Salience and Taxation: Theory and Evidence

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Motivation

Problem
- Public economics assumes that agents optimize fully with respect to taxy policies (some way as price changes)
- However, evidence suggests that individuals are inattentive to some type of incentives

Suggested solution
- Investigation empirically that supports whether individuals optimize fully with respect to taxes by analyzing the effect of “salience” on behavioral responses to commodity taxation
- Develop a simple method of characterizing the welfare consequences of taxation when agents optimize imperfectly with respect to taxes.
Empirical Framework

Economy with two goods, \( x \) and \( y \). Supplied perfectly elastically.

- Good \( y \) is untaxed and normalized to one.
- Good \( x \), with pretax price \( p \), subject to an \textit{ad valorem} sales tax \( \tau^S \).
- The total price of \( x \) is \( q = (1 + \tau^S) p \)
- Consumers see the price \( p \) directly and calculate \( q \) themselves. Price \( q \) is less “salient” than the pretax price \( p \).
- \( x(p, \tau^S) \) represents the demand function
- Neoclassical full-optimization model – 1 percent increase in \( p \) and a 1 percent increase in the gross-of-tax price \((1 + \tau^S)\) reduce demand by the same amount. Elasticity in relation to price \( p \) is the same that the elasticity of taxes.
- Hypothesis: in practice consumers underreact to taxes \( \tau^S \) because it is less salient.
- Test: \( \log x(p, \tau^S) = \alpha + \beta \log p + \theta_r \beta \log (1 + \tau^S) \)
- Parameter \( \theta_r \) measures the degree to which agents underreact to the tax.
- Null hypothesis of full optimization implies \( \theta_r = 1 \)

\[
\theta_r = \frac{\partial \log x}{\partial \log (1+\tau^S)} = \frac{\partial \log x}{\partial \log (1+\tau^S)} = \frac{\varepsilon_{x,1+\tau^S}}{\varepsilon_{x,p}}
\]
Two Field Experiments – Grocery Store

Manipulate Tax Salience
- First empirical strategy is to make the sales tax as salient as the pretax price by posting the tax-inclusive $q$ on the shelf.
- Normally the price posted exclude sales tax of 7.335 per cent. When product is subject to sales tax, it is added to the bill only on the register.
- Test if people underreact to the sales tax, they posted tags showing the tax inclusive price below the original pretax price tag.

Results
- Making the sales tax salient reduces demand by 7.6 percent.
- Estimated price elasticity of demand at the product level is $\varepsilon_{x,p} = 1.59$
- Plugging these values in the formula before, estimate $\theta_T = 0.35$
- That is, a 10 percent in taxes increase reduces demand by the same amount as a 3.5 percent price increase.

Conclusions – Why do consumers underreact to sales tax?
- Two possible explanations – One is that consumer are uninformed about sales tax rates. Other is that salience matters: individuals know about taxes when their attention is drawn to the subject, but not pay attention to taxes that are not transparent while deciding what to buy.
Two Field Experiments – Alcohol consumption

Manipulate Tax Rate

- Second empirical strategy: comparing the effect of increases in posted prices and taxes on demand, focusing on alcohol consumption.
- Alcohol is subject to two taxes in most states of USA: an *excise* tax that is levied at the wholesale level and is included in price posted on the shelf; and a *sales* tax, which is added at the register. $\tau^E$ is the excise tax; $\tau^S$ is the sales tax.
- The total price of alcohol is therefore $q = p(1 + \tau^S)(1 + \tau^E)$
- Authors used data of aggregate annual beer consumption by state from 1970 to 2003
- Model for estimation the state-level growth rate of alcohol consumption to measure the effect of excise and sales taxes on beer consumption.

Results

- 1 percent increase in the gross-of-excise-tax price is estimated to reduce beer consumption by 0.88 - $\varepsilon_{x,1+\tau^E} = 0.88$
- In contrast, a 1 percent increase in the gross-of-sales-tax price is estimated to reduce beer consumption by 0.20 - $\varepsilon_{x,1+\tau^S} = 0.20$
- The hypothesis that the excise and sales tax elasticities are equal is rejected.
- Also tested for difference over long horizons – to evaluate if people can learn about changes in the sales tax over time. However, an increase in the excise tax rate continues to have a large negative effect than the sales taxes even in the long run.
Conclusion that salience matters over information problems

- Survey customers entering the store where conducted the experiment.
- Most consumers are well informed about commodity tax rates when their attention is drawn to subject.

Implications for tax policy – Tax Incidence

- First, characterize tax incidence, which is essentially a mechanical calculation of price changes.
- Using the same two-good model presented before, but now assuming that sales tax levied on good $x$ is a specific (unit) tax $t^s$ rather than an *ad valorem* tax.
- **Attenuated Incidence on producers** – Producers face less pressure to reduce the pretax price when consumers underreact to the sales tax.
- **No Tax neutrality** – Taxes that are included in post prices have greater incidence on producers because they are fully salient. Taxes levied on producers are more likely to be included in posted prices than taxes levied on consumers.
- **Effect of price elasticity** – Holding fixed the size of the tax elasticity, an increase in the price elasticity of demand raises incidence on consumers – smaller price reduction is needed to clear the market if demand is very price elastic.
Welfare Analysis

Implications for tax policy – Efficiency costs

- Second, characterize efficiency cost, additional assumptions to calculate welfare changes when agents optimize imperfectly.

- **Inattention reduces excess burden when there are NO income effects** – the tax $t^s$ generates deadweight loss equivalent to that created by a perfectly salient tax of $\theta t^S$.

- **Inattention can raise excess burden when there are income effects** – making a tax less salient reduce effect of the taxes in demand can increase deadweight loss.

- **Role of price elasticity** – Holding fixed the elasticity $\varepsilon_{x,q \mid t^S}$, excess burden is inversely related to $\varepsilon_{x,q \mid p}$.
Conclusions and extensions

- Salience is an important determinant of behavioral responses to taxation.
- Commodity taxes that are included in posted prices reduce demand significantly more than taxes that are not included in posted prices.
- Alternative method of welfare analysis that does not rely on a specific positive model of how agents make choices when faced with taxes.
- The compensated tax and price elasticities as “sufficien statistics” for empirical studies in behavioral public economics.

Extensions
- Characterize optimal taxation when agents optimize imperfectly – Extend the welfare analysis to a general equilibrium model with more than two markets.
- Apply the same methods to other contexts – social insurance or transfer programs.
Questions?