Political Economy of Taxation When Lotteries are Regressive

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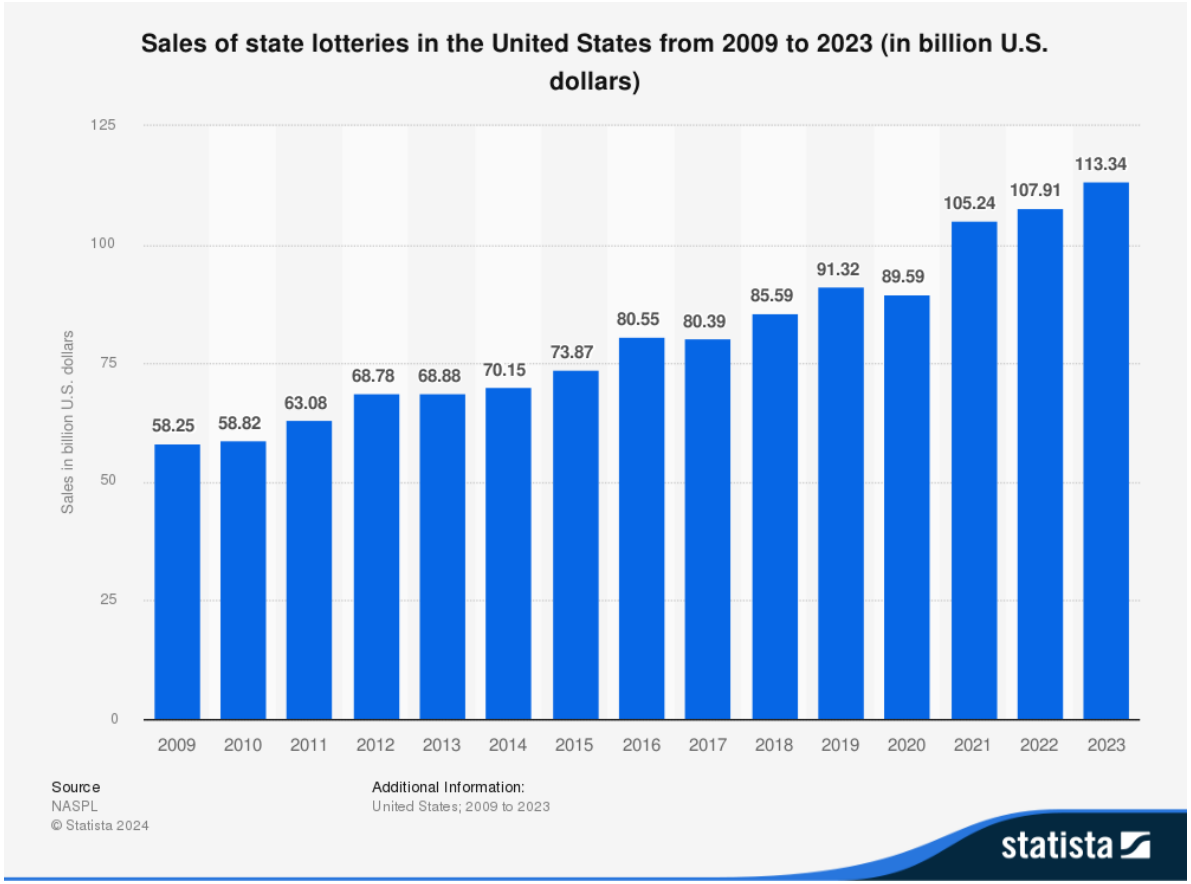
State Lotteries are Regressive Taxation

- Low-income citizens spend a relatively larger proportion of their income for state lotteries (Borg and Mason, 1988; Clotfelter and Cook, 1989; Kearney, 2005).
- Lotteries are issued to finance pubic goods (Morgan, 2000; Morgan and Sefton, 2002).
- These two essentially imply that lotteries, although they are not intended to be, are working as *regressive* taxation.

While regressivity of lotteries is well documented, studies on its effect to optimal income taxation is scarce.

Lottery Sales in the United States



- For comparison: Coke+Pepsi revenues in 2023 = 73.35B
- Is \$437 per adult per year big? The bottom 50% of earners pay \$1,307 as a federal income tax.
- 30–50% of lottery sales revenues are used for public goods.

Research Questions

- What are welfare implications on lottery issuance? How should the tax policy respond to the lottery sales?
- How would office-motivated political candidates set the lottery–taxation policy?
- How do the theoretical predictions vary by the citizens' motivations for buying lotteries?

Road Map

- Merely adding the lottery sales in the public finance model is useless.
- Need to consider some behavioral aspects; a literature review on why people buy lotteries
- A benevolent social planner version of optimal taxation when lottery sales are given
- Political economy of optimal taxation

A Simple Model

- A continuum of citizens, three types in terms of income-generating ability, θ_i, $i \in \{L, M, H\}$. (For now,) each type is equally populated.
- Citizen i's income $y_i = \theta_i l$, where $l \in [0, 1]$ is the amount of the labor supply.
- Each citizen decides how much to work to consume and how much to buy lotteries. Utility function is given as $U_i(c, l; T)$, where c consumption, l labor supply, and T is the lump-sum transfer (or additively separate benefit from public goods).
- $c_i = (1 - t)\theta_i l_i + s_i$, where s_i is the net payoff of buying lotteries. ($s_i = \varepsilon W - x_i$, where W is the lottery award, x_i is the expenses for buying lotteries, and ε is the probability of winning the lottery.)

A Simple Model

- A government needs to finance $G \geq 0$ via lottery sales, income taxes, or the mixture of the two. Assume that a government sets a linear income tax $t \in (0, 1)$, and the half of the total lottery sales becomes the government revenues.
- A government sets the optimal income tax and the lottery sales(*) that maximize the social welfare subject to citizens' rational choices under t and the government's budget constraint.
  - People buy more lotteries when the stake size increases (Kearney, 2005). The state government can have some controls over the lottery sales by adjusting the payout proportion.

Optimal Taxation When Everyone is Rational

- **No tax revenues** from the lottery sales.
- Since the expected net benefit of lotteries is negative, no rational citizens would buy a single lottery.
- This is perhaps why no public finance theories do not take into account lottery sales: Recall again that the optimal tax policy is the solution of the government social welfare maximization with a constraint of individual rationality.

Claim 1: When every citizen is rational, regardless of existence of lottery sales in the model, lottery sales won't play a role.

Taking Behavioral Patterns into Account

Why do people buy lotteries?

- **Cognitive bias**: subjective probability weighting (Tversky and Kaheneman, 1992), financial illiteracy and overoptimism (Chen, 2016), likelihood insensitivity (Choi et al., 2022), narrow decision bracketing (Haisley et al., 2008a).
- **Concerns for the socioeconomic rank**: (Injected) perception of being lower rank and reminder of fairness in lotteries facilitate lottery purchases (Haisley et al., 2008b). More income inequality encourages risk-taking behaviors (Payne et al., 2017).
- **Habits and external stimuli**: Varieties of legalized lotteries (Welte et al., 2016), parents' lottery purchasing experience (Ariyabuddhiphongs, 2011), and scratch-off lotteries as gifts make people buy lotteries more.

(For now) focus on *subjective probability weighting*.

Optimal Taxation When Some Buy Lotteries

- Six (=3×2) types of citizens.

	Ability		
Probability weighting	**P,L** N,L	**P,M** **N,M**	P,H **N,H**

- For consistency with the empirical regularity, I assume
  - $1 = p(P|L) > p(N|L) = 0$,
  - $\frac{1}{2} = p(P|M) = p(N|M) = \frac{1}{2}$, and
  - $0 = p(P|H) < p(N|H) = 1$,

  so that all low-income, half of middle-income, and no high-income citizens buy lotteries.

  (I practically consider four types of citizens.)

Optimal Taxation When Some Buy Lotteries

- Given lottery sales F, the government sets income tax rate t.
- Low-income citizens pay $2F/3$, and half of middle-income citizens pay $F/3$, which exacerbates income inequality.
- This implies that the government's redistribution motive becomes stronger, leading to a **more progressive** tax policy.
- More progressivity leads to larger distortions of labor supply, especially those on top, decreasing the social welfare.

Claim 2: When lower-income citizens tend to buy lotteries more, the income tax should be more progressive. The social welfare decreases in F. (Normatively speaking, there should be no public financing via lottery sales, contrary to Morgan (2000).)

Political Economy of Taxation

- Taxes are not set by benevolent governments, but by politicians who have objectives different from citizens (Acemoglu et al., 2010)
- Would politicians propose a reform to reduce F?
- (I will later consider a Downsian model of office-motivated political candidates who set F and t simultaneously, but)
- Consider a referendum; a politician who wants to keep his/her current office decides whether to propose a reform. If majority of citizens prefers the reform, the politician keeps the office.

Political Economy of Taxation

Consider the status quo ($F > 0$ and t) and the socially-optimal reform ($F = 0$ and $t' < t$).

- All high-income citizens prefer the reform. 👍
- Half of middle-income citizens who do not buy lotteries compare the benefit (lower taxes) with the cost (lower transfers). Under a typically-assumed skewed income distribution, the cost exceeds the benefit. 👎
- Lottery-buying middle-income citizens can be better or worse off. The benefit (not losing money on lotteries and lower taxes) may exceed the costs. It depends on parameters. 👍👎
- All low-income citizens, who were the beneficiaries of the lump-sum transfers, do not prefer the reform. 👎

Claim 3: Regressive lotteries decrease social welfare, but politicians do not want to propose a reform.

Discussions: Things I should consider

- I assumed that citizens are free from 'narrow bracketing' biases. If people do not perceive the connection between lottery and tax revenues, politicians may even want to propose a **welfare-diminishing reform**: More lottery sales and more progressive tax.
- I did not focus on the concerns for the socioeconomic rank (Kim, 2019). If income inequality encourages risk-taking behaviors, lottery purchasing behaviors will exacerbate the income inequality, igniting a vicious circle. To make a full stop, a very progressive redistribution might be needed.

Discussions: Things I would consider less

- I ignored the hedonic utility of lotteries: perhaps the lottery renders some entertainment values (dopamine?) independent to the monetary outcomes. With adding this, the model predictions will be ad hoc.
- I did not consider corrective taxation on lotteries. Higher ad valorem tax is effectively identical to the decrease in the payout proportion. Progressive taxation (e.g., buy one with no taxes, but two or more with taxes) can be avoided when lotteries are anonymous.

Future Directions

Experiments examining the relationship between lottery buying behaviors and preferences for redistribution.

- Morgan and Sefton (2002) and Lange et al. (2007) provide experimental evidence on using lotteries to provide public goods. They were abstract in income heterogeneity and redistribution.
- N citizens with exogenously given abilities (piece-rate wage on a real-effort task).
- The income tax rate t is announced or determined.
- They work on the real-effort task. With the disposable income, they can buy lotteries.
- The winning probability increases in the relative proportion of lottery purchases. The winner gets a half of the lottery sales.
- Final payoffs are a sum of net disposable income and transfers.

I consider varying the ability distribution, the income tax rate, and how the income tax is determined.