary interest centered on the effect of work requirement waivers and the effect of the change in recertification on FSP participation of so-called able-bodied adults without dependents

¹CPS is a cross section survey collecting monthly information although one out of eight rotation groups is continually surveyed over four months and resurveyed in the following year for the same period as in the previous year.

(ABAWDs) in North Carolina. They found that ABAWDs who are subject to the time limit of three months are more likely to exit FSP within the first few months of their spells than adults who are not subject to the limit.² Moreover, people are more likely to leave FSP when they face re-certifications. The authors used county unemployment rate as a control for economic conditions. Their results indicate that households without children tend to delay exit from the FSP when the unemployment rate increases.

Blank and Ruggles (1996) investigated eligibility and participation spells in the AFDC and FSP among single female household heads.³ Their primary interest was to explain non-participation. To solve this puzzle, they calculated AFDC and FSP eligibility and measured participation spells using 1986 and 1987 panels of SIPP. Based on their calculation, the mean length of FSP participation spells was 15.7 months for left censored spells and 7.8 months for non-left censored spells. Using competing risk models of duration of eligibility and participation the authors found that older and better educated women with fewer children who live in states with low unemployment and higher AFDC benefits are more likely to end eligibility spells without taking up food stamps.

Duration of participation in welfare programs

Similar to studies on FSP participation, a large body of welfare duration studies provides evidence that economic conditions impact welfare duration. Hoynes and MaCurdy (1994) explored how the length of AFDC participation spells has changed during 1968 to 1988 in response to changes in the composition of the recipients, changes in welfare benefits, and changes in labor market conditions. Using the data from the Panel Study of Income Dynamics (PSID), they estimated the hazard rates of exiting from welfare as a function of demographic variables, economic variables including wage rates, unemployment rates, benefit levels, and year splines. The estimates indicate that welfare benefit levels and wage rates do not have any explanatory power for welfare spells lasting longer than four years whereas they affect the hazard rate of welfare exit for short durations.

The controversy over self-sufficiency and welfare dependency motivated O'Neill et al. (1987) to examine AFDC spell duration from 1968 to 1982 for female recipients using the National Longitudinal Survey of Young Women. Their analysis indicates that the majority of recipients have short spells with only 39 percent of welfare spells lasting longer than two years. They found that an increase in welfare benefits reduces the probability of exit from the program. Moreover, the number of children in the household, poor health status, being raised in a female headed family, being black, and never married are negatively associated with the probability of exit. In contrast, high wages prior to the spell, work experience, schooling, and high wage level in the state of residence shorten spells. Their research is innovative in that they included the changes in characteristics that occurred from the start of the spell to the current spell year as explanatory

²Able Bodied Adults Without Dependents (ABAWD) are FSP recipients aged 18 to 50, who must meet work requirements to remain eligible for FSP benefits. The work requirement includes working at least 20 hours a week and enrolling in work related trainings. ABAWD who do not satisfy work requirement cannot receive food stamps for over three months in a 36 month period. Nevertheless, states in unfavorable economic conditions can apply for a waiver. The conditions are an unemployment rates exceeding 10 percent and insufficient jobs available during the period of consideration.

³AFDC was a cash assistance program for single mothers with dependents, running from 1935 to 1995 and was replaced by TANF as welfare reform begun in 1996.

variables. The results suggest that additional schooling and work experience increase the probability of leaving welfare. While manufacturing wage rates are positively correlated with exit, the unemployment rate unexpectedly showed a positive estimate, which may imply a biased estimate.

Hoynes (2000) also provides evidence that macroeconomic factors should affect welfare participation. She explicitly examined the impact of local labor market conditions on the AFDC spell duration in California and investigated whether a weak economy translates into long term dependency on AFDC. Using administrative data collected as part of the Longitudinal Database (LDB) 1987-1992, she adopted discrete time hazard models incorporating economic measures such as monthly county unemployment rates, the log of employment, and the employment to population ratio as well as demographic attributes of participants and policy factors. The results indicate that better labor market conditions lead to higher exit rates. A 10 percent increase in employment, or an increase in employment to population ratio of 3.5 percentage points, increases the probability that a family leaves AFDC within one year by 7 percent to 15 percent. Furthermore, the increase in those measures also yields a reduction in the probability of reentry into the program.

Fitzgerald (1995) also supports the hypothesis that higher unemployment rates lead to lower exit rates. He estimated duration models for unmarried women with children who are on AFDC using the 1984 and 1985 panels of SIPP. His estimate indicates that a 2.7 percent increase in the local unemployment rate decreases the AFDC exit rate by 23 percent for blacks. For whites, the estimate of nine percent is not statistically significant. Personal characteristics such as having young kids and the number of children matter to whites whereas location factors do not have significant impact on exit rates.

Ribar (2005) adds another noteworthy improvement in evaluating economic factors in AFDC participation behavior. Unlike in other studies on AFDC participation duration, he estimated probit models for dynamic AFDC participation pattern rather than hazard models to measure the impact of local labor market conditions and welfare policy changes. He used longitudinal, individual level data drawn from 1992 and 1993 panels of the SIPP and estimated three probit models simultaneously for transitions into and out of AFDC among single women with children. These models represent three types of transitions: participation status in the initial observation period, entry into AFDC conditional on non-participation in the previous period, and continuation of participation conditional on participation in the prior period. The models control for age, ethnic origin, educational attainment, information on children, state AFDC policy variables, regions of residence, child-care availability, year dummies and local labor market measures. What differentiates Ribar (2005) from other studies on welfare and labor market conditions is the attempt to incorporate local labor market and wage conditions specific to women with low skill level. In the absence of local measures of economic conditions, he substituted employment prospects for individuals in his sample for general employment factors in the transition models.⁴

⁴In his earlier work, Ribar (2003) constructed an annual skill- and residence specific employment index using skill specific information on earnings and employment from the Sample Edited Detail File (SEDF) of the 1990 decennial census and annual industry specific information from the Regional Economic Information System (REIS). The estimated skill- and residence specific employment index was used to estimate individual level employment and wage rate for women from the SEDF and the 1990-1997 annual demographic files of the CPS separately by

The estimation results imply that the local, skill-specific employment rate negatively affects transition into and continuation on AFDC. In addition, local wages have a negative relationship with AFDC take-up. The minimum wage was also found to be positively associated with the probability of AFDC participation in any period. Ribar (2005) suggests that a higher minimum wage may induce employment losses rather than earnings gains.

Conceptual Framework

An individual's welfare participation decision is described as a comparison of benefits and costs of participation (Moffitt, 1983). Welfare participation is chosen when the utility of participation outweighs the utility of non-participation and costs associated with enrollment. The utility from FSP participation is a function of wages, the FSP benefit amount, and all other household non-wage income. The utility of non-participation is a function only of wages and other income. The cost of participation is broadly composed of direct costs and psychological costs. Direct costs include the time costs and money costs of collecting information and going through the application process. The psychological costs of welfare participation are the stigma attached to applying for and using the program.

Provided that eligibility for FSP benefits is determined by household income and asset level, macroeconomic factors will influence FSP participation through two channels, the labor market and the asset market (Figure 1). Job displacement or reduced wages lead to decreases in household income so that more eligible households appear in a weak economy. Moreover, as stock prices and interests fall in a freezing asset market, the value of asset holdings among the low income population declines so that those disqualified before become eligible by meeting the asset criteria. Therefore, the economic downturn contributes to the growth of FSP participation by adding more eligible people.

Moreover, an economic recession may lead to higher participation among families who are already living in poverty. Previous studies found that only six in 10 eligible people received benefits (Cunningham, 2002; Wolkwitz, 2008). This, in turn, means some non-participating eligible households are likely to enter the FSP due to economic pressure. Facing higher risk of unemployment during recessions, poor households would be more willing to receive FSP benefits to offset the expected loss of earnings or any other source of income. Moreover, within the poor population, a gradient exists in FSP demand by income level. That is, more needy households are more likely to receive FSP benefits than less needy households (Haider et al., 2003). If non-participating eligible households become poorer due to a devastating local economy, their willingness to participate in the FSP will increase.

In contrast, improved labor market conditions during an economic recovery will slow the growth of FSP participation. Employment increases the opportunity cost of FSP enrollment (time cost to file an application form and for interviews) and increasing wage income will make FSP benefits less attractive. Therefore, a counter cyclical movement of FSP shows up as changes in the economy affect the participation decisions of individuals through labor and asset markets.

education level. Explanatory variables included are controls for age, race, and ethnicity; current and lagged local employment index; state policy variables; time dummies; and geographic dummies. The parameter estimates from these regressions were combined with the REIS and the SIPP to impute local, skill-specific wage and employment probabilities for each woman under study.



Figure 1. Mechanism of Macro Shocks on FSP Participation

In addition to the absolute level of participation, time spent on food stamps is affected by the macroeconomy as well. Though there is scant evidence on the effect of the macroeconomy on FSP participation spell duration, a rich literature from other welfare programs such as AFDC suggests that macroeconomic downturns increase the duration of welfare participation. Higher unemployment rates and slow employment growth decrease the likelihood of staying in a job and of finding a job after being laid off. Therefore, poor economic conditions are correlated with higher entry and lower exit propensities from welfare or alternatively, longer participation in welfare (Hoynes, 2000; Fitzgerald, 1995; Ribar, 2005).

Even though significant and substantial impacts of macroeconomic conditions on welfare program participation are well established in the literature, age differences in the macroeconomic impact of food stamp participation have not been addressed. Under the premise that difficult labor market conditions lead to growing FSP participation, the age differences in the probability of re-employment may translate into differential responsiveness in the amount of time on food stamps across age groups.

Unemployment rates in Table 1 indicate that, compared to older workers, younger workers get laid-off at higher rates. Of those aged at 25-34 in the labor force, 9.9 percent are unemployed in 2009 whereas only 6.6 percent of those aged 55-64 are unemployed. Since older workers are more experienced and more skilled than their younger counterparts, they are less likely to become unemployed even during a recession. However, once older workers are unemployed, compared to their younger counterparts they face longer periods of unemployment (Chan and Stevens, 2001).

Table 1. Unemployment Rate by Age (percentage)

Year	2003	2004	2005	2006	2007	2008	2009
Total	6	5.5	5.1	4.6	4.6	5.8	9.3
Age 16-19	17.5	17	16.6	15.4	15.7	18.7	24.3
Age 20-24	10	9.4	8.8	8.2	8.2	10.2	14.7
Age 25-34	6.1	5.5	5.1	4.7	4.7	5.8	9.9
Age 35-44	4.9	4.4	3.9	3.6	3.4	4.6	7.9
Age 45-54	4.1	3.8	3.5	3.1	3.2	4.1	7.2
Age 55-64	4.1	3.8	3.3	3	3.1	3.7	6.6
Age 65 or over	3.8	3.6	3.5	2.9	3.3	4.2	6.4

Source: Bureau of Labor Statistics, U.S. Department of Labor

Table 2 shows the duration of unemployment by age between 2003 and 2009. Overall, workers have been out of work for 16.8 weeks to 24.4 weeks on average. Moreover, unemployment spells are longer for older workers relative to younger people. In 2009, those aged 55-64 stay unemployed for 29.3 weeks whereas those aged 25-34 workers are unemployed for 23.4 weeks. Workers 65 and over have even longer spells but we do not focus on this cohort since this cohort is also more likely to be retired and eligible for other sources of program income.

Table 2. Average Duration of Unemployment by Age (weeks)

Year	2003	2004	2005	2006	2007	2008	2009
Total	19.2	19.6	18.4	16.8	16.8	17.9	24.4
Age 16-19	11.7	12.6	11.4	10.8	11.2	12.3	17.5
Age 20-24	16.0	15.8	15.7	14.6	14.4	15.3	21.6
Age 25-34	17.9	18.0	17.7	16.1	16.4	17.3	23.4
Age 35-44	21.5	22.5	20.2	18.5	17.9	18.7	25.0
Age 45-54	24.1	24.9	23.8	20.9	21.2	22.3	27.8
Age 55-64	26.1	26.0	23.8	23.0	21.9	22.2	29.3
Age 65 or over	23.3	25.2	25.2	19.4	18.5	21.3	30.4

Source: Bureau of Labor Statistics, U.S. Department of Labor

Taken together, Table 1 and 2 indicate that older people are at lower risk of unemployment compared to younger people but their duration of unemployment is higher once they lose their jobs. The decreased job market opportunities for older cohorts will affect welfare participation patterns. In particular, decreased opportunities to re-enter the labor force once laid off could result in long term dependency on welfare programs such as food stamps compared to younger cohorts. In contrast, younger poor workers have a relatively high probability of re-employment so that their welfare participation tends to be shorter.⁵ Indeed, Ribar et al. (2005) show that the mean length of FSP participation spell for individuals aged 50 or over is 25.07 months whereas those under age 50 is 15.89 months.

⁵Ribar et al. (2005) used administrative data from the South Carolina Department of Social Services.

The differences in the unemployment patterns of younger versus older workers will result in very different food stamp program patterns for older versus younger workers. In the analysis below we quantify these differences.

Empirical Analysis of FSP Transition

Data

To address FSP transition behavior over time, this study utilizes the 2004 panel of the Survey of Income and Program Participation (SIPP). SIPP is a longitudinal survey of the U.S. population. It collects information on respondents' sources of income, amounts of income, labor force information, welfare program participation and general demographic characteristics. The 2004 panel extends over four years, from October 2003 to December 2007, and covers 12 waves of interviews. The respondents of a panel are re-interviewed in four-month intervals and asked for information about the past four months at each wave of the interview.

The SIPP is preferred to other longitudinal surveys such as the Panel Study of Income Dynamics (PSID) and the National Longitudinal Surveys (NLS) because of the short recall period (four months only), a relatively large sample size of N= 46,500 households at the beginning of the 2004 panel, and its representativeness of the entire U.S. population. In fact, SIPP data are designed to allow the government to evaluate the effectiveness of various programs at the federal level, including the FSP.

Table 3. Descriptive Statistics of Sample

Variables	Entry Sample		Continuation Sample		
	Mean	Std. Dev.	Mean	Std. Dev.	
White	0.768	0.422	0.589	0.492	
Male	0.350	0.477	0.210	0.407	
College Educated	0.475	0.499	0.365	0.481	
Married	0.319	0.466	0.193	0.395	
Number of Children in Family	0.629	1.113	1.228	1.456	
Living in Metropolitan Area	0.720	0.449	0.710	0.454	
Age	< 20	0.008	0.089	0.008	0.090
	20-29	0.122	0.327	0.181	0.385
	30-39	0.155	0.362	0.207	0.405
	40-49	0.168	0.374	0.202	0.402
	50-59	0.152	0.359	0.166	0.372
	60+	0.396	0.489	0.237	0.425
Local attributes	State Unemployment Rate	5.107	0.954	5.175	0.982
	State employment per capita	0.478	0.025	0.476	0.409
	State's Weekly Wage Level	761.7	125.7	757.3	129.8
Number of observation	297,810		100,170		

Note: Statistics are not weighted. The weighted statistics of sample is provided in Appendix. The entry sample is composed of household-month observations among households which did not participate in previous month. On the contrary, the continuation sample consists of household-month observations among households which participated in previous month.

To begin with, the sample is selected based on three criteria, the history of FSP receipt, authorization to receive FSP benefits, and income less than 200% of poverty threshold applied to

each household to identify potentially eligible households for food stamp benefits. As a result, the target sample is composed of 28,034 households.⁶

Within the target sample, FSP participation is defined as the actual take up of FSP benefits during a month. The focus thus shifts to the 'household-month' as the unit of observation, where the household is at risk of FSP participation during that month. Choosing the household-month as the observational unit makes it possible to track households' transitions into and out of the FSP over time. Towards that end, the observations are divided into an entry sample and a continuation sample. The entry sample forms the basis for transitioning into FSP and includes 297,810 household-months that are characterized by the household being eligible for food stamps but not receiving them during the previous month. The continuation sample is the complement of the entry sample and is used to model the transitioning out of the FSP. It includes 100,170 household-months that are characterized by the household receiving food stamps during the previous months.

Table 3 shows means and standard deviations of socio-economic and locational attributes of household-months for the entry and the continuation samples. The differences between the two samples are crude measures of differences in participation rates across various subpopulations. In the entry sample, 77 percent are white, compared to only 59 percent in the continuation sample, suggesting that - compared to non-whites - whites are less prone to participate in FSP albeit under poverty. Similarly, in the entry sample only 35 percent are male, 32 percent married and 48 percent college educated, whereas the respective shares in the continuation sample are much smaller.

There are also differences in the age distributions of the two samples. For younger cohorts under 60, the shares in the continuation sample are significantly bigger than in the entry sample. In contrast, for the oldest cohort (over 60), the share in the entry sample is 16 percentage points higher than in the continuation sample. Since FSP entry is conditional on households not participating in the FSP in previous month, this suggests that elderly eligibles are significantly less likely to participate in the FSP.⁷

Looking at the length of participation spells across age cohorts similarly suggests age-specific FSP participation behavior. As shown in Table 4, the mean spell length monotonically increases with recipients' age. The youngest group participates in the FSP for only 8.0 months on average, whereas the oldest group stays on food stamps for 17.0 months. Moreover, these differences in mean spell length are coupled with stark differences in the distributional shapes. Younger people more frequently change participation decisions causing short spells to dominate. For example, spells of less than four months account for 58 percent among the youngest cohort, but only 28 percent among the oldest cohort. In contrast, very long spells extending over two years are quite common with increasing age. As a result, the distributions of spell lengths for young cohorts

⁶As often documented in studies on welfare program participation, SIPP also struggles with misreporting of income and participation in social assistance programs (Meyer et al., 2009; Bollinger and David, 1997; Haider et al., 2003). Due to either misreporting of income or FSP participation, there are households receiving FSP benefits even though their income exceeds 130 of poverty threshold or they do not self report as authorized. All households satisfying at least one requirement are included in the sample to not lose significant amounts of information at a cost of including false positives (eligible households actually not being eligible).

⁷Studies on labor force participation typically identify the oldest group as people who are 65 years or older. In this study, we define the elderly as people who are older than 60, thereby adhering to the USDA definition of the elderly and the more generous FSP eligibility criteria for people over 60.

peak at the shortest duration and decay rapidly for longer durations, whereas the distributions for the older age cohorts become bimodal, peaking at the shortest and the second longest durations.

Table 4. FSP Participation Spells by Age

Age	< 20	20-29	30-39	40-49	50-59	60+	Total
Number of spells	217	2,167	2,052	1,886	1,398	1,386	9,106
Mean spell length (months)	8.0	10.0	11.2	11.3	12.9	17.0	12.0
Distribution of spell length							
1-4 months	125 (58)	975 (45)	878 (43)	783 (42)	548 (39)	393 (28)	3,702 (41)
5-8 months	36 (17)	407 (19)	380 (19)	366 (19)	238 (17)	219 (16)	1,646 (18)
9-12 months	20 (9)	229 (11)	192 (9)	176 (9)	145 (10)	127 (9)	889 (10)
13-18 months	8 (4)	183 (8)	170 (8)	145 (8)	90 (6)	109 (8)	705 (8)
19-24 months	9 (4)	123 (6)	130 (6)	150 (8)	104 (7)	132 (10)	648 (7)
25-36 months	9 (4)	172 (8)	211 (10)	182 (10)	184 (13)	253 (18)	1,011 (11)
37-48 months	10 (5)	78 (4)	91 (4)	84 (4)	89 (6)	153 (11)	505 (6)
Total	217	2,167	2,052	1,886	1,398	1,386	9,106

Source: Survey of Income and Program Participation 2004 Panel

Note: Numbers in parenthesis are column percentages.

Transition models

Hazard models are frequently employed to elicit the sources of variations of spell length (Blank and Ruggles, 1996; Ribar et al., 2009; Hoynes, 2000; Fitzgerald, 1995). However, hazard models do not account for the initial status and thus left-censored spells (spells starting before the interview period) are excluded from the analysis. To avoid such information loss, this study takes a different approach that focuses on households' transition choices between two consecutive months. A household not participating in FSP in one month, and thus being part of the entry sample, can choose between entering or not entering FSP in the subsequent month. Similarly, a household enrolled in one month (and thus part of the continuation sample) can choose between either continuing to stay on FSP or exiting FSP in the next month. This gives rise to two types of transition models. The first model, referred to as the entry model, tackles the take-up decision, conditional on non-participation in FSP in the previous months. The second model, referred to as exitmodel, addresses the decision between exiting from versus continuing FSP, conditional upon participation in the preceding month.

Econometrically, probit models are well suited to measure the effects of exogenous factors on the probabilities associated with the entry and the continuation transitions. Let y_{it} be a 0-1 indicator variable with $y_{it}=1$ if household i receives FSP benefits at time t , and $y_{it}=0$ otherwise. Furthermore, let X_{it} be the vector of exogenous factors hypothesized to affect FSP participation, and thus including the pivotal information on age and economic indicators. Then the transition probabilities can be specified as:

$$\text{Entry model: } P(y_{it} = 1 | y_{i,t-1} = 0) = X_{it}\beta + u_{it}$$

$$\text{Continuation model: } P(y_{it} = 1 | y_{i,t-1} = 1) = X_{it}\beta + e_{it}$$

where β is a parameter vector. Moreover, given the panel data design, the models are estimated as random effects probit models to control for individual idiosyncratic effects. Thus, the error terms, u_{it} and e_{it} are assumed to be composed of an individual-specific term, μ_i and v_i , respectively, and a normally distributed error term, ε_{it} and η_{it} , respectively:

$$u_{it} = \mu_i + \varepsilon_{it}, \quad \mu_i \sim N(0, \sigma_\mu^2) \quad \text{and} \quad \varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$$

$$e_{it} = v_i + \eta_{it}, \quad v_i \sim N(0, \sigma_v^2) \quad \text{and} \quad \eta_{it} \sim N(0, \sigma_\eta^2)$$

For both the entry and continuation models, a series of specifications are estimated that speak directly to the central hypotheses of this study, namely the age-differences in FSP participation behavior, the impact of macro-economic factors on that behavior, and the influence of state administration variations of the FSP program.⁸ All models control for a set of factors that previously have been shown to influence FSP participation behavior, namely gender, marital status, children, race, educational attainment, and employment status.

The first model includes dummies to allow for behavioral differences across age cohorts. The oldest cohort (60+) is the omitted category. The second model adds indicators of state economic performance. One indicator is the quarterly average of weekly wages, the other is a variable describing employment opportunities, proxied by monthly state unemployment rates in Model 2a, and by employment per capita in Model 2b. In Model 3, state dummies are added to account for variations in state administration of FSP. Model 4 includes interaction terms between the age dummies and economic measures to examine potential age differences in the impact of macroeconomic factors on FSP participation behavior. All models are estimated using maximum likelihood techniques.⁹

⁸Even though main components such as the level of benefit and eligibility criteria are determined at federal level, the administration of FSP is performed by state governments.

⁹The likelihood function of random effects probit is presented in the Appendix.

Table 5. Entry into FSP

Variable	Model 1	Model 2a	Model 2b	Model 3	Model 4
White	-0.387** (0.028)	-0.387*** (0.028)	-0.387*** (0.028)	-0.431*** (0.029)	-0.386*** (0.028)
Male	-0.303*** (0.026)	-0.304*** (0.026)	-0.301*** (0.026)	-0.300*** (0.026)	-0.303*** (0.026)
Age under 20	1.158*** (0.075)	1.155*** (0.075)	1.152*** (0.075)	1.129*** (0.075)	2.885*** (0.623)
Age 20-29	1.031*** (0.041)	1.030*** (0.041)	1.029*** (0.041)	1.013*** (0.040)	1.253*** (0.288)
Age 30-39	0.822*** (0.042)	0.823*** (0.042)	0.822*** (0.042)	0.818*** (0.042)	1.093*** (0.286)
Age 40-49	0.825*** (0.040)	0.827*** (0.040)	0.827*** (0.040)	0.832*** (0.040)	1.197*** (0.283)
Age 50-59	0.761*** (0.041)	0.766*** (0.041)	0.763*** (0.041)	0.757*** (0.040)	0.859*** (0.299)
Age 60 or over					
College education	-0.251*** (0.025)	-0.248*** (0.025)	-0.250*** (0.025)	-0.258*** (0.025)	-0.248*** (0.025)
Working status	-0.408*** (0.022)	-0.407*** (0.022)	-0.409*** (0.022)	-0.413*** (0.022)	-0.409*** (0.022)
Marital status	-0.418*** (0.027)	-0.423*** (0.027)	-0.420*** (0.027)	-0.426*** (0.027)	-0.423*** (0.027)
Number of kids within family	0.204*** (0.011)	0.204*** (0.011)	0.204*** (0.011)	0.208*** (0.011)	0.204*** (0.011)
Living in Metropolitan area	-0.100*** (0.027)	-0.098*** (0.027)	-0.092** (0.027)	-0.060** (0.030)	-0.098*** (0.027)
Monthly state unemployment rate		0.065*** (0.010)		0.081*** (0.014)	0.099*** (0.021)
Employment per capita			0.164 (0.495)		
Quarterly average weekly wages		-2.1E-04** (9.6E-05)	-3.0E-04*** (9.7E-05)	0.001*** (1.8E-04)	-1.7E-04 (2.0E-04)
Age under 20 * Unemployment rate					-0.054 (0.068)
Age 20-29 * Unemployment rate					-0.028 (0.030)
Age 30-39 * Unemployment rate					-0.037 (0.030)
Age 40-49 * Unemployment rate					-0.048 (0.030)
Age 50-59 * Unemployment rate					-0.067** (0.032)
Age 60 or over * Unemployment rate					
Age under 20 * Wage					-0.002*** (0.001)
Age 20-29 * Wage					-9.7E-05 (2.9E-04)
Age 30-39 * Wage					-1.0E-04 (2.8E-04)
Age 40-49 * Wage					-1.5E-04 (2.8E-04)
Age 50-59 * Wage					3.3E-04 (2.9E-04)
Age 60 or over * Wage					
Constant	-2.754*** (0.044)	-2.929*** (0.105)	-2.607*** (0.235)	-3.545*** (0.315)	-3.141*** (0.206)
$\ln \sigma_u^2$	0.120 (0.039)	0.109 (0.039)	0.113 (0.039)	0.081 (0.040)	0.109 (0.040)
Log likelihood	-20907.3	-20883.2	-20902.4	-20735.6	-20874.0

Note: State dummies of Model 3 are not reported for brevity.

*** p<0.01, ** p<0.05, * p<0.1

Results

The estimation results of the entry model are summarized in Table 5. Overall, the models perform quite well and support the notions that take-up rates vary by age and are influenced by macro-economic conditions. All models suggest that, compared to the oldest group (60+), younger cohorts are significantly more prone to entering the FSP. The difference is particularly large between the oldest and the youngest cohort. Models 2a, 3 and 4 further suggest employment opportunities rather than wages influence FSP participation behavior. Increasing unemployment rates are associated with increasing take-up rates. Model 2b shows that measuring employment opportunities via employment per capita does not yield significant effects. Model 4 allows the effects of macro-economic conditions on FSP entry to vary across age cohorts by including interactions between the cohort dummies and the economic variables.

The estimates of interactions terms suggest that there are no significant age differences in macroeconomic impact on entry into the FSP. However, the age effects and the impact of unemployment rates on entry probabilities, separately, remain significant and are bigger than in Models 1 to 3.

Regarding the control variables, the estimations suggest that white people, males and people who are married are significantly less likely to enter FSP. Similarly, having a college education and living in a metropolitan area significantly lower the probability of taking up food stamp benefits. Moreover, those who are currently working are not prone to FSP entry. The number of children in the household increases the probability of entering the FSP. In sum, demographic attributes of low income population play a significant role in the FSP entry decision entry as well as economic incentives from FSP.

Turning now to the continuation model, the estimation results are summarized in Table 6. Overall, the estimations support the hypotheses that FSP continuation probabilities are affected by age and macro-economic conditions, and - unlike in the case of entry probabilities - that the macro-economic effects vary across age cohorts. In Models 1 to 4, the parameter estimates of all cohort dummies are highly significant and negative, suggesting that the elderly (60+) are more likely to continue FSP than their younger counterparts. As was the case in the entry model, the contrast with the youngest cohort is particularly stark and diminishes for successively older cohorts.

Adding macro-economic conditions (Models 2) suggests that employment opportunities (if measured via unemployment rates) significantly affect FSP continuation. As expected, when state unemployment rises, the probability of exiting FSP decreases. The estimated effects of state wages in Models 2a and 2b are, however, counter-intuitive. Rising wages are estimated to be associated with increasing FSP continuation probabilities. Since this index covers all categories of jobs regardless of level of skill, this variable is insufficiently nuanced to measure the impact of economic conditions for the FSP population. However, adding regional controls reverses the sign of wage effects. When state dummies are included, state wage rates no longer exhibit positive effects on FSP continuation, which suggests higher average wages in each state leads to lower probability of FSP continuation.

Table 6. Continuation of FSP Participation

Variable	Model 1	Model 2a	Model 2b	Model 3	Model 4
White	-0.061** (0.027)	-0.063** (0.027)	-0.059** (0.027)	-0.058*** (0.029)	-0.063** (0.027)
Male	-0.220*** (0.029)	0.222*** (0.029)	-0.219*** (0.029)	-0.220*** (0.029)	-0.222*** (0.029)
Age under 20	-0.853*** (0.087)	-0.861*** (0.088)	-0.848*** (0.087)	-0.850*** (0.088)	-2.504*** (0.729)
Age 20-29	-0.437*** (0.044)	-0.442*** (0.045)	-0.432*** (0.044)	-0.447*** (0.045)	-0.883*** (0.324)
Age 30-39	-0.367*** (0.045)	-0.374*** (0.045)	-0.365*** (0.045)	-0.391*** (0.045)	-1.020*** (0.328)
Age 40-49	-0.223*** (0.043)	-0.228*** (0.043)	-0.221*** (0.042)	-0.239*** (0.043)	-0.755** (0.328)
Age 50-59	-0.188*** (0.043)	-0.191*** (0.043)	-0.187*** (0.043)	-0.191*** (0.044)	-0.673* (0.346)
Age 60 or over					
College education	-0.092*** (0.026)	-0.090*** (0.026)	-0.090*** (0.026)	-0.081*** (0.026)	-0.091*** (0.026)
Working status	-0.510*** (0.024)	-0.512*** (0.025)	-0.509*** (0.024)	-0.510*** (0.025)	-0.512*** (0.025)
Marital status	-0.112*** (0.030)	-0.115*** (0.030)	-0.112*** (0.030)	-0.111*** (0.030)	-0.116*** (0.030)
Number of kids within family	0.166*** (0.011)	0.167*** (0.011)	0.166*** (0.011)	0.173*** (0.011)	0.167*** (0.011)
Living in Metropolitan area	0.022 (0.028)	0.015 (0.029)	0.017 (0.028)	0.049** (0.032)	-0.011 (0.029)
Monthly state unemployment rate		0.065*** (0.012)		0.099*** (0.019)	-0.034 (0.026)
Employment per capita			-0.667 (0.515)		
Quarterly average weekly wages		2.3E-04** (1.0E-04)	1.8E-04* (1.0E-04)	-2.9E-04*** (2.1E-04)	3.2E-04 (2.4E-04)
Age under 20 * Unemployment rate					0.280*** (0.084)
Age 20-29 * Unemployment rate					0.117*** (0.036)
Age 30-39 * Unemployment rate					0.107*** (0.037)
Age 40-49 * Unemployment rate					0.129*** (0.037)
Age 50-59 * Unemployment rate					0.123*** (0.039)
Age 60 or over * Unemployment rate					
Age under 20 * Wage					2.5E-04 (0.001)
Age 20-29 * Wage					-2.2E-04 (3.2E-04)
Age 30-39 * Wage					1.3E-04 (3.1E-04)
Age 40-49 * Wage					-1.8E-04 (3.1E-04)
Age 50-59 * Wage					-2.0E-04 (3.3E-04)
Age 60 or over * Wage					
Constant	2.444*** (0.044)	1.948*** (0.112)	2.628*** (0.243)	2.372*** (0.339)	2.393*** (0.244)
$\ln \sigma_u^2$	-0.933 (0.060)	-0.909 (0.061)	-0.940 (0.060)	-0.932 (0.061)	-0.915 (0.061)
Log likelihood	-12,860.7	-12,845.2	-12,858.7	-12,763.4	-12,832.8

Note: State dummies of Model 3 are not reported for brevity.

*** p<0.01, ** p<0.05, * p<0.1

To examine the possible age differences in economic effects, interactions of age dummies and the two macro-economic variables were included in Model 4. The wage variable has a positive effect and, by and large, the interaction effects between wages and age cohort, are insignificant and show mixed effects across age groups. A different situation emerges for the age-specific effects of the unemployment rate. Unlike in the entry model, the coefficients for the interaction between age and unemployment rate are significantly positive whereas the unemployment rate itself has a significantly negative effect albeit insignificant. The interplay between the coefficients suggests that increasing unemployment rates lower the FSP continuation probabilities for the oldest cohort but not for the cohorts under 60.

Figure 2 presents the combined impact of age and unemployment rate on FSP continuation behavior from the results presented above. For each age cohort, the estimated FSP continuation probabilities are plotted against unemployment rates, thereby sketching the age-specific trajectories of FSP continuation with increasing unemployment. While the coefficients for the age dummies shift the probability trajectory along the vertical axis, the coefficients of interaction terms and state unemployment rate determine the slope. The positive sloping lines suggest that the probability of continuation for those younger than 60 increases as unemployment rate increases whereas it decreases among those aged 60 or over.¹⁰ Nevertheless, the sensitivity of continuation probabilities varies across unemployment rate. For example, as the unemployment rate changes from 4 percent to 15 percent, continuation probabilities increases by 10.2 percentage points for the age cohort of 20 to 29 year olds but by 6.9 percentage points for the 50 to 59 year olds.

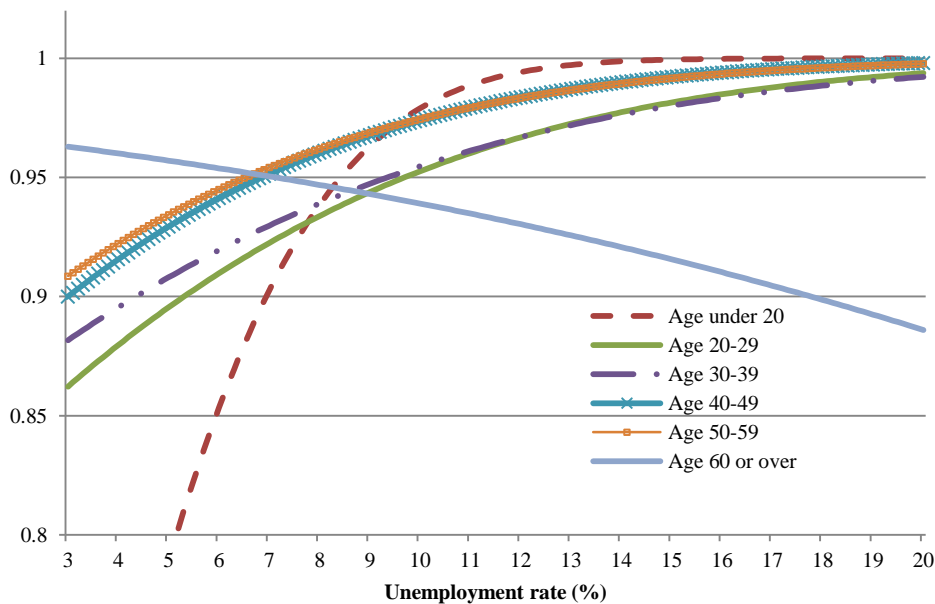


Figure 2. Predicted Probability of Continuation

Note: Predicted probabilities are calculated at white = 1, male = 1, college = 0, working = 1, married = 1, number of children = 1, metropolitan = 0 and wage = \$757.

¹⁰When state controls are included in the model, the estimated effects of state unemployment rates on the probabilities of FSP continuation among the elderly becomes positive but the significance level of the estimate is extremely low.

The FSP continuation probabilities of the teenage group are the most sensitive to the changes in unemployment rates. Their probabilities of FSP continuation stay below those of other age cohorts even during a strong economy (unemployment rates below eight percent) but sharply increase as unemployment rises. FSP continuation probabilities for the oldest cohort significantly drop when unemployment rate increases but one should note that the decreasing probability is predicted from an insignificant effect of state unemployment rates in Model 4. This somewhat counterintuitive result may be due to compositional effects as the cohort also includes a substantial portion of retirees who often depend on other sources of income such as Supplemental Security Income (SSI), Social Security benefits and pension. As a result, retirees' FSP participation behavior is less responsive to employment conditions.¹¹

In general, Figure 2 suggests that age differences in the propensity to continue FSP receipt in response to unemployment conditions resemble age-specific unemployment pattern in labor market. The probability of FSP continuation more rapidly increases for age 20-29 and age 30-39 as well as age under 20 than those aged 40 to 59. This suggests that, as documented in Table 2, unemployment spells for young workers lengthen substantially during a weak economy, and thus encouraging their prolonged stay on food stamps. In contrast, unemployment spells of older people are less responsive to a weakening of the economy, and so are their FSP participation propensities.

Lastly, the estimated effects on the FSP continuation probabilities of all but one control variable are highly significant. Whites and men are less likely to continue FSP receipts than non-whites and women, respectively. A similar result can be reported for those with a college education, and for married people. Among all control variables but age dummies, working status once again exerts the strongest influence on FSP participation behavior. That is, being employed substantially increases the FSP exit probability, just as it substantially lowers the FSP entry probability. The number of children within a family increases the likelihood of continuing FSP receipt just as it increased the entry probability. Living in metropolitan area does not have a significant effect though the estimates from Model 1 to 3 suggest that living in urban area increases the likelihood of FSP continuation due to the proximity to social security offices.¹²

Conclusions

The recent financial crisis followed by the ongoing recession resulted in mass layoffs, more than doubling the unemployment rate from less than five percent before the crisis to more than ten percent in 2010. Low income populations are particularly severely affected by economic downturns because they are at high risk of prolonged unemployment and face reduced earnings during economic downturns. FSP receipts form one mechanism that families can use to buffer the income losses due to unemployment during a recession. The recent increase in average monthly participants to over seven million highlights the role that the FSP as a social safety net during times of high unemployment. Over the two-year period 2007 to 2008, the FSP-eligible

¹¹This phenomenon does not disappear when age intervals were changed. I tried 10 year intervals starting at age under 25 and 5 year intervals starting at age under 20. The oldest group always showed decreasing likelihood of FSP continuation.

¹²The insignificant estimates may be attributable to the recording of SIPP data. To protect respondent's locational information, the Census Bureau identifies some random sample of metropolitan residents as non-metropolitan. This procedure may result in biased estimates for the metropolitan dummy.

population increased by five percent and the number of participants increased by seven percent (Leftin, 2010).

Even though several studies have addressed macro-economic impacts on FSP participation, little is known about differential effects of macroeconomic conditions on participation propensities of different population groups. Of particular importance are differential effects by age and a focus on older workers for whom access barriers may ultimately result in low participation propensities. To assess these age differences, this study employed data on households possibly eligible for food stamps - extracted from the SIPP 2004 panel - to regress transitions in and out of FSP on age, macro-economic indicators, state effects, and socio-economic controls using panel probit models.

This study finds several important results. First, there are significant age differences in entry into and exit from the FSP. The propensity of entry into the FSP among younger people is higher than among older people while young cohorts are more prone to exiting FSP than the oldest cohort of retired or retirement-bound people. The implication for the elderly is that once receiving FSP benefits, they are very likely to continue the FSP. Second, rising unemployment boosts FSP entry propensities and lengthens FSP spells. Changes in wage levels, however, affect neither entry nor exit propensities. Third, the effect of unemployment on FSP continuation propensities varies by age. The youngest cohort responds to increasing unemployment by drastically prolonging their FSP spells whereas the older extend their FSP spells more gradually. For the oldest cohort, FSP exit probabilities are even found to rise in association with rising unemployment, a phenomenon that can be explained by retirement and other transfer programs targeted at the elderly.

Acknowledgements. The research was supported by a grant from the Clifford B. Kinley Trust. We thank the participants of the SHaPE seminar at Purdue University for their helpful comments on an earlier version of the paper.

References

- Akin, J., D. Guilkey, B. Popkin, and K. Smith (1985). The impact of federal transfer programs on the nutrient intake of elderly individuals. *Journal of Human Resources*, 383-404.
- Blank, R. and P. Ruggles (1996). When do women use aid to families with dependent children and food stamps? The dynamics of eligibility versus participation. *The Journal of Human Resources* 31 (1), 57-89.
- Bollinger, C. and M. David (1997). Modeling Discrete Choice with Response Error: Food Stamp Participation. *Journal of the American Statistical Association* 92(439), 827-835
- Chan, S. and A. Stevens (2001). Job loss and employment patterns of older workers. *Journal of Labor Economics* 19 (2).
- Cody, S., P. Gleason, B. Schechter, M. Satake, J. Sykes, and M. Policy (2005, July). Food Stamp Program Entry and Exit. Contractor and Cooperator Report 8, Mathematica Policy Research, Inc.
- Cunyngham, K. (2002). Trends in Food Stamp Program Participation Rates: 1994 to 2000. Alexandria, VA. U.S. Department of Agriculture, Food and Nutrition Service.

- Figlio, D., C. Gundersen, and J. Ziliak (2000). The effects of the macroeconomy and welfare reform on food stamp caseloads. *American Journal of Agricultural Economics*, 635-641.
- Fitzgerald, J. (1995). Local labor markets and local area effects on welfare duration. *Journal of Policy Analysis and Management* 14 (1), 43-67.
- Gleason, P., P. Schochet, and R. Moffitt (1998). The Dynamics of Food Stamp Program participation in the early 1990s. Report to the US Department of Agriculture. Princeton, NJ: Mathematica Policy Research, Inc.
- Guilkey, D. (1985). Changes in Elderly Household Participation in the Food Stamp Program. *Journal of Nutrition for the Elderly* 4, 3.
- Haider, S., A. Jackowitz, and R. Schoeni (2003). Food Stamps and the Elderly: Why is Participation so Low? *Journal of Human Resources*, 1080-1111.
- Heckman, J. J. (1981). Structural Analysis of Discrete Data with Econometric Applications, Chapter 3. Statistical models for discrete panel data, pp. 114-178. Cambridge, Massachusetts 02142: MIT Press.
- Hoynes, H. (2000). Local labor markets and welfare spells: do demand conditions matter? *Review of Economics and Statistics* 82 (3), 351-368.
- Hoynes, H. and T. MaCurdy (1994). Has the decline in benefits shortened welfare spells? *The American Economic Review* 84(2), 43-48.
- Leftin, J. (2010). Trends in supplemental nutrition assistance program participation rates: 2001 to 2008. Alexandria, VA. U.S. Department of Agriculture, Food and Nutrition Service.
- Mills, B., S. Dorai-Raj, E. Peterson, and J. Alwang (2001). Determinants of food stamp program exits. *The Social Service Review* 75 (4), 539-558.
- Mishel, L., J. Bernstein, and S. Allegretto (2005). The state of working America 2004/2005. Economic Policy Institute, Cornell University Press.
- Moffitt, R. (1983). An economic model of welfare stigma. *The American Economic Review* 73 (5), 1023-1035.
- O'Neill, J., L. Bassi, and D. Wolf (1987). The duration of welfare spells. *The Review of Economics and Statistics* 69 (2), 241-248.
- Ribar, D. (2003). County-level estimates of the employment prospects of low-skill workers. In Professor Solomon Polachek, Dr Konstantinos Tatsiramos (ed.) *Worker Well-Being and Public Policy (Research in Labor Economics, Volume 22)*, Emerald Group Publishing Limited, 227-268.
- Ribar, D. (2005). Transitions from Welfare and the Employment Prospects of Low-Skill Workers. *Southern Economic Journal* 71 (3), 514-534.
- Ribar, D., M. Edelhoj, and Q. Liu (2005). Food Stamp Participation and Employment among Adult-Only Households. Unpublished manuscript. Washington, DC: The George Washington University.
- Ribar, D., M. Edelhoj, and Q. Liu (2009, September). Food Stamp Participation among Adult-Only Households. Upjohn Institute Working Paper No. 09-159.
- Wolkwitz, K. (2008). Trends in Food Stamp Program Participation Rates: 2000 to 2006. Alexandria, VA. U.S. Department of Agriculture, Food and Nutrition Service.

Appendix1.Summary Statistics of Sample: Weighted

Variables	Households which did not participate in previous month		Households which participated in previous month	
	Mean	Std. Dev.	Mean	Std. Dev.
White	0.779	0.415	0.598	0.490
Male	0.368	0.482	0.222	0.416
College Educated	0.488	0.500	0.362	0.481
Married	0.322	0.467	0.198	0.399
Number of Children in Family	0.644	1.118	1.259	1.463
Living in Metropolitan Area	0.754	0.430	0.742	0.438
Age				
< 20	0.007	0.085	0.007	0.083
20-29	0.138	0.345	0.202	0.402
30-39	0.165	0.371	0.214	0.410
40-49	0.171	0.377	0.196	0.397
50-59	0.153	0.360	0.160	0.367
60+	0.366	0.482	0.221	0.415
State Unemployment Rate	5.107	0.954	5.175	0.982
Local attributes				
State employment per capita	0.478	0.025	0.476	0.409
State's Weekly Wage Level	761.7	125.7	757.3	129.8
Number of observation	297,810		100,170	