

Agenda

Advancing economics in business

Behavioural toppings for the sugar tax

George Osborne, UK Chancellor of the Exchequer, recently announced a sugar levy on the soft drinks industry. A tax may discourage the consumption of sugary drinks by making them more expensive, but there are questions over how responsive consumers will be. The way in which the tax is presented will be important, as will be the introduction of complementary measures. Behavioural economics, and precedent from elsewhere, offer insights into effective policy design

The levy on sugary soft drinks announced in the 2016 UK Budget is aimed principally at tackling childhood obesity. Of those who become obese in childhood, 80% will go on to become obese adults.¹ The government noted that sugar consumption is a major contributory factor, and that added-sugar soft drinks are the single biggest source of dietary sugar for children and teenagers.

From April 2018, large producers and importers will have to pay a tax on drinks containing over 5g of sugar per 100ml, with a higher rate applying to those containing more than 8g per 100ml. The tax will not apply to fruit juices or milk-based drinks, and smaller producers will be excluded. The levy is expected to raise £520m in the first year, which will be used to fund sports activities in schools.² The independent Office for Budget Responsibility (OBR) notes that the government's plans imply tax rates of 18p and 24p per litre, respectively, and predicts that the revenues raised will reduce over time as consumers respond to the price increases and producers reformulate their offerings or promote lower-sugar sub-brands.³

The government has emphasised that the tax is on companies rather than consumers and that the industry will have time to adjust its product range before it comes into force.⁴ However, this is not wholly a supply-side story. Indeed, the OBR expects the levy 'to be passed entirely onto the price paid by consumers'.⁵ In practice, the precise degree of pass-through to consumers will depend on several factors, but if producers were to pass on at least the vast majority of the tax burden, the key issue of interest would be the extent to which this reduces consumer demand for sugary soft drinks, and thus lowers obesity.

Before considering this demand-side response in more depth, it is useful to outline why excessive sugar is

detrimental to health, and why people may nevertheless end up consuming too much of it.

'Free sugars' are sugars that are added to food and drink, as well as those that are naturally present in honey, syrups and fruit juices. They do not include sugars that are naturally present in whole fruit, vegetables or milk (for which the World Health Organization finds no evidence of harm to health).⁶ Free sugars contribute to the intake of calories, and excessive consumption can lead to weight gain and obesity. In the longer term this can lead to conditions including heart disease, type 2 diabetes and strokes. Obesity is estimated to cost the UK National Health Service (NHS) £5.1bn per year.⁷

So, too much sugar is a bad thing. This being the case, why do some people still consume so much of it? One explanation is that they are not aware of how much sugar is in the products they are consuming. However, there is also evidence that, even when people know the health risks, consumption of sugar-rich products can be habit-forming, and certain individuals form a relationship with particular foods which they then over-eat to raise their mood.⁸ Some researchers have gone further than this purely behavioural explanation, and claim that sugar can be physically addictive. Their view is that, when people eat or drink something with a high sugar content, it triggers a large release of dopamine in the brain, or a 'sugar rush'. However, over time, people need more and more sugar to receive the same amount of reward, and experience withdrawal when they are not satiated.⁹

Whether the true explanation is physical or behavioural, or a combination of the two, what is clear is that some people can lose control over their consumption. Not everyone does—many people enjoy the odd sugary food or drink as part of a balanced diet and healthy lifestyle. But the prevalence of

added sugar in our diet, its social acceptance, and its low cost, all play a part in determining consumer behaviour.

The challenge of excessive sugar consumption can be addressed in two main ways:

- look to traditional economics, which assumes that consumers, facing a budget constraint, are rational, and take on board all available information to make a decision that is consistent with their long-term preferences;
- look at the issue from a behavioural economics perspective, which relaxes some of the assumptions of the traditional model in terms of how consumers think and behave.

Both approaches indicate that a sugar tax, on its own, may not necessarily be effective in tackling obesity.

The economic theory behind the sugar tax

Assuming that producers pass on all or most of the tax in the form of higher prices, its impact on consumption depends on the degree to which consumers respond to the price increase. Consumption changes are driven first by sugary drinks becoming more expensive ('own-price effects'), and second by consumers choosing to switch to lower-cost alternatives ('cross-price effects'). Whether this reduces sugar consumption overall depends on the extent to which consumers switch to healthier low-sugar alternatives, such as water, or to sugar-rich substitutes that are not subject to the tax, such as chocolate bars.

The World Health Organization is of the view that sugar taxes *do* affect consumer demand, particularly in the case of low-income households.¹⁰

Low-income consumers and their children have the greatest risk of obesity in many societies and are most influenced by price. Fiscal policies may encourage this group of consumers to make healthier choices (provided healthier alternatives are made available) as well as providing an indirect educational and public health signal to the whole population.

A UK government agency, Public Health England (PHE), notes in a report that, in countries where taxes on sweetened soft drinks (and other added-sugar products) have been introduced (including Norway, Finland, Hungary, France and Mexico), sales of these products have fallen.¹¹ The report focuses on the results from an econometric analysis, based on the experience of Mexico. This found that, following the introduction of a 10% tax on added-sugar drinks in January 2014, the total volume of taxed beverages purchased over the year was 6% lower than what would have happened without the tax (i.e. the 'counterfactual'). This divergence was greatest for people from a low-income background, where volumes were 9% lower. The evidence suggests that there was some substitution to bottled water.¹²

However, evidence from other countries seems less compelling. For example, in Finland, additional taxes are levied on confectionery, ice cream and soft drinks. While the price of soft drinks increased by an average of 5.7% each year between 2011 and 2013, consumption declined by an average of only 1.6% per year.¹³ While not based on econometric analysis, demand in Finland therefore appears to have been less price-sensitive (or less 'elastic').

Substitution to other sugar-rich products that are not taxed may be a concern if this means that there is not a reduction in the total calories consumed.¹⁴ There may also be geographical substitution. For example, Denmark scrapped a tax on saturated fat, and abolished plans to introduce a sugar tax, in part because the fat tax had encouraged consumers to shop over the border in Germany and Sweden.¹⁵ A similar concern emerged in Berkeley, California, where a soda tax was introduced in 2015. Retail prices for high-sugar drinks went up by less than half the amount expected, possibly reflecting store owners' concerns that consumers might shop outside of Berkeley.¹⁶ These geographical issues may be less relevant to mainland Great Britain, but could be a concern when the sugar tax is introduced in parallel in Northern Ireland, given the free movement of consumers between the Province and the Republic of Ireland.

So how price-elastic will UK consumers be when the sugar tax is introduced? The PHE suggests that the tax needs to be high enough (i.e. 10–20%) to have a significant impact on consumption, and ultimately population health.¹⁷ The OBR forecasts a 0.8–1% reduction in demand for sugary drinks for every 1% rise in price as a result of the new levy.¹⁸ Current assumptions therefore lean towards the Mexico experience of lower-income consumers, in which demand was found to be only mildly inelastic (-0.9). However, the OBR range covers the UK population as a whole, and the UK is also overall wealthier than Mexico. UK demand may therefore be more inelastic than assumed. For example, the average estimate for Mexico (-0.6) may be informative for predicting the behaviour of lower-income households in the UK, but not the population as a whole.

Another issue is whether tax rates of 18p and 24p per litre, and the resultant demand response, will have a significant effect on daily calorie intake. For a 330ml can of cola, the top tax rate will be around 8p. Assuming a pre-tax price per can of 70p, this amounts to an 11% tax. If an individual consumes one can per day, and the OBR's upper-bound elasticity estimate is assumed, the consumer will go without a can of cola every tenth day. For a consumer who drinks a 1.25l bottle of cola a day costing £1.30 pre-tax, 30p in tax will be payable, and the consumer will go without a bottle every four days—which is a more significant change.¹⁹

A common objection to 'sin' taxes on food or drink is that they are regressive—lower-income people spend a higher portion of their income on these products, and are therefore hit the hardest. Another complication is that, while lower-income consumers are more responsive to the price signals of a tax because they have less money, this group is also most likely

to be affected by a poorer diet, excessive sugar consumption and obesity.²⁰ Putting income to one side, this sub-group will therefore be more price-inelastic to a sugar tax than the general population.

One area of consumption that is already taxed in the UK is smoking. The dangers of smoking are somewhat different to those associated with excessive sugar consumption, and the taxes on tobacco are already much higher than those for sugar. However, lessons can be learned in terms of taxation. In the UK, taxes make up over 70% of the cost of a cigarette.²¹ For an average smoker this translates into more than £700 per year in taxes.²² Despite this, the reduction in observed smoking rates seems to have been slowest among low-income groups.²³

A behavioural economics perspective

A sugar tax alone may not be effective in tackling excessive sugar consumption if a significant portion of consumers are price-insensitive. Are these consumers really making a fully informed and fully rational decision, while accepting the future health consequences of excess sugar consumption?²⁴

In some instances, children are buying the product concerned (such as a can of cola) directly. In other cases, children may be accompanying their parents on a regular shop (e.g. for larger bottles of cola). While standard economic theory assumes that consumers make fully rational and informed choices to maximise their (or their children's) wellbeing, behavioural economics recognises that people exhibit some irrational biases that may prevent them from making decisions that are in their long-term best interests. Marketing often targets these biases. In turn, behavioural remedies seek to work with, or unwind the biases.

The traditional economics approach posits that consumers, even in the presence of a tax, may not be fully aware of the sugar content in the food or drink that they are buying. To this extent, policy could aim to educate people and encourage healthier choices. However, conscious forms of education may not always be effective. Since 2008, fast-food chains in New York have been obliged to display calorie information on menus. While the intention may have been to encourage consumers to rethink their diets, the evidence suggests that the measure has failed.²⁵ This illustrates one of the main insights from behavioural economics: people may already know the health risks, and/or may be faced with information overload, so education alone may not be sufficient (this can be compounded by a lack of self-control, as described below).

First, consumer prompts at the point of purchase, which appeal to the subconscious, may be more effective. Research indicates that, on average, consumers spend six seconds looking at food before purchase, and understand symbols better than numeric information.²⁶ There is some evidence that traffic-light food labelling can be effective

in stimulating healthy diet choices. A study of a cafeteria of a large Boston hospital showed that the consumption of unhealthy beverages declined by 24% following the introduction of traffic-light labelling.²⁷ In the UK, several food and drinks companies have already signed up to the government's voluntary colour-coded labelling scheme, introduced in 2013. For soft drinks, this scheme recommends that information be provided on energy, fat, saturates, sugar and salt levels, colour-coded green, amber or red.²⁸ However, not all brands have implemented the scheme, some have done so only in part (e.g. providing energy content only, or avoiding the use of colour), and the reference intakes are for an adult and not a child.

Second, a sin tax may work effectively only if it is salient. In the USA, it has been found that increases in taxes that are included in prices posted in the store reduce alcohol consumption more than increases in taxes that are applied at the cash register.²⁹ In the UK, retail prices generally include all taxes, but if soft drink prices are clearly marked as being higher in price due to the higher taxation, this may have an impact on behaviour. The very presence of the tax is a public health signal—clearly marking that there is a 30p sugar tax on a £1.60 bottle of cola may make consumers think twice.

Third, excessive sugar consumption often stems from a lack of self-control. As consumers, we may know we want to lose weight, but we will often decide to drink the cola today and go to the gym tomorrow. When tomorrow comes, we repeat the pattern. This is even more pronounced if we suffer from optimism bias, and overestimate the strength of our willpower to give up sugary drinks in the future. While people are willing to commit to healthier alternatives, this is more difficult when high-sugar options are immediately available. In one experiment, office workers were asked to choose whether they would like, as a snack, chocolate or fruit the following week. 70% chose fruit—the healthier option. When, one week later, the researchers returned and told participants that they could choose whatever they wanted, 70% chose chocolate.³⁰

Even simpler notions of availability or convenience can have an impact on self-control—for example, the location of a product relative to the checkout, or the placement of an item on a menu. A UK study of university student behaviour at a cafeteria found that students purchased fewer sweets or crisps if they had to buy them from a separate cashpoint to their lunch.³¹ Similarly, restricting the sale of high-sugar items (e.g. chocolate, but also fizzy drinks) close to the checkout may prove helpful in combatting excessive consumption by avoiding impulse purchases.

Concluding thoughts

Fizzy drinks and sugar are only part of the health story. A sugar tax on soft drinks will raise awareness of the dangers of excessive consumption of free sugars, but it may only have limited impact on consumer behaviour in practice. Education has a role, but by itself can be ineffective.

Behavioural insights indicate that simple, impactful labelling, and limits to convenience, may have a greater impact.

In this respect, the current traffic-light labelling guidance is not universally implemented by soft drink brands. There is also a debate as to how effective it actually is. Some suggest that a more hard-hitting approach would be to display ‘activity-equivalent’ calorie information—which would show how many minutes of exercise would be required to burn off the calories (e.g. a graphic showing that one can of

lemonade ‘equals’ 15 minutes of running).³² An alternative would be to include a graphical depiction of how much sugar a product contains—for example, it might show that one can of fizzy drink contains nine teaspoons of sugar.³³ More experimental research is required to test these options. What would make you think twice?

¹ HM Treasury (2016), ‘Budget 2016’, paras 2.190–2.192; and Public Health England (2015), ‘Sugar reduction: the evidence for action’, October.

² HM Treasury (2016), ‘Budget 2016’, paras 1.93–1.95, and 2.157, and Table 2.1.

³ Office for Budget Responsibility (2016), ‘Economic and fiscal outlook’, March, paras 4.76–4.77.

⁴ HM Treasury and Osborne, G. (2016), ‘Budget 2016: George Osborne’s speech’, oral statement to Parliament, delivered on 16 March.

⁵ Office for Budget Responsibility (2016), ‘Economic and fiscal outlook’, March, p. 227.

⁶ World Health Organization (2015), ‘WHO calls on countries to reduce sugars intake among adults and children’, press release, 4 March.

⁷ Public Health England (2015), ‘Sugar reduction: the evidence for action’, October.

⁸ Hebebrand, J., Albayrak, Ö., Adan, R., Antel, J., Dieguez, C., de Jong, J., Leng, G., Menzies, J., Mercer, J.G., Murphy, M., van der Plasse, G. and Dickson, S.L. (2014), “‘Eating addiction’, rather than “‘food addiction”, better captures addictive-like eating behavior”, *Neuroscience & Biobehavioral Reviews*, **47**, November, pp. 295–306.

⁹ Avena, N.M., Rada, P. and Hoebel, B.G. (2008), ‘Evidence for sugar addiction: Behavioral and neurochemical effects of intermittent, excessive sugar intake’, *Neuroscience & Biobehavioral Reviews*, **32**:1, pp. 20–39.

¹⁰ World Health Organization (2016), ‘Ending childhood obesity’, p. 18.

¹¹ Public Health England (2015), ‘Sugar Reduction: the evidence for action’, October; and Public Health England (2016), ‘Sugar Reduction: the evidence for action. Annexe 2: A mixed method review of behaviour changes resulting from experimental studies that examine the effect of fiscal measures targeted at high sugar food and non-alcoholic drink’.

¹² See Public Health England (2015), ‘Sugar Reduction: the evidence for action’, October; and Public Health England (2016), ‘Sugar Reduction: the evidence for action. Annexe 2: A mixed method review of behaviour changes resulting from experimental studies that examine the effect of fiscal measures targeted at high sugar food and non-alcoholic drink’, p. 17; and Colchero, A., Popkin, B.M., Rivera, J.A., and Ng, S.W. (2016), ‘Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study’, *British Medical Journal*, **352**:h6704.

¹³ ECORYS (2014), ‘Food taxes and their impact on competitiveness in the agri-food sector’, Final report for DG Enterprise and Industry, Table 2.2; and Oxera calculations.

¹⁴ Edwards, R.D. (2012), ‘Sugar-sweetened beverage taxes raise demand for substitutes and could even raise caloric intake’, *Preventive Medicine*, **54**:3–4, pp. 284–5, March–April.

¹⁵ Snowdon, C. (2013), ‘The Proof of the Pudding: Denmark’s fat tax fiasco’, Institute for Economic Affairs, 25 May.

¹⁶ Cawley, J. and Frisvold, D. (2015), ‘The Incidence of Taxes on Sugar-Sweetened Beverages: The Case of Berkeley, California’, NBER Working Paper 21465, August.

¹⁷ See Public Health England (2015), ‘Sugar reduction: the evidence for action’, October, p. 23.

¹⁸ Office for Budget Responsibility (2016), ‘Economic and fiscal outlook’, March, p. 128.

¹⁹ This assumes that demand is linear, which may not be the case.

²⁰ See Public Health England (2015), ‘Sugar reduction: the evidence for action’, October, p. 5.

²¹ Tobacco Manufacturers’ Association, ‘Taxation’, <http://www.the-tma.org.uk/policy-legislation/taxation/>.

²² Based on average cigarette consumption per adult in the UK. See Thisismoney.co.uk, ‘Vice-ometer calculator: you’re even taxed on fun – see how much you pay’, <http://www.thisismoney.co.uk/money/news/article-1633429/Calculator-tax-pay-beer-wine-cigarettes-spirits.html>.

²³ Ash (2005), ‘Smoking and Health Inequalities’, November, http://ash.org.uk/files/documents/ASH_82.pdf.

²⁴ For a discussion, see Kahneman, D. (2011), *Thinking, Fast and Slow*, Penguin Books.

²⁵ Cantor, J., Torres, A., Abrams, C. and Elbel, B. (2015), ‘Five years later: Awareness of New York City’s calorie labels declined, with no changes in calories purchased’, *Health Affairs*, pp. 1893–900.

²⁶ For a discussion, see Royal Society for Public Health, (2016), ‘Introducing “activity equivalent” calorie labelling to tackle obesity’, January; and Hamlin, R.P. (2015), ‘The average time to make a food purchase is six seconds; front of pack labelling must be visible and impactful to affect decision making at point of purchase’, article published by The Nutrition Society, 11 Feb. The six seconds include ‘recognising the want, looking at alternatives, making a choice and putting the “winner” in the trolley’, <http://www.nutrition-society.org/yournutrition/articles/average-time-make-food-purchase-six-seconds-front-pack-labelling-must-be-visited>

- ²⁷ Levy, D.E., Riis, J., Sonnenberg, L.M., Barraclough, S.J. and Thorndike, A.N. (2012), 'Food Choices of Minority and Low-income Employees: A Cafeteria Intervention', *American Journal of Preventive Medicine*, **43**:3, pp. 240–8.
- ²⁸ Department of Health (2013), 'Guide to creating a front of pack (FoP) nutrition label for pre-packed products sold through retail outlets', June.
- ²⁹ Chetty, R., Looney, A. and Kroft, K. (2009), 'Salience and Taxation: Theory and Evidence', *American Economic Review*, **99**:4, pp. 1145–77.
- ³⁰ Read, D. and Van Leeuwen, B. (1998), 'Predicting Hunger: The Effects of Appetite and Delay on Choice', *Organizational Behavior and Human Decision Processes*, **76**:2, pp. 189–205. The 70% figures are approximate.
- ³¹ Meiselman, H.L., Staddon, S.L., Hedderley, D., Pierson, B.J. and Symonds, C.R. (1994), 'Effect of effort on meal selection and meal acceptability in a student cafeteria', *Appetite*, **23**:1, pp. 43–55.
- ³² Royal Society for Public Health, (2016), 'Introducing "activity equivalent" calorie labelling to tackle obesity', January; and Cramer S. (2016), 'Food should be labelled with the exercise needed to expend its calories', *British Medical Journal*, **353**:i1856.
- ³³ Local Government Association (2016), 'Fizzy drinks need child-friendly "teaspoon labels" to spell out sugar content, say councils', LGA media release, 20 February.