

The effective contribution of excise taxation on non-alcoholic beverages to government revenues and social objectives: a review of the literature

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Abstract

The effectiveness of a discriminatory tax, such as excise, on various food and beverage products deemed ‘luxuries’ or even ‘harmful to health’ has been debated regularly in recent years. The concept of ‘effective’ needs to be discussed in the context of what the tax is trying to achieve in terms of government policy but, in the context of non-alcoholic beverages, it can be expected that objectives of a discriminatory tax on these products would be to raise revenue or externalise perceived harm from consumption, or both. Using these expected objectives, this paper reviews the literature available and believes that excise-type taxes on non-alcoholic beverages have little or no effect in terms of revenue raising, and indeed often result in a negative economic benefit. In terms of health benefits, the literature shows that discriminatory taxes on soft drinks will reduce consumption of any targeted category but these policies seemingly miss the issue of consumers responding to the tax by substituting those types of beverages with other forms of calories.

1. Introduction

The use of discriminatory taxation, such as excise, on non-alcoholic beverages, particularly on sweetened drinks, has been subject of much debate in recent years. Taxes on such products have been levied, removed and in several countries, are being considered. This review of the literature looks at excise-type taxes in terms of their effectiveness against a range of measures relating to government revenue raising and to health-related objectives. As a discriminatory tax, an excise levied on sweetened soft drinks may raise tax revenues from this single category of product, and may also operate to change consumption of the product through the consequential rise in its price. In this review, the author attempts to determine the ‘value’ of that revenue in the context of its impact on the economy, and to determine the likely consumer responses to such tax-related price increases. The question of the effectiveness of such a tax has added interest as the Danish Government recently announced the abolition of both its so-called ‘fat tax’ after twelve months operation and of the planned implementation of a so-called ‘sugar tax’ to avoid a range of unintended consequences.¹

To begin the literature review, it is important to look at a number of scoping issues. This paper relates only to the use of discriminatory taxes, such as excise, on non-alcoholic beverages and not to other more general or broader taxes such as customs duties or value added taxes (VAT), although a VAT with a rate differential for say, sweetened soft drinks, or a special VAT on those drinks, would come into the scope of this review. The paper does not look at direct taxation such as income taxes or taxes based on profits. In terms of the revenue issue analysis, there will be some reference made to these other taxes, as the effect of excise and its impact on pricing will flow through to them.

2. What is meant by ‘excise’ taxation?

For the purposes of this paper, the term ‘excise’ relates to a form of taxation which is applied to a narrow base of goods (and services) which primarily are seen to have a level of harm associated with their consumption, typically tobacco, alcohol, fuel, motor vehicles, and gambling.

Excise taxes are classified by the Organisation for Economic Co-operation and Development (OECD) as being those taxes which are:

levied on particular products, or on a limited range of products ... imposed at any stage of production or distribution and are usually assessed by reference to the weight or strength or quantity of the product, but sometimes by reference to the value.²

Excise is not a VAT or sales tax, which the OECD differentiates by reference to the application of such taxes (and tax credits for business inputs) at each stage or tier within the supply chain, as well as a generally broader tax base.³ Excise is not usually levied instead of such taxes but rather, levied in addition to such taxes.

This paper recognises that in many countries the term ‘excise’ is not used but we see similar commodity and service-based taxes which meet this OECD classification for excise being known by their local titles, for example ‘Consumption Tax’,⁴ or ‘Special Consumption Tax’.⁵ In some cases, these taxes may have a very limited base or be specific to a single type of commodity such as a ‘Fuel Tax’⁶ or a ‘Tobacco Tax’.⁷ As such, the term ‘excise’ as used in this paper should be seen as including each of the countries’ taxes that are classified as an ‘excise’ by the OECD.

Excise can also be levied on imported goods, in which case they are often referred to as ‘like goods’ or goods which are like those domestically manufactured goods subject to excise. Excise duties in this context are generally collected by the local customs agency at the time the goods are declared at importation, along with any customs duties and VAT. Under the OECD classification of taxes, where an excise duty is to be collected from imported goods, it is not considered to be a ‘customs’ duty but is considered to be an excise tax.⁸

Traditionally, excise has been used to raise revenue with the tax levied on high volume, relatively price inelastic goods for which there are few substitutes. Today, excise policy is largely driven by the correction of negative externalities and as such, the most common forms of goods subject to excise are tobacco, alcohol, motor vehicles, and fuels, where excise tax is used to capture those negative externalities in the price paid by the consumer. Excise taxes are now moving away from *ad valorem* or value-based taxes that have been designed to solely raise revenue, and towards specific-rate taxes with the tax base relating directly to the cause of harm, such as the alcohol content, weight of tobacco, quantity of fuel or level of CO₂ emissions from a vehicle, such as a litre of alcohol, kilogram of tobacco, stick of cigarette or per tonne of CO₂.

3. When is excise taxation best utilised?

A key principle in tax policy is that the objective of an indirect tax should be neutrality, or the principle that the tax rate, tax base and tax structure should not impact markedly on investment, production or consumption. Tax policy can however, in certain limited circumstances, include the need to levy ‘special’ taxes or discriminatory taxes such as an excise tax, in response to the externalities (or harm) associated with the consumption of certain goods and services. These products, as mentioned above, are usually alcohol, tobacco, fuels, motor vehicles, and gambling (Cnossen 2005, pp. 3-5). Therefore, a key question that often arises in the literature reviewed is ‘do we need to have a discriminatory tax on non-alcoholic beverages?’ Or, what are the externalities behind the consumption of such beverages which need addressing through a discriminatory tax such as a non-alcohol beverage excise?

If the policy intent is not in response to identified externalities but is simply to raise revenue, then we need to return to our first key principle of neutrality in tax policy, where taxes such as VAT are likely to

conform. This paper looks further at the effectiveness of excise as a revenue raising tool in the context of an overall tax system and tax policy, where that effectiveness is actually questionable. However, if raising revenue is not the prime objective of the tax, then we need to assess those externalities and consumption issues. The effectiveness of an excise on non-alcohol beverages in addressing their perceived harm is also reviewed and again, the effectiveness of such a levy is questionable.

4. Analysis of excise taxation on non-alcoholic beverages

4.1 Excise and its impact on economic activity

It would appear from the literature that non-alcoholic beverages are not an ideal commodity for an excise-style tax. Excise taxes are taxes on manufacture or production of certain goods and they have the effect of increasing the price of the good being taxed as the manufacturer is looking to recover this additional tax burden when they sell their product. In some cases, the market may not allow for this full cost to be passed on and the result is a fall in the manufacturer's profit margins. This has been seen in the soft drink market by Bonnet and Réquillert who refer to 'passive pricing' in which all of the tax can be passed through, however, they note that manufacturers take a more 'strategic look' at pricing rather than a simple pass through of the tax liability they incur (Bonnet & Réquillert 2012, pp. 21-3).

With any price rise for the consumer resulting from the excise tax being built into the price, because carbonated soft drinks generally are price elastic (that is, as prices rise, consumption decreases by more than the level of the price rise), we can also expect to see a reduction in consumption of that product as consumers respond to the additional cost they must incur to consume the good in question. In short, excise taxes have the effect of reducing demand and consumption of any good subject to the tax and will place pressure on the manufacturer's margins as they attempt to maintain sales and market shares in this environment of reduced demand.

This relationship between excise taxation and economic activity is perhaps best illustrated in the 2005 tax reforms in Egypt. In that year, Egypt included a cut in the sales tax levied on bottled soft drinks from 65% of retail price to 25%, where it remains today.⁹ It should be noted that the sales tax cut did form part of a broader reform package that applied the same cuts to some other targeted products as well as reducing income tax rates and would therefore generate some economic stimulus. However, the soft drinks industry of Egypt was identified as a 'stand out' success from the reforms, particularly the effective 60% cut in the sales tax rate which helped spur an immediate 'double digit growth in sales'.¹⁰ From this growth, the overall tax paid by the soft drinks industry in Egypt reportedly grew by 13%, and combined with the associated economic activity surrounding that growth, such as employment and profitability in value-add industries, the actual 'full tax impact' has been estimated at a 20% tax revenue increase (Oxford Economics and International Tax & Investment Center 2009 [unpub.]). This issue is expanded below when we consider excise as a revenue raising source.

It is clear that there are some industries in which the government would want to dampen demand through pricing, and these are in products in which there is a clear cost to the community when consumed, and for which the government is seeking to reduce harmful levels of consumption and have the consumer make choices about consumption with the cost of harm part of the price. As such, we see modernisation of excise systems resulting in a move away from taxing a wide range of consumer goods with an excise levy (having them absorbed into VAT and sales taxes) and focusing on products such tobacco, alcohol, fuels, motor vehicles and pollutants (Cnossen 2005, pp. 1-2).

Thus, excise tax policy needs to carefully consider the negative economic impact of the retention or implementation of such a tax on a product and within this context, excise taxation is best utilised when applied to addressing products which have a clear cost to society in their consumption and it is necessary to address the cost of this harm through consumption decisions based on pricing.

4.2 Excise tax and revenue generation

Where an excise tax is levied on a particular industry there is a clear economic impact and in the context of seeking tax revenues, the literature suggests that the effect of excise taxation on these industries is to drive down revenue receipts from VAT and sales taxes, as well as reduce the taxes which apply to profitability, such as income taxes or company taxes from taxpayers in these industries. Examples from the literature are illustrated in case studies below.

In terms of excise-type taxes being levied on non-alcoholic beverages, an excise tax is still in place in several countries, primarily in developing countries within Africa, the Middle East and Asia. In those countries such products are included in a range of goods seen as ‘luxury goods’ and the same excise systems extend into other commodities such as perfumes, jewellery, carpets, crystal glassware, etc., with the aim of establishing a progressive tax on the spending of the wealthy. These types of excise taxes are distinguished by their *ad valorem* nature, rather than being targeted at some element of perceived harm through a specific tax rate approach, and as such are designed simply to raise revenue.¹¹

It is important to note at this point that in terms of using excise taxes on ‘luxury’ or ‘consumer’ goods in developing countries, the motivation also comes from the ineffectiveness of tax administrations in those countries to ensure collections from income taxes, profit-based taxes, or broad-based consumption taxes. In developing economies with limited tax administration capacity, excise taxes are attractive in this context as they are applied to a limited range of goods (and services), provided by a limited range of manufacturers who can be more readily controlled via means such as excise officers being stationed in the manufacturers’ premises.

With regard to soft drinks, as a percentage of excise collected, beverages in these categories are relatively small, with reported ranges of less than 0.1% in Tanzania,¹² 0.3% Turkey,¹³ and up to 3.6% of total excise collections in Thailand, although this figure could be higher than normal with the significant reduction in the diesel excise tax rate.¹⁴

Thus excise taxes on a product like non-alcoholic beverages, when used, appear to be only a relatively small source of tax revenue in their own right, with the more likely effect of operating to reduce tax revenue from other sources of tax such as VAT and profit-based taxes and, as such, are often a somewhat questionable levy to retain or implement.

4.3 Excise tax and administration

Having just reviewed the small scale of revenue generated by excise taxes on non-alcoholic beverages, and the negative impact of these taxes in terms of suppressing other potential revenue sources, there is the question of whether existing excise taxes are cost effective. At the lower end of these ranges (that is, 0.1% and 0.3% of excise collected), it becomes questionable as to whether the cost of administration and compliance efforts is even covered by the revenue generated by the tax.

Administration and compliance costs can be looked at in two ways: administration by the relevant government agency and administration by the producer taxpayers. In terms of agency administration, this will include costs of licensing and monitoring production and payments, and confirming compliance through means such as a permanent presence in factories or the conduct of an audit program, the latter two representing significant manpower resource costs. For industry, compliance costs include classification of products, particularly where policy discriminates against one category of beverage, or has a range of rates for a range of product categories, and the calculation of excise tax liabilities.

Where a government has decided to apply excise to just one, or just a few categories of non-alcoholic beverages, compliance costs rise considerably as producer taxpayers properly assess and revenue agencies confirm the correct classification and tax rates of each product. Discriminatory taxation within

an industry will cause considerable tax administration issues as manufacturers will try and reformulate or adjust products to gain a more favourable tax classification or tax exemption. Discriminatory taxation within an industry also causes ‘product substitution’ issues where consumers switch their consumption to non-taxed products that are readily substitutable, with an associated revenue loss – the issue of substitution is revisited below in the context of the review of excise and health objectives.

The other administrative matter highlighted is that of the tax base and whether it has been applied as an *ad valorem* or value-based tax or as a specific rate per measure of volume. Where excise is levied as a specific rate, administration and compliance becomes increasingly easier to administer as the excise is determined by a simple count of volume passing the taxing point. *Ad valorem* taxes, however, are far more complex to administer, and often disputes arise between taxpayers and revenue agencies as to what cost component should and should not be included in an excisable value. Further, in an *ad valorem* tax base, taxpayers look to strategies to reduce excise tax liabilities by transferring certain costs past the taxing point and therefore outside of the excisable value used to calculate the excise.

Thus, where excises remain in place on non-alcoholic beverages, it would appear that to reduce the costs of administration and compliance for both revenue agencies and industry, the excise needs to apply broadly to all beverages that can act as substitutes, and be levied on a specific rate basis.

4.4 Case study

Perhaps one way to look at the effectiveness and current thinking about the use of excise taxation on soft drinks is to focus on a case study example from a jurisdiction in which a ‘soft drink excise’ has been in place. The case study in Box 1 should be read with the discussions of the issues outlined in 4.1 to 4.3 above. Here we look at Ireland, where excise taxes on soft drinks were reduced and/or removed and from which certain other economic benefits were realised resulting in increased collections from both VAT and income taxes.

Box 1: Case study: Ireland: removal of soft drink special excise and revenue

Special Excise Levy:

1975-79: IR£0.10 per gallon

1980-90: IR£0.37 per gallon

1990-92: IR£0.29 per gallon

November 1992: Abolished

The increase of nearly 400% in 1980 was due to the need to obtain additional revenues. By 1984, revenues from this special excise levy began ‘eroding’ and with pressure to begin harmonising tax systems of the European Union, the rate was dropped by around 20%.

In 1992, the remaining excise was removed but actual revenue loss was largely offset. Whilst excise revenue in the order of IR£16 million was lost, the tax cut fed through to a price cut which stimulated demand, resulting in an additional IR£3.4 million in VAT. Better margins for the producers, additional production created by the new demand which in turn stimulated activity in all of the value-add industries and created new employment, then contributed an additional IR£1.5 million in income taxes.

The authors then argue that the actual revenue loss, now at IR£11.0 million, is further offset by savings in administration costs by the government which administered the tax.

Of note is that accompanying the removal of the special excise levy in 1992 was a cut in the VAT rate from 23% to 21% – had the rate stayed at 23% the actual loss of overall revenue would likely have been further reduced.

Source: Adapted from Bahl, Bird & Walker 2003.

4.5 Recent trends and considerations in excise policy for non-alcoholic beverages

Where economies which are transitioning, have transitioned or are reviewing excise systems, it seems the trend is for ‘consumer’ items to be reduced or removed from the excise tax system. See, for example, Thailand which has recently removed chandelier lights, air conditioners and spa treatments from the excise tariffs, and Croatia which is reducing a range of excise taxes including and of interest for this review, a reduction in excise on coffee and soft drinks from 1 January 2013.¹⁵

On the other hand, the French government introduced a ‘soda tax’ from 1 January 2012 on sugary beverages, set at an equivalent of 2 Euro cents per can.¹⁶ However, this review notes some confusion as to the objective of this soft drink tax as, despite a ‘health angle’ in the announcement, this new soda tax was seemingly introduced as part of a greater austerity program to help the finances of the country, and would appear to be more of a ‘nuisance tax’ than delivering either a clear revenue or health outcome.

The question of health-based outcomes and excise is important in the context of this review and the next section will concentrate on this issue. What is critical to note at this point is that perhaps one of the most recently introduced ‘health-based’ excises, notably the Danish tax on saturated fats in foodstuffs, has been abandoned after just twelve months in operation and the proposed ‘sugar tax’ has been shelved. In terms of revenue, some 200 million Euros¹⁷ were targeted from the ‘fat tax’ as well as a change in the Danish diet, but in line with the issues outlined above in terms of negative broad economic impacts, questionable revenue generation, ease of substitutability, and of complexity and costs in administration and compliance, these health-related taxes failed.

Thus, the literature and case study seem to suggest that discriminatory taxes like excise are not appropriate when the objective is to raise revenue. Rather they act to stifle and hinder the growth and activity that generate revenues through broad-based consumption taxes like a VAT, and from profit-based taxes like company tax. In an industry like non-alcoholic beverages that is a large employer and has many associated value-add industries, this hindrance of economic activity has a broader negative impact. This type of fiscal outcome would seem far from desirable, targeting a single industry for what generally are small revenue streams at the likely expense of greater revenues if that industry was not subject to discriminatory taxation.

Excise taxation today is therefore more appropriate where the product subject to excise very clearly has externalities to consider in relation to the consumption of the product, and the discriminatory nature of excise taxes allows policymakers to include the cost in the product for consumers to consider.

When looking at new taxes to raise revenue, this review considers some of the guiding principles espoused in the 2009 review of the future of Australia’s taxation system which can be summarised as follows:

Efficiency – that the tax will not hinder economic activity, nor alter the consumption, production and investment decisions made by households and business, and that the tax will raise the revenue needed at the lowest possible cost to the taxpayer.

Equity – in that the tax will be applied fairly.

Neutrality – in that the tax will treat all those in similar circumstances in the same way.

Simplicity – so that the tax is transparent, easy to comply with, easy to administer and cost effective to levy.

Certainty – where rates are clearly set and will not be subject to sudden fluctuation enabling business to plan with full knowledge of their expected tax liabilities (Commonwealth of Australia 2010, pp. 15-17).

This review agrees with these principles and would recommend that they be central to any new tax policy development. In terms of introducing an excise style tax on a product like a non-alcoholic beverage, this review finds little support for use of excise taxation as a revenue raising measure, particularly if using the tax design principles mentioned above. Instead, this review holds that excise taxation has a role in setting a ‘cost of harm’ in those areas for which the government might seek to address the harm in consuming that product, given that such a product can be clearly identified as being harmful. In that context, it is worth reviewing the debate surrounding the perceived harm of consuming soft drinks.

5. The use of excise tax in addressing negative externalities

The review found the use of excise tax to address negative externalities to be ‘polarising’ in terms of the published papers and articles on the topic. It is difficult to argue with the research that links calorie intake to health, particularly the intake of excess fats and carbohydrates (including sugars), to a range of diseases such as obesity, hypertension, cardiovascular disease and diabetes. Whilst it is clear that carbonated soft drinks, energy drinks, juices, ready-to-drink teas and coffees, and other sweetened beverages are a source of dietary intake of calories and sugar, they are certainly not the only source of either in many consumers’ diets, and their intake from other food sources must be considered (Howard & Wylie-Rosett 2002).

When looking at applying a discriminatory tax like excise, policymakers need to look carefully at what product, products or components are being targeted in the tax measure. As the review progressed, it became apparent that government policies aimed at reducing weight gain and obesity (and their related illnesses) are being targeted largely at a single category of non-alcoholic beverage – sugar-sweetened carbonated soft drinks. Excise and health policies are not addressing the growing body of research which suggests that weight and obesity issues are not limited to sugar-sweetened beverages or sugar intake, and that this area of health concern needs a more holistic view which includes the principles that:

- sugar consumption is not the sole origin of weight and obesity issues and, in fact, some studies suggest that some countries have seen a reduction in sugar consumption per head in recent years, yet levels of weight and obesity have been maintained or increased in some cases¹⁸
- sugar-sweetened carbonated beverages account for only between 1.4%¹⁹ and 7%²⁰ of a consumer’s total daily energy intake
- targeted excise taxes levied on a health or social basis to influence consumption are only effective where there are no readily available substitutes, and ineffective where say, a tax on a sugar-sweetened carbonated soft drink is substituted with a sugar-sweetened tax free juice drink
- rather than a focus on sugar, consideration must be on total caloric intake from foods and beverages as a measure for combating unhealthy weight gain and obesity with some studies showing that in Thailand for example, 33% to 41% of all calories come from rice, and when looking at rice and all cereals this rises to 53% to 63% of daily intake (Rojroongwasinkul 2008, pp. 3-10). Calories come from all food sources and the issue should be around the amount of calories consumed and balance in diets, rather than selecting a single food item for fiscal measures.
- caloric intake should not be the sole focus; unhealthy weight gain and obesity are also linked to changes in lifestyle in which physical activity has been greatly reduced and sedentary activity has been greatly increased.

It is important to now look at these points in more detail in the context of the objectives of this paper, that is, in terms of the effectiveness of excise taxes on non-alcoholic beverages.

Put simply, assuming an excise tax is passed on to consumers, it operates to increase the price of a product which has been viewed as having a negative externality through its consumption, with the desired outcome to be a reduction in demand for that product. In terms of an excise tax on

sugar-sweetened carbonated soft drinks, the theory is quite simple in that such a price increase will reduce the consumption of the product and therefore, in turn, reduce the consumption of calories.

However, the review found this theory to be an over-simplistic representation, particularly if looking at the full diet of consumers, the range of foodstuffs which contribute to caloric intake and the range of readily available substitutes for sweetened carbonated soft drinks. The OECD in its 2012 *Obesity Update* for example, is even concerned that taxes on products like soft drinks which raise their price, sometimes result in unintended consequences such as consumers:

- cutting back on nutritious foods to ensure they have sufficient spending power to keep purchasing the same quantities of taxed foods
- using substitute food and beverages which are not taxed but contain an identical and sometimes higher amount of calories, for example, substituting a sweetened fruit juice, and energy drink or a flavoured milk for a soda drink
- absorbing the additional financial burden of the tax and maintaining existing diets
- changing their mix of food and beverage intakes to one which may actually contain a higher amount of calories; and/or
- gaining a mindset from the tax that any cutback in sweetened carbonated soft drinks allows them to increase consumption of other foods which may have more calories, for example, ‘not buying a soda means I can buy a cake’ (Klick & Helland 2011, p. 20) where the cake is higher in calories (OECD 2012).

Thus, the OECD calls for a more comprehensive approach to dietary choices and policies which are more than just tax-based in nature. Where taxes are used, they need to take account of consumer behaviour in response to price changes and the range of possible food and beverage substitutes available.

The extent to which the consumption falls relative to price increases can be measured and is known as ‘own price elasticity’, and generally price elasticities for non-alcoholic beverages seem, in the literature, to vary product to product and market by market. (See Box 2 for explanations of ‘price elasticities’.) In relation to the soft drink market itself, a range of product categories are available which make up the total market, and this is found to be an important aspect of this review for several reasons.

Firstly, some excise tax systems or proposals seem to discriminate against specific product categories using sugar content as a basis for the tax system, for example, ‘sweetened beverage tax’ or ‘soda tax’, leaving a range of other products, which in some cases are considered substitutes, untaxed or exempt from tax. The risk in such discriminatory approaches is to send consumers of a sugar/syrup-based soda to a fruit juice drink with added sugar, or to a flavoured and sweetened milk product on the basis that the tax system has signalled through price that the ‘soda’ is less desirable than the sweetened fruit juice drink or the sweetened milk.

Moreover, discriminatory taxes such as those on sweetened carbonated beverages also risk sending a signal to the consumer that such beverages are the only dietary source of excess calories or sugar which may contribute to health issues the government wishes to address. Other sources of calories in excess of energy needs are equally important: fat or carbohydrate (including sugars) in numerous other food categories, or calories from beverage alcohol (beer, wine and spirits).

The review quickly formed the view that levying an excise on just one category of non-alcoholic beverage as a ‘health-related measure’ would not meet such health objectives, due to the likelihood that consumers will simply switch to other beverages of the same or higher calorific value, and could form an opinion that other beverages or indeed other foodstuffs will not affect weight gain as they are not taxed. The review also looked at the literature in relation to price elasticities, or the effect of increasing the price of soft drinks (say through an excise tax), substitution effects, and income elasticities or the relationship between increased spending power and soft drink sales.

Box 2: Price elasticities: an explanation

'Own price elasticity' is the measure of a percentage change in a quantity demanded by consumers as a result of a percentage change in price. It is expressed as a negative number relative to the fall in consumption, thus an own price elasticity of minus 0.8 would suggest that a 10% increase in price would result in an 8% fall in consumption. An own price elasticity of minus 1.5 would suggest that a 10% increase in price would result in a 15% fall in consumption. Goods with own price elasticities at or below minus 1.0 are considered price inelastic whereas those above minus 1.0 are considered price elastic or very sensitive to price increases.

'Cross-price elasticity' is the measure of a percentage change in demand of one good's changes as a result of a percentage price change of another good's changes (provided all other factors are constant). If cross-price elasticity is negative, then those goods are 'complements' or consumed together. If cross-price elasticity is positive, then those goods are 'substitutes' and one is chosen over the other.

'Income elasticity' is the measure of a percentage change in a quantity demanded of a good when the income of a consumer changes (provided all other factors are constant). If income elasticity for a good is positive and between 0 and 1, this is income inelastic and generally refers to the basics of life such as food and clothing. Income elasticities higher than 1 are income elastic and generally refer to luxury goods. Income elasticities that are negative imply the goods are of inferior quality and being replaced by more premium equivalents.

In the literature, quite divergent results are found as to the own price elasticities relating to soft drink consumption and, as well, there is a divergent range of opinions as to the effectiveness of 'price-based' policies to reduce calorie intake via the excise tax system. Table 1 provides a summary of recent elasticity studies over the non-alcohol beverage market and highlights how difficult it has been to gauge consumers' sensitivity to price changes to soft drinks, and how soft drinks are perceived by consumers in terms of an everyday or 'luxury' purchase.²¹

When looking at the impact of an excise tax on soft drinks, Table 1 suggests that the price sensitivity of consumers is very different in different markets and within the full range of 'soft drink' in the non-alcoholic beverage market – different beverage types have different price sensitivities. Looking at carbonated soft drinks like sodas, which are often singled out for discriminatory taxation, for a 10% increase in price the estimated or projected reduction in consumption ranges between 1.5% and 19%. From this, it is critical for tax policy to properly understand the products available, the pricing of products and the consumer's response to price changes in the market before considering any form of excise-type tax.

It is also interesting to note that the same studies in Table 1 also include findings in relation to income elasticities: all indicate positive results meaning that where additional spending power becomes available, the consumer will purchase more of the beverages. Water and milk have low positive results across the studies reflecting the view that these products are 'necessities' of life, whereas sugar-sweetened beverages such as sodas, juice drinks and energy drinks are viewed more as 'luxuries', which helps to confirm why these same products are more price sensitive as they are not viewed as 'essential'.

However, will that reduction in consumption of a targeted soft drink product reduce calorie consumption in the population? Will it reverse obesity and health-related issues, or will there be little change to calorie intake and health impacts? Here the answer lies in 'cross-price elasticity' or substitution effects. What is missing in the review to date is the link between caloric intake and related health issues. There seems to be almost an 'assumption' that sugar is the main source of calories in a consumer's diet and that is of concern as it has the potential to misdirect consumers to different calories on the misunderstanding that because they are not taxed, they will not impact on weight. Cross-price elasticity studies can help policymakers understand the impact of any tax on a particular beverage.

Interestingly, there has not been much published on the cross-price elasticity effects but what has been published suggests that the closest substitutes for carbonated soft drinks are 'juice products' and 'whole cream milk'.²² Here, with the benefit of only a limited number of 'studies', some interesting policy

questions begin to emerge. Firstly, what if the caloric content of juice substitutes is the same as or higher than for the carbonated soft drink that has not been consumed and as such the caloric intake has not decreased? Secondly, what if the caloric content of the milk (or caloric content of the flavoured milk), is greater than the carbonated soft drink that has not been consumed? Finally, what if the substitute for the soft drink is beer, such as has been suggested in a recent ‘field study’ in Utica, New York.²³ Do these types of outcomes work against the intentions of introducing a discriminatory excise tax on carbonated soft drink products? Certainly more research is needed by health economists in this area.

Table 1: Recent international studies: income and price elasticities by non-alcoholic beverage category

INCOME AND OWN PRICE ELASTICITIES OF NON-ALCOHOL BEVERAGES BASED ON INTERNATIONAL STUDIES			
Studies	Product	Income elasticity	Compensated own price elasticity
Dharmasena & Capps (2009)	Regular soft drinks	1.506	-1.903
	Diet soft drinks	1.276	-0.957
	Bottled water	0.364	-0.070
	Fruit drinks	1.259	-0.082
	Fruit juices	0.649	-0.822
	Isotonics (energy drinks)	2.604	-5.937
	Coffee	0.628	-0.464
	Tea	0.752	-0.509
	High-fat milk	0.798	-0.733
	Low-fat milk	1.059	-0.761
Zheng & Kaiser (2008a)	Soft drinks	0.997	-0.151
	Milk	0.614	-0.154
	Juice	0.656	-0.172
	Bottled water	0.029	-0.498
	Coffee/tea	3.144	-0.083
Zheng & Kaiser (2008b)	Soft drinks	0.381	-0.164
	Milk	0.243	-0.102
	Juice	2.891	-0.458
	Bottled water	0.062	0.044
	Coffee/tea	3.049	-0.260
Kinnucan, Miao, Xiao & Kaiser (2001)	Soft drinks	1.238	-0.137
	Milk	0.406	-0.169
	Juice	0.698	-0.361
	Coffee/tea	1.876	-0.249
Yen, Lin, Smallwood & Andrews (2004)	Soft drinks	1.010	-0.520
	Milk	0.800	-0.590
	Juice	0.900	-0.350
	Coffee/tea	1.130	-0.470

Source: Dharmasena & Capps 2009; Zhen & Kaiser 2008a; Zheng & Kaiser 2008b; Kinnucan et al. 2001; Yen et al. 2004 cited in ‘Modelling the impacts of Thailand’s soft drinks market to excise reforms’, Allens Consulting Group 2011 (unpub.).

This need for further study is confirmed somewhat by the World Health Organization (WHO) which itself has reviewed many studies on this topic, including looking at non-beverage calories such as those consumed in fatty foods, dividing its studies on the relationships between consumption and body weight.²⁴

When reviewing the selected studies, those that related directly to soft drink taxes did, as expected, link an increase in the price of sugar-sweetened soft drinks with a projected fall in consumption of that product, and this is consistent with the price elasticity data highlighted above which suggests such products are price sensitive. However, when looking at those jurisdictions where soft drinks are taxed and the effectiveness of this tax in regard to health-related objectives, there are a number of ‘gaps’ in associated studies. These ‘gaps’ include:

- The currency of the introduction of these taxes to be measured meaningfully against improvements in levels of obesity and in cases of obesity-related illnesses. In fact the OECD work indicates that obesity levels are still on the increase in the US even in the states and localities where a soft drinks tax has been in place for several years.
- The limiting of such studies to attempting only to measure the impact of a tax on a single food (that is, a soft drinks tax) when the tax is only targeting a small percentage of caloric intake. For example, whilst soft drink consumption has grown significantly in the US over the past decades, it represents only 7% of sugar intake.²⁵
- The perception that a soft drinks excise tax can work like a tobacco or alcohol tax in reducing consumption of consumables believed to be ‘unhealthy’ without considering:
 - tobacco and alcohol have no clear substitutes whereas calories are found in a wide variety of food and beverages
 - tobacco and alcohol are not essential to life with tobacco in particular providing no positive health benefits, whereas food and beverages contain categories which are essential to life, and that sugar and fat are required in a diet (albeit not to the levels being consumed in many countries today).
- The fact that studies have seemingly been conducted only in high income countries and no literature exists to indicate the effectiveness of such taxes in limiting unhealthy impacts in developing economies.
- An observation that the ‘quality of the evidence is quite low’ in terms of that being analysed for the studies concerned.

It is worth looking at some of these issues more closely. Several studies on the effectiveness of existing soft drinks taxes in the US question their effectiveness in regard to reduction in incidents of weight loss and obesity levels. One study suggests that in those US states with a soft drinks tax, the taxes ‘have little influence on Body Mass Index (BMI), overweight or obesity in children and adolescents’ (Fletcher, Frisvold & Tefft 2010b, p. 973) for whom it is most important that the policy has an impact. That study adds that the prime factor for this lack of positive impact is likely to move to other and often higher caloric beverages as a response to the price increases caused by the tax.

Another study of the same US states with a soft drinks tax suggests that when considering BMI as a measure of effectiveness of such taxes, there was a very minor, indeed insignificant impact, with a 1% increase in the tax rate resulting in a 0.003 percentage point drop in BMI, leading to the conclusion that there is ‘little dynamic effect of soft drink taxes on weight’ (Fletcher, Frisvold & Tefft 2010a). Interestingly, this same study looked at BMI reduction by differing (possibly target) population groups who were found to respond differently to price changes. For example, for every 1% increase in the tax rate, BMI reductions ranged from 0.02 for Hispanics down to a negligible 0.001 for African Americans. By income grouping, BMI reductions were greatest in the lowest income groups at 0.0153, however, for those classified as overweight or obese in this income category the BMI reductions were only 0.001 and 0.0008 respectively, which may suggest that the tax is ineffective when looking at the targeted populations.

The ineffectiveness of soft drinks excise-type taxes to reduce weight and BMI (as representative measures of effectiveness) seems to be related to the effect of substitution and the availability of other food and beverages to replace, and in some cases to actually increase, any calories not consumed via taxed soft drinks. Thus, an excise tax whilst effective for goods like tobacco where no substitutes are available cannot seemingly be replicated in a product like soft drinks. This issue was best seen addressed in the following extract from Fletcher (2012) (see Box 3) when discussing this ‘gap’ between expectations from a soft drink tax, and the actual results in terms of weight and obesity outcomes.

Box 3: Soda taxes and substitution effects: will obesity be affected?

‘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.’

Extract from Fletcher 2012, p. 2.

At this point the review is increasingly concerned that the use of a targeted tax, like an excise, in the same manner as it is used on products like tobacco and alcohol, is largely ineffective as a measure to tackle health-related objectives in the area of growing obesity problems. This ineffectiveness is due largely to the fact that:

- a wide range of food and beverages can be consumed as substitute sources of sugar
- calorie intake comes from more than sugar and that it is equally important to consider the caloric content of all other foods
- studies show that in Australia, the US and in the United Kingdom, sugar consumption is actually falling whilst obesity rates continue to climb, placing some doubt of the selective targeting of sugar alone (Barclay & Brand-Miller 2011, pp. 499-500)
- certain ‘target’ groups within the population are likely to shift some spending away from more nutritious foods to pay for the increased price of soft drinks
- obesity is also the result of a greater sedentary life-style in which important physical activity like exercise and sports are declining
- strategies to tackle obesity clearly need to be multifaceted and include education, encouragement, and healthy choice options rather than a focus on the price of a few selected products.

In concluding this analysis of the effectiveness of an excise tax on soft drinks – in terms of both a revenue raising measure and/or as a health-related measure – the review looked at a case study from Finland which has had an excise tax on soft drinks since the 1940s (Juanto 2003). The objective of the excise tax has always been to raise revenue on what was perceived as a ‘luxury good’, although the review notes some interesting adaptations to Finnish excise law in 2011 to ‘dress up’ the tax as a health measure by increasing its rate by 66% and having it now sitting in the same tariff category as ‘sweets’ and ‘ice-cream’, although pastry, biscuits and other items are still exempt.²⁶

Despite a longstanding soft drinks excise, obesity levels in Finland continue to rise. The rates of increase are slower than in many developed countries, and this might be attributable to some government intervention programs which commenced in the 1970s and 1980s and included:

- media campaigns
- school-based policies which removed certain food and drinks from sale at schools and introduced one 'free' nutritious meal for children per day (a subsidised meal for university students)
- nutrition education drives through schools, government and NGOs
- legislation such as labelling of caloric content, and subsidies for low fat milk and canola oil production (North East Public Health Observatory 2005).

Interestingly, the Finnish campaign outlined in the study did not make reference to the longstanding soft drink excise as a specific tool in combating obesity. In terms of the Finnish campaign however, whilst obesity rates remained below those of other developed countries and in some cases improved, particularly in children, the obesity rate has grown by 0.18% between 1980 and 1998. The study suggests that diet alone is insufficient to tackle the problem, and believes that the rise in obesity is connected to a decline in physical activity over the same time.

This was a significant statement for the review in that there were concerns about the lack of consideration given in soft drinks excise policy to the effects of substitution, and that resulted in ineffective health-related outcomes, but this Finnish study raises the issue that it is not just the intake of calories but lifestyle which is contributing to current weight and obesity issues. In this context, a reliance on a fiscal measure such as an excise tax on a single product or single category of product may not be helpful, but rather that weight and obesity are perhaps health and social issues best addressed with a broad range of strategies.

Thus this review is unconvinced as to the effectiveness of an excise tax on selected categories of non-alcoholic beverages as a response to weight, obesity and associated health issues.

6. Recent excise tax developments

Discriminatory taxes, like excise, and their use in the context of reducing sugar consumption, are being widely discussed and have in fact been introduced in several countries in recent times including in Algeria, Finland, Hungary and Denmark (OECD 2012). Included in the taxation arrangements proposed here are excise-type taxes on saturated fats and in the case of Hungary, also on salt and caffeine. As mentioned, France also introduced a tax on sugar-sweetened beverages from 1 January 2012.

Where the review focused next was on the literature in relation to the effectiveness of the 'health-based' approach to taxation, which was the most recent development in this area, and which is of great significance in the largely publicised scrapping of the range of health taxes in Denmark. As mentioned earlier, after only twelve months in operation the Danish government, through its Treasury Ministry, formally announced the abolition of the 'fat tax' and an abandonment of the proposal to implement a 'sugar tax' (Treasury Ministry of Denmark 2012). Interestingly, the Danish government's announcement was in the context of a tax cut to help business and consumers, and also included an excise tax reduction on heating oil. The key points from the press release are outlined in Box 4.

Are there any messages from the Danish case study? The repealing of both Danish taxes supports many of the findings of the literature review, particularly in relation to economic impacts and consumer behaviours in response to the price increases of selected foods.

6.1 Tax and economics

The Danish 'fat tax' had an immediate economic impact. Consistent with this review's findings and case studies, a discriminatory tax like an excise levy moves quickly to dampen economic activity in that industry – reducing its revenues and putting employment levels under threat. Where a discriminatory tax is used in this context, there are added compliance and administration costs as industry needs to classify products as taxable or non-taxable and then calculate the taxes payable on those taxable commodities.

The cost of the economic slowdown in the relevant industry sectors created by this new tax is likely to have outweighed the anticipated 200 million Euros expected in ‘fat tax’ receipts, as other revenues from sales and profits fell, and the multiplier effects of job losses and associated losses of income taxes and spending from these retrenched staff fed through the system. However, it is too early for this data to be published.

Box 4: What happened to fat and sugar taxes in Denmark?

From 1 October 2011, the Danish government introduced a ‘fat tax’ comprising an excise-type levy of 16 Kroner (or about USD2.90) per kilogram of saturated fats in a product which exceeds 2.3% in saturated fats. This equated to 2.2 Kroner (or about USD0.36) to a 250 gram block of butter.

The same tax reform package also included an extension to an existing tax on confectionary by expanding the scope of that tax onto all manufactured goods which contain sugar such as soft drinks, jams, sauces, yoghurt, pickles, etc. – although the specific details were not published.²⁷

On 10 November 2012, the Treasury Ministry announced both the cessation of the ‘fat tax’ and the abandonment of the proposed ‘sugar tax’, with the main reasons cited as being:

- heavy criticism of the impact on consumer prices, particularly on lower income families and as such, providing for a ‘better social profile’
- corporate administrative costs
- loss of Danish jobs
- consumers moving to purchase targeted foods across neighbouring borders contributing to revenue losses to the budget and to Danish food manufacturing.²⁸

The review noted the industry responses to both the tax itself and its withdrawal and accepts that the requirement of the tax to identify fat content within foods would have been highly complex and an expensive compliance exercise for both industry to administer and authorities to confirm. The review also accepts that the price rises and cross-border shopping were putting 1,500 to 2,400 Danish food manufacturing jobs at risk in the short term, with 700 to 1,000 more job losses should the ‘sugar tax’ have commenced.²⁹

6.2 Tax and consumption

Consumers responded immediately to the ‘fat tax’ by reducing purchases of Danish made foods that exceeded the established levels of saturated fats and so faced higher taxes (price elasticity effect). One response to the price increases was for Danish consumers to take advantage of the option of continuing to purchase the same foodstuffs ‘tax free’ from neighbouring Germany.³⁰ Thus, whilst it is too early for a study of the twelve-month ‘fat tax’ in relation to obesity levels, it appears that there was little change in consumption and as a result the financial impact on households was quite regressive and seemingly socially unacceptable to the Danish government.

6.3 Tax and health

When there are readily available substitutes, discriminatory taxes like an excise levy are less effective than when there are limited substitutes, as is true for alcohol, tobacco and fuels. Where health objectives are a driver, taxation becomes complex and has the potential for a range of unintended consequences and impacts that go beyond the intended outcomes. These consequences clearly included a negative economic impact for Danish industry and its employees, but the literature also suggests that there are risks of health objectives being undermined, dependent upon the reaction of the consumer. Some of the literature suggests that health objectives could be better served through broader strategies such as education on diet and caloric intake, encouragement to undertake greater physical activity and in support of healthier lifestyles that include information on healthy weight and food nutrition.

7. Conclusions

The review of the literature strongly suggests that, as a revenue raising measure, an excise or similar type tax levied on non-alcoholic beverages first needs a comprehensive study of the broader impact on the industry as it is likely that any additional revenues raised from the excise will be offset by losses in terms of VAT or sales taxes; company and profit-based taxes; and of personal income taxes as the industry contracts with the associated loss of sales resulting from the excise tax. Introducing an excise tax for revenue raising purposes, or maintaining an excise tax in a properly functioning tax system for revenue generation, cannot be recommended or supported as good tax policy.

Levying an excise tax on the basis of health-related externalities also requires careful consideration, and clearly risks a range of unintended consequences, notably in some cases perpetuating or exacerbating the relevant health issues. In summary, policymakers have quickly assumed a link between the calories in (and sugar content of) some non-alcoholic beverages and contemporary weight- and obesity-related health concerns.

This policy approach has seemingly neglected the more important links between total caloric intake and the weight and obesity problem, and has largely ignored a number of important factors including that daily intake of calories comes from many sources, not just from sugar, and not just from certain beverages. The approach has also largely ignored the links between lifestyle changes such as reduced physical activity with weight gain and obesity problems.

This has become a critical finding of the review. For an excise tax to be successful in curbing consumption, there has to be no readily available substitute to deliver the same (or greater) effects, or the tax needs to be levied across all products which can cause the same effect. In this context, it would appear to be questionable policy to place an excise tax on just a single source of calories such as sweetened carbonated beverage, when the motivating or underlying health issue is an overly high caloric intake in a diet for a given level of physical activity.

The review contends that a discriminatory tax targeting a single beverage such as sweetened carbonated drinks runs a real risk of:

- consumers substituting their sweetened carbonated drink with a beverage of equal or greater caloric content, and/or a beverage high in fat
- sending a signal to consumers through price that non-taxed food and beverages are ‘non-caloric’ and are appropriate substitutes
- not addressing the questions of caloric intake across a whole diet, nor the issue of an increasingly sedentary lifestyle and limited physical activity.

Whilst the review of the literature found many passionate advocates supporting an excise tax on sweetened carbonated soft drinks as a means to reduce caloric intake, studies of those jurisdictions where such taxes have been in place are not yielding sufficient positive data to demonstrate success in reducing obesity rates. The author believes that whilst ‘soda taxes’ can slow sales in such places, not enough research is available at this point to demonstrate exactly what consumers are doing in response to the price increases of these drinks, and that in a view shared by the WHO, consumers are simply moving to different sources of calories.

These types of issues need to be examined and discussed by policymakers looking at future uses of sugar- and/or fat-based excise taxes to reduce caloric intake, and the findings from Denmark support this statement and highlight the issues that are present. The Danes attempted to address obesity concerns with a tax on foods which exceeded an amount of saturated fat, but succeeded only in jeopardising the economic viability of the local food industry, and led to a quick scrapping of both the ‘fat tax’ itself and a proposed similar ‘sugar tax’.

Excise taxes in this context are best applied to products for which there are readily available substitutes and the externalities are clear, such as alcohol, tobacco and fuels. These principles are very difficult to apply to caloric intake from food and beverages.

Based on the literature reviewed, and the findings of the studies contained therein, the review cannot support the use of discriminatory excise taxation applied to selected non-alcoholic beverages to effectively achieve certain 'health-related' policy outcomes.

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Notes

- 1 Treasury Ministry of Denmark, 10 November 2012.
- 2 OECD 2004, Classification of taxes and interpretative guide, paragraph 61, classification sub-heading 5121.
- 3 OECD 2004, Classification of taxes and interpretative guide, paragraphs 53-58, classification heading 5100, sub-headings 5110-5113.
- 4 In addition to a broad-based Value Added Tax, China has a Consumption Tax applicable to refined oil, motor vehicles, motor cycles, tyres, skin care products, certain wood products, watches, golf products, tobacco, and liquors.
- 5 In addition to a broad-based Value Added Tax, Viet Nam has a Special Consumption Tax on liquor, tobacco, motor vehicles, refined oil, beverages, air conditioners, playing cards, gambling, golf memberships, massage and karaoke.
- 6 Australia has a Fuel Tax in addition to a Goods and Services Tax, whilst Chile has a Fuel Tax in addition to its Value Added Tax.
- 7 Chile has a Tobacco Tax in addition to the Value Added Tax.
- 8 OECD 2004, Classification of taxes and interpretative guide, paragraph 62, classification 5123.
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- 19 Rojroongwasinkul 2008, p. 10.
- 20 Block (2004) cited in Fletcher, Frisvold & Tefft 2010b, p. 968.
- 21 Dharmasena & Capps 2009; Zhen & Kaiser 2008a; Zheng & Kaiser 2008b; Kinnucan et al. 2001; Yen et al. 2004 cited in 'Modelling the impacts of Thailand's soft drinks market to excise reforms', Allens Consulting Group 2011 (unpub.).
- 22 See Pofahl, Capps & Clauson A (2005) and Schroeter, Lusk & Tyner (2008) in Jeffords 2010.
- 23 Wansink et al. 2012, cited in 'Regulation of sugar-sweetened beverages'.
- 24 Bulletin of the World Health Organization 2010, viewed 1 December 2012, www.who.int/bulletin/volumes/88/8/BLT-09-070987-table-T1.html, divides a range of studies into 'peer reviewed' and 'grey literature'.
- 25 Relating to the US, see Block (2004) cited in Fletcher, Frisvold & Tefft 2010b, p. 968.
- 26 See Finish National Excise Duties, viewed 30 November 2012, www.vm.fi/vm/en/10_taxation/05_excise_duty/index.jsp.
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- 30 Cross-border shopping by individuals or private consumers does not attract border taxes within the European Union.

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