Public policy to combat error

Optimal Paternalism

Optimal Paternalism

- Optimal Paternalism formally analyzes optimal policy as a function of our beliefs about the degree of and prevalence of errors in the population.

Optimal Paternalism

- Write down assumptions about:
  - types of errors that people make.
  - distribution of errors in the population (prevalence and magnitude).
  - available policy instruments.
  - government's information about agents.
- Then investigate which policies achieve the "best" outcomes.

- Goal: By doing so, we can more fully understand the benefits and costs of paternalism.

- Example: Optimal sin tax

Sin tax

an excise tax specifically levied on certain goods deemed harmful

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Optimal sin taxes

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Abstract

We investigate "sin taxes" on unhealthy items, such as fatty foods, that people may (by their own reckoning) consume too much of. We employ a standard optimal-taxation framework, but replace the standard assumption that all consumers have 100% self control with an assumption that some consumers may have some degree of self-control problems. We show that imposing taxes on unhealthy items and returning the proceeds to consumers can generally improve total social surplus. Because such taxes counteract over-consumption by consumers with self-control problems while at the same time they naturally redistribute income to consumers with no self-control problems (who consume less), such taxes can even create Pareto improvements. Finally, we demonstrate with some simple numerical examples that even if the population exhibits relatively few self-control problems, optimal taxes can still be large.

Keywords: Hyperbolic discounting; Immediate gratification; Paternalism; Pigouvian taxation; Time inconsistency

Optimal Sin tax

- This paper investigated the use of sin taxes to combat over-consumption of unhealthy items, such as fatty foods that people may (by their own reckoning) consume too much of.

Optimal Sin tax

- The simple intuition is straightforward: impose a tax to counteract over-consumption.

- The big question: In a heterogeneous world, **where some people have self-control problems and some don't,** and **some people like potato chips and some don't**, and **people differ in the health consequences of eating potato chips**, **do the benefits of imposing sin tax outweigh the costs?**

Optimal Sin Tax: model

- Consider a quasi-linear economy with two goods, potato chips (x) and a composite good (z).

- Both goods are produced with identical marginal costs.

- Markets are competitive, and we normalize price of the composite good $p_Z = 1$.
  - We assume competitive market to get rid off all other distortions.
  - Assume $p_Z = 1$. This means $mc_x = mc_z = 1$.

Optimal Sin Tax: model

- Government might impose per-unit tax t on potato chips and return the proceeds to consumers via a lump-sum l.

- A per-unit tax t on potato chips implies $p_x = 1 + t$.

- Government sees heterogenous agents, but treats them homogenously.

Optimal Sin Tax: model

- Instantaneous utility in period t is
- $u_t \equiv v(x_t; \rho) - c(x_{t-1}; \gamma) + z_t$
- ρ and γ are heterogenous.
- $v(x_t; \rho)$ represents the immediate benefits from current potato-ship consumption
  - Assume $v_x > 0$, $v_{xx} < 0$
  - Assume $v_{x\rho} > 0$. This means as ρ increases, the marginal utility of x, v_x, increases.

Optimal Sin Tax: model

- Instantaneous utility in period t is
- $u_t \equiv v(x_t; \rho) - c(x_{t-1}; \gamma) + z_t$
- ρ and γ are heterogenous.
- $c(x_{t-1}; \gamma)$ represents the negative health costs from past potato-chip. consumption
  - Assume $c_x > 0$.
  - Assume $c_{x\gamma} > 0$. This means as γ increases, the marginal cost of x, c_x, increases.

Optimal Sin Tax: model

- Instantaneous utility in period t is
- $u_t \equiv v(x_t;\rho) - c(x_{t-1};\gamma) + z_t$

- *Examples:*

$v(x;\rho) = \frac{\rho x^{1-r}}{1-r}$ and $c(x;\gamma) = \gamma x$

$v(x;\rho) = \rho lnx$ and $c(x;\gamma) = \gamma lnx$

Optimal Sin Tax: model

- Assume β, δ preferences, and for simplicity assume $\delta = 1$
- The person's *actual behavior* (x^*, z^*) maximizes

$$u^*(x, z) \equiv v(x; \rho) - \boldsymbol{\beta} c(x; \gamma) + z.$$

- The person's *ideal behavior* (x^{**}, z^{**}) maximizes

$$u^{**}(x, z) \equiv v(x; \rho) - c(x; \gamma) + z.$$

Optimal Sin Tax: behavior

- Consider ideal vs. actual behavior for a person with per-period income l, where l is "large".
- The first-best allocation (x^{**}, z^{**}) maximizes

$$\max u^{**}(x, z)$$

$$\text{subject to } x + z \leq l$$

- NO tax, focus at the ideal utility

➢ x^{**} satisfies $v_x(x^{**}; \rho) - c_x(x^{**}; \gamma) - 1 = 0$

Optimal Sin Tax: behavior

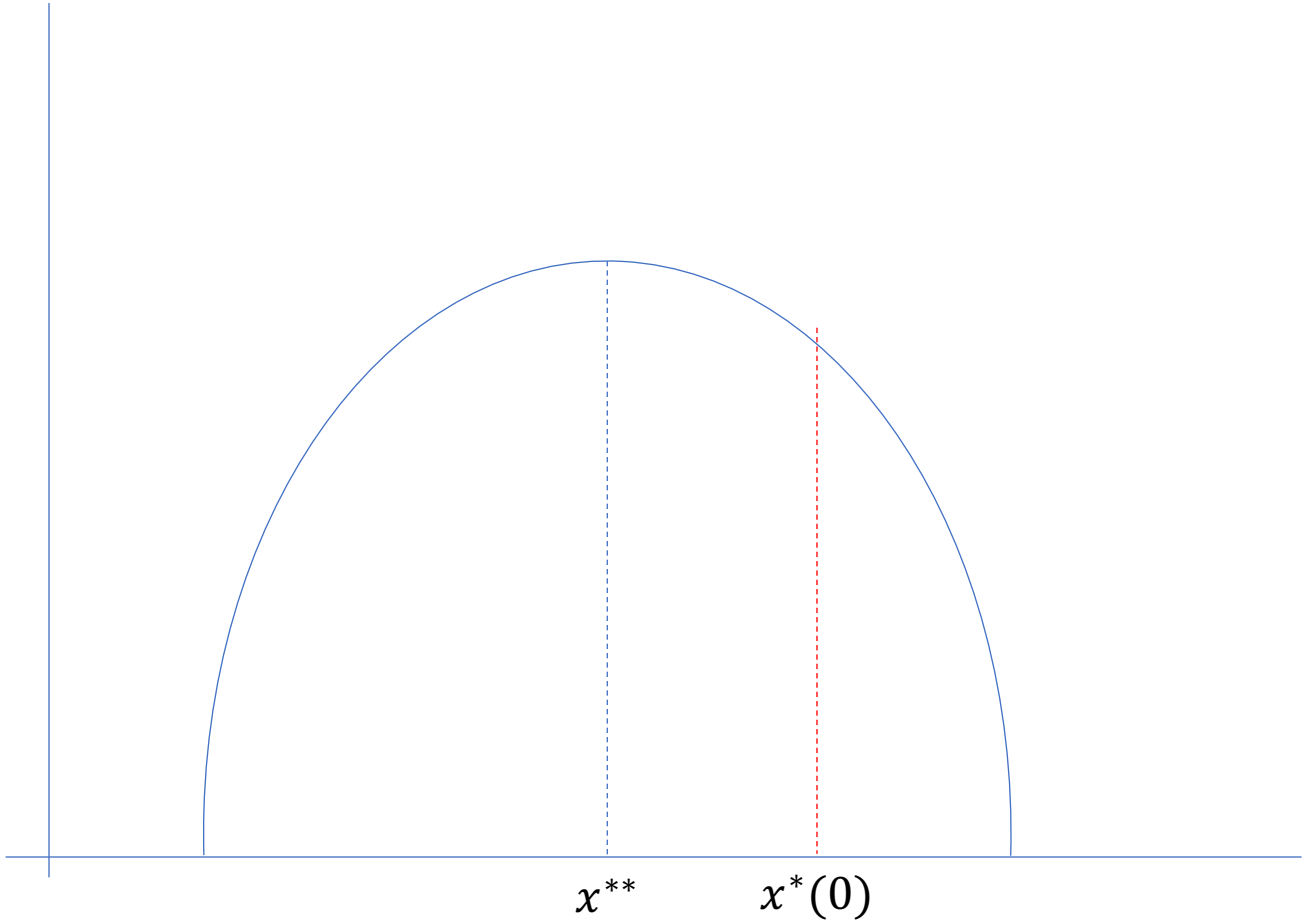
- Given policy (t, l) tax and lump-sum transfer, the person's actual allocation (x^*, z^*) maximizes

$$\max u^*(x, z)$$

$$\text{subject to } (1+t)x + z \leq l + l$$

➢ $x^*(t)$ satisfies $v_x(x^*(t); \rho) - \beta c_x(x^*(t); \gamma) - (1+t) = 0$

- If $t = 0$,
- $x^*(0)$ satisfies $v_x(x^*(0);\rho) - \beta c_x(x^*(0);\gamma) - 1 = 0$
- x^{**} satisfies $v_x(x^{**};\rho) - c_x(x^{**};\gamma) - 1 = 0$
- For given ρ, γ, z, $u^{**}(x,z) \equiv v(x;\rho) - c(x;\gamma) + z$.



Optimal Sin Tax: benchmark result

- For all ρ and γ, if $t = 0$, then $x^*(t) = x^{**}$ for people with $\beta = 1$, whereas $x^*(t) > x^{**}$ for people with $\beta < 1$.

- With homogeneous consumers, a Pigouvian tax and a uniform lump-sum transfer can implement the first-best outcome – in particular,

$$t^{**} = (1 - \beta)c_x(x^{**})$$

This t^{**} sets FOC of actual utility maximization to be FOC of ideal utility maximization. Hence, $x^*(t) = x^{**}$.

Optimal Sin Tax: Introducing Heterogeneity

- Let's now focus on population heterogeneity in tastes and in the degree of self-control problems. That is, let's consider the case that individuals differ in (ρ, γ, β).

- Let $F(\rho, \gamma, \beta)$ denote population distribution
- Assume $F(\rho, \gamma, \beta) = G(\rho, \gamma)H(\beta)$
- Aggregate demand (in per capita terms) is:

$X^*(t) = E_F[x^*(t)]$, summing actual consumptions of heterogenous agents

- The uniform lump-sum transfer is:

$l(t) = tX^*(t)$, lump-sum transfer is equal to tax revenue

Optimal Sin Tax: Optimal Tax

- We analyze optimal taxation given a social-welfare function that puts "equal weight" on all people.
- Policymakers maximize aggregated realized ideal utility from actual consumption.

$$\Omega(t) = E_F[u^{**}(x^*(t), z^*(t)]$$

Given the budget constraint $(1+t)x + z = l + l$, we have that:

$$\Omega(t) = E_F[v(x^*(t);\rho) - c(x^*(t);\gamma) + l + l(t) - (1+t)x^*(t)]$$

,where $l(t)$ doesn't depend on $F(\rho, \gamma, \beta)$.

Optimal Sin Tax: Optimal Tax

Given, the balanced budget constraint $l(t) = tX^*(t)$

$$\Omega(t) = E_F[v(x^*(t);\rho) - c(x^*(t);\gamma) + l - x^*(t)]$$

Optimal Sin Tax: Optimal Tax

- Proposition 1: Suppose policymakers maximize $\Omega(t)$.

$$\Omega(t) = E_F[v(x^*(t);\rho) - c(x^*(t);\gamma) + l - x^*(t)]$$

- For any distribution of tastes $G(\rho, \gamma)$:

(1) If everyone has $\beta = 1$, then the optimal tax is $t^* = 0\%$, and

(2) If everyone has $\beta \leq 1$ and some have $\beta < 1$, then the optimal tax is $t^* > 0\%$.

- If we are confident that all people are 100% self-controlled, then we should not tax potato chips. If instead we believe some people have self-control problems, we should indeed impose sin taxes on potato chips.

Optimal Sin Tax: Takeaway

- If some people have $\beta < 1$, sin taxes may yield Pareto improvements.
- People with self-control problems are helped because sin taxes counteract over-consumption.

- At the same time, because people with self-control problems on average consume more potato chips than people without self-control problems, on average income is redistributed from people with self-control problems to people without self-control problems.

- Rigid attachment to 100% rationality may make us fail to recognize policies that could in fact help everyone .

Behavioral Public Economics

- In recent years, the literature has just started doing behavioral public economics.
- Write down assumptions about:
  - what determines an individual's choices and welfare
  - types of heterogeneity in the population
  - available policy instruments
  - what the analyst can observe
- Then solve for optimal policy or other welfare statistics
- Sometimes compute an empirical estimate for optimal policy
- Rees-Jones & Taubinsky (RES 2018)

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Attention Variation and Welfare: Theory and Evidence from a Tax Salience Experiment

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This article shows that accounting for variation in mistakes can be crucial for welfare analysis. Focusing on consumer under-reaction to not-fully-salient sales taxes, we show theoretically that the efficiency costs of taxation are amplified by differences in under-reaction across individuals and across tax rates. To empirically assess the importance of these issues, we implement an online shopping experiment in which 2,998 consumers purchase common household products, facing tax rates that vary in size and salience. We replicate prior findings that, on average, consumers under-react to non-salient sales taxes—consumers in our study react to existing sales taxes as if they were only 25% of their size. However, we find significant individual differences in this under-reaction, and accounting for this heterogeneity increases the efficiency cost of taxation estimates by at least 200%. Tripling existing sales tax rates nearly doubles consumers' attention to taxes, and accounting for this endogeneity increases efficiency cost estimates by 336%. Our results provide new insights into the mechanisms and determinants of boundedly rational processing of not-fully-salient incentives, and our general approach provides a framework for robust behavioural welfare analysis.

Key words: Tax salience, Rational inattention, Deadweight loss, Welfare analysis.

JEL Codes: C9, D0, H0