

Commentary: Soda Taxes, Obesity, and the Shifty Behavior of Consumers

Ryan D. Edwards^{a,b,*}

^a*Economics Department, Queens College, City University of New York, Powdermaker
300, 65-30 Kissena Blvd., Flushing, NY 11367, USA*

^b*National Bureau of Economic Research, 1050 Massachusetts Ave., Cambridge, MA
02138, USA*

Abstract

Rising obesity is a threat to public health, and taxing sugar-sweetened beverages (SSBs) in order to reduce consumption and thus caloric intake could be a viable policy response. But raising the price of SSB calories will raise the quantity demanded of relatively cheaper calories, and net effect on obesity is unclear. I review the evidence on shifting calorie demand and discuss the viability of soda taxes to achieve improvements in public health.

Keywords:

Soft drink taxation; Beverage; Weight

JEL classification: I18; H75

1. Introduction

According to a basic law of economics, placing an excise tax on sugar-sweetened beverages (SSBs) would directly raise their prices, reduce the quantities of SSBs demanded and consumed, and would raise revenue, which is currently in short supply at every level of government. In these pages, Andreyeva et al. (2011) present a new estimate of the effects of a penny-per-ounce SSB tax on consumption of SSBs and tax revenues using national data and estimates of consumer responses from an earlier meta-study (Andreyeva et al., 2010). Their analysis is standard and their basic results are reasonable. But what is the motivation behind taxing SSBs? Another insight from

*Tel.: +1-718-997-5189; fax: +1-718-997-5466.

Email address: redwards@qc.cuny.edu (Ryan D. Edwards)

economics is that taxes typically distort behavior and reduce well-being, especially for low-income consumers. Absent some extra justification, tax rates should generally either be zero or low.

2. Soda taxes, obesity, and shifting demand

The specific rationale for an excise tax on SSBs is that it might lower rates of obesity by reducing caloric intake. Obesity is broadly perceived as a threat to individual health, and the burden of higher medical costs associated with obesity-related illnesses is spread broadly through systems of public and private health insurance (Bhattacharya and Sood, 2007). High excise taxes on cigarettes are motivated in part by the future costs borne by governments of treating smoking-related illnesses. A tax on obesity could be justified using similar logic.

But taxing obesity per se is different than taxing SSBs. The former is probably illegal, while the latter is already in effect in a number of states, albeit at relatively low levels of taxation. Taxing SSBs is guaranteed to reduce SSB consumption, to raise revenue, and to raise the ire of the beverage industry, which has successfully funded efforts to block or repeal increased SSB taxes around the country (Peters, 2010). It probably also irritates or distresses low-income consumers, for whom grocery bills represent a larger share of household expenditures. It is much less clear whether taxing SSBs actually reduces obesity.

The net effect on obesity is theoretically ambiguous because we know that consumers will shift their demand toward cheaper foods in response. Taxing all SSBs will certainly reduce SSB consumption, but it is likely to increase consumption of very close substitutes like diet soft drinks, and also fruit and vegetable juices, milk, water, and maybe alcoholic beverages. An SSB tax might also reduce demand for a complementary good like salty snacks. The net impact of an SSB tax on obesity therefore depends not only on the own-price responsiveness of the demand for SSBs, which Andreyeva et al. (2011) measure, but also on the cross-price responsiveness of the demand for a broad range of substitutes and complements, which they do not.

The net effect on caloric intake of this shifting is not guaranteed to be negative because consumers choose foods based on many characteristics beyond caloric content. Schroeter et al. (2008) formalize this argument, showing how taxes on some types of food might even raise obesity if close substitutes actually have higher caloric content. But soda taxes might be a better bet than

others. Using a full set of own- and cross-price substitution elasticities based on scanner data, Schroeter et al. estimate that a tax on soft drinks is likely to reduce net caloric intake. But the empirical relationship between soda taxes and obesity is ultimately of most interest, and several recent studies have explored it using multiple data sources.

3. A wide array of estimates

No randomized controlled trials (RCT) exist in this literature, most studies encounter some difficulties with measuring treatments and outcomes, and each uses different data. The end result is a wide range of study designs and results. Of recent efforts, Andreyeva et al. (2011) is unique in not accounting for consumers' substitution toward cheaper sources of calories and in conducting a calibration exercise with behavioral parameters drawn from an earlier meta-study and quantities drawn from separate national data. These are both weaknesses.

Like the papers examined by the earlier meta-study (Andreyeva et al., 2010), Finkelstein et al. (2010) estimate own- and cross-price elasticities via a traditional demand analysis using a year of monthly data on prices and quantities of an array of beverages purchased by households in the 2006 Nielsen Homescan panel. Based on their estimates, they forecast effects on beverage purchases that should result from 20% and 40% soda taxes if the elasticities remain unchanged.

Other studies examine how consumption and obesity respond to changes in prices over time using panel data, a study design that is closer to the RCT standard. Fletcher et al. (2010a) estimate the impacts of SSB taxes on state-level obesity rates using repeated cross sections of survey data combined with price data and state-level tax rates with a fixed-effects strategy. Fletcher et al. (2010b) explore children's access to soda vending machines at school in two waves of the Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K), and they also compare children's weight and consumption of soda across high SSB-tax and low SSB-tax states in two NHANES surveys. Fletcher et al. (2010c) examine the NHANES data in greater detail, matching it to the state-level tax data in Fletcher et al. (2010a) and performing a similar fixed-effects analysis. Sturm et al. (2010) also study the ECLS-K and explore how soda consumption and BMI respond to soda taxes as measured in a second database.

Table 1: Estimated marginal effects of a 20% increase in the tax rate on SSBs

Study	Design	Universe	Accounts for Substitution	Change in BMI (%)
Andreyeva et al. (2011)	calibration	population	no	-3.29
Finkelstein et al. (2010)	cross section	households	yes	-0.46
Fletcher et al. (2010a)	panel	population	yes	-0.23
Fletcher et al. (2010b)	panel	adolescents	yes	0.00
Fletcher et al. (2010c)	panel	adolescents	yes	0.00
Schroeter et al. (2008)	calibration	households	yes	-0.22
Sturm et al. (2010)	panel	adolescents	yes	-1.00

Notes: Authors' calculation based on reported estimates. The estimate listed for Schroeter et al. (2008) is the average for men and women. Fletcher et al. (2010b,c) find a statistically insignificant positive marginal effect.

For comparability, I have translated each study's results into an percentage effect on average obesity as measured by body mass index (BMI) that would be associated with a 20 percent increase in the tax rate on SSBs. The array of estimates from these studies are shown in Table 1. Andreyeva et al. report results that imply the largest effect on BMI, a reduction of 3.29%, but it is also the only study that does not model or measure the effect of substitution toward other beverages or foods, which would tend to reduce the marginal effect on BMI. All other recent studies find smaller effects, or in the case of Fletcher et al. (2010b,c), statistically insignificant positive effects of SSB taxes on BMI. Sturm et al., whose study accounts for substitution, report -1%, the second-largest marginal effect.

4. Challenges

The literature does not speak with one voice on the magnitude or even the sign of the effect on obesity of SSB taxes. Given that the primary justification for an SSB tax is that it might reduce obesity, it seems clear that more research is needed before adopting such a policy. Governments could raise a lot of revenue simply by taxing everyday activities of any kind. But taxes are fundamentally unwelcome, as evidenced by prevailing political winds and supported by economic theory. Taxes are appropriate if the benefits associated with reducing the behavior exceed the costs of taxation that are borne by consumers and producers. The benefits of SSB taxation in terms of reduced obesity are unproven. A 20 percent tax that only raises \$79 billion

nationally is not a particularly convincing solution to the 50 states' fiscal problems or the nation's.

What is apparent from the literature that consumers' substitution behavior is very important in understanding the effects of food and beverage taxation. Studies that omit substitution behavior, like Andreyeva et al. (2011), do not provide useful insights into the key question of whether taxing SSBs is similar enough to taxing obesity that some clear public good might be achieved by levying such taxes. The available evidence is sufficient to raise healthy skepticism, and that should drive us toward further study and alternatives.

References

- Andreyeva, T., Chaloupka, F. J., Brownell, K. D., 2011. Estimating the beverage tax potential to reduce beverage consumption and generate revenue. *Preventive Medicine X (X)*, X.
- Andreyeva, T., Long, M. W., Brownell, K. D., 2010. The impact of food prices on consumption: A systematic review of research on the price elasticity of demand for food. *American Journal of Public Health* 100 (2), 216–222.
- Bhattacharya, J., Sood, N., 2007. Health insurance and the obesity externality. *Advances in Health Economics and Health Services Research* 17, 279–318.
- Finkelstein, E. A., Zhen, C., Nonnemaker, J., Todd, J. E., Dec 13/27 2010. Impact of targeted beverage taxes on higher- and lower-income households. *Archives of Internal Medicine* 170 (22), 2028–2034.
- Fletcher, J. M., Frisvold, D., Tefft, N., January 2010a. Can soft drink taxes reduce population weight? *Contemporary Economic Policy* 28 (1), 23–35.
- Fletcher, J. M., Frisvold, D., Tefft, N., May 2010b. Taxing soft drinks and restricting access to vending machines to curb child obesity. *Health Affairs* 29 (5), 1059–1066.
- Fletcher, J. M., Frisvold, D. E., Tefft, N., December 2010c. The effects of soft drink taxes on child and adolescent consumption and weight outcomes. *Journal of Public Economics* 94 (11–12), 967–974.

Peters, J., July 13 2010. Soda taxes fizzle in wake of industry lobbying. The Washington Post July 13.

Schroeter, C., Lusk, J., Tyner, W., 2008. Determining the impact of food price and income changes on body weight. *Journal of Health Economics* 27 (1), 45–68.

Sturm, R., Powell, L. M., Chriqui, J. F., Chaloupka, F. J., May 2010. Soda taxes, soft drink consumption, and children's body mass index. *Health Affairs* 29 (5), 1052–1058.