**Behavioral Responses to Taxation: Cigarette Taxes and Food Stamp Take-Up**

Kyle Rozema (with Nicolas Ziebarth)

ktr35@cornell.edu • www.kylerozema.com

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**Research Question**

Do sin taxes drive people to accept government transfers?

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**Research Design**

Identify program “take-up” using *both* changes in state taxes and “enrollment”
- Deliberately allow for “other” compensating behaviors
- Estimates interpreted as Intent-to-Treat (ITT) - the policy relevant estimates

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**Empirical Findings**

$1$ increase in state cigarette taxes
- increases households’ annual cigarette expenditures by $150$ to $200$
- increases food stamp take-up by about $15\%$ among eligible smoking households

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**Contribution**

1. First paper that relates increases in cigarette taxes to food stamp participation
2. Take-up of programs overlooked form of behavior response to taxation
3. Explains small part of the recent staggering increase in food stamp participation

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**Theoretical Model**

\[
\max u(c, x) - \phi(S) = \begin{cases} 
\max_x \sum_i \frac{\partial S_i}{\partial p} x_i S_i \geq pc + x \geq 0 \end{cases}
\]

- $c$ is the number of cigarettes smoked
- $x$ is consumption of the composite food good
- $S$ is the social stigma of enrolling in food stamps
- $W$ is the after tax price of a pack of cigarettes
- $FS$ is the amount received from food stamps (if enrolled)

**Model Assumptions**

A1. No marginal stigma (Ranney & Kushman, 1987) 
\( \Rightarrow \phi(S) = S \)
A2. Food stamps is cash transfer program
A3. Agents must satisfy true budget constraint regardless of optimization failures
A4. Bernheim and Rangel (2004): “hot” state

**Model Setup**

- Suppose agents only vary along $S \sim U(0, 1)$
- Agent $i$ with the marginal stigma enrolls if: 
  \[ S_i^* \leq v(p, W + FS) - v(p, W) \]
- What happens to $S_i^*$ when prices increase? 
  - Answer depends on sign of $\frac{\partial S_i}{\partial p}$.

**Model Prediction**

\[
\frac{\partial S_i}{\partial p} = \frac{1}{p} \left( \frac{\partial u}{\partial x} \bigg|_{S=0} - \left( \frac{\partial u}{\partial x} \bigg|_{S>0} \right) \right) > 0
\]

\( \Rightarrow \) Increases in taxes can induce eligible smoking households to enroll in food stamps.

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**Data: CPS**

- Tobacco Use Supplements (TUS)
- Food Security Supplements (FSS)
- Build Two Datasets
  - Cross section
  - Pseudo-panel (main result)
  - FSS Food Stamp “Panel”
  - TUS Smoking “Panel”
  - Merged TUS “Panel” to FSS “Panel”
  - Ex: Jan ‘11 TUS and Dec ‘10 FSS
  - 12 months in pseudo-panel

**Methods**

- $y_{int} = \alpha + \beta_{tax, mun} + \gamma X_i + \delta_1 \times \phi_0 + \delta_0 + \epsilon_i$
  - $\gamma$ is a vector of household socio-demographics
  - $\delta_0$ are month-year fixed effects
  - $\phi_0$ is the constant term
  - $y_{int}$ measures
    (i) Cigarette expenditures
    (ii) Food stamp enrollment
    (iii) Take-up of food stamps

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**Empirical Results**

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<tr>
<th>Variable</th>
<th>Year + State FE (123)</th>
<th>Covariates (6)</th>
<th>Month-Year Covariates (5)</th>
<th>State FE (6)</th>
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Source: CPS Food Security Supplements (FSS) and Tobacco Use Supplement (TUS) 2001-2011 merged with state-month level cigarette tax information (Tax Burden on Tobacco, 2012), own calculation and illustration; * p < 0.1, ** p < 0.05, *** p < 0.01, standard errors are in parentheses and clustered at the state level. Regressions are based on a pseudo-panel that makes use of the retrospective monthly information on household food stamp take-up in the FSS. Each column represents one regression as in equation (5). The binary dependent variable in the last four models indicates food stamp take-up in between the previous and the current month ($y = 1$). The variables of interest indicate the states where the tax changes took effect.