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CHOICES
a publication of AAEA Agricultural & Applied Economics Association
The Magazine of Food, Farm and Resource Issues

3rd Quarter 2011 | 26(3)

SODA TAXES AND SUBSTITUTION EFFECTS: WILL OBESITY BE AFFECTED?

Jason Fletcher
JEL Classifications: I12, H20, H71
Keywords: Obesity, Soft Drink Taxation

This article is part of a series of Policy Issues articles on Soda Tax. You can also find articles on Should Soft Drinks be Taxed More Heavily?, Can Taxing Sugary Soda Influence Consumption and Avoid Unanticipated Consequences?, Sugar-Sweetened Beverage Taxation as Public Health Policy-Lesson from Tobacco, Better Milk than Cola: Soft Drink Taxes and Substitution Effects, Evaluating Excise Taxes: The Need to Consider Brand Advertising, and Caloric Sweetened Beverage Taxes: The Good/Food/Bad Food Trap as part of this theme.

Although the United States has a relatively long history of taxing soft drinks, it has only been in the past decade that public health experts have focused on this policy as a way of potentially curbing the growing prevalence of obesity for both adults and children (Jackson and Brownell 2000; Brownell and Frieden 2009; and Andreyeva, Long, and Brownell, 2010). This recent focus has occurred for many reasons, including the large amounts and increases in soft drink consumption; increases in obesity, against the backdrop of ineffective policy responses; and the considerable success of tobacco taxes in reducing tobacco use in the previous decades. These factors point to a need to craft policy interventions to combat obesity and a compelling example to guide a policy of taxation related to specific types of consumption.

Soft drinks and the larger group of sugar-sweetened beverages (SSBs) appear to be reasonable targets because they are often considered to be "empty calories"—a category of consumption with very little nutritional value—and because they are a surprisingly large category of caloric intake for both adults and children. Putnam and Allshouse (1999) report that soft drink consumption has increased by almost 500% in the past 50 years, and recent data suggest it represents 7% of overall energy intake in adults and often larger proportions in children (Block, 2004). For example, Wang, Bleich, and Gortmaker (2008) estimate a 16% share of calories in youth ages 12-19 and 11% in children ages 2-11. However, some evidence points to recent reductions in soda consumption among some groups (Welsh, et al., 2011).

Indeed, soft drink taxation has been an increasing focus of state legislatures across the United States. Soft drink tax legislation was filed in 17 states between January 2009 and May 2010 (Yale Rudd Center for Food Policy and Obesity, 2010). While many of these bills failed, there is growing support from the public and health experts for such a tax. Additionally, as of the first quarter of 2011, over a dozen states were considering new excise taxes on SSBs in the legislative session. The benefits are touted to be widespread, including increased tax revenues, reductions in unhealthy beverage consumption, a reduction in obesity and associated illnesses such as diabetes, and potential downstream effects on the labor market and medical utilization and expenses. With this list of potential benefits, it is important to highlight obesity's role in the policy debate—while it is the clear focus of public health officials, other benefits of a potential soda tax should not be ignored, including those commonly discussed as well as more distal effects, such as improved dental health through reductions in sugar consumption. The focus on obesity is an important issue in this debate because much of the available evidence suggests that soda taxation may have negligible effects on obesity. If obesity was the main reason to consider taxation, then this evidence may imply that soda taxes may be unwarranted. However, a broader perspective on the potential health and economic gains from such a tax should be considered in evaluating this policy option.

Uncertainty about Effectiveness of Soft Drink Taxation to Reduce Obesity

On one hand, the potential benefits of soda taxation on obesity seem quite straightforward. We know that soda consumption is an important share of total consumption, and ample evidence suggests that maintained reductions in consumption of approximately 100 calories per day—less than a can of soda—could halt weight gain for 90% of the population (Hill, et al., 2003). Thus, basic economic theory suggests that raising the price of soda would reduce consumption and reduce population weight. This intuition is buttressed by the history of tobacco taxation, where price increases in cigarettes and other tobacco products have appeared to substantially reduce consumption. On the other hand, there is now ample research that examines the association between the level of state soft drink taxes—or soft drink prices—and obesity rates and found no effect (Fletcher, Frisvold, and Tefft, 2010 a, b, c).

The answer to this apparent discrepancy between intuition and empirical evidence may be quite simple—substitution effects. This becomes more apparent when we consider the important differences between the consumption of tobacco and soda. In a sense, the different results between tobacco and soda taxation are a matter of the definition of policy goals and in considering precisely what desire is being satisfied for individuals who consume tobacco or soda. For tobacco, we might think that the demand the product satisfies is somewhat narrow, mainly nicotine, and the policy of tobacco taxation was aimed at reducing consumption. For soda, the demand for the product seems broader, including its sweetness/sugar and its calories. This basic difference suggests a smaller ability for soda taxation to reduce the quantity of sugar/calories because of the many opportunities for substitution to other products. In contrast, it is more straightforward to tax the larger class of products containing nicotine and potentially reduce its consumption.

In emerging results, this substitution effect seems to answer the question of why taxes seem to lead to soda consumption reduction but not lower obesity rates. Fletcher, Frisvold, and Tefft (2010c) use the National Health and Nutrition Examination Survey (NHANES) dietary data to show evidence that, while individuals in states with higher soda taxes have lower soda consumption, these individuals completely offset the reductions in calories from soda by consuming other high-calorie beverages, such as milk and juice. This evidence is consistent with the view that individuals demand calories each day, and if the price increases on one mechanism of attaining calories (soda) then individuals shift their consumption relatively easily to satisfy their demand. These results are not without controversy, though, as research that uses simulation methods, and assumes lower levels of substitution to high-calorie drinks, suggests that soda taxes could reduce obesity (Smith, Lin, and Lee, 2010).

The clear and intuitive substitution effect found in Fletcher, Frisvold, and Tefft (2010c) has implications for the type of policies that we might then suggest to reduce obesity in the population. Broader taxes on higher calorie products would appear to allow less substitution than narrow taxes. However, an issue with this approach is the number of healthy high-calorie products—for example, milk and juice—that would be difficult to motivate including in the tax category. A more general excise tax on added sugar may serve to shift consumption to alternative products.

Related to the issue of substitution, a second potential limitation with the discussion of soda taxation in policy circles is the insistence on comparing the debate surrounding soda taxes to the debate and eventual success of tobacco taxes. While there are clear similarities with how public perception has changed over taxation, as well as how the relevant industry has lobbied against the imposition of taxes, there are also some key differences. Unlike soda consumption, there is no completely safe level of tobacco consumption. While there are likely to be health consequences for any level of tobacco use, it is only excess calories from soda that increase weight. In this way, the issue of soda taxation may be more similar to that of alcohol taxation than to tobacco taxation. In both cases, the health consequences seem to be specific to heavy or excessive consumption, but moderate consumption may pose no health risk. This is an important distinction because an evaluation of the success of the policy of taxation would need to center on reductions in problem users rather than reductions in moderate users. Indeed, in the case of alcohol taxes, Manning, Blumberg, and Moulton., (1995) found that only moderate drinkers—and not problem drinkers—reduce consumption when alcohol taxes increase. This undercuts the public health goals of the policy because it penalizes responsible users and has no effect on the problem users and the associated externalities, such as drunk driving. Similarly, we may be concerned whether any reductions in soda use are coming from individuals who are consuming excess calories, or those with otherwise healthy diets and weights. There is currently very little evidence related to this research question.

New Tax Policy Proposals and the Potential for Obesity Reductions

A primary limitation in the current research examining the effects of soda taxation on obesity is the limited policy variation that is available. While most states tax soda either through excise taxes or through sales taxes—the rates are currently quite low and they are not often clear to the public. Because many states use the sales tax instead of an excise tax, consumers do not see the tax in the posted shelf price—it is added at the register. Thus, some consumers may not know they are being taxed differentially for soda. In addition, the low rates of soda taxation may be below some critical (and unknown) threshold where consumers react. Fletcher, Frisvold, and Tefft (2010c) show reductions

in soft drink consumption associated with soda taxes in NHANES data of about 6 calories per day for each 1-cent increase in tax. So, there is evidence of some reaction, but it is counteracted through substitution to other high-calorie drinks. These small (and "hidden") tax rates on soda have led many proponents to suggest that only large taxes will reduce obesity rates. The claim is that when consumers know they are being taxed—and taxed heavily—they will react by lowering soda consumption and will, thus, over time, lose weight. The key assumption with this claim is the existence of a threshold of taxation where substitution patterns abruptly shift. Indeed, many proponents of increased soda taxation assume that over one-third of soda consumption is shifted to water, which has zero calories, if there is an 18% to 20% increase in soda taxes. Of course, this could be true—there could be a threshold effect in consumers' substitution patterns. However, there seems to be no evidence for the existence of a threshold, and this implicit assumption in many proponents' analyses is often not discussed.

Ongoing Policy Considerations

The simplicity of the reason that soda taxation appears to be ineffective in reducing obesity is both vexing for current policy efforts but also potentially useful for future policy efforts. While currently proposed soda taxes likely will not overcome the issue of substitution, it might be constructive for future policies to focus attention on this particular component of the pathway between commodity prices and eventual weight. Specifically, efforts to constrain the availability of substitutes, particularly for children, may serve as a useful complement to ongoing policies aimed at reducing obesity. As an example, Fletcher, Frisvold, and Tefft., (2010a) show that children in schools subjected to vending machine restrictions drink the same number of soft drinks as those in schools with no restrictions, again suggesting the issue of substitution effects. That is, most students have multiple avenues to purchase soft drinks in schools in addition to vending machines, such as school stores, cafeterias, and the like. But a more comprehensive policy that removed soda from all school facilities and substituted water may serve to reduce soda consumption in school. An open question is whether after-school soda consumption might compensate for in-school reductions. However, the potential goal for policies would be to limit the availability of substitution between soda and other high-calorie drinks—perhaps policies can interactively work together to both shift students away from soda through the price mechanism and also limit availability of other substitutes. Although on its own, the prospects of soda taxation contributing to substantial reductions in obesity seem limited, more comprehensive policies may serve to affect the change in obesity rates that proponents desire. For example, Massachusetts recently passed new school standards that ban foods with artificial sweeteners, trans-fats, and caffeine from schools' a la carte lines, vending machines, stores, events, and fundraisers. The standards also require schools to offer unsweetened fruits and vegetables, and provide water for free at all times (Kaiser 2011).

Finally, although new soda taxation may fail to meet its primary stated purpose of reducing obesity, it may yet enhance population health. Because soda consumption is typically "empty calories" with little nutritional value and it also reduces dental health, policies such as soda taxation, which have been shown to reduce soda consumption, may still be an effective health policy without actually contributing to its main goal of obesity reduction.

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Jason Fletcher (jason.fletcher@yale.edu) is an Associate Professor in Yale University's School of Public Health, Division of Health Policy and Administration, New Haven, Connecticut., as well as a Health and Society Scholar for the Robert Wood Johnson Foundation at Columbia University, New York, N.Y.

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