On Optimal Taxes for Cigarettes and E-cigarettes

Applied Welfare Economics

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The issue

- Should ENDS be taxed?
  - How much?
  - Relative to cigarettes?
- There are many motives and rationales for taxing tobacco products
- The main conclusion for optimal taxes does not depend on the rationale:
  taxes on ENDS and other harm-reduced products would be relatively *lower*, and likely *much lower*, than those on cigarettes

Three facts about ENDS underlying the results

1. ENDS are not risk-free products, but they are (almost certainly) not as harmful as cigarettes. National Academy of Science, 2018:
   - there is “substantial evidence” that vaping exposes users to **significantly lower levels of toxic substances** than smoking
   - switching from smoking to ENDS results **in improved short-term health outcomes**
   - Long-term health effects unknown, but hard to imagine could be as bad as smoking

Three important facts about ENDS

1. ENDS are not risk-free products, but they are (almost certainly) not as harmful as cigarettes.
2. ENDS can help some smokers quit
   - Review of 90 RCTs and other studies: using ENDS to help quit smoking led to better success rates than NRT, counseling, or willpower alone (Cochrane Review, Lindson et al, 2025)

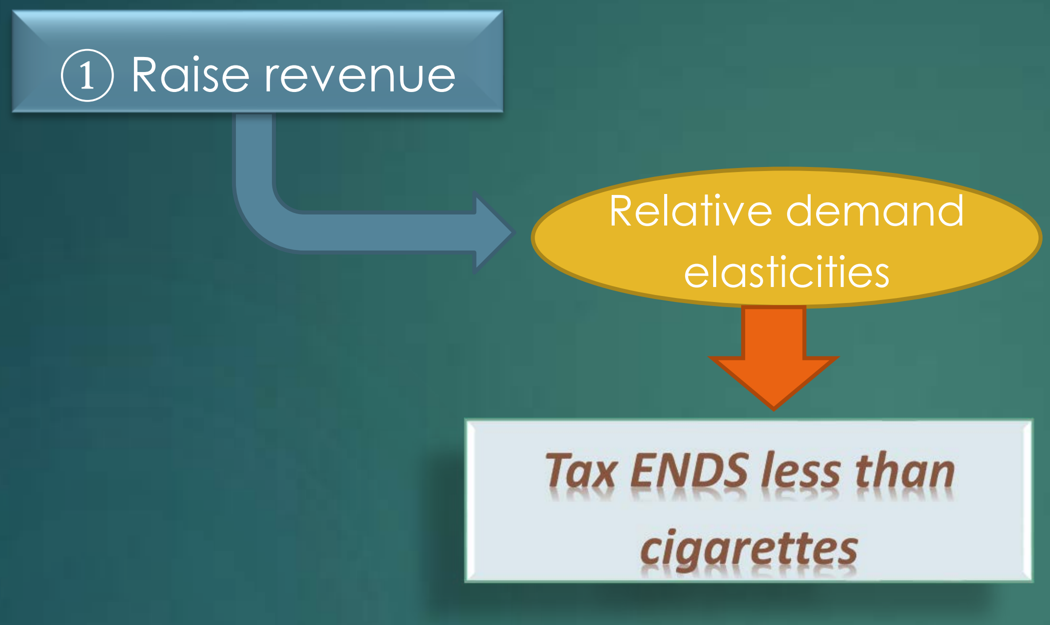
Three important facts about ENDS

1. ENDS are not risk-free products, but they are (almost certainly) not as harmful as cigarettes.
2. ENDS can help some smokers quit
3. ENDS and cigarettes are economic substitutes in demand. (Do, Shang, Huang et al., 2025; Pesko, 2023; Allcott & Rafkin, 2021; Cotti et al. 2022; Huang et al., 2014; Saffer et al., 2020; Stoklosa et al., 2016; Yao et al., 2020; Zheng et al., 2017)
   - Thus taxing ENDS will lead to increased demand for cigarettes

Motivations for taxing ENDS

- There are many motives and rationales for taxation
  1. Raise revenue
  2. Correct a market failure (Externalities)
  3. Improve public health
  4. Correct for behavioral irrationality ("Internalities")

The main results



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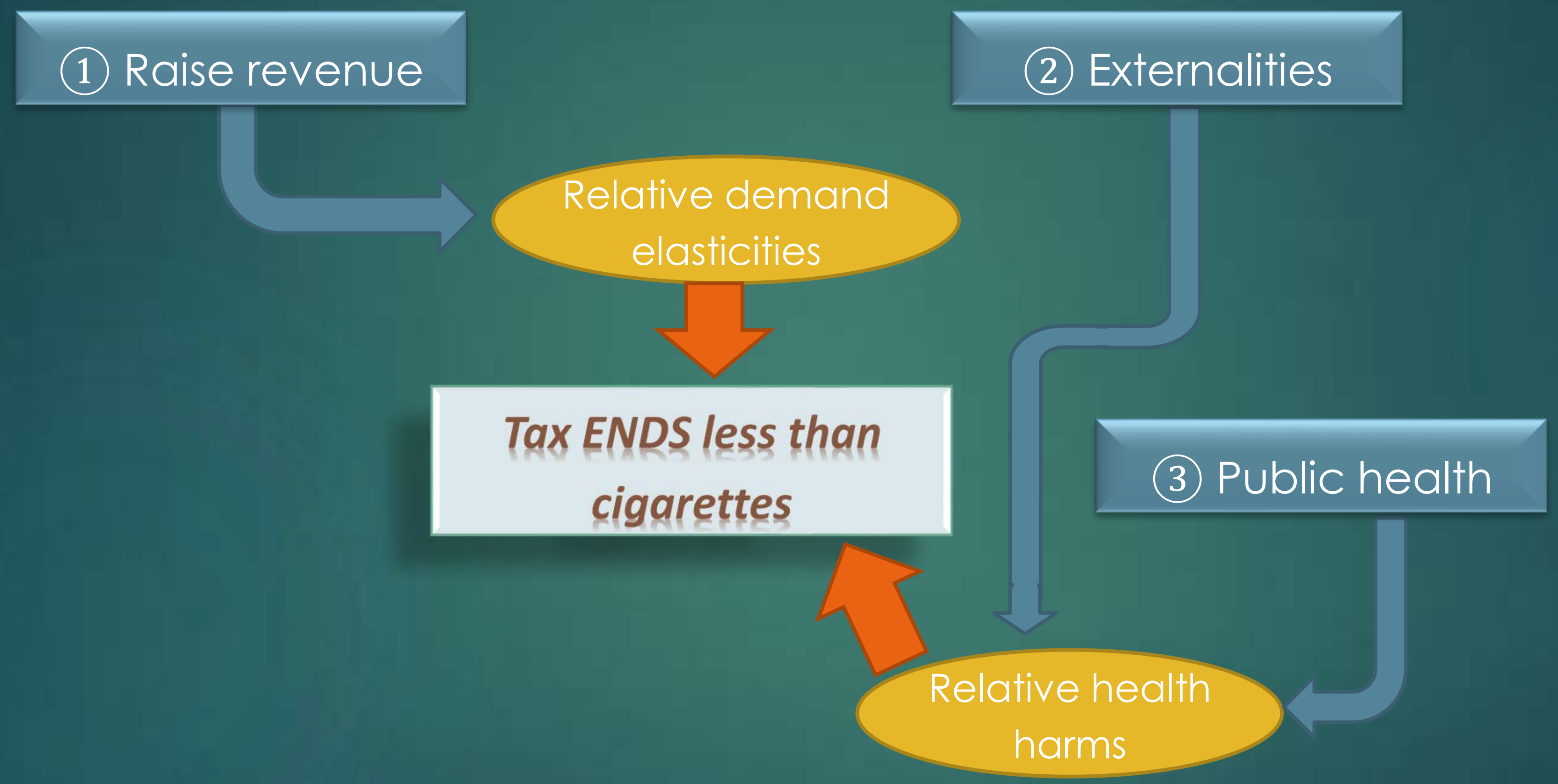

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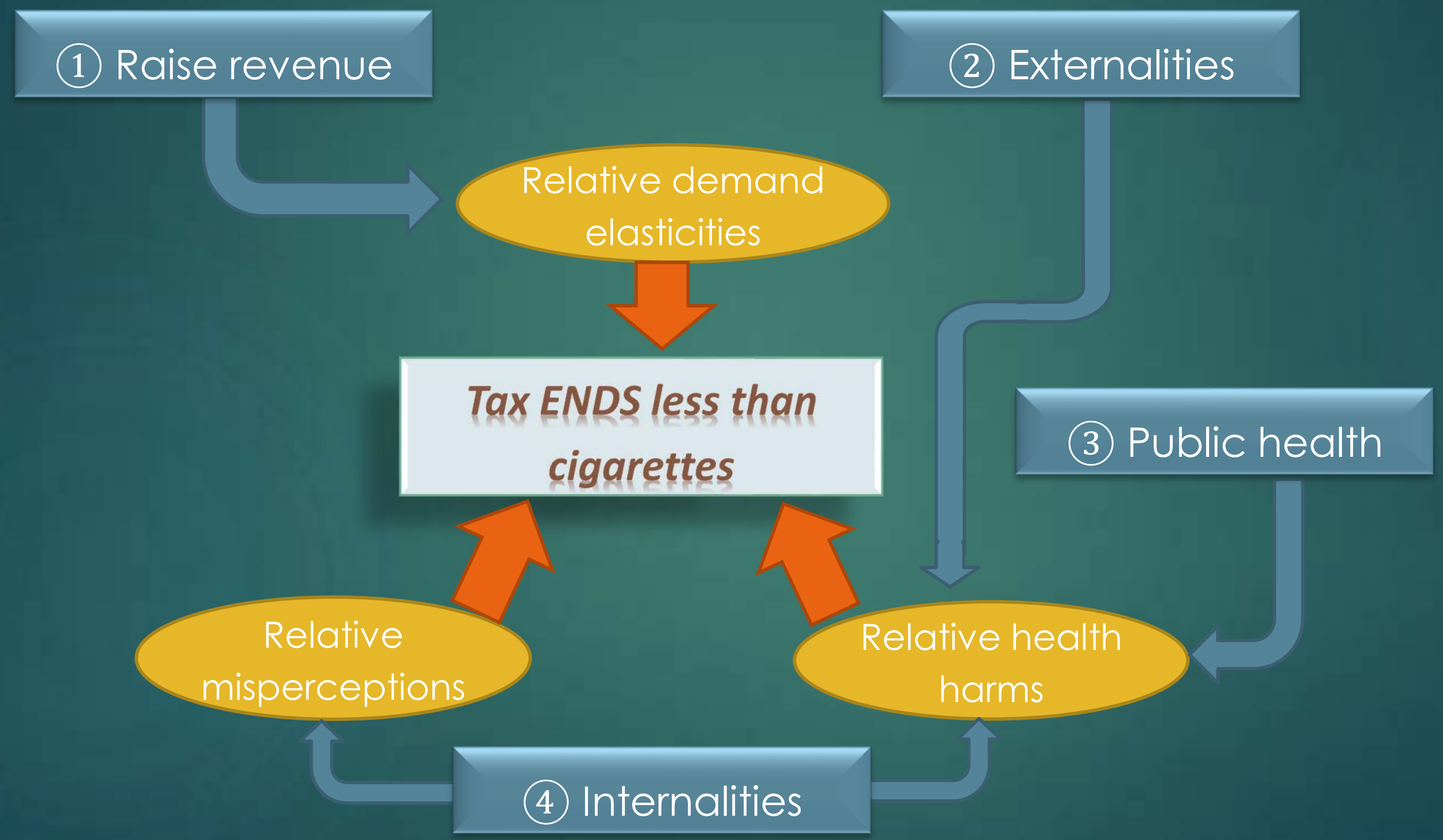

Rationale #1: Tax to raise revenue

- The (economist's) objective function with *K* tax rates

$$\max_{\tau_1,\ldots,\tau_K} TotalSurplus(\tau_1, \ldots, \tau_K) \;\; \text{s.t.} \; \sum_{k=1}^{K} \tau_k P_k Q_k(P_k) = \bar{R}$$

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- Solution: the *Ramsey Rule* for optimal commodity taxes
- Goods with *more elastic demand* are taxed *less*
- Under simplest assumptions (no cross-price effects in D), all taxes are proportional to the inverse elasticity of demand:

$$\tau_k \propto \frac{1}{|\varepsilon_k|}$$

Application to cigarettes and ENDS

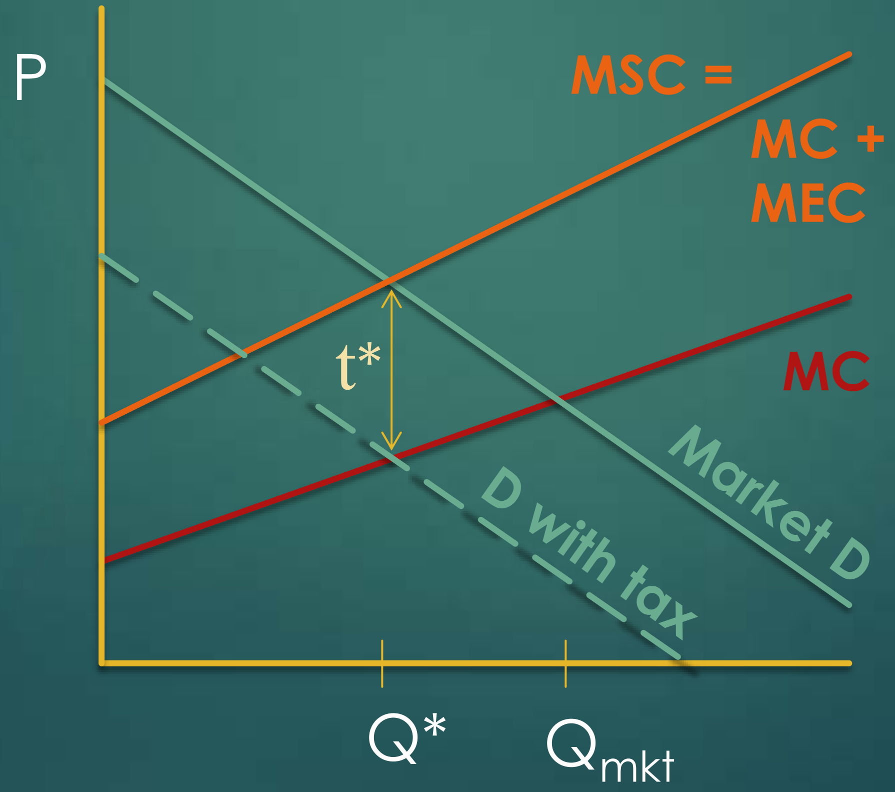
- Econometric evidence: $\varepsilon_{cigs} = -0.4 \qquad \varepsilon_{ecigs} = -2.3 \text{ to } -1.3$
- So the Ramsey Rule implies: $\dfrac{\tau_{cigs}}{\tau_{ecigs}} = \dfrac{|\varepsilon_{ecigs}|}{|\varepsilon_{cigs}|} = 3\tfrac{1}{4} \text{ to } 5\tfrac{3}{4}$
  - Cigarette taxes should be around **4.5** times the tax rate on ENDS

Application to cigarettes and ENDS

- Econometric evidence: $\varepsilon_{cigs} = -0.4 \qquad \varepsilon_{ecigs} = -2.3 \text{ to } -1.3$
- So the Ramsey Rule implies: $\dfrac{\tau_{cigs}}{\tau_{ecigs}} = \dfrac{|\varepsilon_{ecigs}|}{|\varepsilon_{cigs}|} = 3¼ \text{ to } 5¾$
  - Cigarette taxes should be around **4.5** times the tax rate on ENDS
  - Ramsey Rule with cross-price and income effects $\Rightarrow$ cigarette taxes should be **1¾** times the tax rate on ENDS

Rationale #2: Pigovian taxes to correct for externalities

- Optimality requires MSB = MSC.
- So the *optimal tax ratio* depends on the ratio of *marginal external harms* (MEC).



- Optimal tax: t* = MEC(Q*).

Application to cigarettes and ENDS

- Externalities from cigarettes: mostly 2nd hand smoke.
  - Second hand smoke causes about 40,000 deaths per year in the U.S. (1.5% of all deaths)

Application to cigarettes and ENDS

- ENDS:
  - Amounts of potentially harmful substances in secondhand vapor are a *small fraction of pollutants* found in secondhand smoke (Ruprecht et al., 2014; Schripp et al., 2013)
    - Typical finding: Palmisani et al. (2019): 20 mins vaping indoors creates 1-2 orders of magnitude *less* ultrafine particles (UFPs) than **1** cigarette.
  - Vaping within a closed, small room: air quality exceeds WHO or EU air-quality standards (O'Connell et al., 2015)
  - Any health risk from exposure to others' vapor is likely to be less harmful than secondhand smoke (lit review: Hess et al. (2016); National Academies of Science (2018))

Application to cigarettes and ENDS

- Conclusion: taxes on ENDS would be low under this rationale (Pigovian externalities)

Skip to Rationale #4:
To correct for internalities

- Behavioral economics
- Rests on one or both of two assumptions:
  - People misperceive (underestimate) the risks
  - People have time-inconsistent preferences

Rationale #4: To correct for internalities

- Regarding misperceptions:
  - For smoking, perceptions are fairly accurate: 87% of U.S. adults in 2022-23 believed that cigarettes are "very harmful" or "extremely harmful". Only 1.0% thought smoking was "not at all harmful" (Path Wave 7).
  - ENDS, perceptions are not at all accurate, but people **OVER**estimate risk:
    - 69% think ENDS are as harmful as cigarettes,
    - 16% think ENDS are *more* harmful, and
    - only 14% think ENDS are less harmful.
  - Behavioralist prescription: *subsidize* ENDS?

Rationale #4: To correct for internalities

- Regarding time inconsistent preferences
  - The present self wants to smoke. The future self wishes one hadn't smoked
  - Intrapersonal market failure $\Rightarrow$ "behavioral wedge" between true marginal cost of consumption and the true marginal benefits
  - Optimal tax: height of the wedge
  - Wedge is smaller for e-cigarettes, due to lower ignored health harms
- So, once again: optimal taxes would be lower for e-cigarettes than cigarettes

Summary: Regardless of motivation for taxation, optimal e-cigarette taxes are *lower* than optimal cigarette taxes

For the full presentation of these issues, see the journal article

- Prieger JE. Optimal Taxation of Cigarettes and E-Cigarettes: Principles for Taxing Reduced-Harm Tobacco Products. *Forum Health Econ Policy*. 2023 Dec 15;26(2):41-64.