

Should we put a thin subsidy on the policy table in the fight against obesity-?

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Abstract

The idea of using ‘fat taxes’ to curb obesity rates has been raised by many. In particular, the idea of taxing sugar-sweetened beverages (SSBs) has received considerable attention in the United States and has recently been discussed by President Obama. Rather less attention has been given to the alternative of ‘thin subsidies’, that is, subsidies for the consumption of foods or beverages likely to be associated with reduced incidence of obesity. This commentary examines the case for a subsidy for artificially sweetened beverages (ASBs) or ‘diet soft drinks’. In this commentary, we outline the evidence on the relationship between health outcomes, most notably obesity, and the consumption of SSBs and ASBs. In the light of the evidence we consider the economic effects of taxing SSBs, and the way in which those effects would be modified by the adoption of the alternative ‘thin subsidy’ based on subsidising ASBs.

Keywords- Fat Tax; Thin Subsidy; Obesity; Sugar Sweetened Beverages; Soda Tax; Artificially Sweetened Beverages

Introduction:

The idea of using ‘fat taxes’ to curb obesity rates has been raised by many^{1, 2,3}. In particular, the idea of taxing sugar-sweetened beverages (SSBs)¹ has received considerable attention in the United States⁴ and has recently been discussed by President Obama. In May 2009, the Senate Finance Committee heard testimony from advocates of public health who argued that the tax could reduce obesity and help finance new health care legislation.

Rather less attention has been given to the alternative of ‘thin subsidies’, that is, subsidies for the consumption of foods or beverages likely to be associated with reduced incidence of obesity. Proponents of a thin subsidy argue that subsidising healthy diets will be more equitable and effective than taxing foods considered unhealthy. For example⁵ subsidies for fruit and vegetables have been proposed with the aim being to increase consumption.

This commentary examines the case for a subsidy for artificially sweetened beverages (ASBs) or ‘diet soft drinks’. The idea behind proposing such a subsidy is three-fold. First, the general arguments in favour of differential treatment of ‘healthy’ and ‘unhealthy’ foods are stronger in the case of SSBs than for foods in general because of the particular characteristics of these beverages. Second, the same characteristics imply that a thin subsidy would have demand effects similar to those of fat tax. Third, the evidence that a tax on SSBs will be regressive, and a subsidy on ASBs progressive, is clear-cut.

In this commentary, we outline the evidence on the relationship between health outcomes, most notably obesity, and the consumption of SSBs and ASBs. In the light of the evidence we consider the effects of taxing SSBs, and the way in which those

¹ We will use the term SSB, to include soft drink, concentrated fruit juices, flavored milks, cordials and all other sweet non-alcoholic beverages flavored with sugar, most commonly sucrose or high fructose corn syrup. The term ASB will be used to describe similar beverages flavored with a non-nutritive sweetener such as saccharine or aspartame. Particularly where we wish to distinguish SSB and ASB versions of the same beverage (such as Coke Regular and Coke Zero), the terms ‘sugar-sweetened’ and ‘diet’ will also be used.

effects would be modified by the adoption of the alternative ‘thin subsidy’ based on subsidising ASBs.

Economic Analysis of Demand for Artificially Sweetened Beverages

In economic terms, a food or beverage, may be regarded as supplying a bundle of characteristics: in the case of SSBs, the most important are thirst quenching, sweetness, energy supply and, in some cases, stimulus from caffeine. Demand then depends on the intensity with which these characteristics are demanded and the interactions between them. Demand for characteristics is determined by personal tastes, incomes and relative prices. Personal tastes are partly exogenous but may be affected by advertising, public education and other variables amenable to policy intervention.

The relationship between income and demand is important, because of the regressive effects of taxing goods whose characteristics lead them to be demanded relatively intensively by individuals of low socio-economic status (SES). In particular, minimum requirements for energy intake are determined by physical requirements and energy intake in excess of the minimum, or of the desirable level, is not closely related to income. This means that taxes on foods, which provide intake at low cost are likely to be regressive.

Relative price effects depend on the characteristics associated with particular goods. Comparing ASBs to SSBs, the main difference is the absence of energy supply. Hence, if energy supply is neither demanded for its own sake, nor an essential component of the bundle of benefits associated with consumption of SSBs, the ASB will be a good substitute for the SSB. In this case, either a ‘fat tax’ on the SSB or a ‘thin subsidy’ for the ASB will produce the same result - a reduction in SSB consumption and a corresponding increase in ASB consumption, with little impact on the consumption of other foods and beverages. However, the SSB tax is regressive.

In the case where energy is demanded for its own sake, ASBs will be poor substitutes for SSBs, so that a subsidy on ASBs will not have much impact on SSB consumption.

In this case, however, a tax on SSBs will also prove ineffective with respect to obesity, since consumers will increase their intake of energy from other food sources.

Finally, in the case where energy supply is an essential component of the bundle of benefits associated with consumption of SSBs, a subsidy on ASBs will be relatively ineffective, but a tax on SSBs may be effective in reducing energy intake. The tax of SSBs will however tighten the budget constraint even further on low-income households, with no guarantees that they will not substitute away from previously purchased healthful foods.

Tax policy and food

Economists are divided on whether food should be taxed at the same rate as other items of consumption (as in New Zealand) or exempted from taxation (as is the case for grocery food items under most State sales taxes in the United States).

The dispute over exempting food in general from taxation turns on two main issues. The first is the regressivity of a tax on food, arising from the fact that food makes up a greater proportion of expenditure for poor households than for well-off^{5,6}. Opponents of an exemption argue either that the extent of regressivity has been exaggerated or that other (commonly unspecified) measures could be used to offset the regressive impact.

There is little support among economists for systematic discrimination between ‘good’ and ‘bad’ foods. Such discrimination takes place in the value-added tax systems of Ireland and Australia, where ‘fresh’ food is tax-free but ‘processed’ food is taxed at the standard rate. This distinction, although justified on health grounds, is not closely related to the dietary value of the food concerned. In Australia, for example, fats, sugar and flour are all tax-free, but cookies and crackers are taxed at the standard rate. Milk is tax-free, as are most flavouring ingredients, but flavoured milk is taxed at the standard rate.

The definitional problems observed in Australia cast doubt on the assumption that it is possible, in general, to distinguish desirable and undesirable foods. Many nutritionists reject this assumption given that nearly all foods are beneficial as part of a balanced diet⁷. Conversely, any food, consumed to excess will adversely affect health⁸. SSBs provide something of a special case. Since most diets contain adequate or excessive

amounts of sugar even without taking beverages into account, it is arguable that the most desirable consumption level for SSBs is zero. Hence, policies directed at reducing SSB consumption appear less problematic than attempts to target a broad range of ‘unhealthy’ foods.

Empirical Evidence:

The Link Between Obesity and Sugar Sweetened Beverages

The consumption of SSBs is positively associated with higher energy intake, weight gain, obesity and diabetes^{9,10,11,12}. Given the literature highlights^{13,14} that obese adolescents are likely to be obese into adulthood, this group is the best target with respect to long run obesity outcomes. In addition, given their high-energy intake from SSBs, obese adolescents are the group that could benefit the most from a direct substitution to ASBs. Other studies examine the reduction of SSBs with no substitution. It has been found¹⁵ that reducing SSB consumption in adults leads to weight loss that is sustainable in an eighteen month randomised, controlled, behavioural intervention trial.

Substitution with Artificially Sweetened Beverages

The science behind the effectiveness of a thin tax subsidy is linked to the evidence that sugar seems to be less satiating when provided in liquid form and attributes to incomplete energy compensation^{16,17}. Therefore, substituting SSBs with non-caloric alternatives can lead to a decrease in overall calories and thereby weight.

Studies that examine individuals who substitute SSBs with ASB alternatives are limited. At first glance, the evidence of paediatric trials on this subject may seem mixed, but the crux in finding an effect seems to be linked to the type of adolescents that are recruited into the trial. That is, in a trial¹⁸ where baseline consumption of SSBs was low in the recruited adolescents (1 glass every 3 days), change in mean BMI did not differ between the control group and the intervention group who decreased their consumption of SSBs.

Conversely, another study¹⁹ that focused on adolescents who consumed at least 1 serving of SSB per day found that decreasing SSB consumption had a beneficial effect on bodyweight that was strongly linked to baseline BMI. The authors also

found a greater effect among subjects who previously drank more SSBs, which, they attribute to a greater displacement of calories. Therefore we can infer that weight changes as a result of an SSB tax may be a symptom only for those who need the weight loss most.

In adult studies, studies ^{20,21} have found evidence that replacing SSBs with ASBs reduces the weight of overweight and obese adults respectively. In a further study ²² additional regular soft drink consumption was found to contribute significantly to weight gain, whereas diet soft drink consumption was negatively associated with obesity.

Studies of market demand

The law of demand states that a price increase in a good results in a reduction in the quantity of the good consumed. The extent of this reduction depends on its price elasticity of demand². A systematic review estimates soft drinks to have an elasticity of 0.79²³. While this point estimate has been used in support⁴ of SSB taxation, the estimate has a high standard error, with a confidence interval of 0.33-1.24. An elasticity at the low end of this range would imply that a tax on soft drinks would have little effect on total demand.

The most important aspect of price-responsiveness is the cross-elasticity of demand between SSBs and ASBs. Estimation of the most direct substitution relationships, between ‘regular’ and ‘diet’ versions of the same beverage is difficult, because prices of the two versions typically move together. In addition, true estimates have yet to be estimated and what has been produced has been based only on scanner data and therefore elasticities are generally only related to at home consumption³.

The main contribution to this literature comes from ²⁴. Here the authors show that each regular calorie soft drink has a strong substitute alternative belonging to another brand. While individual elasticity estimates are subject to error, the general patterns imply that individuals do regard ASBs as substitutes for SSBs and should respond by

² Price elasticities are defined as the percentage change in quantity consumed resulting from a 1 percentage point change in price

³ To this end the cross price elasticities may over represent low income people assuming that their budget constraint decreases their propensity to eat out. For our purposes this does not pose a problem as this is a group that the thin subsidy will benefit most.

substituting toward these diet versions if their relative price is reduced, either through a fat tax or a thin subsidy.

For those worried about the regressivity of SSB taxation, perhaps some consolation is that one would expect individuals of lower SES to be the most price elastic, and given that the distribution of obesity is higher for these individuals²⁵, to gain the most from the intervention. This argument does not guarantee that the weight of these individuals will decline in the face of a price increase. Specifically, on the margin, it is expected that individuals will substitute away from the now more expensive goods towards other goods. This may result in individuals substituting towards other beverages that are not captured under the SSB tax that can also contribute to obesity growth (perhaps high fat alternatives such as whole milk or other sugar alternatives that remain untaxed⁴) or towards bulk buying to offset the tax. The latter is a feasible alternative given the price differences noted between small serves and large serves options²⁶.

Currently, SSB taxation has much support and is even part of policy in the United States at a State level. This taxation's mean range is 3.43% for grocery stores and 4.02% for vending machines²⁷. The impact of these taxes on weight was estimated²⁸ and it was found that a 1% increase in soda taxes resulted in a decrease of about 8 calories. It was also found that this calorie sacrifice was offset by an increase in whole milk consumption. A similar result was found²⁹, when associations between state-level grocery store and vending machine soda taxes and adolescent BMI are examined. The fact that taxes of a small magnitude have not been a viable tool in lowering obesity rates is unsurprising and is supported in the literature³⁰, which examines food price sensitivity.

This suggests two things. The first is that taxes on SSBs are regressive. That is, seemingly the main purpose of these State-by-State taxes is in increasing revenues²⁶ and given that the majority of individuals who consume SSBs are of low SES status, then these individuals are paying a disproportionate amount towards these funds with no obvious channel of return. The second is that for SSB taxes or ASB subsidies to work, they need to be reasonably aggressive.

⁴ Currently in the U.S on a State by State basis concentrated fruit juice is often left untaxed

To date, there has been no study that examines the impact of a price subsidy on non-caloric beverages, however a number of controlled field experiments suggest that significantly lower prices would result in a substantial increase in the consumption of healthful foods. Studies in this niche^{31,32,33,34,35} find this result for subsidies on cafeteria fruit sales, university cafeteria fruit and salad sales, restaurant low fat items, a targeted subsidy on intake of fruits and vegetables among low-income women and vending machine low fat snacks respectively. Given the evidence that food subsidies work and that price incentives can be an effective-and progressive- intervention strategy to influence purchases³⁶ it would be useful to examine the impact that a price substitute on ASBs can have on uptake and weight status.

Regressivity of SSB taxation

The regressive nature of SSB taxation arises given that individuals of lower SES spend a higher percentage of their income on food and consume more added sugars and unhealthful food³⁷. Specifically, based on the Bureau of Labor Statistics' 2007 Consumer Expenditure Survey, the average spending on carbonated drinks of households where the household purchaser does not have a high school education and the household has an average before tax household income of \$33,913 is \$139.79. Conversely, where the household purchaser is a college graduate and the household has an average before tax income of \$98,193 the same average is \$122.23³⁸. In addition, it is worth noting that lower income households (<\$39,999 before tax income) make up approximately 35% of the market share for non-alcoholic carbonated beverages.

It has also been argued that creating more income disparities may encourage obesity³⁹. A general policy of taxing foods that are commonly preferred by low-income households would exacerbate inequality in income, which might be expected to increase inequality in health outcomes, with negative effects on health for society as a whole⁴⁰

It has been suggested⁴¹ that to offset the regressive nature of food taxes, instruments in the form of tax subsidies could be called for on normative grounds, with revenue from the former funding the latter. Therefore, we are recommending that policy makers look at one of two options. The first is a straightforward subsidy on non-caloric beverages such as ASBs. The second, recognising that it is necessary to raise

financing for the suggested policy intervention, suggests both a fat tax on SSBs and a thin subsidy on ASBs. In addition, the second is also a multi-pronged approach, which is generally shown to be more effective empirically⁴⁰. It should also be pointed out that in both cases the taxes and subsidies together should be non-trivial in magnitude.

Concluding comments:

This paper has raised the idea of having a 'thin subsidy' for ASBs either as an alternative to, or in conjunction with, a fat tax for SSBs. The thin subsidy option is preferable because it is progressive, and less paternalistic, than the fat tax alternative. Evidence from clinical studies and analysis of market demand suggests that ASBs or 'diet drinks' are highly substitutable for SSBs, so that a 'thin subsidy' will have beneficial effects on obesity similar to those claimed for a 'fat tax'.

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