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Household history, SNAP participation, and food insecurity☆

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ABSTRACT

Food security in an important public policy issue. In 2015, approximately 1 in 8 U.S. households experienced food insecurity at some point in the year. Low-income families are at higher risk for food insecurity than other families, and these families may also face higher levels of disruption (e.g., moves, loss of income, or individuals entering or leaving the household) than other families. I use data from the Survey of Income and Program Participation to explore the relationship between food insecurity, the household's history during the previous year, and SNAP participation. The results indicate that a number of aspects of the household's recent experience including negative income shocks, moves, and both increases and decreases in household size increase the probability of being food insecure while SNAP participation is estimated to reduce the probability of being food insecure.

1. Introduction

Approximately 1 in 8 U.S. households were food insecure at some point during 2015 (Coleman-Jensen et al., 2016).[1] At the individual level, 42.2 million individuals lived in a household that was food insecure at some point during the year (Coleman-Jensen et al., 2016), Evidence suggests that food insecurity is associated with a number of poor health outcomes (Gundersen and Ziliak, 2015) and negatively affects child development and academic performance (Jyoti et al., 2005). Consequently, understanding the determinants of food insecurity is an important area of research.

Low-income families are at higher risk for food security than other households. These families also face stresses beyond a lack of resources, and these stresses may independently affect food insecurity. For example, low income families tend to experience higher levels of "family chaos" than higher income families, and family chaos has been shown to be related to food insecurity (Fiese et al., 2016). Chaos in the household may be created or exacerbated by disruptive events such as moving, frequent changes in household membership or events such as marriage.[2]

In this paper I focus specifically on the effect of recent household experiences on food insecurity. I consider both the economic history of the household, characterized by the household's income during the preceding year and the experience of a negative income shock, and non-economic household experiences, characterized by recent moves, changes in household size, and changes in marital status. Because much of the literature on food insecurity focuses on the effect of participation in the Supplemental Nutrition Assistance Program (SNAP), I also consider the role of SNAP participation and allow participation to be endogenous. Data for the analysis come from multiple panels of the Survey of Income and Program Participation. The results indicate that recent income, recent income shocks, moves, and changes in household size are all important determinants of food insecurity but that recent changes in marital status are not. After allowing for SNAP participation to be endogenous, participation in SNAP is estimated to reduce the probability of being food insecure. The results highlight the importance of recent household experience in understanding food insecurity.

2. Previous literature

Most of the literature exploring a relationship between household history and food insecurity has focused on the income and employment history of the household. Gundersen and Gruber (2001) used data from the 1991 and 1992 Survey of Income and Program Participation and found that food insufficient households have lower average income and are more likely to have experienced a negative income shock in the

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[1] Food security is commonly defined as "access by all people at all times to enough and appropriate food to provide the energy and nutrients needed to maintain an active and healthy life" (Bartlett, 2002).

[2] Although not considered in this paper, other work has explored additional factors that may disproportionally affect low-income families including food prices (Gregory and Coleman-Jensen, 2013), non-standard employment patterns Coleman-Jensen, 2011), and financial management skills (Gundersen and Garasky, 2012).

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previous eight months. Using the 1993 SIPP and the Survey of Program Dynamics, Ribar and Hamrick (2003) found evidence that higher levels of past income is negatively correlated with becoming food insufficient though this effect becomes insignificant after controlling for current income. For a sample of welfare recipients in Michigan, Heflin et al. (2007) found a positive but statistically insignificant relationship between food insufficiency and recent job losses. Leete and Bania (2010) found that food insecurity is negatively related to average income measured over the preceding 12 or 24 months, positively related to a recent decrease in income, and negatively related to a recent increase in income. Using data on 331 families in Toronto, Loopstra and Tarasuk (2013) explored the relationship between changes in household income, employment, and welfare participation and food insecurity. The results indicate that increases in income and gains in employment were associated with reductions in the food insecurity measure. Taken together, these studies provide evidence that the recent economic experience of the household is related to food insecurity.

There is more limited evidence on other types of household history and food insecurity. Using data collected through the Children's Healthwatch study, Cutts et al. (2011) found that frequent moves are associated with an increase in the odds of being food insecure. Other work indicates that gaining a household member (Brown et al., 1997 as described in Rose, 1999) increases the likelihood of being food insufficient and that changing household composition increases the probability of becoming food insufficient (Ribar and Hamrick, 2003). In a small study of management of food resources among low income families, Campbell and Desjardins (1989) found that 85% of households experienced a significant change in the past twelve months. These included receiving an eviction notice, moving, and changes in household composition as well as the more commonly studied economic changes such as job loss.

Compared to household history, there is a much larger literature on the relationship between SNAP participation and food security.[3] In simple comparisons of means, studies (e.g., Ratcliffe et al., 2011; Shaefer and Gutierrez, 2013; Coleman-Jensen et al., 2016) consistently find that the proportion of SNAP recipients who are food insecure is higher than the proportion of eligible non-recipients who are food insecure. Controlling for observed characteristics reduces but does not eliminate this positive relationship (e.g., Alaimo et al., 1998; Gibson-Davis and Foster, 2006).

Given that SNAP participation is expected to reduce food insecurity – or as a worst case to have no effect – this positive effect is unexpected and is believed to arise because SNAP participants are self-selected on unobserved characteristics. This selection means SNAP participation is "endogenous", and studies that address non-random selection into SNAP have used a number of different empirical strategies to address the endogeneity. These include two stage least squares (e.g., Borjas, 2004; Greenhalgh-Stanley and Fitzpatrick, 2013), simultaneous equations (e.g., Gundersen and Oliveira, 2001; Jensen, 2002), dummy endogenous variables models (e.g., Yen et al., 2008; Mykerezi and Mills, 2010; Ratcliffe et al., 2011; Shaefer and Gutierrez, 2013), and panel data methods (e.g., Hofferth, 2004; Wilde and Nord, 2005; Greenhalgh-Stanley and Fitzpatrick, 2013). Recent studies have also focused on families that stop participating in SNAP (e.g., Nord and Coleman-Jensen, 2010; Nord, 2011) or begin participating in SNAP (e.g., Mabli et al., 2013).[4] Generally speaking, studies employing dummy endogenous variable models and studies that focus on families beginning or ending participation have found the most consistent evidence of a beneficial effect of SNAP participation on food insecurity. The present study employs a dummy endogenous variable model similar to Ratcliffe et al. (2011) and Shaefer and Gutierrez (2013).

3. Empirical methodology

3.1. Conceptual framework

Consider a model where utility depends on food security and the consumption of non-food goods and where a household is food insecure if food purchased falls below a threshold that depends on household needs and on the ability of the household to convert food purchases into food security.[5] Let F_i be the amount of food purchased by household i, and let $\widetilde{F}_i$ be the amount of food needed to avoid being food insecure. A household will be food insecure if $\widetilde{F}_i > F_i$ and will be food secure if $\widetilde{F}_i \leq F_i$.

For a given $\widetilde{F}_i$, the likelihood of being food insecure decreases with increases in food purchased, and the amount of food purchased is assumed to increase as economic resources increase. Therefore, participation in SNAP and higher levels of current income should decrease the likelihood of being food insecure. Similarly, a low level of earnings during the past year or a negative income shock is expected to increase the likelihood of food insecurity by reducing the ability to save or increasing borrowing depending on the household's circumstances (Gundersen and Gruber, 2001; Leete and Bania, 2010). Additionally, events such as moves, increases in the number of household members, marriages, or divorces may impose costs on the household. These costs are expected to increase the likelihood that a household is food insecure.

For a given level of food purchases, the likelihood of being food insecure increases as $\widetilde{F}_i$ increases. $\widetilde{F}_i$ depends on household characteristics (e.g., food requirements increase with household size) and on how efficiently the household uses purchased food to produce food security. Fiese et al. (2016) conjecture that "chaos disrupts the ability to make use of available resources" (p 148), and Campbell and Desjardins (1989) note that the households they studied had developed strategies for managing their resources and that dramatic changes – whether good or bad – upset the strategies they had developed. If disruption upsets routines and results in less efficient use of purchased food items, then significant changes such as moving, a change in marital status, or individuals joining or leaving the household will increase the risk of food insecurity.

3.2. Empirical methods

Estimating the effect of household history on food insecurity in the absence of SNAP participation is straightforward. Food insecurity for household *i*, FI_i, is a binary variable equal to 1 if the household is food insecure and 0 otherwise. Let $F_i^* = \widetilde{F}_i - F_i$ where $\widetilde{F}_i$ and F_i are defined above.[6] Household *i* is assumed to be food insecure, $FI_i = 1$, if $F_i^* > 0$ and food secure, $FI_i = 0$, if $F_i^* \leq 0$. I assume that F_i^* is a linear function of the household history variables (H_i), other determinants of food insecurity (X_i), and an idiosyncratic error term (ε_i):

$$F_i^* = H_i'\gamma_f + X_i'\beta_f + \varepsilon_i.$$

The vectors γ_f and β_f are parameters to be estimated. After making an assumption about the distribution of ε_i, such as $\varepsilon_i \sim N(0,1)$, it is straightforward to estimate the parameters of this model, and estimates of this model are presented below.

Under the assumption that SNAP participation is exogenous, it is similarly straightforward to include SNAP participation, denoted S_i, as an explanatory variable, and estimates of this model are also

[3] Bartlett (2002) provides an extensive international review of food security and food assistance programs while Currie (2003) provides a comprehensive overview of U.S. food assistance programs. Caswell and Yaktine (2013) and Fox et al. (2004) survey studies of food security and food stamps/SNAP.

[4] Wilde (2007) and Gregory et al. (2015) survey these different approaches and others.

[5] Gundersen and Gruber (2001), Barrett (2002), Jensen (2002), and Ribar and Hamrick (2003) provide economic models of food insecurity.

[6] I do not observe $\widetilde{F}_i$ or F_i so the empirical model cannot not distinguish the effect of, for example, a negative income shock on $\widetilde{F}_i$ or F_i separately.