How do sales tax holidays affect retailers?

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Background

• **Sales tax holiday**
  Short term policy when a state does not charge sales tax for some items

• **Policy perspective:**
  • Sales tax holidays are popular (23 states tried them)
  • Overall losses by local and state budgets total billions of dollars
    (Massachusetts lost $23 million on a 2 day holiday)
  • State legislators constantly change the set of taxed goods including
    apparel (New York, Connecticut)
Motivation

• **Sales tax holidays**
  - Increase in daily apparel purchases by at least 25%; no evidence for time shifting behavior (Agarwal, Marwell and McGranahan, 2013)
  - Cole’s (2009) finding that intertemporal shifting explains 90% of computer sales rise due to tax holiday

• **Media evidence:**
  - “Right now we have all our summer clothing on [50%] sale” (Rachel's Dress Shop)
  - “Some retailers increase prices during sales tax holidays.” (Tax Foundation)
  - Retailers employ additional labor to deal with overcrowding
Research Tools

• Research goals:
  • Estimate tax incidence: by how much retailers change prices
  • Test for price adjustment costs: for what items retailers change prices
  • Explore the availability of items in a store (Retailer quality)

• Empirical analysis employs:
  • Cross-section and time variation in tax holidays
  • Tax holidays differ in duration and tax rate drop
  • BLS confidential micro data for constructing CPI
Literature and Contributions

- **Sales tax**
  - Tax incidence is a sufficient statistic for welfare analysis (Fabinger and Weyl, 2013)
  - Sales tax can be treated as an excise tax (Anderson, de Palma and Kreider, 2001)
  - Tax incidence of sales tax is positive (Besley and Rosen, 1999)
  - State sales tax ↑ by 1 pp. → 2% ↑ in online purchases and 3-4% ↓ in purchases from state sellers (Einav et al., 2014)
  - Sales tax is not salient to consumers (Chetty, Looney and Kroft, 2009)
Literature and Contributions

• **Tax and subsidy incidence**
  (Busse et al., 2013; Busse, Silva-Risso and Zettelmeyer, 2006; Samphantharak and Doyle, 2008; Hastings and Washington, 2010; Rothstein, 2010)

• **Adjustments with frictions**
  (Chetty, 2012; Kleven and Waseem, 2013)

• **Retailer quality**
  (Matsa, 2011)
Road map for analysis

Tax incidence for different goods

- Negative tax incidence
- Positive tax incidence

- Menu costs
- Retail quality
Theory: Tax incidence

- **Perfect competition**
  - Tax incidence $\rho_P = \frac{\epsilon_D}{\epsilon_D - \epsilon_S}$ belongs to $[-1,0]$ as
    - elasticity of inverse marginal cost curve $\epsilon_S > 0$
    - elasticity of demand $\epsilon_D < 0$.

- **General models of imperfect competition**
  - Tax incidence $\rho_I = \frac{1}{1+A}$ range depends on
    - $A = \frac{\theta}{\epsilon_\theta} + \frac{\epsilon_D - \theta}{\epsilon_S} + \frac{\theta}{\epsilon_{ms}}$;
    - $\epsilon_\theta$ and $\epsilon_{ms}$ — elasticities of demand with respect to conduct parameter $\theta$ and marginal surplus $mS = p'q$. 

Theory: Tax incidence

- \[ A = \frac{\theta}{\epsilon_\theta} + \frac{\epsilon_D - \theta}{\epsilon_S} + \frac{\theta}{\epsilon_{ms}} \] can take any values
  - If \( \theta(q) = const \) and \( MC(q) = const \), the first two terms are zero
  - \( A \) depends on \( \epsilon_{ms} \), the curvature of logarithm of demand
  - If \( \epsilon_{ms} \in \left[-\frac{\theta}{2}; 0\right] \), then tax incidence \( \rho_I \in [-1; 0] \); otherwise it is of any value.

**Proposition 1:**

Under perfect competition, tax incidence \( \rho_I \in [-1; 0] \). Under imperfect competition, it takes any value.
Theory: Price adjustment costs

- Store manager compares:

\[ \text{rev loss} = \left( \frac{t \cdot dp_i}{\text{tax drop}} \right) \cdot \frac{dp_i}{\text{tax incidence}} \cdot Q_{is} \cdot \frac{L_{hol}}{\text{holiday length}} \lessgtr 2 \cdot \frac{\text{adjcost}_s}{\text{adjustment cost}} \]

Proposition 2:

When duration of tax holidays ↑ and the change in tax rate ↑, retailers should change prices for:

(i) more goods
(ii) for the goods which are sold in large quantities
(iii) for the goods whose tax incidence is higher.
Theory: Quality of Retailers

• Tax holidays:
  
  Sales ↑ (mostly in the end of a season) → store inventories ↑ in advance → product availability ↑ before/during holidays

Proposition 3:
  
  Store quality should increase before/during tax holidays. The effect on quality is uncertain after the policy.
Data – Tax Holidays (1996-2013)

- Never implemented
- Implemented at least once
- In effect this year
Data

• Confidential micro data from CPI:
  • Panel on item prices
  • Price quote date
  • Thorough item description
  • Disadvantages: mainly bimonthly quotes and no quantity/sales data

• Supplementary is scanner data:
  • Weekly data on prices/sales/stocks of multiple items
  • Disadvantages: no exact date for prices and no apparel in the data
Empirical Estimation – Tax Incidence

• Difference-in-Differences

\[
\ln(p_{ict}) = \alpha + \gamma STH_{ct} + \beta_1 \ln(1 + \tau_{ict}) STH_{ct} + \beta_2 \ln(1 + \tau_{ict}) + \beta_3 FEmth,yr + FEi + Contr_{c,yr} + \varepsilon_{ict},
\]

where:
• Item index \( i \), county index \( c \) and date \( t \);
• \( STH_{ct} \) is sales tax holiday;
• \( \tau_{ict} \) is tax rate.
• Controls are county socio-demographic characteristics

• Hypothesis 1 – \( H_0: \beta_1 \in [-1,0] \)
Empirical Estimation – Price Adjustment Costs

• Difference-in-Differences

\[ P_{\text{change}}_{ict} = \alpha + \gamma STH_{ct} + \beta_1 \ln(1 + \tau_{ict}) STH_{ct} + \beta_2 \ln(1 + \tau_{ict}) \]
\[ + \beta_3 L_{\text{hol},ct} STH_{ct} + FE_{mth,yr} + FE_i + Contri_{ct} + \varepsilon_{ict}, \]

• \( P_{\text{change}} \) is a dummy for price change;
• \( L_{\text{hol},ct} \) is the duration of sales tax holiday.

• **Hypothesis 2 –** \( H_0: \beta_3 > 0 \)
Empirical Estimation – Quality of Retailers

- **Difference-in-Difference**

\[
\text{Stockout}_{isct} = \alpha + \sum_{j=-N}^{N} \beta_j \text{week}_{t-j} 1(STH_{ct}) + \gamma \text{Contr}_{ict} + \text{FE}_{mth, yr} + \text{FE}_c
\]

+ \text{FE}_s + \varepsilon_{isct},

- \( \text{FE}_c \) and \( \text{FE}_s \) – county and store fixed effects;
- \( \text{week}_{t-j} 1(STH_{ct}) \) is a dummy equal to one \( j \) weeks before sales tax holiday.

- **Hypothesis 3** – \( H_0: \beta_j \downarrow \) in \( j \) for \( j > 0 \).