Food Stamps Program (SNAP), Food Insufficiency, and Health of the Elderly

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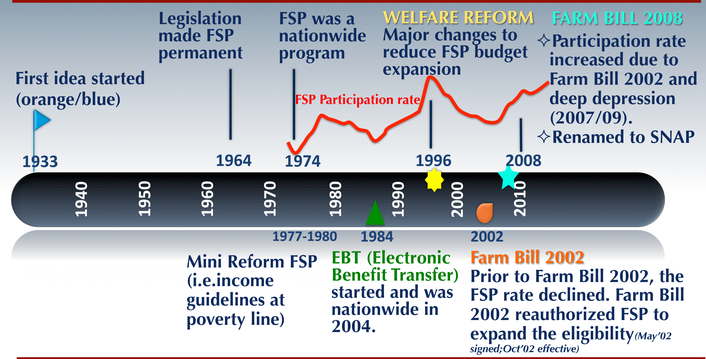
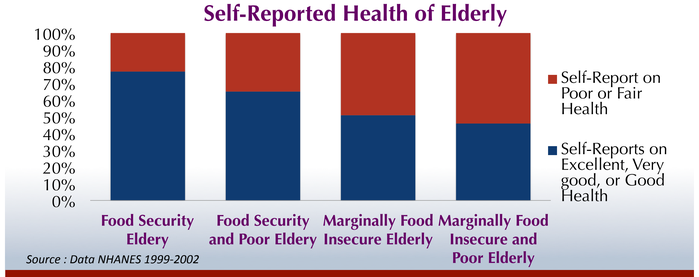
Food Stamps Program (FSP) Timeline



Introduction

The Food Stamp Program is designed to help low-income households stretch their food budget, reduce their food insufficiency, and ultimately improve their health. The growth of low-income elderly population and long lifespan in the US. makes them the most vulnerable to food insufficiency and health deterioration. The presence and degree of food insufficiency and the outcome of the Food Stamps Program participation decision may affect the health status of the elderly.



Objectives

A theoretical framework is developed to understand the mechanism of the FSP participation decision, food insufficiency, and these two factors impact on the health status of the elderly. A two-step econometric framework is developed to account for the endogeniety of FSP participation and food insufficiency to

1) **estimate the effectiveness of the FSP on improving health of the eligible elderly and alleviating food insufficiency, and**
2) **examine why so few eligible elderly households choose to receive food stamps and what determines their level of food insufficiency.**

Data

The study uses Health and Retirement Survey (HRS) Restricted Data in 2002 with initial sample of 22,000 residents in US over the age of 55. **The eligible elderly household* aged 60 or greater are focused in the study. Final sample is 1,357 households having complete information.**

*(Program eligibility is determined by using *State-specific FSP criteria from the Urban Institute's waiver database and from the Center on Budget and Policy Priorities reports for Net Income Test and Assets Test))*

Selected Variables	Definitions	Mean	S.D.
FSP participation	FSP participation =1 if HH participated sometimes in the past two years and 0 otherwise	**31.4%**	**0.464**
Food insufficiency	Food insufficiency =1 if HH member(s) skipped meals or ate less than they wanted to because they didn't have enough food in the house sometime over the past two years.	**16.8%**	**0.374**
Elderly health	Self-reported health status =0 if poor, 1 if fair, 2 if good, 3 if very good and 4 if excellent.	**1.407**	**1.094**

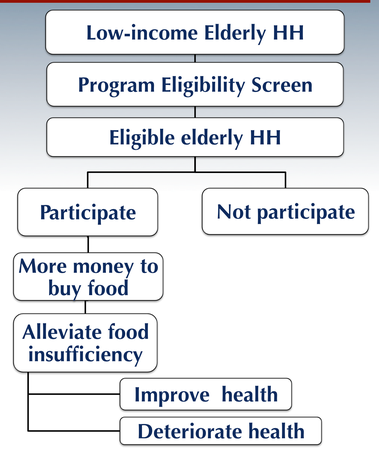
Theoretical Framework

Eligible elderly household will maximize household utility subject to their budget constraint *(Grossman,1972)*

$$Max \quad U(F, H(N(F), O(F), M), S(FS), Z, L)$$
$$s.t. \quad Tw + A + B_{fs}FS - C_{fs}FS = p_m M + p_f F + Z + wL$$

$$\frac{U_F + U_H H_N N_F + U_H H_O O_F}{p_f} = \frac{U_H H_M}{p_m} = U_Z = \frac{U_L}{w} = \frac{-s*\varsigma}{B_{fs} - C_{fs}} = \lambda$$

$$\lambda (B_{FS} - C_{FS}) > S \text{ where } S = -s * \varsigma$$



✧ **Participate in FSP :** If the marginal utility of net benefits from participating the program (LHS) is greater than disutility of stigma (RHS), the eligible elderly will participate the program (FSP*), otherwise not.

✧ **Experience Food insufficiency (FI)** : we solve for optimal level of food consumption (F*) and determine whether F* is greater or less than F^{FI}. Only we observe is FI=1 if $F^* < F^{FI}$, otherwise FI=0

✧ **Both FSP and FI** are **simultaneously** related and affect **elderly's health status** through the function H(.).

i)FSP Participation could alleviate **FI** through more money to buy more food.
ii)FI encourage individuals to participate in the **FSP** if HH have food consumption that is low to be skipping meals.

Variables of Interest
F(Food); **M**(Medical Services);
Z(Other goods); **L**(Leisure time)
FS(FSP Participation:
FS =1 Participate, otherwise 0)

Budget constraint variables
T (Total time available); **W** (wage rate);
A (Non-labor income)
$\mathbf{B_{fs}}$ (Money receive from Food Stamps);
$\mathbf{C_{fs}}$ (Cost to apply Food Stamps Program)
$\mathbf{B_{fs}}$ **-** $\mathbf{C_{fs}}$ (Net benefit of Food Stamps Program)
$\mathbf{P_f}$ (average unit price of food)
$\mathbf{P_m}$ (average unit price of medical services)
$\mathbf{P_z}$ = 1 (all prices are normalized by P_z)

Functions
H(Health Function) ; **N**(Nutrition Function);
O(Obesity Function); **S**(Stigma function = ⊆FS)

A Two-Step Econometric Framework

Step one estimation: Endogeneity solving using a simultaneous probit models of Food Stamp Program participation (FS) & Food insufficiency (FI) equations following Maddala's (1983)

$$FS^* = \beta_{0,FS} FI^* + x'_{FS}\beta_{FS} + \varepsilon_{FS} \quad ; \quad FS = 1 \;\; iff \;\; FS^* \le 0 \;\; and \;\; FS = 0 \;\; iff \;\; FS^* > 0$$
$$FI^* = \beta_{0,FI} FS^* + x'_{FI}\beta_{FI} + \varepsilon_{FI} \quad ; \quad FI = 1 \;\; iff \;\; FI^* \le 0 \;\; and \;\; FI = 0 \;\; iff \;\; FI^* > 0$$

Identification for endogeneity of FS and FI :

❑ **SKIP MEDICINES** is a mechanism for dealing with insufficient resources much like skipping meals. (+ve with FI)

❑ **RECEIVE SSI BENEFITS** : The stigma associated with receiving welfare is incurred when applying for and receiving SSI benefits. Any stigma remnants associated with food stamps would not be significant participation barriers. (+ve association with FSP).

Step two estimation : Order probit model of elderly health

$$H^* = \beta_{0,H} FS^* + \beta_{1,H} FI^* + x'_H \beta_H + \varepsilon_H \quad ; \quad H_i = 0 \;\; if \;\; H_i \le \mu_0$$
$$= 1 \;\; if \;\; \mu_0 < H_i \le \mu_1$$
$$= 2 \;\; if \;\; \mu_1 < H_i \le \mu_2$$
$$= 3 \;\; if \;\; \mu_2 < H_i \le \mu_3$$
$$= 4 \;\; if \;\; H_i > \mu_3$$

Murphy and Topel's (1985) standard error correction method for Step two :

$$\tilde{V}_2 = \hat{V}_2 + \hat{V}_2 (\hat{C}\hat{V}_1\hat{C}' - \hat{R}\hat{V}_1\hat{C}' - \hat{C}\hat{V}_1\hat{R}')\hat{V}_2$$

We extend and modify their procedure to be appropriate for two predicted variables (FS and FI). The corrected covariance matrix of the estimators leads to a more accurate conclusion of whether FSP participation and FI affect health outcomes.

References

Baum, C.(2011). The Effects of Food Stamps on Obesity. *Southern Economic Journal 77*(3), 623-651.
Bhattacharya, J., DeLeire,T., Haider, S., Currie,J.(2004). Poverty, Food Insecurity, and Nutritional Outcomes in Children and Adults. *Journal of Health Economics 23*(4), 839-862.
Grossman, M.(1972). On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy* 80(2), 223-255.
Gundersen, C., Oliveira, V. (2001). The Food Stamp Program and Food Insufficiency. *American Journal of Agricultural Economics 83*(4), 875-887.
Lee, J.S., Frongillo, Jr. E.A.(2001). Nutritional and Health Consequences are Associated with Food Insecurity among U.S. Elderly Persons. *Journal of Nutrition* 131, 1503-1509.
Leung, C.W., Villamor, E.(2011). Is Participation in Food and Income Assistance Programs Associated with Obesity in California Adults? Results from a State-Wide Survey. *Public Health Nutrition 14*(4), 645-652.
Maddala, G.S.(1983). Limited Dependent and Qualitative Variables in Econometrics. *Cambridge, UK, Cambridge University Press.*
Murphy, K.M., Topel, R.H.(1985). Estimation and Inference in Two-Step Econometric Models. *Journal of Business & Economic Statistics 3*(4), 370-379.
Nicholas, L.H.(2011). Can Food Stamps Help to Reduce Medicare Spending on Diabetes?. *Economics and Human Biology 9*(1), 1-13.
Wu, A.Y.(2009). Why Do So Few Elderly Use Food Stamps?. *Working Paper 10-01. The Harris School of Public Policy Studies*. The University of Chicago, Chicago, IL.
Ziliak, P., Gundersen, C., Haist, M. (2008).The Causes, Consequences, and Future of Senior Hunger in America. University of Kentucky.

Results

STEP ONE	Reduced Forms		Independent Probits		Simultaneous Probits	
	FSP (st. err)	FI (st. err)	FSP (st. err)	FI (st. err)	FSP (st. err)	FI (st. err)
FSP participation (FSP)			-	0.378*** (0.091)	-	-0.270 (0.291)
Food insufficiency (FI)			0.404*** (0.098)	-	-0.224 (0.213)	-
Skipped medicine	-0.153 (0.223)	0.680*** (0.217)	-	0.736*** (0.219)	-	0.626*** (0.186)
Receive SSI	0.317** (0.132)	-0.093 (0.148)	0.344** (0.136)	-	0.296*** (0.097)	-
+ demographic variables						

STEP TWO

Self-reported health status ordered probit estimates

Selected Variables	Coeff.	Uncorrected St. err	Corrected St. err (M&P method)
Probability of FSP	-1.552	0.583***	0.991
Probability of FI	-3.530	0.553***	1.520***

Marginal Effects of Selected Variables on Self-Reported Health Status

Selected Variables (*significant coeff.)	Poor Health	Fair Health	Good Health	Very good health	Excellent Health
Prob of FSP	**0.425**	**0.129**	**-0.196**	**-0.236**	**-0.122**
Prob of FI*	**0.967**	**0.294**	**-0.448**	**-0.535**	**-0.278**
Income ($1,000)*	-0.117	-0.035	0.054	0.065	0.034
Widowed*	0.082	0.025	-0.038	-0.046	-0.024
Economically active*	-0.073	-0.022	0.034	0.041	0.021
Female*	-0.132	-0.040	0.061	0.073	0.038
Nonhispanic black*	-0.099	-0.030	0.046	0.055	0.029
Exercise*	-0.111	-0.033	0.052	0.061	0.032
Obese*	0.054	0.016	-0.025	-0.030	-0.015

Conclusion & Discussion

- Food insufficiency significantly worsens health of the elderly.
  The food-insufficient elderly tend to consume lower quantities of a number of nutrients *(Bhattacharya et al., 2004)*. It is difficult for them to maintain good health condition. *(Ziliak et al., 2008)* and more likely for them to report fair/poor health status *(Lee and Frongillo, 2001)*.
- Food Stamp Program has no significant impact on food insufficiency, and vice versa among eligible elderly participants *(Similar to Gundersen & Oliviera,2001)*.
- Food Stamp Program has no significant impact on health of the elderly.
  (Similar to Nicholas, 2011 ; Wu, 2009)
- No association found between program participation and obesity.
  (Baum,2012; Leung et al.,2011)
- Income, working, female, exercise have +ve association with elderly's health.

✧ Further investigation on insufficient FSP benefits is needed.
The low net benefits (B_{FS}- C_{FS}) of the FSP are still positive; however, the level of net benefits, in fact, does not uniformly suffice for all eligible elderly to reach the significant level of food that improves health.

✧ The underlying health status of Elderly is inferior to that of young adults.

✧ The health status variable in the study is a self-reported health status which is more subjective than medical measurements.

✧ The data is a cross sectional data. Panel data could well explain the effect of the program on elderly health.