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On Intra-Annual Poverty in the U.S: Prevalence, Causes and Response to Food Stamp Program Use

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ABSTRACT

Poverty measurement with data whose reference period is one year masks family exposure to poverty that only lasts for part of the year. We use quarterly expenditure data and decomposable severity of poverty indexes to quantify consumption-based intra-annual poverty, determine its causes and its response to federal food assistance. Results show that twice as many households are poor for at least one quarter then would be classified as poor with annual consumption data. Severity indexes indicate that intra-annual poverty accounts for over one third of the total annual severity of poverty. The common determinants of intra-annual and annual poverty include low human capital, unemployment and minority status. Changes in family size during the year affect intra-annual but not annual poverty. We also find evidence that food stamp program use reduces intra-annual poverty.

Introduction

The dynamic nature of poverty is now well recognized in economic research. Family economic well-being fluctuates, therefore it is important to recognize the time context of household exposure to poverty. Traditionally, poverty research has employed annual data and has defined poverty as a condition whereby household resources (measured by annual income or consumption)[1] fall short of a poverty threshold that is designed to represent a minimally adequate, socially acceptable standard of living (e.g. National Academy of Sciences, 1995). The dynamic nature of poverty has been accounted for in several ways. Some studies count the number of years in poverty out of a multi-year period or count poverty spells by duration (e.g. Bane and Ellwood, 1986). These methods do not fully capture the severity of poverty as they do not use information on the distance between resources and the poverty threshold (see Rodgers and Rodgers, 1993). For instance, two households that experience the same number of spells of poverty in a fixed time frame and have spells of poverty of similar duration will receive the same poverty score even though one may consume 90 percent of the poverty line while the other may only consume 40 percent of the poverty line during their time in poverty. Others have used more comprehensive, decomposable measures of poverty that account for both the frequency of poverty spells and the severity of poverty (measured by some function of the distance of income or consumption from the poverty line) (e.g. Jalan and Ravillion, 2000).

Regardless of how the dynamic nature of poverty is modeled, reliance on annual data may mask an important dimension of household economic deprivation, intra-annual poverty. Specifically, households that may have average annual incomes, or that may be able to sustain average annual consumption that is above the annual poverty line will not be classified as poor if annual data are used. It may, however, be the case that such households are not able to smooth

1

consumption to an extent that guarantees above-poverty consumption levels throughout the year. Such households would consume sub-poverty amounts for at least part of the year. The incidence, severity, causes and consequences of intra-annual poverty remain, to date, unexamined.

The Food Insecurity literature presents indirect evidence that short term economic deprivation among U.S. households may be substantial and it may cause significant hardship, even among households with moderate annual incomes. [2] Specifically, less then half (47 percent) of all households reporting food insecurity have annual incomes below the poverty line (Ribar and Hamrick, 2003); 20 percent of all households that experience difficulties in sustaining the desired level of food supply have annual incomes that are greater then 180 percent the poverty line; additionally, 17 percent of all households that had at least one member who experienced spells of hunger also had income above 180 percent of the poverty line (Nord and Brent 2002). Nord and Brent (2002) further find that changes in income and other family circumstances *within* the interview year are significant causes of food insecurity in moderate income households.

The current study uses a short panel of quarterly consumption data to measure the incidence and severity of intra-annual poverty. Additive poverty indexes are then used to create annual severity of poverty measures that account for both the average annual deprivation (evident from annual data) and the intra-annual component (not detected with annual data). We then examine the unique and common causes of annual and intra-annual poverty as well as their response to federal food assistance in a multivariate regression framework.

As noted, intra-annual deprivation may be of substantial magnitude and consequence. Measuring this important dimension of deprivation, knowledge on its potentially unique causes

and information on its response to federal food assistance will greatly enhance the ability of policy makers to design mechanisms that protect vulnerable households.

The rest of the paper is organized as follows. Section 2 presents background information on the Food Stamp Program, and provides a rationale for examining its impact on intra-annual poverty. Section 3 details the data, presents the measures of intra-annual and annual poverty and presents a discussion of the choice to use household consumption as a measure of household well-being. Section 4 presents the statistical model employed in the analysis. Section 5 presents descriptive statistics for poverty measures and covariates. Section 6 presents model estimation results and section 7 distills policy implications and concludes.

The Role of the Food Stamp Program[3]

The Food Stamp Program (FSP) is the most significant food assistance program in the U.S., with annual spending of over $30 billion (USDA, 2007). Many dimensions of FSP impacts on family well-being have been examined, including impacts on food insecurity (Mykerezi and Mills, 2008; Borjas, 2004; Kabbani and Kmeid, 2005; Gundersen and Oliveira, 2001), impacts on the official poverty measure for the general population (Bishop, Formby, and Zeager, 1996; Hoynes, Page, and Stevens, 2006), and impacts on specific target groups like children (Jolliffe et al., 2005). Studies have also documented the impacts of the FSP on family expenditures, food consumption, and diet quality (Breunig et al., 2001; Wilde, McNamara and Ranney, 1999). An important, and often overlooked, impact of the FSP is the reduction in food consumption variability. For instance, Gundersen and Ziliak (2003) use annual income and food consumption data from the Panel Survey of Income Dynamics (PSID) to estimate that FSP participation reduces food-expenditure volatility by 14 percent. Evidence that FSP participation has a significant impact on the variability of family food consumption suggests that FSP participation

should also influence family poverty dynamics, even within a year. The role of food assistance in ameliorating intra-annual and annual poverty will, however, differ. If the FSP is primarily used as a short-term expenditure smoothing mechanism, it will reduce intra-annual poverty. If, on the other hand, the FSP is mainly used to support longer-term expenditure levels, it will reduce annual poverty. These potentially distinct FSP contributions to intra-annual poverty and annual poverty alleviation have not been documented, leaving those designing food assistance programs and policy makers with an incomplete understanding of the dynamic role the FSP plays in ameliorating economic hardship.

Data and Measures

This paper uses Bureau of Labor Statistics Consumer Expenditure Survey (CEX) data from 2001 to 2004 to generate intra-annual and annual consumption-based poverty measures from a short-term panel of quarterly family expenditures. The use of consumption as opposed to income data as a measure of well-being offers two advantages when analyzing short-term exposure to poverty. First, family incomes vary more in response to shocks to economic circumstances than does family consumption, as families use accumulated assets and credit markets to smooth consumption in the face of transitory income changes (Jorgenson, 1998). Thus, income-based measures may over-estimate variations in family economic well-being and the magnitude of intra-annual poverty. Second, expenditures appear to be less susceptible to systematic under-reporting than income, particularly among low-income families (Meyer and Sullivan, 2003).

The CEX is a rotating panel of about 5,000 families (consumption units) per quarter. Families are in the panel for five consecutive quarters, but consumption expenditure information is only available for the second through fifth quarters. Income sources in the previous 12 months

are also recorded in the second and fifth quarters of participation in the survey, along with information on family demographics, education and other characteristics of the family head, workforce participation, and FSP participation.

This study uses data on the 19,950 families that were interviewed between 2001 and 2004, and that have complete expenditure information for their last four quarters in the panel. The CEX data is supplemented with state-level FSP participation rates and FSP eligibility rates obtained from U.S Census Bureau's Small Area Income and Poverty Estimates and are attached to the family-level CEX data based on the state and year of the second quarterly interview. For a small share of observations (14 percent), data on state of residence is suppressed to protect the confidentiality of survey respondents. In this case, the observation uses more aggregate FSP participation rates for the region of residence.

Following Meyer and Sullivan (2001), household expenditures are adjusted for several factors in order to better approximate current consumption. First, few CEX households purchase durables in any given quarter. But these durable goods expenditures are consumed over long time periods, often years. Thus, durable expenditures lead to an over estimation of wellbeing in the quarter of a purchase and underestimation in other quarters. A procedure similar to the one used by the Bureau of Labor Statistics in computing aggregate durable expenditure data is used to adjust for the lumpy nature of consumer durables. Specifically, the sample is grouped by income bracket and year of interview. Average group expenditure on durables is then used as a measure of household durable consumption, instead of the recorded household expenditure. Second, expenditures on home ownership are often a mixture between investment and consumption. Therefore, all expenditures associated with home ownership including mortgage interest, property taxes and maintenance/repair are subtracted from total expenditures and are

replaced with a self reported rent-equivalent. Third, expenditures toward retirement and pension funds are excluded as they are investments. Finally, health expenditures are excluded as they do not contribute to current consumption.

Intra-annual and Annual Poverty Measures

In this application, the intra-annual poverty measure captures the component of poverty that stems from quarterly variability in family consumption over one year, while the annual poverty measure captures the component of poverty associated with average consumption below the poverty line over the same year. Adjusted quarterly family expenditures are divided by one-quarter of the family-type-specific official annual U.S. poverty line in the survey year in order to normalize consumption for family size. A normalized family consumption measure below one indicates that the family's consumption falls below the official poverty line for the relevant quarter. Both the incidence and severity of annual and intra-annual poverty are then calculated. For the incidence measures, a family is identified as annually poor if normalized consumption averaged across the four survey quarters is below one. A family is defined as intra-annually poor if normalized consumption in at least one quarter is below one, but the family is not poor for the year.

The severity of poverty measure is defined as:

$$(1)\ P(y_{it}) = (1 - y_{it})^2 \quad if \quad y_{it} < 1 \ and \ P(y_{it}) = 0 \ \text{otherwise}$$

where y_{it} represents normalized consumption of household *i* in quarter *t*. The severity measure has the advantageous property of penalizing inequality among the poor (Sen, 1976). For empirical work the severity measure also has the advantageous properties of being convex and approaching zero at the poverty line smoothly from below. Let $P(y_{i1}, y_{i2}, ..., y_{i4})$, be a measure of the average annual severity of poverty for the *i*th household over the four survey quarters.

6

Following Jalan and Ravallion (2000) the intra-annual component of poverty is defined as the portion of the severity of poverty measure attributable to intra-annual variability in consumption:

$$(2)\, I_i = \sum_{t=1}^{4}[P(y_{it}) - P(\bar{y}_i)]/4$$

where $\bar{y}_i$ is the inter-temporal mean of normalized family consumption. Severity of poverty at mean normalized consumption $P(\bar{y}_i)$ is the measure of annual poverty, A_i. Total annual severity of poverty is then exactly equal to the sum of the intra-annual, I_i, and the annual, A_i, components, as the severity measure is additively decomposable.

Empirical Model

The multivariate modeling effort focuses on identifying the determinants of the intra-annual and annual components of the severity of poverty jointly with the determinants of the intensity of FSP use. Most families have intra-annual and annual severity of poverty measures of zero. The intra-annual severity of poverty is, therefore, best modeled by accounting for this censoring:

$$(3)\, I_i = I_i^* \quad if \quad I_i^* > 0 \quad where \quad I_i^* = \gamma_1^I F_i + x_i' \beta_1^I + \varepsilon_i^I \; and \; I_i = 0 \quad otherwise$$

where I_i^* is a latent continuous variable, I_i is the observed measure of intra-annual poverty, F_i is the measure of food stamp benefits, x_i is a vector of covariates of consumption-poverty, γ_i^I and β_i^I are vectors of intra-annual poverty parameters, and ε_i^I is the vector of the intra-annual poverty equation errors. Annual severity of poverty is similarly expressed as:

$$(4)\, A_i = A_i^* \quad if \quad A_i^* > 0 \quad where \quad A_i^* = \gamma_1^A F_i + x_i' \beta_1^A + \varepsilon_{1i}^A \; and \; A_i = 0 \quad otherwise$$

7

A major empirical challenge is to disentangle the relationships between each component of poverty and the intensity of FSP participation.[4] FSP benefits and the severity of poverty components are likely to be jointly determined, as family well-being is a primary determinant of program eligibility and influences the participation decision for the eligible households. In addition, most households do not participate in the FSP and report receiving no program benefits. To account for potential simultaneity and the censored nature of both the intra-annual poverty component and FSP benefits received, the intra-annual poverty equation is specified jointly with the FSP use equation in a Tobit system framework as:

$$(5)\ I_i = I_i^* \quad if \quad I_i^* > 0 \quad where \quad I_i^* = \gamma_1^I F_i + x_{1i}^{'} \beta_1^I + v_{1i}^I \quad and \quad I_i = 0 \quad otherwise$$

$$(6)\ F_i = F_i^* \quad if \quad F_i^* > 0 \quad where \quad F_i^* = \gamma_2^I T + x_{2i}^{'} \beta_2^{I} + v_{2i}^I \quad and \quad F_i = 0 \quad otherwise$$

where F_i^* is a latent variable representing FSP benefits, $x_{2i}^{'}$ is a vector of covariates of FSP benefits, γ_2^I and β_2^I are vectors of parameters, while v_{1i}^I and v_{2i}^I are the system errors. Similarly the annual poverty system is specified as:

$$(7)\ A_i = A_i^* \quad if \quad A_i^* > 0 \quad where \quad A_i^* = \gamma_1^A F_i + x_{1i}^{'} \beta_1^A + v_{1i}^A \quad and \quad A_i = 0 \quad otherwise$$

$$(8)\ F_i = F_i^* \quad if \quad F_i^* > 0 \quad where \quad F_i^* = \gamma_2^A C_i + x_{2i}^{'} \beta_3^A + v_{2i}^A \quad and \quad F_i = 0 \quad otherwise$$

The reduced forms for these systems of censored equations are estimated as bivariate Tobits. Structural parameters of interest are then recovered. As standard errors of structural parameters are difficult to derive analytically, confidence intervals for the structural parameters are bootstrapped (Cameron and Trivedi, 2005). The significance of the system error covariance parameter provides a direct test for simultaneity of the severity of poverty component and FSP benefits.

Six common groups of covariates (family demographics, family education, changes in family composition, family workforce participation, location attributes, and controls of

measurement error) are included in the specifications of the determinants of intra-annual and annual poverty and the specification of the determinants of the intensity of FSP use. Family demographics include family size, number of children (below the age of 18) and number of children-squared, number of elderly above the age of 64, age, age-squared, marital status, race and ethnicity of the family-head. [5] An indicator for single mother families is also included as they are the family type with the highest incidence of both poverty and FSP use. Family educational assets are measured by discrete indicators of education level of the family-head (no high-school degree, high-school degree, some post-secondary education but no college degree, and a college degree). Changes in family composition during the survey year include divorce and addition or reduction in the number of family members. Family workforce participation includes indicators of self-reported involuntary unemployment of the family head and the spouse during both the survey year and the year prior to the survey. Involuntary unemployment is defined as having spent a positive number of weeks unemployed and reporting that 'they couldn't find a job' as the reason for not working. [6] Location attributes are measured by indicators of region of residence to capture unique circumstances associated with living in each Census region. An indicator of residence in a rural area is included, along with the state-level per capita number of households that were eligible to receive food stamps in the respondent's state in the year of the household's second interview. Indicators of year of second interview are also included to capture aggregate time-varying unobserved heterogeneity. Controls for measurement error are specified through dummy variables (never, almost never, occasionally, mostly, almost always and always) that indicate how often the respondent consulted financial records such as bills, receipts, checkbooks when they answered expenditure related questions. Households that maintain and consult financial records likely make fewer mistakes in reporting expenditures and, thus, measurement

error in expenditure data may be inversely correlated with the frequency of consulting records. Measurement error in expenditure data overstates both the annual and the intra-annual severity of poverty, thus households with poor record keeping practices are likely to show higher observed severity of both components of poverty, ceteris paribus. For example, if the observed expenditure y_{it} can be expressed as the sum of error free expenditures e_{it} and zero mean measurement error λ_{it} such that: $y_{it} = e_{it} + \lambda_{it}$, with Var $(e_{it}) = \delta_e$, Var $(\lambda_{it}) = \delta_\lambda$, Cov $(e, \lambda) = 0$, $E(\lambda) = 0$, then $E[A_i(y) - A_i(e)] = \frac{1}{4}\delta_\lambda$ and $E[I_i(y) - I_i(e)] = \frac{3}{4}\delta_\lambda$. So mean zero, random and additive measurement error inflates average annual poverty by one third of the measurement error variance and average intra-annual poverty by three times as much.

State-level per-capita rates of active FSP caseloads in the year that the household was interviewed are included in the FSP intensity of use equation and are used to identify the intra-annual and annual poverty equations. Transaction costs, including stigma, are likely to play an important role in the FSP use decision (Moffit, 1983). These transaction costs are hypothesized to decline with higher state rates of FSP participation. As a proper identifying restriction, state FSP active caseloads per capita need to be uncorrelated with the intra-annual and annual poverty measures except through their impact on household FSP participation. This assumption would fail if state FSP participation rates, in addition to being correlated with program accessibility, were also influenced by other factors that are correlated with family well-being, such as state-level poverty. However, the inclusion of state per-capita FSP eligibility rates accounts for such variations in state-level well-being.

The FSP intensity of use equation is identified by the inclusion of lump-sum non-income receipts in the intra-annual and annual poverty equations, but exclusion of such receipts from the intensity of FSP use equation. Non-income receipts include one time payments from court case

10

settlements and insurance settlements that are likely to directly impact consumption. However, as these receipts are one time events and often unpredictable by the household, they are arguably unlikely to influence the intensity of FSP use except through their impact on consumption. The validity of this identifying assumption is open to debate. Therefore, the models are also estimated excluding the non-income receipts variable and using only the state rates of FSP participation to identify FSP use impacts on intra-annual and annual poverty. Under these alternative specifications only the parameter estimates for the intensity of FSP use on intra-annual and annual poverty are structurally identified.

Descriptive Statistics

Incidence and severity measures for annual and intra-annual poverty are presented in table 1. Overall, the national rate of annual poverty is 5.8 percent and the rate of intra-annual poverty is 5.7 percent, with 11.4 percent of the households experiencing at least one quarterly spell of poverty. The annual severity of annual poverty is 0.0027 while the severity of intra-annual poverty is lower at 0.0015. Intra-annual poverty, thus, accounts for nearly half of the total incidence of poverty and 36 percent of the total annual severity of poverty. Focusing on annual poverty measures alone, thus, overlooks a significant component of family economic distress.

Food Stamp Program Participation and Benefits

Descriptive statistics for the other endogenous variable in the model, the intensity of FSP use, are provided in table 2. Nationally, the rate of FSP participation in the CEX sample is low, with 5.4 percent of individuals living in families that received Food Stamps.[7] Conditional upon participation in the FSP, the average amount received during the survey year is $2,176 (in real 2004 dollars). FSP participation rates are, as expected, much higher among annually poor families, with 40.7 percent of individuals in annually poor families receiving on average $2,528

in program assistance. FSP participation rates are also higher among intra-annually poor families than in the sample as a whole, with 30.2 percent of individuals in intra-annually poor families participating in the program and receiving on average $2,410 per year.

Descriptive statistics for other model covariates are presented in table 3.

Results

Reduced form and structural parameter estimates for the intra-annual poverty system of equations are presented in table 4. The discussion focuses on the structural parameter estimates. As noted, statistical significance for these structural estimates is based on bootstrapped five and ten percent two-tailed confidence intervals. Turning to the main structural parameter of interest, the impact of the intensity of FSP use on intra-annual poverty is negative and statistically significant at the *p=0.05* level. Many of the structural estimates for other covariates are also significant. Non-income receipts, having a male family head, having a married family head, and higher levels of education of the family head reduce the intra-annual component of the severity of poverty. Age of the household head has a non linear effect on intra-annual poverty with a negative coefficient associated with age but a positive coefficient associated with age squared. These coefficients imply that additional years of age decrease intra-annual poverty with decreasing intensity until the age of 54. Every additional year of age after 54 increases intra-annual poverty. Intra-annual poverty also increases with the number of children and is higher for households headed by single mothers. Race and ethnicity influence the severity of intra-annual poverty. Families headed by African Americans and members of other non-White racial groups show higher levels of intra-annual poverty than families headed by Whites, even after controlling for other family characteristics and assets. Similarly, Hispanic-headed families show higher

levels than non-Hispanics. Intra-annual poverty also increases with additions or reductions in family size over the survey year.

Involuntary unemployment of the family head during the survey year and in the prior year also significantly increases intra-annual poverty. Residence in a rural area and higher per capita FSP eligibility rate in the respondents' state are also associated with higher severity of intra-annual poverty. Interestingly the structural parameter estimate associated with residence in the South is significant (*p=0.05*) and negative, thus residence in the South is associated with lower intra-annual poverty after controlling for household level characteristics and state level FSP eligibility rates.[8]

The parameter estimates for the jointly estimated determinants of the intensity of FSP use are also presented in table 4. The structural parameter estimate for the impact of intra-annual poverty on the intensity of FSP use is positive, but not significantly different from zero. The rate of state FSP caseloads per-capita is, however, positive and significant. Family structure and composition significantly affect FSP use, as the intensity of FSP use increases with family size and with the number of elderly in the family. The intensity of FSP use also increases at a decreasing rate with the number of children. The coefficient associated with age of the head is negative (*p=0.1*) but that of age squared is positive (*p=0.05*). Combined, the parameter estimates suggest that the intensity of FSP use declines up to 62 years of age. Single mothers show higher intensity of FSP use, ceteris paribus. On the other hand, households with male, married, and more educated heads use the program less intensely. Households headed by African Americans or other non-white racial groups use the program more intensively than households with White heads. Also, Hispanic-headed households use the program more intensively then non Hispanic-headed households. Additions to the family over the survey year also increase the

intensity of FSP use. Interestingly, involuntary unemployment of both the head and the spouse in the previous year increases the intensity of FSP use, but in the current year only involuntary unemployment of the head increases the intensity of FSP use. It is also worth noting that the error covariance parameter estimate is significant, suggesting the presence of simultaneity in the intra-annual poverty and intensity of FSP use equations.

Parameter estimates for the annual poverty system are presented in table 5. The parameter estimate for the impact of the intensity of FSP use on annual poverty is negative but not significant. Annual poverty declines with overall family size (*p=0.1*), but increases at an increasing pace with the number of children below the age of 18. Age, gender, marital status, education, race and ethnicity, and involuntary unemployment of the family head show similar associations with annual poverty and intra-annual poverty in terms of sign and significance, as do additions to the family during the year. The impact of non-income receipts, while negative, is now not statistically significant, indicating that these one-time lump sums do not have a lasting effect on family wellbeing. Also, a reduction in family size only seems to have a temporary effect on wellbeing, as the structural coefficient is not significant in the annual poverty system. The indicators of residence in a rural area and in the South, as well as the FSP eligibility rate coefficients, are also not significant at conventional levels.

As expected, the intensity of FSP use equation yields almost identical reduced form parameter estimates in the annual poverty system and the intra-annual poverty system. Structural parameter estimates for the intensity of FSP use equation vary slightly from those in the intra-annual poverty system, but remain very similar in terms of sign and magnitude. The small differences stem from the fact that the structural estimates depend, in part, on the jointly estimated severity of poverty equation reduced-form parameter estimates. The parameter

estimate for the impact of annual poverty on the intensity of FSP use is positive, but not statistically significant and the error covariance parameter is again significant.

Turning to the issue of measurement error, controls for measurement error through indicator variables for never consulting records while reporting expenditures and for not providing an answer to the record consulting question are significant and positive in both the intra-annual and the annual systems. Thus, as expected, the severity of intra-annual poverty and annual poverty are both higher for households with poor record consulting practices relative to households that always consult records, ceteris paribus. Using these parameter estimates, the descriptive statistics on severity of poverty are adjusted to the levels that would be expected if all households had excellent record consulting. The adjusted average intra-annual severity of poverty is 20 percent lower, while the average severity of annual poverty is 11 percent lower. Measurement error may thus be an important source of upward bias in non-linear dynamic poverty measures, with intra-annual poverty measures being, as expected, most affected.

Alternative specifications

The robustness of the parameter estimates for the intensity of FSP use on intra-annual and annual poverty are examined by dropping the variable 'non-income money received' that is used to identify the FSP use equation in both the intra-annual and annual poverty systems of equations. As noted, under these alternative system specifications the impacts of the intensity of FSP use on intra-annual and annual poverty are the only identified structural parameter estimates. The FSP use intensity parameter estimates are virtually identical to the initial estimates.[9] Specifically, the impact of the intensity of FSP use is only significant for the intra-annual poverty.

Discussion and Conclusions

Intra-annual poverty appears to account for a large share of the economic hardship that U.S. families face during any given year. Simple annual income-based poverty measures do not capture this important indicator of within-year economic hardship. In fact, the incidence of exposure to a spell of intra-annual poverty within a year is only slightly smaller then the incidence of annual poverty over the whole year. In other words, the number of households that consume sub-poverty amounts in at least one quarter but that would not be classified as poor if annual measures alone were used is about same as the number of families that are classified as poor for the year. The incidence of poverty for at least one quarter is thus double that of annual poverty alone. Further, the intra-annual poverty component accounts for over one-third of the total severity of poverty.

The primary predictors of intra-annual poverty are similar to those for annual dimensions of economic deprivation. Not surprisingly, the common determinants of intra-annual and annual poverty are low human capital, minority status, and involuntary unemployment of the household head. Reductions in family size, on the other hand, are only associated with increased intra-annual poverty, implying that such changes generate negative but short-term shocks to family wellbeing. Non-income lump-sum receipts also appear to have only a temporary effect on household wellbeing, as they ameliorate intra-annual poverty only.

Further, results from the estimation of intra-annual and annual poverty systems of equations indicate that the FSP primarily impacts intra-annual poverty. This finding suggests that many poor and near-poor families use the FSP as a short-term expenditure stabilization tool rather than for long-term expenditure support. The parameter estimates from the intra-annual poverty system imply that a one percent increase in FSP benefits for the average family of FSP

16

participants reduces the intra-annual component of the severity of poverty by 0.15 percent for the average family with a positive severity measure.

The fact that the FSP's main impact is on intra-annual poverty is somewhat problematic for the documentation of program impacts on household economic well-being. As noted, intra-annual poverty is rarely measured and, thus, the primary impact of FSP benefits on family economic well-being is often not readily apparent. The finding also suggests that a two-track FSP may be warranted. Fast-track eligibility and certification guidelines could enhance short-term program use and improve the programs effectiveness as an expenditure smoothing mechanism for intra-annually poor families.

Footnotes

[1] For a complete discussion of advantages and disadvantages of using income versus consumption to construct poverty measures see Meyer and Sullivan (2003, 2007).

[2] Food insecurity is commonly defined as the experiencing of difficulty in providing enough food to sustain a healthy diet for all household members due to a lack of resources. Most of the recent literature on U.S. food insecurity uses measures derived from survey questions in the USDA Food Security/Hunger Core Module regarding conditions and behaviors common among households having difficulty meeting basic food needs. The responses to these questions are used to compute a food insecurity score. The severity of household food security is then classified in four categories, food security, marginal food security, low food security and very low food security based on the score. For a detailed discussion see (Bickel at al. 2000; Nord, 2008).[2]

[3] As of October 1, 2008, the Food Stamp Program has been renamed to the Supplemental Nutrition Assistance Program (SNAP). We will use the old name throughout this paper.

[4] For example Gundersen and Oliveira (2001) find that FSP participants have higher rates of food insecurity than non-participants. However, this relationship is reversed when the FSP participation decision is jointly modeled in a simultaneous system of equations.

[5] Family head is designated as the most educated of either the self-reported head or their spouse.

[6] While the actual number of hours worked by the head of the household and the spouse during the survey year and the year prior to the survey year are available, they are arguably endogenous variables.

[7] Using active caseload data and population estimates from the Bureau of Census we computed the ratio of the average active caseloads between January 2000 and December 2004 to the US population was 0.067.

[8] Descriptive statistics indicate that the incidence and severity of both, intra-annual and annual poverty is higher in the South relative to all other Census regions.

[9] Results available from the authors upon request.

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Table 1. Incidence and severity of poverty

	Intra-annual	Annual	Total
Incidence	0.057	0.058	0.114
Severity	0.0015	0.0027	0.0042

Table 2. Intensity of food stamp program participation

	Participation	$ If participated
Total	0.054	2,176
Intra-annual Poor	0.302	2,410
Annual Poor	0.407	2,528

Note: S.E. indicates standard error.

Table 3. Covariate descriptive statistics

Variable	Mean	S.E.
Food Stamp Caseloads per Capita	0.0235	0.0001
Non-Income Receipts ($1000)	0.6788	0.0833
Family Size	2.6049	0.0106
Number of Children	0.6869	0.0077
Number of Children Squared	1.6676	0.0284
Number of Persons Older than 64	0.3565	0.0046
Age of Reference Person	50.7161	0.1186
Age of Reference Person Squared	2852.8820	12.8115
Family Head is Male	0.5097	0.0035
Family Head is Married	0.5747	0.0035
African American	0.1079	0.0022
Hispanic	0.0880	0.0020
Other non White	0.0536	0.0016
Single Mother Household	0.0455	0.0015
Head Graduated High School	0.2516	0.0031
Head Some College no Degree	0.2937	0.0032
Head Graduated College	0.3317	0.0033
Divorce Occurred During The Year	0.0063	0.0006
Addition to Family	0.0662	0.0018
Reduction in Family	0.0693	0.0018
Head Involuntarily Unemployed Last Year	0.0579	0.0017
Spouse Involuntarily Unemployed Last Year	0.0027	0.0004
Head Involuntarily Unemployed This Year	0.0570	0.0016
Spouse Involuntarily Unemployed This Year	0.0024	0.0003
Rural Residence	0.0981	0.0021
Number Eligible for FSP per Capita	0.1148	0.0002
South	0.3277	0.0033
North East	0.1744	0.0027
West	0.2440	0.0030
Mid West	0.2539	0.0031
Year 04	0.1402	0.0025
Year 03	0.2930	0.0032
Year 02	0.2918	0.0032
Year 01	0.2750	0.0031
Consults Records Always	0.0526	0.0016
Consults Records Almost Always	0.1173	0.0023
Consults Records Mostly	0.1220	0.0023
Consults Records Occasionally	0.1767	0.0027
Consults Records Almost Never	0.1178	0.0023
Consults Records Never	0.3639	0.0034
Missing Answer on Record Consulting	0.0497	0.0015

Table 4. Intra-annual poverty system

	Intra-annual Poverty			Food Stamp Use		
	Reduced	S.E.	Structural	Reduced	S.E.	Structural
Severity of Intra-annual Poverty						0.1909
Food Stamp ($1000)			-0.0033**			
Food Stamp Caseloads per Capita	-0.1254	0.0735*		38.4044	8.9862**	39.0614**
Non-Income Receipts ($1000)	-0.0010	0.0006*	-0.0010**	-0.0053	0.0095	
Family Size	-0.0001	0.0006	0.0004	0.1602	0.0730**	0.1610**
Number of Children	0.0044	0.0011**	0.0074**	0.9249	0.1459**	0.9021**
Number of Children Squared	0.0005	0.0002**	0.0003	-0.0596	0.0231**	-0.0623**
Number of Persons Older than 64	0.0004	0.0012	0.0016	0.3626	0.1662**	0.3605**
Age of Reference Person	-0.0020	0.0001**	-0.0024**	-0.1119	0.0202**	-0.1014*
Age of Reference Person Squared (x100)	0.0019	0.0001**	0.0022**	0.0907	0.0205**	0.0809**
Family Head is Male	-0.0030	0.0009**	-0.0053**	-0.6930	0.1285**	-0.6774**
Family Head is Married	-0.0127	0.0011**	-0.0174**	-1.4398	0.1535**	-1.3732**
African American	0.0121	0.0012**	0.0146**	0.7773	0.1559**	0.7139*
Hispanic	0.0155	0.0014**	0.0181**	0.8046	0.1766**	0.7235*
Other non White	0.0134	0.0018**	0.0166**	1.0045	0.2293**	0.9346*
Single Mother Household	0.0032	0.0018*	0.0068**	1.1080	0.2051**	1.0912**
Head Graduated High School	-0.0125	0.0012**	-0.0157**	-0.9862	0.1518**	-0.9207**
Head Some College no Degree	-0.0196	0.0013**	-0.0246**	-1.5322	0.1662**	-1.4295**
Head Graduated College	-0.0322	0.0017**	-0.0410**	-2.7008	0.2254**	-2.5324**
Divorce Occurred During The Year	0.0066	0.0045	0.0102	1.1069	0.5316**	1.0724*
Addition to Family	0.0080	0.0015**	0.0109**	0.8863	0.1832**	0.8445**
Reduction in Family	0.0031	0.0017*	0.0032*	0.0269	0.2105	0.0107
Head Involuntarily Unemployed Last Year	0.0129	0.0017**	0.0176**	1.4354	0.2073**	1.3680**
Spouse Involuntarily Unemployed Last Year	0.0110	0.0064*	0.0182	2.1791	0.6738**	2.1213**
Head Involuntarily Unemployed This Year	0.0156	0.0017**	0.0224**	2.0725	0.2064**	1.9906**
Spouse Involuntarily Unemployed This Year	-0.0094	0.0094	-0.0100	-0.1862	0.9681	-0.1369

	Intra-annual Poverty			Food Stamp Use		
	Reduced	S.E.	Structural	Reduced	S.E.	Structural
Number Eligible for FSP per Capita	0.1222	0.0315**	0.1298**	2.3270	4.0069	1.6869
Rural Residence	0.0078	0.0013**	0.0084**	0.1793	0.1848	0.1384
South	-0.0040	0.0015**	-0.0039**	0.0515	0.1949	0.0726
North East	-0.0022	0.0014	-0.0019	0.0880	0.1938	0.0996
West	-0.0007	0.0014	0.0004	0.3222	0.1774*	0.3258*
Year 04	-0.0007	0.0016	-0.0002	0.1503	0.1987	0.1541
Year 03	0.0018	0.0013	0.0021	0.1114	0.1673	0.1021
Year 02	-0.0025	0.0012**	-0.0030**	-0.1349	0.1649	-0.1216
Consults Records Almost Always	-0.0007	0.0029	-0.0016	-0.2591	0.4022	-0.2553
Consults Records Mostly	0.0003	0.0028	0.0012	0.2675	0.3789	0.2657
Consults Records Occasionally	0.0000	0.0026	0.0008	0.2514	0.3606	0.2516
Consults Records Almost Never	0.0039	0.0027	0.0055	0.5029	0.3667	0.4827
Consults Records Never	0.0074	0.0025**	0.0089**	0.4539	0.3443	0.4151
Missing Answer on Record Consulting	0.0083	0.0030**	0.0089**	0.1747	0.4244	0.1311
Intercept	0.0017	0.0048	-0.0116	-4.0725	0.6681**	-4.0813**
Variance	0.0305	0.0006**		3.0938	0.0873**	
Covariance	0.7571	0.0460**				

Log Likelihood=-2,278
Number of obs   =   19,950

Note: ** and * indicate significance at the $p=0.05$ and $p=0.1$ levels, respectively.

Table 5. Annual poverty system

	Annual Poverty				Food Stamp Use			
	Reduced	S.E.		Structural	Reduced	S.E.		Structural
Severity of Annual Poverty								0.8493
Food Stamp ($1000)				-0.0022				
Food Stamp Caseloads per Capita	-0.0824	0.3163			37.0041	8.9192	**	37.1012 **
Non-Income Receipts ($1000)	-0.0045	0.0032		-0.0045	-0.0053	0.0094		
Family Size	-0.0044	0.0025	*	-0.0041	0.1322	0.0732	*	0.1374 **
Number of Children	0.0271	0.0049	**	0.0292 **	0.9374	0.1464	**	0.9055 **
Number of Children Squared	0.0012	0.0007	*	0.0011	-0.0637	0.0234	**	-0.0651 **
Number of Persons Older than 64	0.0035	0.0055		0.0043	0.3459	0.1658	**	0.3417
Age of Reference Person	-0.0053	0.0006	**	-0.0056 **	-0.1025	0.0201	**	-0.0962 *
Age of Reference Person Squared (x100)	0.0051	0.0006	**	0.0053 **	0.0803	0.0204	**	0.0743
Family Head is Male	-0.0099	0.0042	**	-0.0115 **	-0.7175	0.1279	**	-0.7059 **
Family Head is Married	-0.0467	0.0052	**	-0.0499 **	-1.4294	0.1528	**	-1.3744 *
African American	0.0397	0.0052	**	0.0412 **	0.6965	0.1555	**	0.6498 *
Hispanic	0.0498	0.0059	**	0.0515 **	0.7489	0.1759	**	0.6902 *
Other non White	0.0499	0.0076	**	0.0519 **	0.9144	0.2288	**	0.8556 *
Single Mother Household	0.0080	0.0073		0.0103	1.0745	0.2041	**	1.0651 **
Head Graduated High School	-0.0444	0.0049	**	-0.0465 **	-0.9630	0.1514	**	-0.9107 *
Head Some College no Degree	-0.0674	0.0055	**	-0.0708 **	-1.5072	0.1656	**	-1.4279 *
Head Graduated College	-0.1197	0.0085	**	-0.1257 **	-2.6755	0.2239	**	-2.5345 *
Divorce Occurred During The Year	0.0138	0.0203		0.0164	1.1613	0.5211	**	1.1451
Addition to Family	0.0141	0.0066	**	0.0159 **	0.8213	0.1836	**	0.8047 **
Reduction in Family	-0.0074	0.0076		-0.0071	0.1185	0.2083		0.1272
Head Involuntarily Unemployed Last Year	0.0442	0.0071	**	0.0474 **	1.4136	0.2073	**	1.3615 **
Spouse Involuntarily Unemployed Last Year	0.0228	0.0288		0.0275	2.1417	0.6745	**	2.1149 **
Head Involuntarily Unemployed This Year	0.0560	0.0071	**	0.0606 **	2.0480	0.2063	**	1.9820 **
Spouse Involuntarily Unemployed This Year	0.0125	0.0325		0.0122	-0.1465	0.9567		-0.1612

	Annual Poverty			Food Stamp Use		
	Reduced	S.E.	Structural	Reduced	S.E.	Structural
Number Eligible for FSP per Capita	0.2080	0.1343	0.2123	1.9285	3.9688	1.6836
Rural Residence	0.0077	0.0061	0.0080	0.1499	0.1844	0.1409
South	0.0001	0.0064	0.0003	0.0700	0.1935	0.0699
North East	-0.0072	0.0065	-0.0070	0.1117	0.1924	0.1203
West	-0.0021	0.0060	-0.0013	0.3679	0.1761 **	0.3704 **
Year 04	0.0192	0.0066 **	0.0195 **	0.1492	0.1982	0.1266
Year 03	0.0167	0.0055 **	0.0171 **	0.1543	0.1664	0.1346
Year 02	-0.0043	0.0056	-0.0045	-0.0821	0.1637	-0.0771
Consults Records Almost Always	0.0000	0.0128	-0.0007	-0.3483	0.3956	-0.3484
Consults Records Mostly	-0.0058	0.0126	-0.0053	0.2107	0.3711	0.2175
Consults Records Occasionally	-0.0013	0.0118	-0.0008	0.2161	0.3526	0.2176
Consults Records Almost Never	0.0081	0.0120	0.0091	0.4120	0.3594	0.4024
Consults Records Never	0.0180	0.0110	0.0189 *	0.3874	0.3365	0.3662
Missing Answer on Record Consulting	0.0243	0.0133 *	0.0246 **	0.1499	0.4162	0.1213
Intercept	-0.0639	0.0214 **	-0.0728 **	-4.0029	0.6629 **	-3.9277 **
Variance	0.1032	0.0028 **		3.0796	0.0869	
Covariance	0.8690	0.0601 **				

Log likelihood = -4,556

Number of obs = 19,950

Note: ** and * indicate significance at the *p=0.05* and *p=0.1* levels, respectively.