Crowding-out Effect of the Current Food Stamp Subsidy Scheme

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Abstract

This paper constructs a simple model to identify a benchmark of the food stamp subsidy scheme – households' food expenditure no less than the Thrifty Food Plan (TFP) amount with the minimum amount of food stamp. More specifically, if the household income is sufficiently low, only the corner solution exists and full subsidy is needed. Due to this crowding-out effect, the current linearly regressive food stamp subsidy scheme fails to achieve its stated aim.

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1 Introduction

The current literature focuses on the issue why governments choose to redistribute in-kind rather than in cash (Currie and Gahvari 2008) and on empirical studies of the marginal propensity to consume food out of food stamp income and cash income (Hoynes and Schanzenbach 2009). The details of how in-kind transfers, more specifically the subsidy scheme, are provided are rarely studied.

The subsidy scheme of the current food stamp program, which is called Supplemental Nutrition Assistance Program (SNAP), is linearly regressive as follows.[1]

> The amount of SNAP benefits you get is the TFP amount for your household minus 30% of your net income, where the **_Thrifty Food Plan (TFP)_** is a model for how much money a household should spend on food. So if you spend 30% of your net income on food, but you still can't spend as much as the TFP says you should, SNAP give you the rest.

[1]United States Department of Agriculture, Food and Nutrition Service: http://www.snap-step1.usda.gov/fns/tool/tutorial/toolfaq.html

The main question of inquiry is: what would be the minimum amount of food stamp that families with different income levels should receive to ensure that the government's objective is satisfied? A simple model is constructed to identify a benchmark of the food stamp subsidy scheme – households' food expenditure no less than the Thrifty Food Plan (TFP) amount with the minimum amount of food stamp. Intuitively, if the household income is sufficiently low, only the corner solution exists, in which the household only spends the amount of food stamp subsidy, while all its own food expenditure in the absence of subsidy would be crowded out. Due to this **_crowding-out effect_**, to have the food expenditure no less than the TFP amount, full subsidy is needed and thus the current linearly regressive food stamp subsidy scheme fails to achieve its stated aim.

2   The Model

Suppose households have a common utility function: $U(X,Y) = X^{\frac{3}{10}} Y^{\frac{7}{10}}$, where X is the food consumption and Y the composite good.[2] Each household solves the following problem.

$$\max_{X,Y} \quad U(X,Y) = X^{\frac{3}{10}} Y^{\frac{7}{10}}$$
$$\text{s.t.} \quad P_X X + Y = M + S \quad \text{if} \quad P_X X > S$$
$$Y = M \qquad\qquad \text{if} \quad P_X X \le S$$

where M is the household income, S the amount of subsidy, P_X the food price, and $P_X X$ the food expenditure. The following proposition identifies a benchmark of the food stamp subsidy scheme – households' food expenditure no less than the TFP amount with the minimum amount of food stamp.

Proposition 1 _The following subsidy scheme achieves the government's aim – households' food expenditure no less than the TFP amount – with the minimum amount of food stamp._

$$\begin{cases} S = TFP & \text{if} \quad M < \frac{7}{3}TFP \\ S = \frac{10}{3}(TFP - \frac{3}{10}M) & \text{if} \quad \frac{7}{3}TFP \le M < \frac{10}{3}TFP \\ S = 0 & \text{if} \quad M \ge \frac{10}{3}TFP \end{cases}$$

Proof. See the Appendix. ∎

Intuitively, if the income of the household is below some threshold, only the corner solution exists, in which the household only spends the amount of food stamp subsidy, while all its own food expenditure in the absence of subsidy would be crowded out. To have $P_X X \ge TFP$, full subsidy is needed: $S = TFP$. Further, if the income

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[2]Based on the current linearly regressive subsidy scheme, we assume the Cobb-Douglas utility function $U(X,Y) = X^\alpha Y^{1-\alpha}$ and set $\alpha = \frac{3}{10}$. In reality, spending on food accounts for a larger share of total spending at very low levels of income. Therefore, α may increase as M decreases.

of the household is high, we have the interior solution. Only partial of its own food expenditure in the absence of subsidy would be crowded out. To have $P_X X \geq TFP$, only partial subsidy is needed to the extent that the income of the household is so high that its own food expenditure would be greater than the TFP amount in the absence of subsidy.

In contrast, the current linearly regressive subsidy scheme is:

$$\begin{cases} S = TFP - \frac{3}{10}M & \text{if} \quad M < \frac{10}{3}TFP \\ S = 0 & \text{if} \quad M \geq \frac{10}{3}TFP \end{cases}$$

Similar to the proof of proposition 1, for households with income $M < \frac{10}{3}TFP$, $P_X X < TFP$.[3] That is, the current linearly regressive subsidy scheme fails to achieve its stated aim.

Appendix

Proof of Proposition 1   The government solves the following problem, subject to the household's problem.

$$\min_{S} \quad S$$
$$s.t. \quad P_X X \geq TFP \geq S$$
$$\begin{pmatrix} \max_{X,Y} \quad U(X,Y) = X^{\frac{3}{10}}Y^{\frac{7}{10}} \\ s.t. \quad P_X X + Y = M + S \quad \text{if} \quad P_X X > S \\ \qquad\quad Y = M \qquad\qquad \text{if} \quad P_X X \leq S \end{pmatrix}$$

Suppose the household has the interior solution: $P_X X = \frac{3}{10}(M + S)$. To minimize S, the constraint $P_X X \geq TFP \geq S$ requires $P_X X = \frac{3}{10}(M + S) = TFP \geq S$, which implies $S = \frac{10}{3}(TFP - \frac{3}{10}M)$ and $\frac{7}{3}TFP \leq M < \frac{10}{3}TFP$. Similarly, suppose the household has the corner solution: $P_X X = S$. To minimize S, the constraint $P_X X \geq TFP \geq S$ requires $P_X X = S = TFP$. In this case, the possible interior solution is out of the budget set. That is, $\frac{3}{10}(M + S) = \frac{3}{10}(M + TFP) < S = TFP$, which implies $M < \frac{7}{3}TFP$. ∎

References

[1] Currie, J. and F. Gahvari, 2008, Transfers in Cash and In-Kind: Theory Meets the Data, Journal of Economic Literature, 46(2), 333-383.

[2] Hoynes, H. W., and D. W. Schanzenbach, 2009, Consumption Responses to In-Kind Transfers: Evidence from the Introduction of the Food Stamp Program, American Economic Journal: Applied Economics, 1(4), 109-139.

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[3]To have an interior solution, we must have $\frac{3}{10}(M + S) \geq S$, which implies $M \geq \frac{70}{51}TFP$. Therefore, for $M < \frac{70}{51}TFP$, only the corner solution exists: $P_X X = S = TFP - \frac{3}{10}M < TFP$. For $\frac{10}{3}TFP > M \geq \frac{70}{51}TFP$, we have the interior solution: $P_X X = \frac{3}{10}(M + S) < TFP$.