

Food taxes and their impact on competitiveness in the agri-food sector

Final report

Client: DG Enterprise and Industry

Rotterdam, 12 July 2014



Food taxes and their impact on competitiveness in the agri-food sector

Final report

Client: DG Enterprise and Industry

Compiled by the following partners of the ECSIP consortium:

- Ecorys
- Euromonitor
- IDEA
- DTI

Rotterdam, 12 July 2014

About ECSIP

The European Competitiveness and Sustainable Industrial Policy Consortium, ECSIP Consortium for short, is the name chosen by the team of partners, subcontractors and individual experts that have agreed to work as one team for the purpose of the Framework Contract on 'Industrial Competitiveness and Market Performance'. The Consortium is led by Ecorys Netherlands and further consists of the partners Cambridge Econometrics, Danish Technological Institute, Euromonitor, IDEA Consult, IFO Institute and WiiW, as well as a group of specialised subcontractors and 28 highly skilled individuals.

ECSIP Consortium

p/a ECORYS Nederland BV, Watermanweg 443067 GG Rotterdam, P.O. Box 4175, NL 3006 AD
Rotterdam, The Netherlands

T. +31 (0)10 453 88 00

F. +31 (0)10 453 87 55

Email ECSIP-MU@ecorys.com

Table of contents

Preface	5
Executive Summary	7
1 About this study	15
1.1 Purpose and scope of the study	15
1.1.1 Scope of the study	15
1.1.2 Rationale for the study	16
1.2 Food taxes	16
1.3 Conceptual framework	20
1.4 Activities conducted	20
1.5 Limitations of the study	21
1.6 Reading guide	21
2 Impact of food taxes on consumption	23
2.1 The impact of taxes on cost, price and product reformulation	24
2.1.1 Taxes, cost and prices	24
2.1.2 Taxes and product reformulation	31
2.2 The impact of price on demand	33
2.2.1 General	33
2.2.2 Differences in target groups	38
2.3 The degree of substitution	39
2.3.1 Product substitution	40
2.3.2 Brand substitution	43
2.4 Changes in demand and public health	46
2.5 Summary of findings on the impact of taxes on consumption	47
Limitations of the analysis on consumption	51
3 Impact of food taxes on competitiveness	53
3.1 Taxes and administrative burdens	55
3.1.1 The type of tax	56
3.1.2 The calculation method of the tax	56
3.1.3 The tax base	57
3.1.4 Administrative costs in practice	57
3.2 The impact of food taxes on profitability	58
3.3 The impact of food taxes on investment	60
3.4 The impact of food taxes on employment	61
3.5 The impact of food taxes on labour productivity	63
3.6 The impact of food taxes on the internal market	64
3.6.1 Competitiveness effects within Member States	65
3.6.2 Competitiveness effects within the internal market (cross-border trade)	67
3.7 Reflections and conclusions on the impact of taxes on competitiveness	69
4 Food taxes and other policy measures	73
4.1 Categories of policy measures	73
4.2 Traditional regulation	74

4.2.1 Market-based instruments	75
4.2.2 Self-regulation and co-regulation	76
4.2.3 Information and education schemes	76

Preface

Europe's increasing obesity prevalence is of growing concern to EU policy makers given its detrimental health effects and associated burden on public health systems. In recent years there has been interest, both within the EU and globally, in the use of taxes on high in fat, sugar or salt foods (this definition of food includes non-alcoholic beverages) to reduce their consumption, and address obesity. Over the last few years, several governments of EU Member States have introduced taxes on specific food categories and food ingredients such as confectionery, ice cream, soft drinks, sugar, fat, artificial sweeteners and salt. The effectiveness of such taxes in discouraging consumption of the targeted foods or ingredients, however, is uncertain. In addition, these taxes can have complex social, economic and environmental consequences for individuals, companies and sectors. The desire to undertake the present study originates in the discussions held among stakeholders participating in the High Level Forum for a Better Functioning Food Supply Chain.

This study *Food taxes and their impact on competitiveness in the agri-food sector* was granted to the ECSIP consortium with Ecorys Netherlands as lead partner. Responsible for the management of the project and overall analysis are Robert Haffner, Patrick de Bas and Eszter Kantor with Jan-Maarten de Vet providing quality control. Key support staff includes Katelyn Price (literature review and coordination support) and Maarten van der Wagt (quantitative analysis). Other Ecorys contributors are Lilian Tilburgs and Anastasia Yagafarova.

For the case studies, the project team drew on the services of Janne Sylvest & Benita Kidmose Rytz (DTI; case study Denmark), Karen Thorsted Hamann (IFAU; case study Finland), Pierre Padilla (IDEA; case study France), Pásztor Zsolt (Eufund Consultants; case study Hungary), Katelyn Price (Ecorys Netherlands; case study Ireland) and Valentina Patrini (Ecorys Brussels; case study Italy).

The project team was advised by a team of experts. The advisory panel consisted of: Professor Dr Xavier Gellynck and Dr Bianka Kühne (University of Ghent), Dr Fabian Zuleeg (European Policy Centre) and Professor Dr Sijbren Cnossen (CPB Netherlands Bureau for Economic Policy Analysis).

We would like to thank the steering group of the European Commission for its constructive comments and excellent guidance and advice throughout the entire period of this study. We also thank the numerous stakeholders that actively supported the study, either through the provision of information and/or participation in the stakeholder meetings organised in Brussels.

The opinions expressed in this Study are those of the authors and do not necessarily reflect the views of the European Commission.

Executive Summary

Background, aim and approach

Industry representatives at the High Level Forum for a Better Functioning Food Supply Chain raised concerns about taxes levied or envisaged on food and drink products by several Member States in recent years. No conclusive analysis of the effect of food taxes on competitiveness of the agri-food sector was available, while also the effect of food taxes on employment, investments and trade flows within the European internal market have not yet been researched in-depth.

Against this background, the European Commission has engaged the ECSIP consortium to conduct a detailed analysis of the impact of food taxes. The aim of the study is to assess the impact that taxes levied on food and beverages would have on the competitiveness of the agri-food sector. The research questions of this study are:

1. How do food taxes impact the consumption of foods with a high percentage in fat, salt and sugar? What qualitative and quantitative results support a public health or fiscal objective?
2. How do food taxes impact competitiveness of the agri-food sector on the Member State level (in terms of costs, profitability and investments)?
3. How do food taxes impact employment and trade flows within the Member States as well as the EU Internal market?

While health effects of food taxes are not the primary focus of this study, we note that health effects are critically important as improved nutrition and health are the driving motivations for many of the implemented food taxes. Additionally, while the main focus of the study is on the food taxes as a policy instrument, we also provide a discussion on food taxes in a broader context of alternative policy measures aimed at improving public health.

In order to provide an answer to the study research questions, we have conducted the following tasks:

- **Literature review** on the impact of food taxes;
- **Quantitative analysis** on product prices and consumption changes, as well as competitiveness indicators such as margins, investment and employment. The analysis is based on data from the Euromonitor Passport system, at detailed product level per Member State and from 1999 onwards. Relevant stakeholders also provided market data;
- **Interviews** conducted with 14 European stakeholders, representing all stakeholder groups impacted by the introduction of food taxes including producers, retailers, public health authorities as well as consumers;
- **Case studies** on the impact of introduced food taxes, in Denmark (saturated fat), Finland (confectionery, ice-cream and soft drinks¹), France (sugared and non-sugar-sweetened soft drinks) and Hungary (confectionery, chocolate, sugar-sweetened beverages, energy drinks, salty snacks and condiments). Case studies on proposed but not introduced food taxes in Ireland (sugar sweetened drinks tax) and Italy (soft drinks with added sugar/sweeteners).

The interim results of the study have been reviewed by a wide group of stakeholders, including industry, health and consumer representatives, as well as peer-reviewed by independent experts from University Ghent (Professor Dr Xavier Gellynck and Dr Bianka Kühne), the Netherlands

¹ Drinks affected by the tax include soft drinks (carbonated drinks, syrup), mineral water, and fruit based drinks (e.g. fruit juice, syrups, and nectars), as well as some alcoholic beverages.

Impact of food taxes on consumption

How do food taxes impact the consumption of foods with a high percentage in fat, salt and sugar?

This section of the study is primarily interested in determining whether a tax on a certain product or nutrient generates a response by consumers to reduce their consumption of that good and by how much. Directly related to this is the question of whether consumers purchase other products to compensate for their reduced consumption of the taxed good, and which products are purchased. To examine consumer behaviour effects of food taxes, the relationship between tax, price and demand changes was analysed through the four basic relations below:

1. Introduction of a tax increases the cost of the product² which in turn may lead to a price increase:
 - Mostly, higher product prices occurred in conjunction with profit margins remaining stable, indicating full pass-through of the tax. However, there is evidence of over-shifting in the sugar-sweetened beverage (SSB) sector in all non-alcoholic beverage taxes studied;
 - For a number of taxes we examined, prices increased by significantly more than what can be directly attributed to the tax (with margins remaining stable), clearly showing that factors other than the tax (and other than over-shifting) influenced prices in the same period the tax was introduced. In some cases, prices showed no effect following the tax changes, equally demonstrating that existing trends and factors other than the tax can have a stronger influence on price.
2. Product reformulation, where possible and feasible, is one of the options to reduce the impact of the tax on the cost of the product:
 - Product reformulation is more likely where the design of the tax is based on the level of certain ingredients (sugar, salt etc.) in the final product. As such, a specific tax provides a stronger incentive (compared to an ad valorem tax) to reformulate products as manufacturers may be able to lower the impact a tax has on their cost by reducing or removing the taxed ingredient;
 - However there are limitations to product reformulation depending on the importance of the taxed ingredient to the taste expectations of consumers³ and composition of the product⁴, as well as the cost and complexity of reformulation.
3. A price increase leads to a reduction in demand, with demand effects potentially different among various groups of consumers e.g. low-income groups or users consuming a high amount of the taxed products:
 - Generally, an increase in the price of a good, resulting from the introduction or increase of a tax, is associated with a reduction in the consumption of the taxed product. Conversely, a tax reduction or abolishment is associated with lower product prices, and more consumption of the taxed products;
 - Decreases in demand following the introduction of food taxes are generally proportionally smaller than the price increase, which is evidence of inelastic food demand;
 - The exact size of demand responses due to food taxes is difficult to establish, because of difficulty in establishing causal links between tax changes, price changes and demand, as well as the presence of external factors such as the cost of raw materials which may also influence price and demand;

² We refer to the direct effect of the tax as the monetary impact of the tax on prices (tax base times tax rate), thereby excluding any additional costs of the tax (administrative costs, product reformulation costs) which might also have an impact on prices.

³ Some products have key features that identify them both in terms of texture and taste, making them unique, and therefore ingredients cannot be reduced or replaced without negatively impacting consumer demand.

⁴ Some products require a certain level of a particular ingredient in order to exist, for example chocolate needs certain levels of cocoa and sugar, butter requires a certain level of fat etc.

- It is important to add that the results for consumption discussed in this report relate to increases or decreases in *average* consumption, meaning the average across all consumers. In order to draw more meaningful conclusions on economic and health impacts, segmentation should go further and for instance analyse risky populations (mainly children and obese people). However, such segmentation is largely under researched and as such changes in demand for different groups of consumers, which may have stronger or weaker preferences for certain products and brands, is unknown;
 - A common criticism of food taxes is that they are regressive, meaning that low-income households pay a greater proportion of their income on food taxes than high-income households. A consistent finding in the literature is that food taxes are regressive but the actual income impact is predicted to be very low. There is some evidence in the literature that food taxes will benefit the low-income population the most in terms of improving nutrition and hence be progressive from a health perspective, but too little quantitative research has been done in this area to reach firm conclusions.
4. In the case of a decline in demand, consumers may move to cheaper versions of the taxed product (brand substitution), to non-taxed products or to less heavily taxed products (product substitution). Substitution to products outside the product category upon which the tax is levied have been identified but remain hard to evaluate:
- Product substitution occurs where less-taxed or non-taxed substitutes are readily available. Tax design, in terms of the scope of products which the tax is levied upon, therefore greatly influence consumer product preferences;
 - Brand substitution in the form of moving to cheaper brands is found to occur, more so in product categories where the brand of the product is less connected to the perceived taste of the product.
5. Health outcomes of food taxes: any alterations in consumption patterns, taking into consideration industry responses and the impact of product substitution, may potentially have an impact on public health:
- To what extent changes in consumption resulting from a food tax actually lead to public health improvements is still widely debated and evidence from academic literature is inconclusive and sometimes contradictory:
 - The key reasons for the diversity in results of studies are the uncertainties around product substitution and the calculation methods used to translate consumption changes into particular health effects (weight loss and disease prevalence).
 - As health motivated food taxes are a relatively recent policy initiative and public health studies require long-term data to assess effects on diet, obesity and non-communicable diseases, impacts of food taxes on public health will need to be further researched and assessed over the longer term.

Impact of food taxes on competitiveness and the internal market

How do food taxes impact the competitiveness of the agri-food sector?

This section of the study is primarily interested in determining how food taxes impact firms active in the agri-food sector. In particular, we focus on cost, profitability and investments as these are important elements for a strong competitive position. To examine the impact of food taxes on competitiveness, we investigated the following basic relations as set out below:

1. Introduction of food taxes increases costs for the firm, most notably administrative costs:
 - The products upon which a tax is levied (either specific or ad valorem tax), and the ways these are classified and defined, can have significant implications for the administrative burden of the tax. Food taxes in Denmark and Finland provide clear examples. Also, the calculation method has an important influence on administrative burdens, notably if the tax is charged on ingredients;

- All taxes investigated in this study are levied on producers, or the first domestic seller for imported products. The lack of comparable food taxes levied on other parts of the supply chain make it impossible to assess the impact of this choice on administrative burdens;
 - As administrative burdens have a fixed cost character to a certain extent, the impact of these burdens on SMEs is relatively larger than the impact on larger producers.
2. Food taxes may negatively impact firm profitability:
- Interviews, case studies and other market data sources provided examples of firms facing significant declines in profitability. These declines were not confirmed in the analysis of our sector data which showed hardly any development in sector profitability. However, the lack of developments apparent in our data can not be relied upon as a true representation given the limitations of the data;
 - External factors, such as the prices of raw materials, are likely to at least partly influence developments in profitability;
 - The profit margin for the taxed product is negatively affected which, together with the decline in demand for the taxed product, negatively impacts firm profitability. This may be somewhat offset by increases in profit on product substitutes of the same firm;
 - It may be more difficult for SMEs to mitigate the impact of food taxes on profitability by means of product reformulation or increased profitability on substitute products due to their smaller product line.
3. The impact of food taxes on investments levels is unclear:
- The industry is divided on the impacts that food taxes might have on investments and innovation. While some stakeholders report that there has been a reduction of innovation in food simply as a result of less capital available due to taxation, another source suggests that product reformulation has increased in response to the introduction of taxes;
 - There is no clear pattern between introduction of a food tax and investment levels at sector level. We observe a strong decline in one case and a strong increases in another, with also a couple of cases with unchanged trends in investment levels. However, as investments often concern long-term plans, the short-term data available does not allow to test for multi-year effects;
 - The analysis is restricted due to the relatively small number of observations. As various food taxes were only recently introduced, no data was available for some of the taxes.

Impact of food taxes on competitiveness and the internal market

How do food taxes impact employment and trade flows within the Member States as well as the EU internal market?

This section of the study is primarily interested in determining how taxes impact the internal market. We explore the impact on employment, labour productivity, cross-border effects and trade flows within the EU. To examine the impact of food taxes on the internal market, we investigated the basic relations as set out below:

4. Food taxes may lead to a decline in the need for labour inputs and thus employment, especially at local level:
- The industry indicates loss of employment due to introduction of food taxes. Production of foodstuffs often occurs in the Member States using local employment. In particular, there are large numbers of local SMEs that manufacturers work with, mostly active in bottling, packaging, advertising and retail. Therefore food taxes may have a direct effect on local employment, as well as a trickle down effect on employment through the value chain;
 - Figures on changes in employment give mixed results, including a few examples where an increase of employment was observed in the year of introduction of the food tax. This result is a strong indication that other factors play a more important role in the development of employment than the food taxes;

- The loss of sales for producers and retailers in tax-affected products, and the loss in employment resulting from this decline in sales, may be compensated by growth in other product lines. However, this is not always the case, not only for multinational companies which produce only one category of products (for example sweet foodstuffs) but especially for SMEs, which do not have as much flexibility to offset the loss of profit margins on other products.
5. No clear impact of food taxes on labour productivity within a firm is observed:
 - The sector data analysis on labour productivity shows a mixed picture with productivity decreasing in two cases, but also an increase of productivity observed in another case. On the basis of the small number of observations, no conclusion can be drawn;
 - No solid information from case studies or interviews are available to shed light on the observations.
 6. The competitiveness between firms within a Member State where a food tax is levied may be negatively impacted:
 - As food taxes may cause consumers to favour cheaper brands of the taxed products in order to maintain consumption of the product but at a lower cost, the competitiveness of premium brand producers reduces compared to the to non-premium brand producers. Likewise, substitution from taxed products to non-taxed products reduces competitiveness of producers of the taxed products compared to producers of the non-taxed products;
 - The precise product substitution that occurs, and therefore the competitiveness effects, is highly influenced by the design and scope of the tax, as well as the nature of the product that is being taxed.
 7. Food taxes seem not to lead to strong increases in cross-border purchases:
 - A common argument against food taxes is that they raise the price of goods in comparison to the prices of the same goods in neighbouring countries where no such tax exists and thereby promote cross border shopping;
 - An often cited example for the negative impact of non-harmonised food taxation is the increase in cross border shopping following the introduction of the Danish fat. Close investigation of the case study shows that the degree of cross-border shopping resulting from the introduction of the tax is limited. Other factors, in particular other taxes on food, are more important drivers for the cross-border shopping effect;
 - No firm conclusions can be drawn on the basis of data analysis of international trade flows due to the limited number of cases.⁵ In two cases we observe the expected changes, but two other cases do not show the expected change in import/export patterns, with one of those cases actually showing an opposite reaction than expected.

Alternative policy measures

Food taxes are not the only options available to policy makers to impact on the consumption of foods with a high percentage in fat, salt and sugar. Various alternative measures exist:

1. Traditional regulation (legislation, contracts or agreements):
 - Traditional regulation prescribes what is permitted and what is illegal;
 - Traditional regulation with respect to the food sector comes in two main forms: food regulation and marketing regulation;
 - Food regulation helps people eat a balanced diet by making it impossible or restricting the possibilities to purchase products that are high in sugar, salt and fat. Food regulation potentially also has drawbacks, such as high informational requirements to design an

⁵ In case of strong cross-border effects, one should expect a strong reduction in demand in the country where the tax is levied, lead to reduced import (less demand for taxed products). At the same time, an increase of export of taxes products (in order to allow the neighbouring country to meet the increase in demand) should be expected.

effective and balanced food regulation, enforcement costs of regulations, and welfare losses for consumers who like to enjoy the products as part of a balanced diet;

- Regulation of marketing by the food industry has aimed to restrict the marketing of food products which are dense in calories and low in nutrition, especially towards children, as well as to promote the marketing of food products like fruit and vegetables.

2. Market-based instruments:

- Market-based instruments target financial incentives of consumers. In addition to food taxes, discussed in the previous chapters, the other main market-based instrument for the food sector is the provision of subsidies;
- Subsidies with respect to the food sector concern the food products low in calories and with high levels of nutrition. The most common example is subsidies for fruit, with subsidies on high fibre products or milk as other examples;
- One consequence of subsidies is that low income households may benefit if they choose for the subsidised products. However, subsidies are difficult to “target” as people who would have bought a low fat alternative in the absence of a subsidy also benefit from it. Moreover, people who receive a subsidy may still use the (actual or perceived) additional income on products high in salt, fat or sugar.

3. Self-regulation and co-regulation approaches:

- Self-regulation and co-regulation refers to situation where the industries set standards themselves. The degree of government involvement and legislative backing determines the difference between the two;
- Self-regulation in industry is mainly used by industry groups to promote ethical conduct, product standards and fair trading. With respect to the food sector, this may be used for setting standards on the use of ingredients;
- A consequence of self-regulatory measures is that optimal use is made of the available information within industry. However, while self-regulation may lead to a reduction in the amount of salt, sugar and fat used in products, it does not in general incentivise consumers to change consumption pattern and focus on a balanced and healthy diet, although it should be noted this depends on the specific self-regulatory measures chosen.

4. Information and education schemes:

- Policy instruments focused on information and education aim to change behaviour by making more information available to allow consumers to make more informed decisions;
- The main tools for the provision of information and education are information campaigns, education and point-of-purchasing information;
- Campaigns refers to the use of mass media, such as websites, flyers, television commercials, physical advertisement and events, to promote and encourage certain behaviour by providing consumers with information and raising awareness.;
- Education aims to inform consumers and increase awareness of the nutritional quality of different food products and the possible consequences of eating too much salt, sugar or fat. A way of implementing education is to include cooking or gardening classes in school curricula. Some studies test this and find that cooking and gardening classes indeed could increase the consumption of fruit and vegetables. Stakeholders across the board agree that education, raising awareness and community-based programs are good, helpful and more should be done;
- Point-of-purchase information refers to specific information about the ingredients and nutrition levels of the product provided to consumers at the point of purchase. Labels are a commonly known example of this measure. Standardised labels create an easy to access way to compare different products and make informed choices. An important factor that plays a role with product labels is that it gives consumers immediate feedback about the choices they are about to make. Due to this feedback the consumer might reconsider his or

her action and choose an option with lower levels of sugar, salt and fat and higher levels of nutrition.

Overall summary of conclusions

Overall, this *study on the impact of food taxes on competitiveness of the agri-food sector* generally finds that food taxes achieve a reduction in the consumption of the taxed products and, in some cases, product reformulation aimed at reducing the sugar, salt and fat levels of the product. It is also found that product substitution takes place, both through an increase in the consumption of taxed products from cheaper brands and non-taxed or less-taxed product substitutes.

On sector competitiveness, we observe food taxes leading to an increase in administrative burdens, notably if the tax is levied on ingredients (specific tax) or the tax base is highly differentiated and complicated. Food taxes may negatively impact profitability, although changes in net profitability are dependent on a wide range of factors, including the impact of food taxes on substitute products and factors that are not influenced by food taxes. The impact of food taxes on investment is unclear.

On the impact of food taxes on the internal market, employment may be negatively impacted. Meanwhile, there is no clear indication on the impact on labour productivity. Cross border shopping effects were limited and other factors, in particular other taxes on food/drinks, are found to be more important drivers for the cross-border shopping effect. Competitiveness of individual firms within a member state can be impacted by food taxes.

To what extent changes in consumption resulting from a food tax actually lead to public health improvements is still widely debated and evidence from academic literature is inconclusive and sometimes contradictory. More research is needed as empirical health data becomes available over time. Additional availability of empirical data over time will also allow improved research on the impact of food taxes on competitiveness of the agri-food sector.

1 About this study

1.1 Purpose and scope of the study

The European Commission, specifically DG Enterprise and Industry, have engaged the ECSIP consortium to conduct a detailed analysis of the impact of food taxes on competitiveness in the agri-food sector. The study took place between November 2013 and June 2014.

We answer the following key questions in this study:

1. How do food taxes impact the consumption of foods⁶ with a high percentage in fat, salt and sugar? What qualitative and quantitative results support a public health or fiscal objective?
2. How do food taxes impact the competitiveness⁷ of the agri-food sector on the Member State level (in terms of costs, profitability and investments)?
3. How do food taxes impact employment and trade flows within the Member States as well as the EU Internal market?

1.1.1 Scope of the study

The sectorial scope of this study is the European food industry, including all the main economic actors along the food supply chain. Although, within the context of the European level interviews the study takes notice of the impacts that non-harmonised food-taxes may have on *alcohol*, wider and more detailed implications of these taxes on alcohol have not been studied. Furthermore, specific taxes on *coffee* or *tea* are also not included in our analysis. They have been introduced prior to the temporal scope of this study and have been motivated by fiscal revenue gains rather than health objectives.

The study focuses on non-harmonised taxes introduced by EU Member States on food and non-alcoholic drinks. In terms of implementation of food taxes, the study focuses on those food taxes that are currently in place, have been recently introduced or recently withdrawn. We have identified the following recent, health motivated EU food taxes (see Table 1.1).

⁶ For the purpose of this study, 'food' is defined in accordance with the definition provided in Regulation (EC) 178/2002, article 2: "(...) 'food' (or 'foodstuff') means any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans. 'Food' includes drink, chewing gum and any substance, including water, intentionally incorporated into the food during its manufacture, preparation or treatment. It includes water (...)."

⁷ For the purpose of this study, 'competitiveness' is defined as: *The ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive in relation to the offers of other firms of nations.* Competitiveness is the result of a wide range of drivers and framework conditions, as identified also in the proposal for the framework contract Industrial Competitiveness and Market Performance, that forms the basis for this request for services. These framework conditions include, among others like institutional arrangements in terms of available skillset and R&D infrastructure, labour market flexibility and access to finance.

Table 1.1 Summary of recent, health motivated food taxes

Country	Tax(es)
Denmark	<ul style="list-style-type: none"> • Excise duty on saturated fat; • Excise duty on chocolate and sweets; • Excise duty on ice cream; • Excise duty on soft drinks.
Finland	Excise duty on confectionery, ice cream and soft drinks ⁸ .
France	Excise duty on sugared and non-sugar-sweetened drinks; Energy drink tax.
Hungary	<ul style="list-style-type: none"> • Public health product tax covering; <ul style="list-style-type: none"> - salty snacks; - confectionery; - sugar-sweetened beverages; - syrups or concentrates for soft drinks; - energy drinks; - flavoured beers/alcopops; - condiments⁹; - fruit jam.

1.1.2 Rationale for the study

Industry representatives at the High Level Forum for a Better Functioning Food Supply Chain raised concerns about taxes levied or envisaged on food and drink products by several Member States in recent years. No conclusive analysis of the effect of food taxes on competitiveness of the agri-food sector was available, while also the effect of food taxes on employment, investments and trade flows within the European internal market have not been researched in-depth.

By providing answers to the research questions, the study aims to support policy making by way of collating information on the impacts and effectiveness of the food tax measures, as well as partially illustrating public health and social impacts.

1.2 Food taxes

Table 1.2 (below) provides an overview of the various non-harmonised tax measures that have been analysed within the scope of this current study. Information on the tax measures are presented according to their current status and applicability as observed during the course of this study. A more detailed description of the individual tax measures and their mechanisms can be found in the case study annexes.

⁸ Drinks affected by the tax include soft drinks (carbonated drinks, syrup), mineral water, and fruit based drinks (e.g. fruit juice, syrups, and nectars), as well as some alcoholic beverages.

⁹ Due to data problems, we had to exclude condiments from the data analysis.

Table 1.2 Detailed information on recent, health motivated food taxes

Description of Tax	Date introduced	Date abolished	Tax Rate	Tax base	Chargeability	VAT
Denmark						
Excise duty on saturated fat	Oct 2011	Jan 2013	DKK 16 / kg of saturated fat ¹⁰	Meat, dairy products, animal fats and vegetable oils which contain more than 2.3% saturated fat. Standardised liquid milk is not subject to the tax.	Applies to food producers with a yearly turnover of more than DKK 50,000 of the corresponding food products in Denmark. Applies to imports.	Standard rate 25%
Excise duty on ice cream	2010 increased In place since 1946.	-	DKK 6.61 / L of ice cream	Ice cream or ice cream mix with a content of sugar above 0.5 g per 100ml.		
			DKK 5.29 / L of ice cream	Ice cream or ice cream mix with a content of sugar below 0.5 g per 100ml.		
Excise duty on soft drink and juice	2013 reduced by 50% In place since 1930's	Jan 2014	DKK 0.82/L standard rate; DKK 0.295/L reduced rate; *note: various rate increases and decreases prior to 2013.	Standard rate for sugar content >0.5g/100ml and reduced rate for sugar content <0.5/100ml.		
Excise duty on chocolate and sweets ¹¹	2013 increased In place since 1968.	-	DKK 24.61 /kg (In 2010 increased from DKK 14.20 to DKK 17.75/kg and a reduced rate of DKK 14.20 for low sugar products. 2012 raised again to DKK 23.75 and 20.2 for low-sugar products.	Chocolate and chocolate products, liquorice products, marzipan, sweets, effervescent products, chewing gum, cakes with a certain sugar, cacao or chocolate content etc. Certain products that can be used for the production of chocolate and sweets, such as almonds, nuts and cocoa nuts, are subject to raw materials tax.		
			DKK 20.93 / kg.	Products, as per above, containing less than 5 grams of sugar /kg.		

¹⁰ Please see the case study on Denmark for a detailed description on the tax base.

¹¹ Further tax increases – via indexation - in this product category are expected.

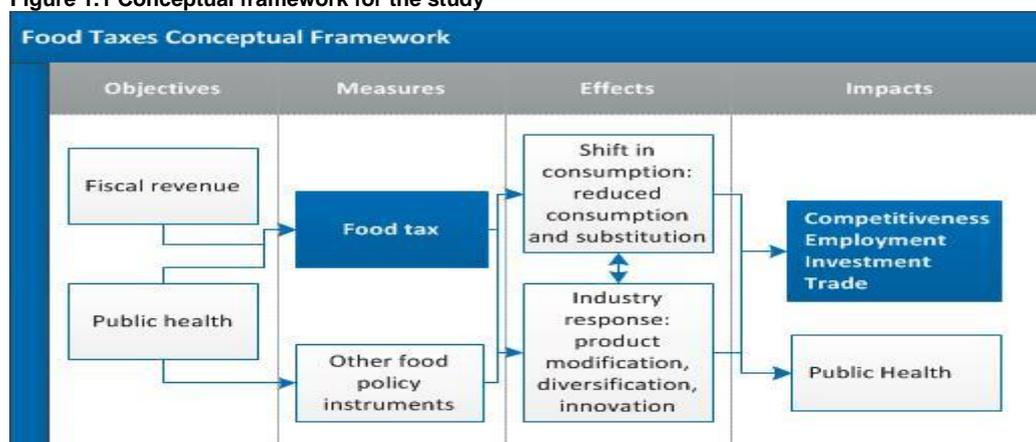
Description of Tax	Date introduced	Date abolished	Tax Rate	Tax base	Chargeability	VAT
Finland						
Excise duty on confectionery, ice cream and soft drinks.	Excise duty on sweets 1926 to 2000. Soft drink excise since 1940. Sweet tax reintroduced in 2011 and combined with existing soft drink tax, ice cream added.	-	<u>2014:</u> EUR 95/kg or EUR 0.220/L (sugar-sweetened beverages & juices) EUR 0.11/L (sweetener-based soft drinks and waters) <u>2012:</u> EUR 0.95 /kg or EUR 0.11 /L <u>2011:</u> EUR 0.75 /kg or EUR 0.075 /L	Sweets, chocolate, ice-cream and soft drinks (including sugar- and non-sugar-sweetened soft drinks, juices and waters). Exemptions: Sweets, ice-cream and soft drinks used in the manufacture of other products; Goods transported by travellers and acquired for their own use.	Paid by producer when products enter into the market. Imported products are taxed. Exported products are not taxed. Exempt: Producers with an annual production volume of less than 10,000 kg or 50,000 litres are exempted from the tax.	Standard rate 24% Reduced rate 14% for foodstuffs
France						
Excise duty on sugared and non-sugar-sweetened drinks	1 Jan 2012	-	Adjusted every 1st of January in order to be in line with the growth rate of the consumption's price index of the second year preceding the levy. 2012: EUR 7.16 / hectolitre 2013: €7.31 2014: €7.45	All beverages with added sugar or sweetener (whatever the quantity), packed into containers aimed to the retail market (direct or with an intermediary) and with an alcohol strength equal or below 1,2%vol. (0,5% vol. in the case of beers.	Tax is paid by producers, importers and those in France acquiring the drinks from other EU countries. Exoneration applies to exports (in and outside EU).	Standard rate 20% Reduced rate 5.5/10% for foodstuffs.
Excise duty on "energy drinks"	1 Jan 2014		EUR 1 / litre	"Energy drinks" defined as beverages with caffeine content $\geq 220\text{mg/l}$.		

Description of Tax	Date introduced	Date abolished	Tax Rate	Tax base	Chargeability	VAT
Hungary						
Public health product tax (NETA)	2011	-	7 HUF/litre	Soft drinks: Added sugar: more than 8g/100ml. Exempt: Drinks with more than 25% fruit or vegetable content and products prepared with the use of at least 50% of milk.	Based on the weight or volume (kg or litres) of the product. Applicable for products sold over 50 kg or 50 litres. The tax is payable by the first domestic distributor or the producer of the own brand product.	Standard rate 27% Reduced rate 18% for milk and milk products
			200 HUF/litre	Syrups or concentrates for soft drinks. Exempt: Syrups with more than 25% fruit or vegetable content.		
			250 HUF/litre	Energy drinks: Methylxanthines content: more than 1mg/100ml Taurine: more than 100mg/100ml. Or: Methylxanthines content alone of more than 15 mg/100ml.		
			70 HUF/kg for sweetened coca powder or 130 HUF/kg for other pre-packaged sugared products	Confectionery: Added and total sugar: more than 25g/100g Chocolate: added and total sugar more than 40g/100g and cocoa content less than 40g/100g. Exempt: Products prepared with the use of at least 50% of milk.		
			250 HUF/kg	Salty snacks: Salt: more than 1g/100g.		
			250 HUF/kg	Condiments: Salt: more than 5g/100g (exemptions for mustard and ketchup and some other salted flavouring vegetable products under 15g/100 g salt content).		
			20 HUF/kg	Flavoured beers/alcopops: Beer or any other alcohol with added sugar that has a total sugar content of more than 5g/100ml.		
			500 HUF/kg	Fruit jam: All fruit flavours except extra jam, extra jelly, marmalade and special quality jams.		

1.3 Conceptual framework

To structure the analysis, a conceptual framework was developed based on the results of the literature review. The outline of the framework is presented in Figure 1.1 below.

Figure 1.1 Conceptual framework for the study



Source: Ecorys analysis.

As pointed out above the introduction of non-harmonised food tax measures are driven by various objectives that can include public health concerns as well as fiscal revenue targets. A potential direct effect of food taxes (and other policy instruments) can be a change in consumption patterns, which may also include substitution effects.

Implementation of a food tax may necessitate a response by industry – such as product reformulation for example -, which in turn may influence consumption. The combined impacts arising from the shift in consumption patterns and the correlating industry response can lead to further implications for the wider industry supply chain as well as consumers. With regard to the industry, these implications may potentially relate to changes in the sector's competitiveness, employment, investment and trade, both on the national and on the EU level. In the case of consumers, any alterations in consumption patterns – taking into consideration industry responses and the impact of product substitution – may potentially have an impact on public health. It should be noted that all these effects need time to materialise, some effects can potentially occur relatively quickly after the introduction of a tax (e.g. effects on prices), while others (e.g. effects on consumption and public health) would potentially need more time.

In Chapter 2, we more closely review the linkage between the various elements of the conceptual framework.

1.4 Activities conducted

In order to assess the particular areas referenced in the research questions as shown in Chapter 1.1, we have carried out a comprehensive desk-based research supported by an EU-wide consultation – composed of face-to-face meetings, telephone interviews and country case studies - taking on board the views and opinions of a large number of stakeholder groups. The following table presents an overview of the individual tasks carried out within our study.

Table 1.3 Overview of tasks and activities

Task	Activity
Literature review	Literature review on the impact of food taxes and other measures.
Data collection and analysis	Quantitative analysis on consumption patterns and industry competitiveness.
Assessment of competitiveness	Interviews conducted with European stakeholders.
Assessment of the regulatory framework	Case studies on the impact of the introduction of food taxes.
Scenario analysis	Overview of other policy measures aimed at improving population health.

1.5 Limitations of the study

Some limitations during the data analysis have been observed. As noted above alcohol taxes were not part of this study even though interviews with industry associations in the sector have been carried out and their views had been taken into consideration. Moreover, while health aspects are in some cases an important part of the rationale for food taxes, this present study has not focused on public health implications as a primary objective.

Furthermore, limitations for the case studies arise from the fact that their coverage extended to only four taxes in four different countries. Additional limitations were observed in relation to the literature review which in some cases relies solely on modelling results and suffers from a lack of analysis of real-life data. Our own data analysis is limited by the aggregated nature of some types of data (e.g. on investment), limiting the possibility to draw conclusions on firm level competitiveness. Moreover, most food taxes are only in place relatively recently, which restricts our ability to measure any long-term effects of the tax increases.

Nonetheless, combining information from the various research activities allows us to provide a comprehensive insight into the impact of food taxes. When interpreting our findings, the reader should be aware of the aforementioned limitations, which we will reiterate where appropriate and relevant.

1.6 Reading guide

The remainder of this report is organised as follows:

- Chapter 2 presents our key findings on the impacts of non-harmonised food taxes on **consumption**;
 - Chapter 3 presents our key findings on the impacts of non-harmonised food taxes on **competitiveness**;
 - Chapter 4 presents potential alternatives for food taxes, the so-called **non-tax policy measures**.
-
- Annex 1 provides a detailed look at the literary review carried out in the study;
 - Annex 2 sets out detailed information on the quantitative (data) analysis for the countries and the various product categories;
 - Annex 3 presents the country case studies; and
 - Annex 4 contains the findings of the EU level interviews.

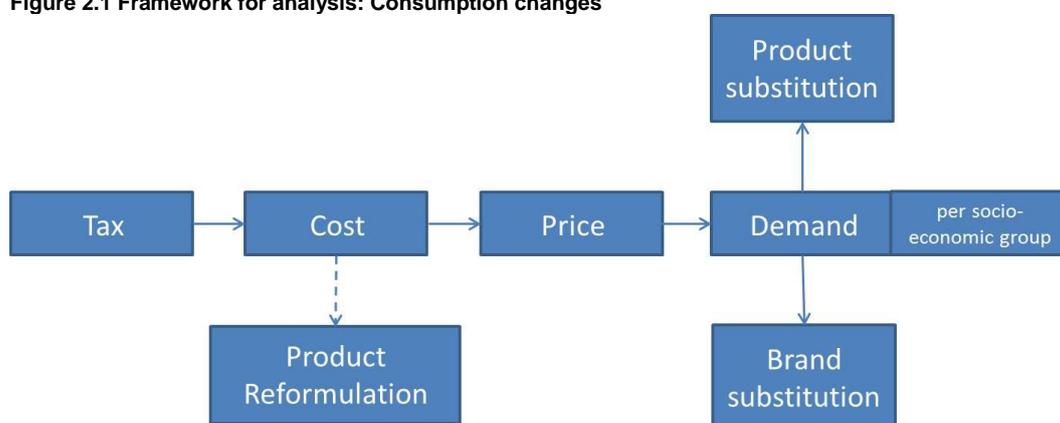
2 Impact of food taxes on consumption

In this chapter, we aim to answer the first research question of the study: How do food taxes impact the consumption of foods with a high percentage in fat, salt and sugar?

In general terms, a study on consumer behaviour is primarily interested in finding out whether a tax on a certain product or nutrient generates a response by consumers to reduce their consumption of that good and by how much. Directly related to this is the question of whether consumers purchase other products to compensate for their reduced consumption of the taxed good, and which products are purchased (product substitution).

For the analysis of such changes in consumption, we draw upon the following framework for analysis.

Figure 2.1 Framework for analysis: Consumption changes



The basic relations to be tested in the study are as follows:

1. Introduction of a tax increases the cost of the product¹² which in turn may lead to a price increase;
2. Product reformulation, where possible and feasible, is one of the options to reduce the impact of the tax on the cost of the product (for specific taxes as these are levied on the raw ingredients, whereas ad valorem taxes are levied on weight/volume irrespective of the product ingredients);
3. A price increase may lead to a reduction in demand, with demand effects potentially different among various groups of consumers e.g. low-income groups or heavy product users;
4. In the case of a decline in demand, consumers may move to cheaper versions of the taxed product (brand substitution), to non-taxed products or to less heavily taxed products (product substitution).

Each of these four relations will be discussed in this chapter, drawing upon all four analysis components of the study: literature review, data analysis, EU level stakeholder interviews and country case studies. Paragraph 2.1 discusses the first two relations by focussing on the impact of food taxes on the cost, prices and product reformulation. Paragraph 2.2 is devoted to the third relation, demand, including effects on different population groups such as low-income households. Paragraph 2.3 analyses potential substitution effects.

¹² We refer to the direct effect of the tax as the monetary impact of the tax on prices (tax base times tax rate), thereby excluding any additional costs of the tax (administrative costs, product reformulation costs) which might also have an impact on prices.

While health effects of food taxes are not the primary focus of this study, we note that health effects are critically important as improved nutrition and health are the driving motivations for many of the implemented food taxes. The key question is whether the overall bundle of food purchases made by consumers subsequent to a food tax has a more healthy composition and if so, how big is the health benefit. We discuss this question in paragraph 2.4. Paragraph 2.5 presents our conclusions and discusses the limitations of the analysis.

2.1 The impact of taxes on cost, price and product reformulation

2.1.1 Taxes, cost and prices

Introduction

This section discusses the relationship between the direct cost of the taxes on the product, and the price changes following the tax changes. The aim of examining this relationship is to understand the pass-through rate of food taxes. It is important to reflect at this stage on the rationale of food taxes. Food taxes are seen to be an excise tax and generally the intention of excise taxes is to correct for consumer externalities. In other words, excise taxes aim to increase the price of products where consumption of those products creates costs for society that are not already factored into the price of the good. In the case of food taxes the externality attempting to be priced is the public health cost of treating non-communicable diseases, obesity being a key risk factor of such diseases. In practice, such taxes are however levied at the producer level, often for simplicity in calculation and collection. The underlying assumption from a policy perspective, again in the above logic, is that these changes in producer taxes are fully passed through to consumer prices with lower sales of the taxed product as the intended result, and indeed the ultimate aim of health motivated food taxes. Thus, under-shifting (producers and retailers absorbing the tax) is not desirable, while over-shifting (prices increasing by more than that directly resulting from the tax) could be welcomed from this logic.

This section first presents a comparison of the expected price increase assuming full-pass through of the respective taxes, with the actual price change that occurred¹³, for all taxes examined in this study. Following this each tax is discussed individually, drawing on evidence from the literature review, case studies and EU interviews, to investigate possible explanations for the pass-through observed.

Comparing expected price changes with actual prices changes

In our analysis of the impact of food taxes on the cost and prices, we observe that a tax introduction/increase in most cases is followed by prices increasing, while a tax decrease/abolishment is followed by prices decreasing. This finding on the general relationship between taxes and prices is observed in all analysis elements of the study; literature review, data analysis, case studies and EU interviews.

In almost all taxes examined in the Ecorys data analysis, except Hungary's Public Health Product Tax for energy drinks and salty snacks, the actual price increase following introduction of the tax is more than the expected price increase directly related to the tax tariffs. This observation of prices increasing more than that attributable to the tax is discussed in the literature on food taxes, especially with regards to taxes on non-alcoholic beverages where some studies^{14,15} found tax increases to be over-shifted and tax reductions to be under-shifted (meaning that retailers and/or

¹³ Expected and actual price changes derived from Ecorys Data Analysis – refer to Annex 2 of this report.

¹⁴ Bahl, Bird, and Walker. 2003.

¹⁵ Bergman and Niels. 2010.

manufacturers increased their margins). The observations in the data analysis of over-shifting are indeed found in all cases of taxes on non-alcoholic beverages, with one case of under-shifting observed for the tax on ice cream in Finland. For the remaining food tax cases it was observed that manufacturer and retailer margins remained stable, meaning that neither over- nor under-shifting took place¹⁶. Where margins remain stable and prices increase significantly more than the direct effect¹⁷ of the tax, this may indicate that there are other factors influencing prices such as indirect costs of the tax, costs of raw materials, prevailing economic conditions or strategic pricing by firms.

Table 2.1 compares the expected change in price resulting from the tax (purely from the tax, and not accounting for indirect costs of the tax) with the actual price changes that occurred.¹⁸ Change in retailers (R) and manufacturers (M) margins are also presented; no change (=), increased (↑), decreased (↓) or data not available (?).

Table 2.1 Expected price change, actual price change and manufacturer/retailer margins

Country – Product taxed	Expected price change due to tax change	Actual change in prices following the tax change	Margins
DK – butter	Calculation not possible ¹⁹	2012: +13.1%, 2013: 9.5%	R = M =
DK – margarine		2012: +12.1%, 2013: -8.3%	
DK – cooking oils		2012: +17.7%, 2013: -11.2%	
DK – olive oil		2012: +4.3%, 2013: -0.3%	
DK – vegetable oil		2012: +9.3%, 2013: -6.4%	
DK – cola	Calculation not possible ²⁰	When taxes increased, or decreased, prices respectively increase or decrease.	R↑ M ?
DK - juices		No changes visible from the trend in pricing behaviour in years of tax change.	
DK – confectionery	2010: +0.4%, 2012: +0.6%, 2013: +0.3%	2010: +8.4%, 2012: +7.6%, 2013: +2.0%	R = M =
DK - chocolate	2010: +0.3%, 2012: +0.6%, 2013: +0.3%	2010: +0.6%, 2012: +4.4%, 2013: +1.7%	R = M =
FI – confectionery	2011: +6.1%, 2013: +1.3%	2011: +14.8%, 2012: +6.0%, 2013: +2.9%	R = M ↓
FI – ice cream	2011: +14.7%, 2013: +3.2%	2011:+15.7%, 2012:+4.9%, 2013:+2.9%	R = M ?
FI – soft drinks	2011: +1.5%, 2013: +0.9%	2011: +7.3%, 2012: +7.3%, 2013: +2.7%	R ↑ M ↑
FR – regular cola	2012: +4.5%	2012: +5.0%, 2013: +3.1%	R↓ M =
FR – low calorie cola	2012: +4.7%	2012: +6.0%, 2013: +4.6%	R↑ M =
FR – juices (1-	2012: + 6.2%	2012: +5.3%, 2013: +3.9%	R ? M ?

¹⁶ In a number of cases data was not available, indicated by the “?” symbol in the table.

¹⁷ We refer to the direct effect of the tax as the monetary impact of the tax on prices (tax base times tax rate), thereby excluding any additional costs of the tax (administrative costs, product reformulation costs) which might also have an impact on prices.

¹⁸ The expected price change is calculated as: (tax rate) * (tax base) as a percentage of the pre-tax price.

¹⁹ The tax is levied on the fat used in the production process and not in the final product (for dairy and oils), or based on average fat content of the meat rather than the specific cut of meat. As such, the cost that the tax adds to the individual product cost could not be calculated in our data analysis.

²⁰ Given the number and complexity of the tax changes (six tax changes between 2001 and 2013 including increases, decreases and the addition of differentiations between sugared and non-sugared products), it was not possible to examine the relationship between price mark-up/down related directly to the tax and the actual price changes in our analysis.

Country – Product taxed	Expected price change due to tax change	Actual change in prices following the tax change	Margins
99%)			
HU - confectionery	2011 and 2012: +5.4%	2011: +3.5%, 2012: +6.4%, 2013: +3.9%	R = M =
HU - chocolate	2011 and 2012: +4.9%	2011: +3.1%, 2012: +7.5%, 2013: +6.3%	R = M =
HU - cola	2011 and 2012: +3.1%	2011: +3.4%, 2012: +1.2%, 2013: +0.7%	R↑ M ↑
HU – juice <25% fruit	2011 and 2012: +2.7%	2011: +0.1%, 2012: +0.6%, 2013: +1.3%	R↑ M ↑
HU – energy drinks	2011 and 2012: +37.5%	2011: -0.7%, 2012: +1.0%, 2013: -1.9%	R↓ M ↑
HU – salty snacks	2011 and 2012: +18.1%	2011: +6.3%, 2012: +5.4% 2013: +3.3%	R = M ?

Source: Ecorys Data Analysis.

Note 1: data in the Ecorys data analysis is annualised, therefore if a tax change occurs part way through a year it is not possible to distinguish prices in the months before from price in the months after. It is also possible that there is a delay by manufacturers or retailer in transmitting price changes. Therefore we examine price changes in the years following a tax change to identify longer term effects.

Note 2: data in the Ecorys data analysis is aggregated and therefore results reflect the overall average price changes of the tax-affected product. Differences in prices among individual manufacturers and retailers was not possible to observe in the data analysis.

From the above table it can be seen that prices of confectionery in Denmark and confectionery, soft drinks and ice cream in Finland appear to have increased significantly more than the direct impact that can be attributed to the respective taxes. The data above also indicate that the prices of energy drinks in Hungary rose by far less than the tax-induced price mark-up. For the taxes investigated, we only found increasing margins for the non-alcoholic beverages. Below we discuss in detail the relationship between tax change and product price for each of the food taxes, drawing on the empirical literature, interviews and case studies to allow a fuller understanding (and cross-checking) than can be gained from the data analysis alone.

Understanding tax and price relationships in Member States

Denmark - tax on saturated fat

The Ecorys data analysis shows that the tax on saturated fat, introduced October 2011, had a strong impact on the prices of the products we analysed (butter, margarine, cooking oils, olive oil and vegetable oil). All products showed an increase in prices in the first full year the tax was in force (2012) with cooking oils show the strongest increase of 17.7% and olive oil shows the weakest price increase of less than 5%²¹. This is in line with expectations given that of all oils and fats, olive oil contains the least saturated fat and is consequently also taxed the least. It was not possible to analyse over- or under-shifting within the data analysis.

The tax on saturated fat was operational for a relatively limited period of time (15 months), abolished on 1 January 2013. It was reported that the abolishment led to lower prices for consumers²². Ecorys data analysis shows that prices of the taxed products decreased by around 10% following the saturated fat tax abolishment, except olive oil which remained at a similar same price level (+0.3%). Prices for olive oil were on an increasing trend prior to the tax and thus it appears the price decrease that should have occurred upon tax abolition was offset by the existing trend of price increases.

²¹ Ecorys data analysis – refer to Annex 2 of this report.

²² <https://www.retsinformation.dk/Forms/R0710.aspx?id=143480&exp=1>.

The sector-level data²³ shows no change in retail and manufacturing margins on average, however evidence from literature provides greater detail on margin developments at the product and retailer level. Jensen and Smed²⁴ observed that supermarkets fully passed on the tax to consumers for blends and margarine, but under-shifted the tax for butter and oils. They also found that discount stores perfectly transmitted the price of blends and oils to consumer prices, but over-shifted the tax for butter and margarines to take advantage of the opportunity to increase margins as a result of consumers switching to discount stores for purchases of the tax-affected products. This finding from literature points to the possibility that retailer margins increased for some products and decreased for others, which may explain why we find no net effect of no change in margins on average in our data analysis.

Denmark - tax on soft drinks and juices

In the 1930s Denmark introduced a tax on soft drinks and juices. Over the observed period in our dataset (1999-2013), substantial and numerous changes have been made to the regime. These changes included increases in tax rate, decreases in tax rate, differentiation of tax rates based on sugar content and finally, abolishment of the tax in January 2014. Overall, prices for cola seem to react in line with the tax changes. When taxes are increased, prices increase. When taxes are decreased, prices also decrease. It is interesting to note that the price development of regular cola, closely follows the price development of low calorie cola. This includes the period when the tax was reduced by half in July 2013. Although the tax should presumably have the largest effect on prices of regular cola, also the prices of low calorie cola decreased by around 5%, which is only marginally less than regular cola (6.1%). For 100% juice and beverages with less-than-100% juice, the volatility of the market prices seem to move separately from any of the tax changes indicating that other factors contribute to the price changes, rather than the tax.

It was not possible to analyse over- or under-shifting within the data analysis. It is clear from the data that for cola, in general, retailers manage to increase their margin every time the tax is increased.

Denmark – tax on confectionery and chocolate

For the tax on confectionery and chocolate, in place since 1968 but changed in 2010 to differentiate between products based on sugar content, the Ecorys data analysis observes that prices increased following all three increases in tax rates (2010, 2012 and 2013). However, the increases in price for chocolate and confectionery following increases in the tax rates are far larger than could be expected from the direct tax effects alone. Particularly noteworthy are the price increases for chocolate being far more moderate than the price increases for sugar confectionery products, while the tax rate is similar. Even so, no changes were observed in retailer or manufacturer margins. Thus it appears that external factors have had a large influence on product prices in this period.

Finland – tax on confectionery, ice cream and soft drinks²⁵

Our data analysis shows that price increases for confectionery and ice cream coincided with the tax reintroduction in 2011. Also in 2012, when the tax was raised, the prices further increased and reached, in 2013, significantly higher levels than before. In 2011 and 2012 prices increased more

²³ Ecorys data analysis – refer to Annex 2 of this report.

²⁴ Jensen, Jørgen D., and Sinne Smed. 2013. "The Danish tax on saturated fat: Short run effects on consumption, substitution patterns and consumer prices of fats" *Food Policy* 42: 18 - 31. www.elsevier.com/locate/foodpol.

²⁵ Compared to other EU countries, the availability of data on food consumption and food sales in Finland is limited. The retail market in Finland is highly consolidated as the two largest retail groups together hold 80% or more of the retail market, and no scanner data are collected. Finnish retailers are reluctant to provide information about sales including information about branded vs. private label products, sales volumes and prices. Following this, most data about food consumption and food sales are estimated by industry sources or researchers. This is confirmed in interviews. Some data on household consumption patterns are available from public surveys such as The Findiet Survey (Finravinto) 2007.

than twice as much as can be attributed to the tax, around 24% for both confectionery and ice cream. Industry interviewees report that since the reintroduction of the tax on ice cream, prices of ice cream have increased by 30-60%. One explanation for the higher upper bound of the range mentioned by industry (compared to the price increase in our data analysis) is that the industry price range is based on individual products (whereas the Ecorys data analysis uses averages per product). Industry stakeholders also highlighted that the price of milk increased, a raw material for ice cream production, which goes some way to explain the price increase over and above the tax. No changes in retailer or manufacturer margins were observed for either product.

Similarly to the impact of the reintroduction of the tax on confectionery and ice cream products, prices for soft drinks rose sharply following the increase in the tax on soft drinks²⁶, both in 2011 and in 2012. In 2013, prices increased less than in the previous two years. Again, these price increases are far larger than the increase attributable to the tax. In the case of soft drinks both retailers and manufacturers profit margins increased over the period, which suggests over-shifting of the tax. The excise tax rates for soft drinks doubled in 2014 to 22 cents per litre and this is expected to have further impacts on prices, with industry foreseeing price to increase by between 10% and 30%.

France – tax on sugared and non-sugar-sweetened soft drinks

For the tax on sugared and non-sugared beverages introduced in France on 1 January 2012, our data analysis shows a clear increase in the prices for the taxed cola and juice (1-99%) after the tax is introduced. The relatively strong price increases continued in 2013. This could be resulting from the fact that manufacturers and retailers are unable to fully pass on the full tax to consumers within one year. This explanation is supported by literature on the French soft drink tax; Berardi et al²⁷ and Bonnet and Requillart²⁸ also found that a delay in pass-through of the tax occurred of approximately six months. The total price increases for the two years 2012 to 2013 (regular cola 8.1%, low calorie cola 10.6%), are higher than the price increase related directly to the tax (regular cola 4.5%, low calorie cola 4.7%). Interviewees also mentioned the role of factors such as the price of raw materials which have important impacts on prices and consumption.

There is no change observed²⁹ in the sector level retail margin after the tax introduction. That said, there is a difference in the retail margins for regular and low calorie cola whereby retailer's profit margins increased for low calorie cola at the same time the tax was introduced and decreased for regular cola. This suggests retailers made strategic pricing decisions between the various product lines. Again, the available literature supports these findings and interviews from the case study revealed that industry did employ strategies to buffer the effects of the tax (although no specifics were given).

It has been noticed by Bonnet and Réquillart (2012) that industry was and still is strategically responsive to the tax, shifting more than the price of the tax to consumers (about 110%). In their simulations, prices increased from 8.7% to 11% on average. Berardi et al.³⁰ (2012) observed that prices of the newly taxed beverages increased but not homogeneously, with transmission of the tax differing across product categories. The study concludes that "on average, the tax has been fully

²⁶ Drinks affected by the tax include soft drinks (carbonated drinks, syrup), mineral water, and fruit based drinks (e.g. fruit juice, syrups, and nectars), as well as some alcoholic beverages.

²⁷ Berardi, Nicoletta, Patrick Sevestre, Marine Tepaut and Alexandre Vigneron. 2012. "The impact of a 'soda tax' on prices. Evidence from French micro data" Banque de France.

²⁸ Bonnet, Céline, and Vincent Réquillart. 2013. "Impact of Cost Shocks on Consumer Prices in Vertically-Related Markets: The Case of The French Soft Drink Market" American Journal of Agricultural Economics 95 (5). doi: 10.1093/ajae/aat055".

²⁹ Ecorys data analysis. Refer to Annex 2 of this report.

³⁰ "results only point to a full pass-through of the tax to soda prices (the average increase in prices for this group of products eached the expected euro cents 7.16 cents in May 2012). Regarding flavoured waters and fruit drinks, the pass-through is only about 85%. (6.1 cents) for the former group of products and about 60% (4.4 cents) for the latter group" (Berardi et Al, 2012).

shifted to prices of sodas, a category of products for which no close untaxed substitute product exists". The study also notes that with regard to flavoured waters and fruit drinks, "results show a slight under-shifting of the tax to prices" i.e. producers and retailers decided to decrease their profit margins on these beverage categories. The authors suggest that this market strategy may be explained by the fact that for these latter two categories of products (flavoured waters and fruit drinks), stronger competition and the presence of untaxed product substitutes means that the aim of producers and retailers to maintain their market share might be more dominant.

An empirical analysis³¹ on the French soft drink tax also found that pricing differed across retailing groups and beverage brands. According to this analysis, the two largest retailers in France had the lowest average pass-through rate, and that the pass-through was much higher for private labels than for other brands. This indicates that the bigger retailing groups have a strong bargaining power, even with the large beverage producers, but the large producers have considerable negotiating power over smaller retailers. Overall, the literature points to the strong importance of the brands' value in the soft drinks sector, which allowed the main producers to benefit from the window of opportunity offered by the tax to increase their margin per unit (not their general profits). This may have enabled producers to compensate for potential losses in terms of market shares (while in fact the ranking in terms of market shares between soft drinks brands remained the same³²).

Hungary – public health product tax

The Public Health Product Tax in was introduced in Hungary on 1 September 2011. We have analysed the price effects of the tax for confectionery, sugar-sweetened beverages, energy drinks and salted snacks for 2012 and 2013, given that the tax was only active for part of 2011 and that further changes were made to the tax in 2012.

Confectionery

Our data analysis reveals a strong price increase for confectionery and chocolate following introduction and increase of the tax. As with the Danish and Finnish taxes on confectionery and chocolate, prices increased by much more than that attributable to the tax, more so than any other product category across all taxes in the study. Total price increase expected based on the 2011 and 2012 tax changes is 4.9% for chocolate and 5.4% for confectionery. This compares to actual price increases totalling 16.9% for chocolate and 13.8% for confectionery across 2011, 2012 and 2013. There is no change observed in retailer profit margins and manufacturer profit margins stabilised over the period.

Sugar-sweetened beverages

For regular colas the actual price change (5.3%) was slightly above the price change directly related to the tax (3.1%)³³. The Ecorys data analysis showed that retailer and manufacturer margins increased over the period for both regular colas and low calorie colas, suggesting over-shifting of the tax as well as strategic pricing. Interestingly for juices (<25% fruit) prices increased slightly less than the +2.7% that was expected from the tax changes. Prices actually increases by 0.7% in 2011 and 2012 combined, and by a total of 2.% when adding the 2013 increase. The years prior to the tax show a similar price development and hence, the price increase in the year of introduction of the tax may be related to the existing trend and not be affected by the tax. That said, retailers significantly increased their margin for non-taxed juices following the tax introduction, but only slightly for taxed juices. Hence, it appears that strategic pricing behaviour was employed by

³¹ Berardi, Nicoletta, Patrick Sevestre, Marine Tepaut and Alexandre Vigneron. 2012. "The impact of a 'soda tax' on prices. Evidence from French micro data" Banque de France.

³² However, a shift has been observed from soft drinks to fruit juices.

³³ Ecorys data analysis – refer to Annex 2 of this report.

retailers. The margin for manufacturers of regular colas and juices recovers slightly in the year following the tax coming into force.

Energy drinks

In the Ecorys data analysis there is very little effect visible in the prices of energy drinks following the tax and even slight decreases in price in 2011 and 2013. This is particularly interesting given that prices were expected to increase by 37.5% if the tax were to be fully passed on. However, after introduction of the tax in 2011, the threshold values for energy drinks were lowered, perhaps indicating that the initial threshold was at a level that did not apply to most energy drinks. In addition, literature as well as the Hungary case study both find that reformulation of energy drinks occurred. An impact assessment³⁴ on the tax, based on a manufacturer's survey across all sectors, found that 40% of industry respondents either removed the taxed ingredient completely or decreased the quantity of the taxed ingredient. Through the Hungary case study interviews, industry confirmed that energy drinks were immediately reformulated in response to the tax whereby taxed components were replaced by other ingredients. Regulators reacted to this situation and made the new components also subject of the tax.

While prices did not change, the retailer margin does change somewhat. After the tax is introduced, we see the retailer recapturing a fraction of the margin that had been lost in the previous years. However, it is hard to attribute this (solely) to the tax, as it may simply be a correction of an earlier occurring trend of decreased margins.

Salty snacks

When there are no other factors affecting the price of salty snack products but the tax, and the tax is fully passed on to consumers, we expect a price increase of 18.1% over 2011 and 2012 combined. In our data analysis we observe that prices rose by 14.9% over the period of 2011 to 2013. Rising prices were however an existing trend prior to the tax introduction with retail prices for salty snacks starting to increase, though slowly, between 2006 and 2010. In 2011, retail prices continued to rise for all three categories and in 2012 (the first full year of the tax and the year when the excise tax was increased to 250 Ft/kg), prices continued to increase but at a slower pace than in the previous year. Also in 2013, prices continued to increase, again at a slower pace than the year before. Net of inflation, the prices were decreasing with the exception of 2011, when the retail prices rose more than average inflation as measured by the consumer price index.

According to our data analysis, the retail margin of the products has not changed during the observed period. This is true both before and after the tax introduction. Any price increase or decrease by manufacturers is one-on-one passed on to consumers.

Further reflections and limitations

An Oxford Economics³⁵ report concludes that introduction of food taxes leads to lower profits for the industry either through absorbing part of the tax as an added cost, or by passing the tax on to consumers and thereby having losses in sales. However, in our EU level interviews, stakeholders representing the health sector noted that there is evidence that manufacturers and retailers may increase the price of foods above the rate of tax increase, enhancing the profitability of products. The body of evidence we have analysed finds support for both of these statements. The data analysis and literature review show that in some cases profit margins decrease, in some they increase, and in all cases sales lowered (except for the lesser taxed substitutes e.g. olive oil -

³⁴ National Institute for Health Development Hungary. 2013.

³⁵ Oxford Economics, International Tax and Investment Centre. 2013.

Denmark fat tax). Hence, over-shifting, under-shifting and 1:1 pass-through are all possible outcomes of food taxes.

As noted above under Table 2.1, the discussion in this section focuses on comparing expected changes in prices with actual price changes using aggregated price data at the sectorial level. Thus, it is important to highlight that price changes for products following a tax, and thus pass-through rates, may differ between individual manufacturers and also between different retailers. As such margins may increase for some manufactures or retailers while decreasing for others. Indeed, a key finding in a number of studies in the literature review was that there is high heterogeneity in product pricing across brands and retailers in response to the implemented food taxes^{36,37,38,39}. For example, the two largest retailers in France had the lowest average pass-through rate, and the pass-through was much higher for private labels than for other brands (tax on sugared and non-sugar sweetened soft drinks). The literature concludes that bargaining power affects pass-through rate and margins. Industry stakeholders in the EU interviews support this finding, noting that bargaining between retailers and manufacturers can create winners and losers.

2.1.2 Taxes and product reformulation

An important consideration is the impact that food taxes have on product innovation and reformulation. Some industry stakeholders interviewed note that there has been a reduction of innovation in food simply as a result of less capital available due to taxation, while other industry interviewees suggest that product reformulation has increased in response to the introduction of taxes. According to reports of one industry association in 2012, about one third of all products (by tonnes) were reformulated with reduced sodium/salt and about two thirds (by tonnes) of all products were reformulated with reduced saturated fat, compared to traditional mainstream products. There are at least two key influences on product reformulation; the design of the tax and the nature of the product.

The design of the tax and product reformulation

The design of the tax has important implications for product reformulation. As shown in Figure 2.1 at the beginning of this chapter, introduction of a specific tax (levied on a particular ingredient within a product) impacts the cost of a product because it increases the cost of one or more of the raw ingredients. However, an ad valorem tax is levied on the weight/volume of the total product, irrespective of its ingredients. As such with ad valorem taxes there is no incentive for manufacturers to adjust ingredients, while a specific tax provides a stronger incentive to reformulate products as manufacturers may be able to lower the impact a tax has on their cost by reducing or removing the taxed ingredient.

Of the EU food taxes analysed in this study, only the Danish tax on saturated fat is a specific tax. However, product reformulation related to the Danish tax on saturated fat is not mentioned in any literature or by interviewed stakeholders and thus appears to not have been highly prevalent. The apparent absence of product reformulation may be due to a number of reasons including the fact that the tax was levied on saturated fat in the production process and not on the final product, low fat versions of the taxed products already existed prior to introduction of the tax, and the taxed

³⁶ Berardi, Nicoletta, Patrick Sevestre, Marine Tepaut and Alexandre Vigneron. 2012. "The impact of a 'soda tax' on prices. Evidence from French micro data" Banque de France.

³⁷ Jensen, Jørgen D., and Sinne Smed. 2013. "The Danish tax on saturated fat: Short run effects on consumption, substitution patterns and consumer prices of fats" Food Policy 42: 18 - 31. www.elsevier.com/locate/foodpol.

³⁸ Bergman and Niels. 2010.

³⁹ Bonnet, Céline, and Vincent Réquillart. 2013. "Impact of Cost Shocks on Consumer Prices in Vertically-Related Markets: The Case of The French Soft Drink Market" American Journal of Agricultural Economics 95 (5). doi: 10.1093/ajae/aat055".

products (eg. meat, butter, cooking oils and margarine) require a certain level of fat content and therefore fat cannot be reduced below a certain point and cannot be removed entirely.

The Hungary Public Health Product Tax is somewhat of a hybrid of a specific and ad valorem tax as while the rate is levied based on volume/weight of the total product, the rates only apply after certain ingredients (e.g. salt, sugar) exceed a minimum threshold level. An impact assessment⁴⁰ of the Hungarian tax found, by way of a manufacturers survey, that “40% of the manufacturers changed their recipe, 30% of them completely removed the targeted ingredient, and 70% of them reduced the amount of the targeted ingredient”. Industry representatives interviewed in the Hungary case study confirm that introduction of the tax has, to a certain extent, contributed to the reformulation of the taxed products. According to manufacturers, many products have already been reformulated prior to the implementation of the tax to meet consumer demands for ‘lighter’ versions (and an increased choice/availability in portion sizes is also being provided). However, introduction of the tax has contributed to this process, and to a certain extent accelerated it.⁴¹

Manufacturers in Hungary highlight that the method and cost of reformulation differ greatly from product to product. In certain cases the change is very easy and cheap (e.g. less salt is added to the product). In other cases it requires the execution of a comprehensive research and development program, and/or the extension of the existing technology or even the installation of a new one. These might be costly and might take several years. Reformulation carried out as a result of the introduction of the tax generally falls in the first category. A few examples of reformulation, provided by the manufacturers:

- As a result of the tax, several companies have decreased the salt content of the products. For example, in the case of peanuts almost all producers launched a non-salted version. It is to be noted that in this category taste has especially high importance and by decreasing the salt content products tend to become “tasteless” for the average Hungarian consumer;
- Immediate reformulation was induced by the tax in the case of energy drinks, whereby taxed ingredients were replaced with other ingredients. Regulators quickly reacted to this situation and made the new ingredients also subject of the tax;
- The sweets industry also tried reformulation on a smaller scale. This did not initiate immediate modification of the act. However the regulation was later changed to ensure the reformulated products were still subject to the tax.

Producers note that for some products the Hungarian food tax is not an incentive to innovate due to the fact that some of the tax thresholds apply a too severe nutrient profile criteria.

Product reformulation can only go so far

It must be noted that reformulation is not possible across all product categories e.g. chocolate bars need to contain a minimum level of sugar or cocoa etc. Industry stakeholders interviewed in relation to the French soft drink case stated that the tax did not lead to any reformulation trend. Beyond the importance of brands (mainly for sodas, less for nectars), another factor which also explains the absence of reformulation⁴² is the role of the taste associated to the products and the strength of this taste. One of the interviewees mentioned that the taste is indeed a key element for soft drinks. In the case of soft drinks, substitution is very difficult as sugar has a more impactful taste in drinks than it can have in food. Stakeholders made clear that the existing reformulation processes in the

⁴⁰ National Institute for Health Development Hungary. 2013.

⁴¹ The NIHD study does not represent the view of the food manufacturers.

⁴² Additional comments from industry pointed out that a lack of product reformulation could also be the result of the tax which targets all drinks regardless of their sugar content.

soda sector was not related to the tax but dated from agreements made in 2006⁴³. Product reformulation has already been occurring in the industry with the development of stevia as an alternative to sugar, as well as an increased focus on innovation and diversification in the form of low and zero sugar cola varieties. Additionally, one industry association mentioned that the nature of the tax, namely that it applies to soft drinks regardless of their sugar content may have contributed to the lack or absence of reformulation.

Additional points on reformulation

Industry highlights that reformulation needs to be carefully designed and gradually implemented by all stakeholders, including producers and health authorities. Doing this in isolation may put the competitiveness of an individual product at risk as consumers may simply leave the product and buy competitive products (having higher contents of salt or sugar) better meeting their taste preference. To overcome this situation the taste expectations of consumers should be changed gradually. Industry stakeholders say this can only be achieved in a coordinated way and in collaboration with all stakeholders (e.g. awareness raising campaigns together with government health authorities). According to these stakeholders, reformulation thus requires a holistic approach and might take several years. Counter-effects of food taxes have also been evoked by some interviewees, such as industry stopping its voluntary efforts to reduce sugar rates in soft drinks in anticipation of a possible food tax.

2.2 The impact of price on demand

2.2.1 General

This section discusses the relationship between the change in product prices and the change in demand for the product following the tax changes. The aim of examining this relationship is to understand how effective the various food taxes have been in reducing consumption of the ingredients/products targeted by the respective taxes.

We first presents a comparison of the price change, with the demand change that occurred⁴⁴, for all taxes examined in this study. Following this each tax is discussed individually, drawing on evidence from the literature review, case studies and EU interviews, to investigate possible explanations for the consumption changes observed.

Comparing price changes with demand changes

Overall, empirical (ex post) and modelling (ex ante) literature finds that an increase in the price of a good, resulting from introduction or increase of a tax, is associated with a reduction in consumption of the taxed product. Conversely, a tax reduction or abolishment generally decreases product prices, and increases consumption of the taxed products. The observations from the Ecorys data analysis show the same relationship, as do the practical experiences in the case studies.

Table 2.2 compares the change in price in the period that tax changes occurred, with the change in consumption as observed in the data analysis conducted by Ecorys. Note that price change is not necessarily solely driven by the tax – as discussed in the previous section.

⁴³ The existing reformulation processes started in 2006 with the development of new 'light' drinks (with less sugar or sweetener), with a decrease of sugar rate of about 7% since 2006.

⁴⁴ Price and demand changes derived from Ecorys Data Analysis – refer to Annex 2 of this report.

Table 2.2 Changes in price and consumption changes of taxed products*

Country – Product taxed	Change in price	Change in consumption
DK – butter	2012: +13.1%, 2013: -9.5%	2012: -5.5%, 2013: +1.9%
DK – margarine	2012: +12.1%, 2013: -8.3%	2012: -8.2%, 2013: -0.4%
DK – cooking oils	2012: +17.7%, 2013: -11.2%	2012: -5.5%, 2013: -2.5%
DK - olive oil**	2012: +4.3%, 2013: -0.3%	2012: +6.3%, 2013: +3.8%
DK – vegetable oil**	2012: +9.3%, 2013: -6.4%	2012: +3.2%, 2013: +3.7%
DK – cola	Demand changed out of the ordinary trend upon the changes in tax, decreasing following tax increases and increasing following tax reductions.	
DK juices	No changes visible from the trend in pricing behaviour in years of tax change.	No changes visible in initial years of tax changes. Increasing demand for more-taxed products after tax reduction.
DK – confectionery	2010: +8.4%, 2012: +7.5%, 2013: +2.0%	2010: -11.2%, 2012: -4.9%, 2013: -1.4%
DK - chocolate	2010: +0.6%, 2012: +4.4%, 2013: +1.7%	2010: -0.4%, 2012: -3.5%, 2013: -1.3%
FI – confectionery	2011: +14.8%, 2012: +6.0%, 2013: +2.9%	2011: -2.6%, 2012: -1.4%, 2013: -0.1%
FI – ice cream	2011: +15.7%, 2012: +4.9%, 2013: +2.9%	2011: -1.6%, 2012: -0.9%, 2013: +1.4%
FI – soft drinks	2011: +7.3%, 2012: +7.3%, 2013: +2.7%	2011: -0.7%, 2012: -3.1%, 2013: -0.9%
FR – regular cola	2012: +5.0%, 2013: +3.1%	2012: -3.3%, 2013: -3.4%
FR – low calorie cola	2012: +6.0%, 2013: +4.6%	2012: -3.0% 2013: -3.1%
FR – juices (1-99%)	2012: +5.3%, 2013: +3.9%	2012: -2.1%, 2013: -1.1%.
HU - confectionery	2011: +3.5%, 2012: +6.4%, 2013: +3.9%	2011: +0.3%, 2012: -0.7%, 2013: +0.2%
HU - chocolate	2011: +3.1%, 2012: +7.5%, 2013: +6.3%	2011: +1.3%, 2012: +0.3%, 2013: -0.1%
HU - cola	2011: +3.4%, 2012: +1.2%, 2013: +0.7%	2011: -2.7%, 2012: -7.5%, 2013: -6.0%
HU – juice <25% fruit	2011: +0.1%, 2012: +0.6%, 2013: +1.3%	2011: -2.0%, 2012: -2.0%, 2013: -4.4%
HU – energy drinks	2011: -0.7%, 2012: +1.0%, 2013: -1.9%	2011: +13.1%, 2012: -6.8% 2013: -6.6%
HU – salty snacks	2011: +6.3%, 2012: +5.4% 2013: +3.3%	2011: -7.6%, 2012: -6.2%, 2013: -0.6%

Source: Ecorys Data Analyses.

*Note: data in the Ecorys data analysis is annualised, therefore if a tax change occurs part way through a year it is not possible to distinguish demand in the months before from demand in the months after. It is also possible that there is a delay in price changes or demand changes in response to the tax. Therefore we examine demand changes in the years following a tax change to identify longer term effects.

The data analysis, conducted by Ecorys, observed that changes in demand are in almost all cases strongly correlated with price changes (Hungary being the exception), whereby an increase in the product price coincided with a decrease in demand for that product, and a decrease in product price coincided with an increase in demand for that product⁴⁵. Furthermore, the decrease in demand is generally proportionally smaller than the price increase. However, these are not surprising findings as the inverse relationship between price and demand changes is well established in economic theory, and it is generally acknowledged that food has inelastic demand (demand change is proportionally less than the change in price).

A more difficult question to answer is by how much demand changes in response to a certain tax/price change. The answer to this question is not straightforward due to the difficulty in establishing a definite causal link between tax change, price change and demand change. Both industry and health EU stakeholders that were interviewed generally agree that the direct impact of

⁴⁵ Except in the case where a tax increase causes the absolute product price to increase but the relative price of the product to its substitutes to decrease. This occurred in Denmark where the tax on saturated fat caused the price of olive oil and vegetable oil to increase, but the increase was less than the price increases of butter, margarine and cooking oils. Thus, while the absolute price of olive and vegetable oil increased, the demand for these products increased because the price decreased relative to the substitute products with higher saturated fat.

non-harmonised national food taxes on consumption is uncertain. Stakeholders agree that following the introduction of national food taxes, consumption of certain tax levied products has dropped, however the precise figures of the decrease differ among data sources. Moreover, external factors such as the cost of raw materials, may also have had an influence on price and demand.

Below we discuss in detail the relationship between product price and product consumption for each of the food taxes, drawing on the empirical literature, interviews and case studies to allow a fuller understanding (and cross-checking) of the impact on tax changes on demand than what can be gained from the data alone.

Understanding demand responses to food taxes in Member States

Denmark – tax on saturated fat

Data analysis by Ecorys found that demand decreased in 2012 by 5.5% for cooking oils, 5.5% for butter, and 8.2% for margarine. The demand decreases were proportionally less than the price increases, indicating a slightly inelastic demand for these products. The demand decrease for cooking oils is in line with decreases in previous years which is surprising given the large and sudden increase in price (+17.7%). Jensen and Smed⁴⁶ also studied the demand effects of the Danish tax on saturated fats. They found that the tax had caused a 10-15% reduction in the consumed level of fats from the examined product categories (butter, margarine and blends). These conclusions point towards a higher impact than the price increases observed in the Ecorys data analysis. This is explained by the fact that the Ecorys data analysis uses annualised figures and thus only the decrease in 2012 is presented. Jensen and Smed however calculate demand changes from the moment of introduction of the tax in October 2011 (and examine the weeks leading up to the tax). In addition, the study observed that hoarding occurred, i.e. consumers purchased large amounts of fat products in the weeks leading up to the introduction of the saturated fat tax, and therefore the observed consumption reduction may be overstated.

For the lesser-taxed products, demand increased in 2012 for olive oil (+6.3%) and for vegetable oils (+3.2%). The increases in demand following the tax introduction are a logical development given that the prices of these taxed products increased less than butter, margarine and cooking oils which are higher in saturated fat. Thus, olive oil and vegetable oil became cheaper on a relative basis following the tax. The increase in demand for olive oil seems particularly strong, however demand was already increasing prior to the tax introduction and so demand seems to have been reinforced in 2012 further than the existing trend. For vegetable oil, 2012 demand increased less than in other years.

Following abolishment of the tax on saturated fat in 2013, demand slightly increased (1.9% for butter), or slowly further decreased (-0.4% to -2.5% for respectively cooking oils and margarine). The decrease for cooking oils however is less pronounced than in previous years, indicating that demand following tax abolishment was stronger, albeit still on a downward trend overall. Interesting to note is that following the abolishment of the tax demand did not return to pre-tax levels and is far below the proportional change in price. It may be that the tax introduction encouraged consumers to switch to lesser taxed (lower fat) products and these consumers then did not switch back upon removal of the tax. Indeed, in 2013 demand increased for olive oil (+3.8%) and vegetable oils (+3.7%) despite these products becoming more expensive relative to their higher fat counterparts. For olive oil, this demand (+3.8%) is in line with the original growth path. Hence, data over a longer period will be needed to understand if the tax introduction had any lasting effects on demand trends of the individual products.

⁴⁶ Jensen, Jørgen D., and Sinne Smed. 2013. "The Danish tax on saturated fat: Short run effects on consumption, substitution patterns and consumer prices of fats" *Food Policy* 42: 18 - 31. www.elsevier.com/locate/foodpol.

Denmark – tax on soft drinks and juices

Following the tax reduction (50% cut) in 2013 and subsequent price drop for regular and low calorie cola, the demand increased by 7.0% and 4.9% respectively. However, looking at the volatility in demand over time, it is hard to interpret and attribute the changes in demand to tax changes. For instance in 2005 and 2006, there were no changes in the tax regime, but there were significant increases in the demand for low calorie cola. For juices, demand does not seem to change in the years with tax changes compared to the years without tax changes.

Denmark – tax on confectionery and chocolate

As expected with price increases, we see a decrease in the consumption levels of confectionery and chocolate. For both product types, the demand change is proportionally less than the price change, indicating a slightly inelastic demand. For confectionery, the fall in demand is much greater than chocolate, in line with the magnitude of the respective price increases in each product category.

Finland – tax on confectionery, ice cream and soft drinks⁴⁷

Consumption of the products in the tax base has declined. The strongest decline has occurred for ice cream and soft drinks, whereas confectionery has not been so strongly impacted from increasing prices. The Ecorys data analysis shows only moderate decreases in demand, in comparison to the price increase, for confectionery (-4%) and ice cream (-3.9%). The case study confirms the findings that the consumption of chocolate and confectionery is not significantly affected with a decline in candy consumption of 1-2% per year reported by a retailer, (while not evident that this drop is linked to the tax) and other sources mention a decrease in chocolate and confectionery consumption of 5% or 6% since 2011. However, for ice cream, analysis conducted by industry shows much higher effects on demand with a reported drop in consumption of around 20%.

For soft drinks⁴⁸, demand has been in decline since 2007 and from 2011 we observe that demand falls at a faster pace (-0.7%) with continuing decline in 2012 (-3.1%) and 2013 (-0.9%). Industry reports show that in 2012 Finns consumed 124.1 million litres of soft drinks, and in 2013 this had decreased to 119.4 million litres, equalling to a drop in consumption of soft drinks of 3.8%⁴⁹. Other figures estimate that the increased rates of the tax on soft drinks have caused a drop in consumption of 9%⁵⁰. For juices affected by the tax, sales figures provided by industry show that when the tax on soft drinks was increased in 2011 and in 2012, this led to a decline in consumption of juice of between 15% and 35%. The excise duty rate for soft drinks was doubled in 2014 and is expected to result in further consumption decreases.

France – tax on sugared and non-sugar-sweetened soft drinks

The Ecorys data analysis observes a decrease in demand of 6.7% for regular cola and 6.1% for low calorie cola for 2012 and 2013 combined. Prior to the introduction of the tax, demand for regular and low calorie cola had been increasing and therefore the change in demand trend corresponds strongly to the tax introduction. A study by Bonnet and Réquillart estimates stronger demand shifts

⁴⁷ Compared to other EU countries, the availability of data on food consumption and food sales in Finland is limited. The retail market in Finland is highly consolidated as the two largest retail groups together hold 80 % or more of the retail market, and no scanner data are collected. Finnish retailers are reluctant to provide information about sales including information about branded vs. private label products, sales volumes and prices. Following this, most data about food consumption and food sales are estimated by industry sources or researchers. This is confirmed in interviews. Some data on household consumption patterns are available from public surveys such as The Findiet Survey (Finravinto) 2007.

⁴⁸ Drinks affected by the tax include soft drinks (carbonated drinks, syrup), mineral water, and fruit based drinks (e.g. fruit juice, syrups, and nectars), as well as some alcoholic beverages.

⁴⁹ Finnish Brewery Association, August 2013 (www.panimoliitto.fi).

⁵⁰ ETL presentation, Feb. 2014.

finding that as a result of the tax on soft drinks, consumption decreases by 3 to 3.5 litres/person per year, representing between 12% and 15% of the initial consumption. Interviewees confirm this trend in practice, but comment that more segmented data would be needed to understand the demand decreases for specific consumer groups.

Our data analysis shows an increase in demand for the non-taxed 100% juices by a total of 3% over 2012 and 2013. However, this trend was already occurring prior to the tax entering into force and the tax does not appear to accelerate this trend. The demand for partial juices (such as juice drinks and nectars) showed a decline of 2% after tax introduction. However, again, the demand for juice drinks and nectars was already declining. It started to decline less fast two years before the tax, making it less likely that the change in the tax rate is causing the changes in demand. Data gained through industry interviews shows that in the nectar sector, sales decreased by 9% in 2012 and 7.5% in 2013, much higher than what is observed in the Ecorys data analysis which is an average of juices, fruit-flavoured drinks and nectars.

Interviewees also mentioned the role of influencing factors such as the weather conditions which have important impacts on beverage consumption.

Hungary – public health product tax

Confectionery

The Ecorys data analysis shows that demand for confectionery does not seem to respond following introduction of the tax, but rather, demand remained quite stable in line with the trend in previous years. Yet, industry figures indicate that demand changed with almost all sweets categories (e.g. candies, biscuits, wafers) experiencing a slump in sales. The decrease of consumption for candy was 15.1%, for countines and dragées 13.31%, and for desserts 10.88%. Only tablet chocolates showed a slight increase of 3%. A study by PwC⁵¹, commissioned by the Association of Hungarian Confectionery Manufacturers, also found that “chocolate sales fell by 3.9% year-on-year between December 2011 – May 2012 and the sweets market dropped by 6% (including chocolate, biscuits and candy sales). According to our data, this trend of decreased sales continued for most products for the second half of 2012 and first half of 2013.”

Sugar-sweetened beverages

The Ecorys data analysis observed that demand for cola decreased by 10.2%, and <25% juices show a declined in demand of 4%. However, both product categories were already experiencing declining demand prior to the tax introduction, although for regular cola the decline appears to be accelerated by the tax. Data from the case study, provided by industry, supports these findings showing that consumption of beverages declined significantly between 2011 and 2013 but that these categories also suffered a meaningful decrease from 2007 to 2011. The data provided by industry for the two periods respectively (2011 to 2013; 2007 to 2011) show that demand for carbonated soft drinks decreased by 15.1% and 13.51% and juice: 2.7% and 22.92%. In addition, industry has figures on demand decreases in further categories of beverage products impacted by the tax, which are: fruit juice drinks: 14.% and 23%, nectar: 11% and 53%, fruit drinks and teas: 15% and 26%, ice tea: 10% and 17%. Overall, industry reports a decrease of 14% from 2011 to 2013 for non-alcoholic beverages, with this sub-sector already suffering a total decrease of 15% from 2007 to 2011.

⁵¹ Price Waterhouse Coopers 2013. "Public Health Product Tax Study" Association of Hungarian Confectionery Manufacturers.

Energy drinks

The Ecorys data analysis observed that the demand for sport and energy drinks had been increasing from 2005 up to and including 2011. From 2012, the first full year since the tax was introduced and the year the tax rate was increased and tax base altered, the demand for sport and energy drinks started to decline, with a decrease in 2012 of 6.8% and in 2013 demand further decreased by 6.6%. However stakeholders interviewed through the Hungary case study note that no serious changes in the total amount of energy and sport drinks sold was observed as a result of the tax. The data provided through industry interviews shows that energy drink consumption declined by 31.4% between 2011 and 2013, but that energy drink consumption was already in decline – by a total of 38.6% between 2007 and 2011. Hence there was no significant change in trend.

Salty snacks

Market data provided by an industry representative shows that salty snack consumption decreased over 2011 and 2012 by a total of 13.9%. The data analysis by Ecorys based on Euromonitor data finds that the total salty snack consumption over the same period decreased by 13.8%. However, there are differences between the data sets in terms of the distribution of the decreases over time and with respect to the decreases within individual product categories (chips and extruded snacks, popcorn and pretzels, nuts). A study by PwC⁵² found that the salty snack market diminished by 12% year on year between December 2011 and May 2012 in terms of sales.

Based on the data of a leading snack production company, the introduction of the public health product tax was followed by a large drop in consumption in almost all the product groups of the savoury snack market. Based on half-yearly data, the level of the drop fluctuated between 15% and 25% in some of the segments. The consumption of chips dropped by 15.4%; this drop was 22.2% for nuts, and 15.3% for floury products (salty sticks, pretzels, bread chips, etc.).

2.2.2 Differences in target groups

It is important to add that consumption results discussed above relate to increases or decreases in *average* consumption, meaning the average across all consumers. To be able to draw more rich conclusions on economic and health impacts, segmentation should go further and for instance analyse risky populations (mainly children and obese people). However, such segmentation is largely under researched and as such changes in demand for different groups of consumers, which may have stronger or weaker preferences for certain products and brands, is unknown. For example, it is not clear if an observed average consumption decrease is largely driven by consumers who eat the taxed products as part of a balanced diet and healthy lifestyle, or by consumers who over consume the nutrient which is being targeted by the tax. If the consumption decrease occurs in the segment of the population that is consuming the products as part of a balanced diet, and does not affect consumption of those at risk (does not target excess consumption), it may be that the tax is ineffective in reducing obesity. The purpose of food taxes after all is to target excess consumption, that is, the part of consumption that causes externalities of obesity and other diet related health problems. This is an area where further research is required.

Another important target group to consider in implementing any tax is households with limited purchasing power. A common criticism of food taxes is that they are regressive, meaning that low-income households pay a greater proportion of their income on food taxes than high-income

⁵² Price Waterhouse Coopers 2013. "Public Health Product Tax Study" Association of Hungarian Confectionery Manufacturers.

households⁵³. The consistent finding in the literature is that food taxes are regressive^{54, 55, 56, 57, 58, 59, 60, 61}. However, the actual income impact is predicted to be very low^{62, 63}. It is also argued that food taxes will benefit the low-income population the most in terms of improving nutrition and hence be progressive from a health perspective^{64, 65}.

2.3 The degree of substitution

Findings from all components of this study's analyses highlight that food is not a single product but a complex bundle of goods with many substitutes, making it quite challenging to predict how consumers will alter their consumption behaviour in response not only to the taxed good, but especially with respect to other related goods. Empirical and modelling studies find that reduced consumption of the taxed good is generally coupled with increased consumption of substitute goods. Results on product substitution are, logically, specific to the product or the classification of products that is being studied. For example, product substitution examined in the case of a tax on saturated fat is quite different from product substitution investigated in the case of a tax on soft drinks, i.e. it is highly improbable that a consumer buys soft drinks instead of cooking oil – thus the sets of products considered as substitutes do not overlap between these food categories. But substitution within a product classification is more complicated. There are a wide variety of findings in the academic literature, sometimes contradictory, as to the specific set of product substitutes within a given food or drink category. For example, within the drink category of sugar sweetened beverages the set of product substitutes are commonly found to be diet drinks, coffee, tea, water, milk and 100% juice^{66, 67}. However there are opposing views on whether sugary or salty foods are a substitute (or a complement) for sugary drinks⁶⁸.

In addition to substitution between classes of products, there are other substitution options and therefore complexities in analysis. For example, do consumers of butter in a MS which introduces a tax on saturated fat substitute butter with a non-taxed or less-taxed product such as olive oil or low-fat butter varieties (product substitution)? Or do they substitute with the same product from a different (cheaper) brand, the same product from a cheaper supermarket, or with the same product from a store in a neighbouring country? EU stakeholders interviewed agree that examples within

⁵³ Nnoaham et al. 2009.

⁵⁴ Nnoaham et al. 2009.

⁵⁵ Chouinard et al. 2007.

⁵⁶ Kotakorpi and Pirttila. 2010.

⁵⁷ Kotakorpi et al. 2011.

⁵⁸ Briggs et al. 2013.

⁵⁹ Zhen et al. 2013.

⁶⁰ Lin et al. 2011.

⁶¹ Jensen and Smed. 2007.

⁶² Briggs et al. 2013.

⁶³ Lin et al. 2011.

⁶⁴ Kotakorpi and Pirttila. 2010.

⁶⁵ Zhen et al. 2013.

⁶⁶ Briggs, Adam D. M., Oliver T. Mytton, Ariane Kehlbacher, Richard Tiffin, Mike Rayner, and Peter Scarborough 2013. "Overall and income specific effect on prevalence of overweight and obesity of 20% sugar-sweetened drink tax in UK: econometric and comparative risk assessment modelling study" BMJ Publishing Group. doi: 10.1136/bmj.f6189.

⁶⁷ Dharmasena S, and O Jr. Capps. 2012. "Intended and unintended consequences of a proposed national tax on sugar-sweetened beverages to combat the U.S. obesity problem." Health Economics 21(6):669-94. doi: 10.1002/hec.1738.

⁶⁸ Zhen et al. (2013), did consider food as a product substitute and found that one half of the reduction in calories from decreased SSB consumption was substituted with calories from other foods and beverages such as canned soup, bread, cheese, cereals, candy and snacks. In contrast, Finkelsteina et al. (2013) did not find any evidence of substitution to sugary foods, such as ice cream and snacks. The study found product substitution to fruit juices only.

industry in regards to substitution effects are not conclusive, and research results sometimes contradict each other.⁶⁹

Our analyses finds that all of these options are possible outcomes of a tax and the precise consumer behaviour that occurs is highly influenced by the design and scope of the tax, as well as the nature of the product that is being taxed. Stakeholders noted that in the case of foodstuff, substitution is more complex than for beverages. We also observe that product substitution is easier to analyse than other types of substitution due to data availability.

The debate over product substitution has important implications for estimating the impact of food taxes on health. Knowing the precise product substitution that occurs in response to a food tax provides essential indications of whether consumers are increasing or decreasing their intake of the targeted nutrient (commonly sugar, salt or fat), that is, whether the aim of the tax in reducing consumption of a specific nutrient is actually achieved or if consumers simply find non-taxed products with the same or similar sugar, salt or fat content. These implications for health effects of food taxes are discussed in more detail in Section 2.4.

Below we discuss product substitution followed by brand substitution. Findings are drawn from all components of the analysis; literature, data analysis, case studies and EU interviews.

2.3.1 Product substitution

A note of limitation on the Ecorys data analysis for product substitution; product substitution was examined where there was a clear product substitute with available data (for example non-taxed juices were examined as a substitute to taxed juices). However, usually only one product substitute was examined rather than the whole range of possible substitutes (in the juice example, other possible substitutes such as milk, tea, water etc. were not investigated). Furthermore, for some categories product substitutes could not clearly be singled out (for example substitutes for ice cream or for chocolate).

Denmark – tax on saturated fat

Imposing a tax on saturated fat in meat, full-fat dairy products, animal fats, edible oils, margarine etc., was intended to encourage people to choose products with a lower content of saturated fat, such as low-fat cheese instead of full-fat cheese. Jensen and Smed⁷⁰ found evidence of product substitution, observing that consumers reduced purchases of butter and increased margarine and blend purchases. The Ecorys data analysis also shows a clear shift from fully-taxed products to lower-taxed products upon introduction of the tax with out of trend decreases in butter and margarine consumption and increased consumption olive, vegetable and seed oils above and beyond the existing trend.

⁶⁹ For example, industry related research claims that Denmark experienced lower sales of domestically product Lurpack, and a corresponding increase in lower-priced alternatives butter imported from New Zealand, which had the same or similar fat content. In contrast to this public health stakeholders say examples from Denmark had shown a 6% decrease in the consumption of unhealthy products (no product categories were named).

⁷⁰ Jensen, Jørgen D., and Sinne Smed. 2013. "The Danish tax on saturated fat: Short run effects on consumption, substitution patterns and consumer prices of fats" Food Policy 42: 18 - 31. www.elsevier.com/locate/foodpol.

Two modelling studies that are not related to Denmark specifically but that simulated taxes on saturated fat, one in France⁷¹ and one in the UK⁷², found that a food tax on dairy causes demand for low fat products to increase and demand of full fat products to decrease. The UK study⁷³ which investigated a hypothetical fat tax on butter and margarine, predicted that all households would reduce demand and the most likely product substitution would be from high saturated intensity products to lower saturated intensity products, rather than substituting away to an entirely different food category.

Denmark – tax on soft drinks and juices

The tax on soft drinks in Denmark is a long standing tax with numerous changes to tax rates over time. For the first time in 2010, the tax rates were differentiated with sugared beverages attracting a higher rate than non-sugared beverages. In 2012 the rate for sugared beverages was increased further. There is a clear trend of increasing consumption of low calorie cola, but this was occurring well before the differentiation in tax rates. Increased consumption of sugared juices occurs following the differentiation in tax rates, which is actually the reverse of what would be expected. Therefore, no clear links between tax changes and product substitution were found.

Finland – tax on confectionery, ice cream and soft drinks⁷⁴

The Finnish excise duty on confectionery, ice cream and soft drinks uses the CN codes to classify taxed and non-taxed products. The CN codes are international codes used for customs tariffs. But, for some product categories the CN codes are not very specific and therefore it is not entirely clear which products fall under the CN code which attracts the tax. An example is breakfast cereals and cereal bars. There is no CN code for these specific kinds of products, thus the products have to be placed under the most appropriate CN code. As a result, chocolate bars are subject to the sweet tax whereas chocolate cereal bars are not (as one example).

During the first year of the reintroduced tax on confectionery and ice-cream, sales have increased of a number of non-taxed product categories that are very plausible substitutes for ice cream or confectionery. Industry analysis provides an overview of the product substitution, including; frozen desserts (+4%), frozen baked goods (+3%), breakfast bars (+10%), stable desserts (+4%), dairy-based desserts (+3.7%) and yoghurts (+1.6%). The growth in demand of such product categories indicates a substitution effect, where demands for the taxed products (particularly ice cream and sweets) have declined. In this perspective the sweet tax has contributed to changes in consumer demand for different categories of products but perhaps not an overall reduction in the demand for sweet and sugary products.

France – tax on sugared and non-sugar-sweetened soft drinks

Initially supposed to specifically target sodas, the tax on sugared and non-sugar-sweetened soft drinks was extended to all beverages with added sugar or sweetener⁷⁵ (including 'light drinks'). The main reason for this extension was the fact that no specific category in the French customs

⁷¹ Allais, Olivier, Fabrice Etilé, and Sébastien Lecocq. 2012. "Mandatory labelling, nutritional taxes and market forces: An empirical evaluation of fat policies in the French fromage blanc and yogurt market" Department of Economics, University of York. york.ac.uk/res/herc/hedgwp.

⁷² Griffith, R., and M. O'Connell. 2010. "Public policy towards food consumption" The Institute for Fiscal Studies. doi: 10.1111/j.1475-5890.2010.00122.x.

⁷³ Griffith, R., and M. O'Connell. 2010. "Public policy towards food consumption" The Institute for Fiscal Studies. doi: 10.1111/j.1475-5890.2010.00122.x.

⁷⁴ Compared to other EU countries, the availability of data on food consumption and food sales in Finland is quite limited. The retail market in Finland is highly consolidated as the two largest retail groups together hold 80 % or more of the retail market, and no scanner data are collected. Finnish retailers are reluctant to provide information about sales including information about branded vs. private label products, sales volumes and prices. Following this, most data about food consumption and food sales are estimated by industry sources or researchers. This is confirmed in interviews. Some data on household consumption patterns are available from public surveys such as The Findiet Survey (Finravinto) 2007.

⁷⁵ Milk-based drinks, soups, as well as drinks delivered on medical prescription do not fall under this tax regime.

codification is dedicated to sodas. A study⁷⁶ examining this tax found that the extension of the tax to a broader set of products (light soft drinks in particular) reduces the impact of the tax on consumption of soft drinks such as sodas. This is because taxing the entire beverage category increases the prices of all drinks so that the relative differences between products remain unchanged. This, as opposed to taxing only high in sugar drinks and excluding diet or light drinks, reduces the impact on changing consumer preferences.

Bonnet and Réquillart (2012 and 2013) found that the application of the tax to all soft drinks led to a substitution effect whereby the consumption of sodas partly shifted to fruit juices, considered as highest in terms of sugar proportion. Interviewed industry representatives comment that the tax is indeed shifting consumption to fruit juices - containing more sugar (even if presenting nutritional benefits thanks to fibres). Ecorys data analysis investigated the consumption of 100% juice drinks to examine product substitution from soft drinks and 1-99% juices and found that consumption in this product category increased in 2012 by 1.5% and again in 2013 by 1.5%. However, Ecorys found that the substitution effect away from 1-99% juice towards 100% juices was already occurring prior to the tax and there is no change in this trend after tax introduction.

The available literature on the French tax on sugared and non-sugar-sweetened soft drinks concludes that no substitution effect is observed from soft drinks towards other food product categories. This finding was supported by those interviewed in the France case study interviews.

Hungary – public health product tax

The tax - according to the preamble of the Act – is aimed at products with significant sugar and salt content, as well as significant caffeine, methylxanthine and taurine content, for which alternatives with a lower level of the targeted ingredients are available. The intent therefore was to encourage consumers to move to product substitutes with lower levels of the taxed ingredients. On the basis of information provided by the manufacturers, reactions of consumers to the tax were manifold.

Consumers were able to replace the taxed products with ones not containing the taxed ingredients, hence acting as the tax intended. However, consumers were also able to substitute, in all product categories, to products which contain those nutrients targeted by the tax (salt, sugar etc.) but do not have product tax levied on them. This is because the products are either not pre-packed products or not subject to tax based on their customs tariff codes. The PwC impact study⁷⁷ support this finding, noting evidence of substitution to non-taxed foods.

A few examples based on Gfk and Nielsen data provided by industry are presented below:

- Cocoa powdered beverages: Significant volume decline of the category in the first year of the tax (although not only due to the tax) with consumers switching partly to fruit juices, milk & tea products. After a year, this trend stopped, and the category volumes remained stable (2012 vs 2013 shows a slow recovery of the category);
- Soft drinks: Sugar-free, low-calorie and mineral water based products having natural sweeteners (e.g. stevia) gained market share in the range of soft drinks;
- Salted goods (snacks): In the salted goods category consumption was shifted to popcorns (non-taxed);
- Seasonings: Volume decline and also consumption decline on seasoning market. Seasonings category competes strongly with mono-spices, mono-spices gaining volume from seasonings. This is a sign of return to home cooking, whereby consumers cook from scratch. Products used

⁷⁶ « L'extension de la taxe aux produits allégés réduit l'impact de la taxe sur la consommation de produits sucrés d'environ un quart » (Bonnet and Réquillart, 2012).

⁷⁷ Price Waterhouse Coopers 2013. "Public Health Product Tax Study" Association of Hungarian Confectionery Manufacturers.

in home cooking (e.g. flavoured powder sugar, vanilla sugar, dried yeast, baking powder) are not taxed.

Further reflections on substitution in the drinks category

In addition to the evidence on product substitution for the specific EU taxes upon which this report focuses, there is quite a large body of literature on the topic of product substitution for the product category commonly referred to as sugar-sweetened beverages. Fletcher et al⁷⁸ and Block et al⁷⁹ found that a tax on sugar-sweetened beverages resulted in an increase in sales of diet drinks, juice and milk. Briggs et al⁸⁰ argues that product substitution from a tax on the whole SSB products category is most likely to benefit diet drinks, water, low-fat milk and low-sugar fruit juice. Dharmasena and Capps⁸¹ found that the consumption of fruit juices, low-fat milk, coffee and tea increased when a SSB tax of 20% was simulated in the US. Zhen et al⁸² found that half of the reduction in calories from decreased SSB consumption resulting from a SSB tax, was substituted with calories from other foods and beverages such as canned soup, bread, cheese, cereals, candy and snacks. Finkelsteina et al⁸³ did not find any evidence of substitution to sugary foods, such as ice cream and snacks, from a SSB tax, but found product substitution to fruit juices only.

It is also interesting to examine the effects on consumption of SSB taxes that differ in which drinks are included or excluded from the tax. If a tax only affects regular carbonated soft drinks, consumers will substitute to similarly high calorie sports / energy drinks and sugary fruit juices or to diet versions of the carbonated soft drinks. Finkelsteina et al also estimates the health benefits are 60% greater when the tax applies to all SSBs (but not diet and sugar-free varieties), rather than only carbonated soft drinks, as product substitution is more difficult. The 'Food consumption and obesity: Public policy measures' (Foodob) study⁸⁴ recommends taxing of all SSBs according to sugar content specifically to prevent product substitution to other high sugar beverages.

2.3.2 Brand substitution

A note of limitation on the Ecorys data analysis for brand substitution; In our data analysis we defined premium and non-premium producers through a combination of two databases as no single database on market share at the product level was available. First, products were classified as premium when they had above average prices in a product category, and non-premium if they had below average prices. Products were then grouped to their brand owner. The producer was classified as premium if most products of that producer were premium, and classified as non-premium if most products belonging to that producer were non-premium. However, there are producers who produce both premium and non-premium products and thus this analysis has limitations. For the taxes examined, there is sometimes the result that no discernable change in

⁷⁸ Fletcher, Jason M., David E. Frisvold, and Nathan Tefft. 2010. "The effects of soft drink taxes on child and adolescent consumption and weight outcomes" *Journal of Public Economics* 94: 967–974. doi:10.1016/j.jpubeco.2010.09.005.

⁷⁹ Block, Jason P., Amitabh Chandra, Katherine D. McManus, and Walter C. Willett. 2010. "Point-of-purchase price and education intervention to reduce consumption of sugary soft drinks." *American Journal of Public Health* 100 (8):1427-1433. doi: 10.2105/AJPH.2009.175687.

⁸⁰ Briggs, Adam D. M., Oliver T. Mytton, Ariane Kehlbacher, Richard Tiffin, Mike Rayner, and Peter Scarborough 2013. "Overall and income specific effect on prevalence of overweight and obesity of 20% sugar-sweetened drink tax in UK: econometric and comparative risk assessment modelling study" *BMJ Publishing Group*. doi: 10.1136/bmj.f6189.

⁸¹ Dharmasena S, and O Jr. Capps. 2012. "Intended and unintended consequences of a proposed national tax on sugar-sweetened beverages to combat the U.S. obesity problem." *Health Economics* 21(6):669-94. doi: 10.1002/hec.1738.

⁸² Zhen, Chen, Eric A. Finkelstein, James M. Nonnemaker, Shawn A. Karns and Jessica E. Todd. 2013. "Predicting the effects of sugar-sweetened beverage taxes on food and beverage demand in a large demand system" *American Journal of Agricultural Economics* 1(25). doi: 10.1093/ajae/aat049.

⁸³ Finkelsteina, Eric A., Chen Zhenb, Marcel Bilgera, James Nonnemakerb, Assad M. Farooquia, and Jessica E. Todd 2013. "Implications of a sugar-sweetened beverage (SSB) tax when substitutions to non-beverage items are considered" *Journal of Health Economics* 32 (1):219–239. <http://dx.doi.org/10.1016/j.jhealeco.2012.10.005>.

⁸⁴ Foodob and Institute for Fiscal Studies 2012. "Food consumption and obesity: public policy measures" European Commission. http://cordis.europa.eu/result/report/rcn/51329_en.html.

market shares could be observed in the Ecorys data analysis. However, given the data limitation, the absence of indications in the data does not necessarily lead to the conclusion that market shares between premium or non-premium brands were not affected, only that the market shares of the portfolio's we analysed did not change.

Denmark – tax on saturated fat

The study by Jensen and Smed⁸⁵ which found evidence of product substitution (discussed above), did not examine substitution within a product category, for example between different butter brands or high and low fat variations, as brand level data was not available. However, the empirical study observed that there was a shift in consumer behaviour from high price supermarkets towards low-price discount stores, at least for some types of oils and fats.

The Ecorys data analysis investigates brand substitution and finds that for cooking oils, consumers strongly moved away from premium brands towards non-premium brands following introduction of the tax. For lower-taxed oils, a large expansion of the market share of non-premium brands for the olive oil products was observed.

The Danish Chamber of Commerce asked 99 of their members (primarily retail organisations) whether they see signs that the fat tax has directed consumers towards products lower in fat (i.e. product substitution). Only 12% of their members saw this development⁸⁶, which may suggest that brand substitution effects were occurring but no academic analysis exists to support this. Industry related research found that Denmark experienced lower sales of domestically product Lurpack, and a corresponding increase in lower-priced alternatives such as butter imported from New Zealand, which had the same or similar fat content.

Denmark – tax on soft drinks and juices

The market for cola, both regular and low-calorie is dominated by premium brands. For the regular cola, between 60 and 70% of the market is served by premium brands, whereas for low calorie cola the market share is between 70 and 80% for premium brands. Over the observed period, in our data analysis we see a small increase for both types of beverages for the premium brands at the expense of the non-premium brands. However, it is hard to observe if this gradual increase in market share for the premium brands was a result of the tax changes as the changes that did occur, did not follow a consistent pattern from the change in the tax. As for juices, we see no consistent picture in the changes in market shares of the brand types. In general, the trends that were already visible in the data before the changes in taxation continue.

Denmark – tax on confectionery and chocolate

In terms of brand substitution, no changes in the relative shares of premium brands and other brands were apparent in the Ecorys data analysis. As highlighted at the beginning of this section, this does not necessarily mean that brand substitution did not occur.

⁸⁵ Jensen, Jørgen D., and Sinne Smed. 2013. "The Danish tax on saturated fat: Short run effects on consumption, substitution patterns and consumer prices of fats" *Food Policy* 42: 18 - 31. www.elsevier.com/locate/foodpol.

⁸⁶ Dansk Erhvervs Perspektiv 2012 #23: Fedtafgiften: et dyrt bekendtskab.

Finland – tax on confectionary, ice cream and soft drinks⁸⁷

We have not been able to obtain reliable results from the market share data in our data analysis, however, evidence from the Finland case study reveals that sales have decreased for producers of branded goods and increased for products under the cheaper private labels, causing a loss in market shares for producers of branded products. It is estimated that in 2010, private labels across categories accounted for 16% of the grocery trade, and in 2012 this share had increased to 20%⁸⁸. Private labels are widely used for ice cream, and in this product category private labels accounted for just over 20% in 2013. As private labels are subject to smaller margins than branded goods, private labels can be marketed to the consumer at a lower price.

Retailers strive to maximise profit per square meter retail outlet, and surface area is allocated to different product categories according to a profit maximisation model. This means that the retailer will select other products or even other categories, if the ones on the shelf today do not perform as well as expected. Following the reintroduction of the tax on confectionery and ice cream and increase in the tax rate for soft drinks, and the subsequent price increases, consumer preferences have shifted towards the more economical private label products or alternative product categories. Particularly for ice cream the substitution effect has been visible. Sales of the more expensive branded ice cream products have declined and less shelf space has been allocated to this product group in retail stores in favour of e.g. frozen gateaux or frozen desserts. This pattern is particularly critical for frozen foods as the freezing containers are the most expensive shelf space in retail stores⁸⁹.

France – tax on sugared and non-sugar-sweetened soft drinks

In terms of brand substitution, there is virtually no change in market shares between premium brands and non-premium brands in the Ecorys data analysis. The case study highlights the strong importance of the brands' value in the soft drinks sector. According to the case study interviews no substitution effects were observed as a result of the tax.

The French market for soft drinks is highly concentrated as two main manufacturing alliances⁹⁰ were sharing about 88.6% of the total market production in 2004 (Bonnet and Réquillart, 2013). Retailers' brands are more affected (especially nectars) by the price levels and as the excise tax is based on a fixed percentage, the prices are therefore more affected in absolute terms. Bonnet and Réquillart came to the conclusion that the impact of the tax on the sales of retailers' brands was larger compared to the main brands. Stakeholders mentioned that negotiations were on-going between producers and retailers regarding this issue.

Hungary – public health product tax

Overall, the Ecorys data analysis found that substitution within the product categories occurs with consumers switching from premium products to non-premium. The case study confirms this observation, noting that consumers switched to cheaper brands, mainly to private labels citing the following examples:

⁸⁷ Compared to other EU countries, the availability of data on food consumption and food sales in Finland is quite limited. The retail market in Finland is highly consolidated as the two largest retail groups together hold 80 % or more of the retail market, and no scanner data are collected. Finnish retailers are reluctant to provide information about sales including information about branded vs. private label products, sales volumes and prices. Following this, most data about food consumption and food sales are estimated by industry sources or researchers. This is confirmed in interviews. Some data on household consumption patterns are available from public surveys such as The Findiet Survey (Finravinto) 2007.

⁸⁸ Nestlé presentation, Feb. 2014.

⁸⁹ Nestlé, 2014.

⁹⁰ «(the alliance, which occurred in 1999, between Coca Cola Enterprises and Cadbury Schweppes, and the alliance, which occurred in 2003, between Unilever and Pepsico » (Bonnet and Réquillart, 2013).

- Confectionery: Consumers reacted with slight movement to private labels within the first year after the PHPT, but consumption of branded products gained market share again from private labels in the second year of the tax; and
- Dry fixes: Consumers do not leave the category but switch to cheaper brands, mainly to private labels.

The PwC impact study⁹¹ also found evidence of substitution to cheaper brands. Their data analysis showed evidence of increases in sales of the private label brands, which are generally the lower priced products, for confectionery and salty snacks. However we note that our data analysis shows that movement to non-premium brands was an existing trend prior to the tax introduction. It is therefore plausible that brand substitution is driven not solely by the tax but by the economic crisis which affected consumers' purchasing power and other factors highlighted by interviewed stakeholders that (increases in VAT rates and raw material price) placed upward pressure on prices.

2.4 Changes in demand and public health

To what extent changes in consumption resulting from a food tax actually lead to public health improvements is still widely debated. As health motivated food taxes are a relatively recent policy initiative and public health studies require long-term data to assess effects on diet, obesity and non-communicable diseases, there are as yet no robust conclusions on the impact of food taxes on public health.

Besides the lack of long term data, interviewed stakeholders point out that food taxes are so far only levied on products which represent a relatively small percentage of consumption of the targeted nutrients (salt, sugar, fat etc.). In support of this view, a food manufacturer in the Hungary case study illustrated that of the total energy intake for adult women in Hungary, 6% comes from added sugars in taxed product groups chocolate and sweets, and 2% from added sugars in taxed soft drinks⁹². The remaining energy intake comes from naturally occurring sugars in foods (such as fruit and milk) or added sugars in non-taxed product groups such as cakes, biscuits, ice cream, preserves, fruit yoghurts etc.⁹³. For the case of Finland's excise duty on confectionery, the share of "taxed intake" is also relatively low compared to the total intake⁹⁴. This is due to the fact that several product categories with similar nutritional profiles are not taxed (for example chocolate muffins, chocolate cookies, fruit yoghurt and doughnuts). While these illustrations relate to the average consumer, and therefore do not by themselves provide an indication of (the presence or absence of) any health impact, they do point out the importance of a well designed tax base. One of the key considerations in this respect is the products or ingredients that are included in the tax base. The broader the tax base, the less scope there is for substitution to product categories with similar nutritional profiles (in terms of salt, sugar or fat consumption).

⁹¹ Price Waterhouse Coopers 2013. "Public Health Product Tax Study" Association of Hungarian Confectionery Manufacturers.

⁹² The illustrative figures in this paragraph on average intake have not been verified by Ecorys, but were kindly provided to us by stakeholders.

⁹³ Similar illustrations with respect to the Hungarian tax were provided on sodium. Average sodium intake shows that salted snacks provide 1% of the average sodium intake for adult men in Hungary, one of the product groups taxed under the PHPT. Bread and bakery products, meat and processed meat products, cheese, and canned vegetables and pickles (all non-PHPT liable products) together are more important contributors to sodium intake, accounting for 78% of average sodium intake for men.

⁹⁴ Industry estimates that only 14% of sugar intake comes from taxed products.

In the absence of data and public health assessments, academic literature has attempted to predict health effects of food taxes through modelling / simulation studies. The findings on health effects of the modelling / simulation literature however, are not conclusive. There are two key reasons why results from academic literature are diverse and inconclusive: 1) uncertainties over product substitution and 2) calculation method of health effects.

Firstly, product substitution has important implications for the total health effects of food taxes because a food tax aimed at reducing consumption of one product or ingredient, may in fact increase consumption of other products⁹⁵. If the product substitutes have the same or similar nutrient composition, this may undermine the intended health outcomes of the tax⁹⁶. As discussed earlier in this chapter, the exact product substitution behaviour of consumers is uncertain and can be influenced by the design and scope of the tax as well as the nature of the product/ingredient that is taxed. Each study uses assumptions regarding product substitution in order to determine health outcomes, with differences and contradictions in assumptions producing a wide variety of results on the health effects of food taxes (both supporting and discounting the ability of food taxes to improve health). The effectiveness of food taxes in curbing obesity is therefore difficult to determine ex-ante. Interviewed stakeholders echoed these sentiments stating that substitution (related to food products) is complex and it is possible that consumers may eventually have the same calorie intake overall by increasing calorie intake elsewhere in their diet.

The second reason that results of modelling / simulation studies can differ, and why results must be viewed cautiously, relates to the way in which nutrient intake changes are converted to weight loss and disease prevalence. Modelling studies generally determine health effects by simulating a food tax, predicting consumer response (including assumptions about product substitution), calculating the overall nutrient or calorie reduction/increase for a population and then translating the increases/reductions to weight loss and/or disease prevalence. This methodology assumes a linear connection between these "variables", of which the size and sign is in itself not undisputed. Each of these steps is highly complex and the credibility of the final conclusions relies on the quality of data and robustness of the methodological approach. No empirical research has to our knowledge been done to verify findings of simulation studies.

2.5 Summary of findings on the impact of taxes on consumption

How do food taxes impact the consumption of foods with a high percentage in fat, salt and sugar?

This study demonstrates that food is not a single product but a complex bundle of goods with many substitutes, making it challenging to predict how consumers will alter their buying behaviour in response not only to the taxed good, but especially with respect to other related goods. In addition, food taxes are operating in a highly dynamic economic and legislative environment with many factors and variables changing and influencing prices and demand within the same period of the studied tax changes.

For the findings on consumption, we draw upon the framework for analysis (Figure 2.1), introduced at the beginning of the chapter.

⁹⁵ Zhen et al. 2013.

⁹⁶ Nnoaham et al. 2009.

The basic relations to be tested in the study, and our findings:

1. Introduction of a tax increases the cost of the product which in turn may lead to a price increase:

- Mostly, higher product prices occurred in conjunction with profit margins remaining stable, indicating full pass-through of the tax⁹⁷. However, there is evidence⁹⁸ of over-shifting in the sugar-sweetened beverage (SSB) sector in all non-alcoholic beverage taxes studied;
- It was not possible to test the impact of the design of the tax (specific or ad valorem) and its influence on the pass-through rate to consumer prices in this study given that only one of the taxes was designed as a specific tax (Denmark tax on saturated fat). As this tax was based on saturated fat in the production process rather than the final product, we are unable to calculate pass-through rates and compare these with the ad valorem taxes studied;
- For a number of taxes we examined, prices increased by significantly more than what can be directly attributed to the tax (with margins remaining stable)⁹⁹, clearly showing that factors other than the tax (and other than over-shifting) influenced prices in the same period the tax was introduced¹⁰⁰. In some cases, prices showed no effect following the tax changes¹⁰¹, equally demonstrating that existing trends and factors other than the tax can have a stronger influence on price;
- Other factors influencing prices¹⁰² may include cost of raw materials (Finland - cost of milk, Hungary – cost of sugar and salt), existing trends that over ride tax influences (France - juices, Denmark - olive oil, Denmark - juices), economic conditions and other legislative changes that outweigh price effects of food taxes (Hungary – all products) and strategic pricing (France - low calorie cola and Hungary - non-taxed juices);
- For the Hungary Public Health Product Tax in particular, the increases in prices and decreases in consumption cannot be linked only to the introduction of the PHPT since there were several other factors having effect on price and consumption¹⁰³.

2. Product reformulation, where possible and feasible, is one of the options to reduce the impact of the tax on the cost (for specific taxes) and thus on the price of the product:

- Product reformulation is more likely where the design of the tax is based on the level of certain ingredients (sugar, salt etc.) in the final product¹⁰⁴. As such, a specific tax provides a stronger incentive (compared to an ad valorem tax) to reformulate products as manufacturers may be able to lower the impact a tax has on their cost by reducing or removing the taxed ingredient;
- Of the EU food taxes analysed in this study, only the Danish tax on saturated fat is a specific tax. However, product reformulation of the products effected by the Danish tax on saturated fat was not apparent¹⁰⁵. This is due to a number of reasons including the fact that the tax was levied on saturated fat in the production process and not on the final product. The Hungary Public Health Product Tax, while not a specific tax, provides some incentive for product reformulation because the tax rates only apply after certain ingredients (e.g. salt, sugar) exceed a minimum threshold level. The introduction of the tax has contributed to product reformulation, and to a certain extent accelerated it, but the method and cost of reformulation greatly differs from product to product¹⁰⁶;

⁹⁷ Based on Ecorys data analysis.

⁹⁸ Based on literature review and Ecorys data analysis.

⁹⁹ Based on Ecorys data analysis.

¹⁰⁰ Based on case studies and EU interviews.

¹⁰¹ Based on Ecorys data analysis.

¹⁰² Based on case studies and EU interviews.

¹⁰³ Based on Hungary case study.

¹⁰⁴ Based on case studies and EU interviews.

¹⁰⁵ Based on literature and Denmark case study.

¹⁰⁶ Based on Hungary case study.

- However there are limitations to product reformulation depending on the importance of the taxed ingredient to the composition of the product (for example chocolate bars which need to contain a minimum level of sugar or cocoa), taste expectations of consumers for specific products¹⁰⁷, as well as the cost and complexity of reformulation¹⁰⁸;
- Reformulation should be a gradual process because it takes time for consumers to adjust to changes in tastes and to minimise effects on competitiveness¹⁰⁹. An individual producer reformulating in isolation may put the competitiveness of an individual product at risk as consumers may simply leave the product and buy competitive products (potentially having higher contents of salt, fat or sugar) meeting their taste preference more.

3. Price increase leads to a reduction in demand, with demand effects potentially different among various groups of consumers e.g. low-income groups or users consuming a high amount of the taxed products:

- Generally, an increase in the price of a good, resulting from introduction or increase of a tax, is associated with a reduction in the consumption of the taxed product. Conversely, a tax reduction or abolishment is associated with lower product prices, and more consumption of the taxed products¹¹⁰:
 - Except in the case where a tax increase causes the absolute product price to increase but the relative price of the product to its substitutes to decrease. This occurred in Denmark where the tax on saturated fat caused the price of olive oil and vegetable oil to increase, but the increase was less than the price increases of butter, margarine and cooking oils. Thus, while the absolute price of olive and vegetable oil increased, the demand for these products increased because the price decreased relative to the substitute products with higher saturated fat;
 - A tax can also result in no effect on prices or demand as is the case for energy drinks in Hungary, where prices appear to not be largely affected by the tax due to the products being reformulated and therefore not chargeable under the tax¹¹¹. Most likely as a result of stable prices, we could not observe any change in demand.¹¹²
- Decreases in demand following the introduction of food taxes are generally proportionally smaller than the price increase, which is evidence of inelastic food demand¹¹³;
- However, it should be noted that the exact size of demand responses due to food taxes is difficult to establish, because of difficulty in establishing causal links between tax changes, price changes and demand, as well as the presence of external factors such as the cost of raw materials which may also influence price and demand. Moreover, consumption data can potentially come from different sources which are not always fully aligned due to differences in collection and estimation methodologies. Both industry and health EU stakeholders that were interviewed generally agree that the direct impact of non-harmonised national food taxes on consumption is uncertain, although there is agreement that the consumption of certain tax levied products has dropped;
 - For example, the rising costs of sugar and milk affected prices of confectionery and ice cream, respectively, in Finland over the same period of the tax reintroduction. As another example, introduction of road tolls, increase in the VAT rate and rising input costs impacted prices in Hungary over the same period that the tax was introduced:
- It is important to add that the results for consumption discussed in this report relate to increases or decreases in average consumption, meaning the average across all

¹⁰⁷ Some products have key features that identify them both in terms of texture and taste, making them unique, and therefore ingredients cannot be reduced or replaced without negatively impacting consumer demand.

¹⁰⁸ Based on literature, case studies and EU level interviews.

¹⁰⁹ Based on EU level interviews.

¹¹⁰ Based on literature review, Ecorys data analysis, case studies and EU interviews.

¹¹¹ Based on Ecorys data analysis.

¹¹² Based on Hungary case study.

¹¹³ Based on literature and Ecorys data analysis.

consumers. In order to draw more meaningful conclusions on economic and health impacts, segmentation should go further and for instance analyse risky populations (mainly children and obese people). However, such segmentation is largely under researched and as such changes in demand for different groups of consumers, which may have stronger or weaker preferences for certain products and brands, is unknown. For example, if a consumption decrease occurs in a segment of the population that is consuming the products as part of a balanced diet, a tax may not be effective in reducing obesity. This is an area where further research is required;

- Another important target group to consider in implementing any tax is households with limited purchasing power. A common criticism of food taxes is that they are regressive, meaning that low-income households pay a greater proportion of their income on food taxes than high-income households. A consistent finding in the literature is that food taxes are regressive but the actual income impact is predicted to be very low. We have found some evidence in the literature that food taxes will benefit the low-income population the most in terms of improving nutrition and hence be progressive from a health perspective, but too little quantitative research has been done in this area to reach firm conclusions.

4. In the case of a decline in demand, consumers may move to cheaper versions of the taxed product (brand substitution) or to other non-taxed products (product substitution):

- Product substitution occurs where less-taxed or non-taxed substitutes are readily available. Tax design, in terms of the scope of products which the tax is levied upon, can therefore greatly influence consumer product preferences¹¹⁴:
 - The **Danish tax on saturated fat** as it applied to **dairy** products (butter, margarine and cooking fats) resulted in decreased consumption of the taxed products and increased consumption of lesser taxed product substitutes (lower in fat) such as olive oil and vegetable oil. After abolishment of the tax, consumption of the higher fat products did not return to pre-tax levels during 2013. Given the aim of the tax was to lower the consumption of products high in saturated fat, the tax seems to have succeeded in achieving this: "... the fat tax actually worked."¹¹⁵;
 - For **Finland's excise duty on confectionery, ice cream and soft drinks**, consumption of confectionery and ice cream has declined, but it is not clear how much consumers have lowered their overall consumption of sweet and sugary products due to increased consumption in a number of substitute products that are not liable to taxation. The discriminatory nature of the tax being cited as a key cause of substitution outside the direct product category, but similar in terms of products with high sugar. For example, moving from taxed ice creams to untaxed frozen desserts and untaxed frozen baked good;
 - Food taxes on only **carbonated soft drinks** result in product substitution to other high sugar drinks such as energy drinks and flavoured waters, or to diet varieties of carbonated soft drinks¹¹⁶. Food taxes on the full **sugar-sweetened beverage** category (including 'light drinks') result in substitution to juice, milk and diet varieties but are less effective overall in reducing consumption of the taxed products. This is because diet and low calorie substitutes are also taxed and do not become relatively more attractive substitutes¹¹⁷.

¹¹⁴ Based on literature, Ecorys data analysis, case studies and EU interviews.

¹¹⁵ Information 2013, <http://www.information.dk/470689>, own translation. Quote belongs to the former chair of the Prevention Commission and professor at Roskilde University, Mette Wier.

¹¹⁶ Based on literature review.

¹¹⁷ Based on literature review and France case study.

- Brand substitution in the form of moving to cheaper brand is found to occur, more so in product categories where the brand of the product is less connected to the perceived taste of the product¹¹⁸:
 - The **Danish tax on saturated fat** as it applied to **dairy** products (butter, margarine and cooking fats) resulted in some consumers substituting to cheaper brands, or to cheaper retail outlets in order to continue consumption of the higher fat products¹¹⁹;
 - In **Hungary**, there is evidence of consumers switching to cheaper products. However this was possibly an existing trend linked to external factors, rather than solely due to the tax¹²⁰;
 - For taxes on **sugar-sweetened beverages**, consumers who continue to purchase the taxed products prefer to stay with the same brand and instead switch to retailers with cheaper prices¹²¹. Evidence from case study on France's tax on sugared and non-sugar-sweetened soft drinks, points to increased brand substitution in product categories where brand was less crucial to consumers. For example nectors saw a greater product substitution to non-taxed juices than the carbonated soft drink product category.

Limitations of the analysis on consumption

There are limitations to the findings on consumption and product substitution. The empirical studies and the data analysis are limited by the available data which is often at a broader category level, preventing observations of product substitution within a given product category (e.g. moving to cheaper versions of the same product). Moreover, the available data in this area has its limits, as actual consumption data at the level of individual products is not always available, and different data sources often present different numbers. A further limitation is that some results may not be representative of long term outcomes of food taxes given the short timeframe over which food taxes have been in effect in most EU Member States studied. Modelling studies surveyed in our literature review are limited by the robustness of the demand elasticities that they use to predict consumer purchase behaviour towards the taxed product and product substitutes. There is a wide variety of own price (the taxed product) and cross price (product substitutes) elasticity estimates for any given product category which is being studied. As demand elasticities play a crucial role in simulating the consumption effects of a food tax, the results of this type of study hinge upon the credibility of the elasticity estimates and assumptions¹²².

¹¹⁸ Based on literature, case studies and EU interviews.

¹¹⁹ Based on literature and Denmark case study.

¹²⁰ Based on literature and Hungary case study.

¹²¹ Based on literature and France case study.

¹²² Lin B.H., T.A. Smith, J.Y. Lee, and K.D. Hall. 2011. "Measuring weight outcomes for obesity intervention strategies: the case of a sugar-sweetened beverage tax" *Econ Hum Biol* 9 (4):329-41. doi: 10.1016/j.ehb.2011.08.007.

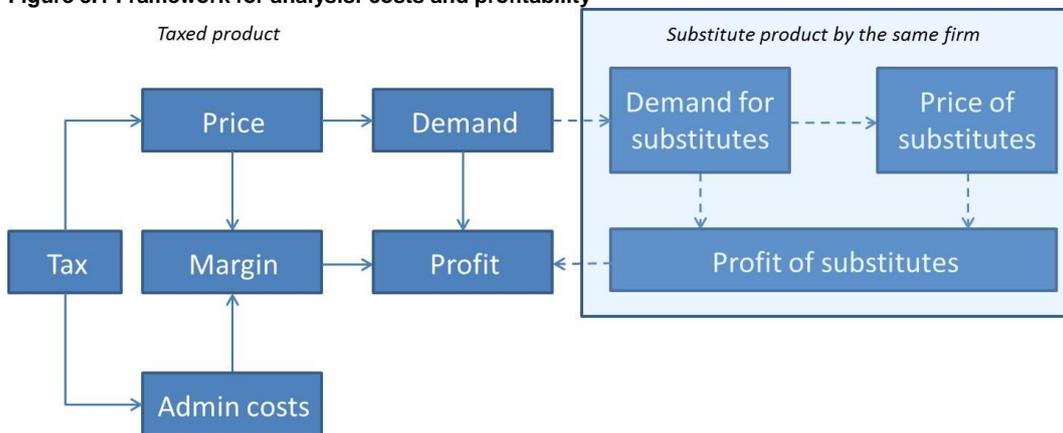
3 Impact of food taxes on competitiveness

For the analysis of the impact of food taxes on competitiveness, we identify how food taxes change firms' performance according to various indicators, like profitability, employment and investment. Changes in firm performance due to the introduction or change of a food tax are not necessarily restricted to the production of taxed foods. As discussed in the previous chapter, substitution effects may occur upon introduction of a food tax. When consumption of a taxed product is replaced by consumption of a non-taxed substitute, the performance of a firm producing substitute products is also impacted. For firms that produce both taxed products and the non-taxed substitutes for these products, introduction of food taxes has more complex effects than just the direct effect of the food tax on taxed products.

We have developed an analytical framework which highlights the key relationships that we investigate in this chapter on competitiveness. The analytical framework consists of two parts, on the one hand describing the key impacts of food taxes on costs and profitability, and on the other hand on competitiveness. In Figure 3.1 we present the first part of this framework of analysis (costs and profitability). Figure 3.2 then presents the second part (on competitiveness).

With the impact of food taxes on price and demand already closely reviewed in the previous chapter, Figure 3.1 focuses on the costs to firms as a result of food taxes as well as any changes in profitability of taxed products. As presented results are net results, these include changes in profitability (the left-hand side of the Figure), as well as profitability of potential substitute products produced by the same firm (the right-hand side box). Often, no breakdown between both parts could be provided.

Figure 3.1 Framework for analysis: costs and profitability



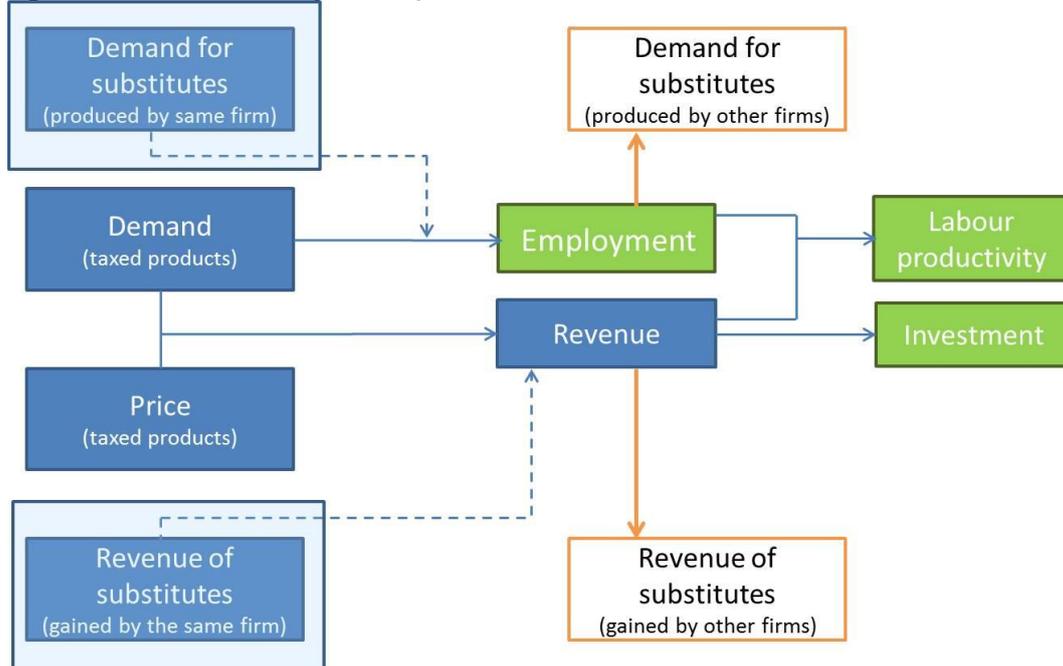
The basic relations to be tested in the step on costs and profitability are as follows:

1. Introduction of food taxes may increase costs for the firm, most notably administrative costs. The direct costs of the tax, in the form of the impact on prices, is discussed in Chapter 2 of this report;
2. The profit margin for the taxed product is negatively affected by the food tax due to changes in costs and price. This, together with the decline in demand for the taxed product, negatively impact firm profitability.¹²³

¹²³ Total firm profitability also depends on the development in profitability of other products, including any substitute products for the taxed products. The profitability of substitutes is not investigated in this study.

For the analysis of competitiveness, we take into account employment, labour productivity and investments. Figure 3.2 presents the second step in the framework for analysis.

Figure 3.2 Framework for analysis: Competitiveness



The basic relations to be tested in the step on competitiveness are as follows:

1. A decline in demand for taxed products (including change in demand of non-taxed substitutes produced by the firm) leads to a change in production levels. Changes in production impact the need for labour inputs and thus employment;
2. Price and demand changes reduce revenues which (together with revenues of substitutes produced by the same firm) means reduced investments;
3. Comparing revenue per employment prior to and after the introduction of the tax gives information on the (net) development of labour productivity;
4. A decline in demand may lead to increased product substitution, including purchase of products from competitors, or purchase of products in a neighbouring country (cross-border trade).

Each of these six relations are discussed in this chapter, drawing upon all four analysis components of the study; literature review, data analysis, EU level stakeholder interviews and country case studies. Paragraph 3.1 discusses the first relation concerning administrative costs while paragraph 3.2 is devoted to the second and third relations on profitability of taxed and substitute products. Effects on employment and investment are addressed in paragraphs 3.3 and 3.4, respectively. An analysis of the net development of labour productivity then follows in paragraph 3.5. Lastly, paragraph 3.6 presents the findings on internal market competitiveness effects.

Limitations of the analysis on competitiveness

While all four strands of the study components will be drawn upon in this chapter, our analysis of the impact of food taxes on competitiveness has particular limitations; the lack of empirical or modelling academic literature on the relevant topics, the sectorial level of the data used in the Ecorys data analysis and the short time frame for which many of the food taxes have been in place.

The literature review conducted as part of this study reveals that empirical evidence analysing the impact of food taxes on investment, employment or trade flows, is limited. Also little to no modelling / simulation evidence of high methodologically quality on these topics is available. Interviews with

Finish stakeholders, for example, confirm that no studies have been conducted by Government or industry on the Finish food taxes to assess the impact on competitiveness, employment, investments, consumption, or health¹²⁴. Interviewed stakeholders comment that a major challenge for conducting such impact assessment studies is the serious lack of data about the retail market and consumer behaviour. There is some evidence in the available academic literature that certain types of food taxes impact the competitiveness of the agri-food industry in the form of increased administrative costs and costs associated with product reformulation. However, the overall impact these types of costs have on competitiveness is not specifically addressed.

The Ecorys data analysis is based on sectorial data and therefore findings from this component of the analyses should be interpreted with caution. As the impact of food taxes on competitiveness differs by firm, aggregated sector data may create the false impression that the impact is homogenous for all firms. However, sector data only shows the net result of all the firms combined, not taking into account any heterogeneity in individual firms' development. This was also stressed by stakeholders in interviews. Therefore, it should be borne in mind that sector data may not (always) be representative.

We recognise that competitiveness effects, such as changes in employment or investment, may take a number of years to develop. It may be the case that many of the food taxes are too recently introduced for industry to have properly experienced effects on their business and therefore decisions surrounding investment and employment may still be in the process.

3.1 Taxes and administrative burdens

All taxes create administrative burdens for government and industry alike, however, the degree and distribution of this burden may vary considerably according to the design of the tax. The design of any tax broadly encompasses three elements – the type of tax (excise, general consumption tax etc.), the calculation method of the tax (specific, ad valorem etc.) and the tax base (the products upon which the tax levied). With respect to the type of tax, all the food taxes in this study are excise taxes levied on producers, or the first domestic seller for imported products. In relation to the calculated method, only the Danish tax on saturated fat is a specific tax (targeting an ingredient in a range of products), with the remaining taxes being ad valorem (based on weight/volume of the total product regardless of ingredient)¹²⁵. The products upon which the various taxes examined in this study are levied vary widely with no tax base being identical. The most comparable are the four taxes on non-alcoholic beverages in Denmark, Hungary, Finland and France. However each tax differs slightly in the definition of “soft drinks” and the classification of included, excluded and lesser- or more-taxed product categories.

Most evidence related to administrative burdens comes from the case studies on Denmark's tax on saturated fat and Finland's tax on confectionery, ice cream and soft drinks.

¹²⁴ Interviews ETL, Nestlé, Ministry of Economic Affairs, 2014.

¹²⁵ A number of taxes are somewhat of a hybrid of a specific and ad valorem tax as they apply minimum thresholds based on ingredient levels or differentiated rates based on ingredient levels or categories. For example, Hungary's Public Health Product Tax, Denmark's excise duty on ice cream and excise duty on soft drinks and juices, Finland's tax on soft drinks.

3.1.1 *The type of tax*

Governments can implement a tax on any part of the supply chain within their jurisdiction¹²⁶. Thus the government can raise revenue from producers, intermediaries and retailers¹²⁷. All taxes investigated in this study are levied on producers, or the first domestic seller for imported products. The lack of comparable food taxes levied on other parts of the supply chain make it impossible to assess the impact of this choice on administrative burdens (for example in comparison to a sales tax or VAT where the administrative burden falls on retailers). The case study on Denmark does note however that the Danish Taxation Ministry, in its initial design considerations of the tax, wanted the tax to be imposed as early in the supply chain as possible so that the fewest possible number of companies should be burdened with the administrative costs¹²⁸. The manufacturers and importers were fewer in number than the retailers, and the tax (and associated administrative burdens) were thus imposed on them¹²⁹. In Hungary, according to the National Tax and Customs Administration (NAV), the PHPT liability affects 400-500 companies on average per month. However we did not find any mention of whether a comparative assessment was conducted as to the number of retailers that would be affected should the tax be levied on them instead. We found limited explicit public considerations on administrative burdens in the design motivations of the other taxes in the study.

3.1.2 *The calculation method of the tax*

We find that the calculation method has an important influence on administrative burdens, notably if the tax is charged on ingredients (specific tax). Jensen and Smed (2007) in their ex-ante analysis of the excise duty on saturated fat in Denmark (a specific tax), refer to the potentially high administration costs due to the targeting of individual nutrients. The more recent ex-post study by the same authors comments that due to the higher costs associated with documentation – for example, importers were obliged to acquire certified statements on the ingredients of products - and calculation of the tax across a large number of products, the chosen design appeared to be more costly than alternatives.

Oxford Economics and ITIC (2013) also raise concern for the administrative burden of taxes based on ingredient levels noting as an example that in the case of a tax on sugar, the government would need to monitor the ingredients of thousands of products in order to calculate the correct tax due to the many kinds of sugar used in products. As yet, no specific tax on sugar in products has been levied in any Member State. Currently taxes targeting products high in sugar are ad valorem taxes, albeit, some with differentiated rates for lower sugar products or minimum thresholds of sugar levels. Ad valorem taxes differentiated based on nutrient profiles are somewhat of a hybrid between pure specific and ad valorem taxes, with the risk that the higher complexity in differentiation, the higher the administration costs. Indeed, Bahl, Bird and Walker (2003) conclude that Ireland's ad valorem tax on soft drinks (in place from 1916 to 1992) was easy to assess and collect and did not suffer the same complications and administrative burden as the highly differentiated and complicated VAT rates for soft drinks, in place at the same time. This finding points to the importance of keeping taxes calculations simple and uniform in order to keep administration costs low.

¹²⁶ As long as the tax are in line with higher legal rules.

¹²⁷ It is practically impossible to raise a tax from consumers based on their consumption. It is however often the case that the tax is shifted to consumers by retailers, for instance VAT.

¹²⁸ Lovbemærkninger i Forslag til Lov om afgift af mættet fedt i visse fødevarer (Fedtafgiftsloven), fremsat d. 19. januar af Skatteministeren http://www.ft.dk/Rlpdf/samling/20101/lovforslag/L111/20101_L111_som_fremsat.pdf.

¹²⁹ Lovbemærkninger i Forslag til Lov om afgift af mættet fedt i visse fødevarer (Fedtafgiftsloven), fremsat d. 19. januar af Skatteministeren http://www.ft.dk/Rlpdf/samling/20101/lovforslag/L111/20101_L111_som_fremsat.pdf.

3.1.3 The tax base

The products upon which a tax is levied (either specific or ad valorem tax), and the ways these are classified and defined, can have significant implications for the administrative burden of the tax. Food taxes in Denmark and Finland provide clear examples.

Denmark – tax on saturated fat

Denmark's tax on saturated fat is levied on the fat used in the production process, not the fat in the finished product. This means that the tax is paid on food waste as well – fat that is not consumed¹³⁰. The decision to impose the tax in the production process proved to be administratively difficult to handle, especially for the importers. Importers had to obtain suppliers' declarations for the amount of saturated fat used in the production of the imported goods and intermediate goods. For example, an importer of a ready-made pizza had to obtain a supplier's declaration from the manufacturer on the amount of saturated fat used to make the dough, the amount of saturated fat that is in the cheese on top of the pizza, and if there is pepperoni on the pizza, the producer must have a statement from the manufacturer of the amount of meat used.

Adding further complication to the tax on saturated fat was the inclusion of meat in the tax base. The Prevention Commission had advised that meat should be excluded from the tax, as it was perceived to be "difficult and expensive to administer"¹³¹. Indeed an industry association highlighted that it is not possible to calculate the saturated fat in each individual cut of meat and therefore an average for each type of meat had to be used.

Finland – tax on confectionery, ice cream and soft drinks

The reintroduced tax on confectionery, with the addition of ice cream as a new category, uses CN codes to determine products liable to the tax. CN codes are international codes used for customs tariff, with each code specifying a set of product categories. However for some product categories the CN codes are not very specific and therefore it is not always clear which products fall under the CN code in question. For breakfast cereals and cereal bars, as an example, there is no CN code for this specific kind of products and thus the products have to be placed under the most appropriate CN code. This implies that where product categories have no clear CN codes, such products may be subject to discussion of whether they are included in the tax base or not. Industry interviewees from the Finland case study highlight that this element of the design of the tax has led to high administrative costs due to the ambiguities in the matching of products with categories.

France – tax on sugared and non-sugar-sweetened soft drinks

In a reverse situation to that of the Finland experience, the French "soda tax" was initially supposed to specifically target sodas, but was extended to all beverages with added sugar or sweetener¹³², mainly due to the fact that no specific category in the French customs codification is dedicated to sodas.

3.1.4 Administrative costs in practice

In the case of the Danish tax on saturated fat, the administrative costs imposed by the tax were found to be significant for the companies. The administrative burdens were already foreseen by the Prevention Commission, which stated that "since this is a new tax, there seems to be considerable

¹³⁰ DI Fødevarer (2012): Problemstillinger – fedtafgiften (notat) and interview with Peter Bernt Jensen, DI.

¹³¹ Lovbemærkninger i Forslag til Lov om afgift af mættet fedt i visse fødevarer (Fedtafgiftsloven), fremsat d. 19. januar af Skatteministeren http://www.ft.dk/Rlpdf/samling/20101/lovforslag/L111/20101_L111_som_fremsat.pdf og Forebyggelseskommissionen (2009): Vi kan leve længere og sundere – Forebyggelseskommissionens anbefalinger til en styrket forebyggende indsats.

¹³² It is interesting to note that milk-based drinks, soups, as well as drinks delivered on medical prescription do not fall under this tax regime.

administrative costs for both government and businesses".¹³³ The Danish Commerce and Companies Agency's Department for Better Regulation (CKR) made an ex-ante assessment of the tax and expressed the following views on the administrative consequences. "CKR has assessed the administrative consequences for app. 160 manufacturers and app. 1450 importers. The expected implementation costs have been estimated at app. DKK 161 million (app. EUR 22 million). The costs include registration as a manufacturer / importer, preparation of the monthly payment of fees (establishment of technical solution and possibly obtaining information on the percentage of saturated fat in foods) and counting of existing stock. The expected yearly administrative costs at national level have been estimated at app. DKK 35 million a year (app. EUR 5 million), and are mainly related to the requirement for monthly statements of tax and contribution rates basis. For the individual company, these are very large transition costs and ongoing costs" (own translation)¹³⁴.

Ex-post figure estimated that the tax on saturated fat in Denmark has cost the companies in the retail and wholesale sector app. DKK 200 million¹³⁵ (app. EUR 27 million). Figures from a member survey carried out by The Danish Food and Drink Federation (DI) estimated that the annual administrative costs amounted to DKK 50 million¹³⁶ (app. EUR 7 million). The Danish Agriculture and Food Council estimated the yearly administration costs for its members to be around DKK 100 million (app. EUR 13 million). The tax was abolished on 1 January 2013 with the central governments' budget proposal for 2013, citing the "administrative hassle" for Danish companies which the law had created as the main reason¹³⁷.

Industry representatives interviewed in the Finnish case study stated that the implementation of the tax on confectionery and ice cream has caused the food industry much administrative work and related costs. For example, Nestlé reports that the administrative costs related to the tax amount to 80,000 EUR since 2011 including costs for system maintenance, monitoring and matching payment of taxes and interpreting unclear legislation (CN codes)¹³⁸.

3.2 The impact of food taxes on profitability

Firm profitability is the result of various factors: price, production costs, sales volume and other costs, and that for the full product line. Each of these factors may be impacted by food taxes, as partly discussed in previous sections, but also by other factors, like costs of raw materials, cost of labour and exogenous developments in demand. As a result, linking developments in profit levels to introduction of food taxes is not straightforward. The overview of information from the data analysis, presented in Table 3.1, illustrates that development of profitability shows a diverse picture.

¹³³ Forebyggelseskommissionen (2009): Vi kan leve længere og sundere – Forebyggelseskommissionens anbefalinger til en styrket forebyggende indsats, p. 153.

¹³⁴ Lovbemærkninger i Forslag til Lov om afgift af mættet fedt i visse fødevarer (Fedtafgiftsloven), fremsat d. 19. januar af Skatteministeren http://www.ft.dk/R/pdf/samling/20101/lovforslag/L111/20101_L111_som_fremsat.pdf.

¹³⁵ Dansk Erhvervs Perspektiv 2012 #23: Fedtafgiften: et dyrt bekendtskab.

¹³⁶ DI Fødevarer (2012): Problemstillinger – fedtafgiften (notat).

¹³⁷ <https://www.retsinformation.dk/Forms/R0710.aspx?id=143480&exp=1>.

¹³⁸ Nestlé presentation, Feb. 2014.

Table 3.1 Ecorys data analysis observations on sectorial profitability effects of food taxes*

Country – Tax	Observations on sectorial profitability
DK –saturated fat	No information available.
DK - soft drinks and juices	No information available.
DK – confectionery and chocolate	No changes directly after the first tax increase. No information available for more recent years.
FI – confectionery	The profitability decreased directly after the introduction of the tax.
FI – ice cream	No information available.
FI – soft drinks	No information available.
FR – regular cola	Increase of profit in the year of the first tax increase, in line with the trend of previous years. No information is available for more recent years.
FR – juices (1-99%)	No information available.
HU – confectionery and chocolate	Profit remained stable throughout the observed period, including in the year the tax was introduced.
HU – sugar-sweetened beverages	The profitability showed a slight increase in 2011. No information available for more recent years.
HU – energy drinks	No information available.
HU – salty snacks	No information available.

Note: Data presented is at sectorial level and thus figures should be interpreted with caution. As the impact of food taxes on competitiveness differs by firm, aggregated sector data may not adequately represent heterogeneity in individual firms' development. Secondly, the level of aggregation for most sectors is higher than the tax base. For instance the information for Finland is available at beverages level, which is a broader category than the tax base (i.e. it includes alcoholic drinks as well).

Comparing developments in the sector with the taxed products, with the developments in the broader agri-food sector does not improve the results. For example, the changes in added value of the cocoa, chocolate and sugar confectionery industry in Denmark and Finland follow the same trend as the overall food sector in the respective countries. In Hungary, the stable profitability of the cocoa, chocolate and sugar confectionery industry outperforms the general trend in the food sector, which has shown a strong decline. This lack of difference or better performance of the cocoa, chocolate and sugar confectionery industry compared to the overall food industry means no impact of the food tax on the cocoa, chocolate and sugar confectionery industry can be isolated.

Hungary – public health product tax

PwC conducted impact studies¹³⁹ in 2012 and 2013 on the Hungarian public health product tax. Both impact studies were commissioned by the Association of Hungarian Confectionery Manufacturers (Hunbisco). PwC examined effects of the public health product tax on confectionery products, salty snacks and seasoning industry using industry data, market research data from Nielsen and Euromonitor International and publicly available statistical and public health data.

In analysing the industry data, PwC observed that domestic sales of the products subject to NETA and net domestic sales revenue had declined since introduction of the tax. PwC concluded that the permanent (and significant) drop of sales diminishes the efficiency and competitiveness of Hungarian food manufacturers, and has a detrimental effect on the whole industry. A very important factor in the discussion on sales and revenue changes for Hungarian manufacturers is that the prices of raw materials increased substantially and the rate of VAT increased from 25% to 27% in the period that NETA came into effect. Therefore prices of affected products generally increased and PwC found the sales revenue therefore increased slightly for most product categories despite falling sales. Even so, this sales revenue was found not to cover the public health product tax payments required by the industries concerned and thus, companies suffered considerable losses which they had to fund from other sources e.g. (profit from product lines not subject to NETA).

¹³⁹ Price Waterhouse Coopers. 2013.

According to the industry association in Hungary, the introduction of the public health product tax had a significant impact on the competitiveness of affected companies in the sector with a decline in consumption and cost increases leading to very low profit levels (around 1-2% at best).

Finland – tax on confectionery, ice cream and soft drinks

From 2008 to 2010, the Finnish ice cream market has presented sales of 71 to 73 million litres with slight fluctuations between years. Following the introduction of the sweet tax in January 2011, sales of ice cream dropped to 65 million litres in 2011 and further down to 58 million litres in 2012. This trend has continued since then. This indicates that the introduction of the sweet tax has imposed a loss in terms of sales volume onto the manufacturers of ice cream.

One example was provided by Nestlé. Nestlé, holding 50% of the Finnish ice cream sales, claims to have suffered a loss of 5 million litres as a consequence of the sweet tax; this equals a reduction in sales volume of 18-20% and a loss in sales of € 25 million. The reduced sales volume inevitably leads to higher overhead costs, and this is claimed to have caused Nestlé a 5% decrease in the company's competitiveness in the ice cream market.

For the other countries, no figures on firm profitability were obtained in the case studies.

3.3 The impact of food taxes on investment

Information on investment levels is quite limited. No information is available in the literature. Also, sectorial data on investments is available for only a few taxes, see Table 3.2.

Table 3.2 Ecorys data analysis observations on sectorial investment effects of food taxes*

Country – Tax	Observations on sectorial investment
DK –saturated fat	No information available.
DK - soft drinks and juices	No information available.
DK – confectionery and chocolate	Investments show a slight increase in the year the tax was introduced. This is an exception to the multi-year trend, showing a decline in investment levels.
FI – confectionery	Increasing investment levels, in line with the multi-year sectorial trend.
FI – ice cream	No information available.
FI – soft drinks	Increasing investment levels, in line with the trend of previous years.
FR – regular cola	No information available.
FR – juices (1-99%)	No information available.
HU – confectionery and chocolate	Decline in investment levels. No multi-year trend available.
HU – sugar-sweetened beverages	Strong increase in the investment activity in the year of introduction of the tax. contrary to the trend of previous years which shows decreasing investment levels.
HU – energy drinks	No information available.
HU – salty snacks	No information available.

Note: Data presented is at sectorial level and thus figures should be interpreted with caution. As the impact of food taxes on competitiveness differs by firm, aggregated sector data may not adequately represent heterogeneity in individual firms' development. Secondly, the level of aggregation for most sectors is higher than the tax base. For instance the information for Finland is available at beverages level, which is a broader category than the tax base (i.e. it includes alcoholic drinks as well).

In nearly all cases, the sectorial investment levels show a similar pattern in the year of introduction of the tax as the investment levels in the overall food or beverage sector. The exceptions are the Danish cocoa, chocolate and sugar confectionery industry, where the sector showed an increase against a decrease for the overall food sector, and the Hungarian sugar confectionery industry,

where the decline in sectorial investments levels does not match the increased levels in the overall food industry.

Finland – tax on confectionary, ice cream and soft drinks

In the case study on the tax on confectionary, ice cream and soft drinks in Finland, Nestlé indicated that the outlook to increasing tax rates as of 2015 are not regarded as a promising environment for future investments in ice cream production capacity. No specific details on the impact of taxes on investments were obtained.

Hungary – public health product tax

Some additional impacts are also presented in the NIHD study, which is based on a manufacturers' survey. The study states: "the manufacturers' answers show that most of them indicated the cancellation of planned investments (23%), the reduction of production (19%), and redundancies (17%) as the main changes to the business policy because of the Public Health Product Tax."

According to industry, the tax is not an incentive to innovate, due to applying too severe nutrient profile criteria and not being broad enough in product base.

Proposed Food tax in Ireland

The beverage industry has observed that consumption of SSBs in Ireland has been in decline in recent years, replaced in part by increases in sales of diet and zero sugar product varieties but not entirely. Many manufacturers are already investing in reformulating products and new product development in order to meet changing consumer preferences. Industry stakeholders point out that a SSB tax which places a cost burden on the industry provides less funds for investment in such initiatives.

3.4 The impact of food taxes on employment

A report by Oxford Economics and ITIC¹⁴⁰ discusses the impact of food taxes on the agri-food sector and suggests that the reduction of profit resulting from a food tax would likely lead to job losses in the tax-affected food sectors and associated supplier and distribution industries. We investigate the impact of food taxes on employment by first presenting the results of the Ecorys data analysis (Table 3.3) and then validating and cross-checking these sectorial level findings with information from the case studies and EU interviews. Literature on employment effects of food taxes is very limited.

Table 3.3 Ecorys data analysis observations on sectorial employment effects of food taxes*

Country – Tax	Observations on sectorial employment
DK –saturated fat	No information available.
DK - soft drinks and juices	No information available.
DK – confectionery and chocolate	Slight increase in the year after the first tax increase. No information available for more recent years.
FI – confectionery	Slight increase in the year after the first tax increase. No information available for more recent years. No impact of tax visible in data.
FI – ice cream	No information available.
FI – soft drinks	Tax increase corresponds to an end of the growth of employment.
FR – regular cola	No change in trend after tax introduction.

¹⁴⁰ Oxford Economics, International Tax and Investment Centre. 2013.

Country – Tax	Observations on sectorial employment
FR – juices (1-99%)	No information available.
HU – confectionery and chocolate	Tax introduction coincided with slight decrease in employment No information is available for more recent years.
HU – sugar-sweetened beverages	Tax introduction coincided with increasing employment after years or reduction. Year to tax increase corresponds with decreasing employment. No information is available for more recent years.
HU – energy drinks	Information aggregated at the beverage sector level – findings thus the same as the above.
HU – salty snacks	No information available.

Note: Data presented is at sectorial level and thus figures should be interpreted with caution. As the impact of food taxes on competitiveness differs by firm, aggregated sector data may not adequately represent heterogeneity in individual firms' development. Secondly, the level of aggregation for most sectors is higher than the tax base. For instance the information for Finland is available at beverages level, which is a broader category than the tax base (i.e. it includes alcoholic drinks as well).

Insofar information is available, we observe different developments in employment across the taxes and sectors examined. Further to the limitations stated earlier and below the above table, analysis of firm employment encounters the same limitations as analysis of profitability in that employment changes are a result of many developments such as the overall state of the economy, any potential restructuring towards more capital intensive production, or changing consumer preferences.

Given the limitations in the Ecorys data analysis we instead rely on information gained through the case studies and interviews to understate the firm level impacts of the respective food taxes on employment.

Denmark – tax on saturated fat

The Denmark case study found that since the tax on saturated fat was operational for a very short period of time (15 months), the effect on jobs was limited - if present at all. However, an industry association interviewed in the EU level interviews stated that 5,000 jobs were lost as a result of the tax on saturated fat.

Two industry organisations, the Danish Agriculture and Food Council and the Danish Chamber of Commerce, have estimated the effect of the tax on employment, had the fat tax not been abolished. Using the macroeconomic model ADAM, the organisations calculated that the tax on saturated fat would increase consumer food prices by approximately 1.4 %. The higher consumer prices for food was expected to decrease consumer spending, which was expected to result in a decline in employment of approximately 1,300 people, mainly in the retail sector¹⁴¹.

Finland – tax on confectionery, ice cream and soft drinks

To date, no research has been carried out about the effect of food taxes on the economic situation and employment of food industry and agriculture in Finland¹⁴². The Finland case study found that since the introduction of the tax, one food producer has decreased employment in the ice cream business of 150 FTE¹⁴³. These jobs have been cut from production, distribution, ice cream vans and in kiosks. Furthermore, the seasonal employment is the lowest ever in its history¹⁴⁴.

The brewery sector has also suffered from reductions in employment. In Finland the breweries are the main producers of soft drinks (carbonated drinks and mineral water). By 2010, the employment in the Finnish beer and soft drink industry was 2,269 persons, and in 2013 this had been reduced to

¹⁴¹ Dansk Erhvervs Perspektiv 2012 #23: Fedtafgiften: et dyrt bekendtskab.

¹⁴² ETL, 2014.

¹⁴³ FTE: Full Time Employees.

¹⁴⁴ Nestlé presentation, Feb. 2014.

1,980 persons. This equals a reduction of 12 %¹⁴⁵. It is stated by industry that taxes on alcoholic beverages and the tax on soft drinks are the most important factor for the loss of jobs in Finnish breweries, but the impact from the increase in the tax on soft drinks on its own is not clear¹⁴⁶. From an interview it is clear that 20 people have lost their jobs in a fruit drink manufacturing company, and this is said to be because of the tax on soft drinks¹⁴⁷.

France – tax on sugared and non-sugar-sweetened soft drink

One industry interviewee in the case study mentioned that due to the decreased consumption and product substitution resulting from the tax on sugared and non-sugar-sweetened soft drinks, the tax could have a negative impact on employment. However no figures or specific experiences were obtained in either the EU level interviews or the France case study.

Hungary – public health product tax

According to the interviews conducted during the Hungary case study, in general domestic companies are more affected by the tax than multinational companies whose products are also sold in other countries (as exports are exempt from the tax). Hunbisco reported that between 2011 and 2013 approximately 1000 employees have been laid off in PHPT affected industries in Hungary, and a number of small and medium size companies were shut down. The NIHD study conducted a survey of around 40 manufacturers' and 17% of respondents indicated that redundancies were one of the changes to the business policy resulting from the Public Health Product Tax.

Other reflections

EU level industry interviewees pointed out that large manufacturing companies are the most visible in the sector and it is often assumed that production is placed in countries external to the EU while in reality production often occurs in the Member States using local employment. Indeed in the Ireland case study, which investigated the proposed but not introduced tax on sugar-sweetened beverages, it was highlighted that in this Member States the agri-food industry is a key employer, providing around 1 in 8 jobs. Moreover, there are large numbers of local SMEs that manufacturers work with, mostly active in bottling, packaging, advertising and retail. Therefore food taxes may have a direct effect on local employment, as well as a trickle down effect on employment through the value chain.

However, impacts on employment are difficult to determine, especially because many of the manufacturers and retailers produce more products than just those affected by the respective taxes. The beverage industry is one example (four of the taxes studied affect this sector), whereby industry interviewees highlight that companies produce or supply more than just the tax-affected sugar sweetened drinks. The loss of sales for producers and retailers in tax-affected products may be compensated by growth in other product lines. Hence, net employment effects for individual companies and for the sector as a whole, resulting from tax changes, are complex to detect.

3.5 The impact of food taxes on labour productivity

Labour productivity measures how well individual employees are able to produce value through their work.¹⁴⁸ Labour productivity is a clear sign of the competitiveness of firms: the higher the labour productivity, the better the competitive position of a firm compared to competitors.

¹⁴⁵ Finnish Brewery Association, 2014.

¹⁴⁶ Newsletters from the Finnish Brewery Association; www.panimoliitto.fi (2013-2014).

¹⁴⁷ Eckes-Granini in the ETL interview, 2014.

¹⁴⁸ Labour productivity is calculated as value added at factor costs divided by the number of persons employed and is measured in thousands of euros per person employed. This allows room for differences caused by the degree of

We have sector data on labour productivity for a few taxes, see Table 3.4

Table 3.4 Ecorys data analysis observations on sectorial labour productivity effects of food taxes*

Country – Tax	Observations on sectorial labour productivity
DK –saturated fat	No information available.
DK - soft drinks and juices	No information available.
DK – confectionery and chocolate	Small rise (3%) in the year of introduction of the tax. Steep decline (-16%) in the year after introduction. Main driver is change in employment levels.
FI – confectionery	Decline in the year of introduction of the tax. Main driver is decline in added value.
FI – ice cream	No information available.
FI – soft drinks	Increase in labour productivity, due to stable employment and increase in value added.
FR – regular cola	No information available.
FR – juices (1-99%)	No information available.
HU – confectionery and chocolate	Unchanged, in line with the multi-year sectorial trend.
HU – sugar-sweetened beverages	Unchanged.
HU – energy drinks	No information available.
HU – salty snacks	No information available.

Note: Data presented is at sectorial level and thus figures should be interpreted with caution. As the impact of food taxes on competitiveness differs by firm, aggregated sector data may not adequately represent heterogeneity in individual firms' development. Secondly, the level of aggregation for most sectors is higher than the tax base. For instance the information for Finland is available at beverages level, which is a broader category than the tax base (i.e. it includes alcoholic drinks as well).

In general, the observed changes in labour productivity upon introduction of the food tax are quite similar to the changes observed in the broader food and beverages industry. Exception is the soft drinks sector in Finland, which shows a slight decline in labour productivity, while the Finnish beverages sector shows increasing labour productivity.

Hardly any information on the development of labour productivity or the impact of food taxes on labour productivity was obtained. However, with labour productivity being driven by developments in value added and employment, the conclusions of the previous sections may also apply here.

Public health stakeholder indicate that an assessment of impact on industry should always be considered in the context of productivity gains among the population – and thus the workforce - resulting from improved health.

3.6 The impact of food taxes on the internal market

Non-harmonised food taxation leads to differences between Member States and between sectors and companies within those Member States. A common argument against food taxes is therefore that they raise the price of goods relative to the prices of the same goods in neighbouring countries where no such tax exists and thereby promote cross border shopping. Following a similar logic, there is concern that food taxes raise the price of goods relative to substitute goods within the same country and as such these substitution effects may lead to changes in the ability of sectors and individual firms to compete with other sectors or firms. This section will examine these internal market effects of food taxes; competitiveness effects within member states and competitiveness effects between member states (cross-border trade).

employment per person (full-time versus part-time). Data limitation prevented the use of labour productivity on the basis of full-time equivalents (FTE).

3.6.1 Competitiveness effects within Member States

As discussed in detail in section 2.3, food taxes may induce product substitution. This is due to the fact that price is a strong influence on demand and where a food tax causes the relative prices of similar goods to change, this may change consumer preferences for certain products or certain brands. This changing of consumer preferences impacts the competitiveness between firms within a Member State where a food tax is levied. For example, and as presented in section 2.3.2, there is evidence that food taxes may cause consumers to favour cheaper brands of the taxed products in order to maintain consumption of the product but at a lower cost. This effects the competitiveness of premium brand producers with respect to non-premium brand producers. Another example is where consumers stop purchasing the taxed, and now higher priced, product and instead switch to a non-taxed food or lesser-taxed food. Producers of the non and lesser-taxed products may then have a competitive advantage. The precise product substitution that occurs, and therefore the competitiveness effects, is highly influenced by the design and scope of the tax, as well as the nature of the product that is being taxed. Insight gained through the case studies shows that the scope of the tax, that is, the definition of products upon which the tax is levied, is a significant influence on how easy it is for a consumer to substitute products and thus on competitiveness between firms.

Denmark – tax on saturated fat

The scope of product categories subject to the Danish tax on saturated fat includes meat, dairy, animal fats and vegetable oils which contain more than 2.3% saturated fat. Standardised liquid milk is not subject to the tax. The Ecorys data analysis and the empirical study by Jensen and Smed examined only the animal fat and vegetable oil product categories. The Ecorys data analysis found that for these categories, prices of products with higher saturated fat (butter and cooking oils) increased by more than products with lower saturated fat (olive and vegetable oil) and both the Ecorys data analysis and Jensen and Smed found that consumers demand for the lesser-taxed products increased as a result. Existing trends show that consumer preferences were already increasingly favouring olive oil and vegetable oil, with growth in demand for these products prior to the tax. However this growth accelerated immediately following the tax. Thus, it appears the tax reinforced consumer preferences towards these products and away from butter and cooking oils. Therefore the olive, vegetable and seed oil sector benefited from the tax and butter and cooking oil sector became less price competitive due to the tax.

In addition to a shifting towards lesser-taxed products, the earlier mentioned empirical study observed a shift in consumer behaviour from high price supermarkets towards low-price discount stores, at least for some types of oils and fats. The Ecorys data analysis finds that for cooking oils, consumers strongly moved away from premium brands towards non-premium brands following introduction of the tax. For lower-taxed oils, a large expansion of the market share of non-premium brands for the olive oil products was observed. Industry related research found that Denmark experienced lower sales of domestically produced Lurpak, and a corresponding increase in lower-priced alternatives such as butter imported from New Zealand. Therefore, the tax impacted competitiveness between both manufacturers and retailers with lower priced brands and discount stores gaining a competitive advantage.

Finland – tax on confectionery, ice cream and soft drinks¹⁴⁹

The tax on confectionery and ice-cream in Finland defines the scope of products to be taxed based on CN codes (tariff codes). Due to not all products being able to be classified clearly in the CN code system, the result is a discriminatory divide between those 'sugary' products which are taxed and those which are not. While chocolate bars are subject to the tax, chocolate cereal bars are not. Similarly, while ice-cream is taxed, frozen desserts, frozen baked goods, stable desserts, dairy-based desserts and dessert yoghurts are not. During the first year of the reintroduced tax on confectionery and ice-cream, sales increased for a number of non-taxed product categories and the demand for the taxed products have declined. In this perspective the tax on confectionery and ice-cream in Finland has contributed to changes in consumer preferences for different categories of 'sugary' products.

Hungary – public health product tax

Hungary's PHPT is a further example. It was found that consumers were able to substitute, in all PHPT affected product categories, to products which contain those nutrients targeted by the tax (salt, sugar etc.) but do not have product tax levied on them. This is because the products are either not pre-packaged products or not subject to the tax based on their customs tariff codes. The PwC impact study¹⁵⁰ supports this finding, noting evidence of substitution to non-taxed foods.

France – tax on sugared and non-sugar-sweetened soft drinks

Like Finland and Hungary, France's tax on sugared and non-sugar sweetened soft drinks is based on tariff codes. Interesting though, while the tax was initially supposed to specifically target sodas, the tax was extended to all beverages with added sugar or sweetener (including 'light drinks') because there is no specific category in the French customs codification for sodas. Product substitution in this case was found to be limited due to the broad scope of the tax, as consumers could not easily switch to similar non-taxed products. Most similar non-taxed products are 100% juices. There was some evidence of increased demand for this product category, however this was largely an already occurring trend.

In terms of consumer preferences regarding premium or non-premium brands, evidence from literature, interviews and the French case study points to a very strong brand loyalty among consumers that results in little to no switching to cheaper brands. This was particularly so for sodas, a sector with strong brand loyalty where brand is connected to the unique taste of a particular soda product. Industry interviewees reported however that nectars suffered more so in terms of competitiveness effects as the particular brands of nectar drinks are less important for consumers. In the case of sodas, it was found that consumers may instead switch retailer, opting for discount stores or buying products when on sale.

Further reflections

It is relevant to mention that in the case of Denmark where the lesser-taxed products (lesser-taxed because they use less of the targeted ingredient in the production process) gained a price advantage over other products with higher saturated fat, this is the intended result of a food tax. That is, consumption moves from the high fat, sugar or salt products to those with less of these ingredients. There is naturally winners and losers as a result, however overall, the tax may

¹⁴⁹ Compared to other EU countries, the availability of data on food consumption and food sales in Finland is quite limited. The retail market in Finland is highly consolidated as the two largest retail groups together hold 80 % or more of the retail market, and no scanner data are collected. Finnish retailers are reluctant to provide information about sales including information about branded vs. private label products, sales volumes and prices. Following this, most data about food consumption and food sales are estimated by industry sources or researchers. This is confirmed in interviews. Some data on household consumption patterns are available from public surveys such as The Findiet Survey (Finravinto) 2007.

¹⁵⁰ Price Waterhouse Coopers 2013. "Public Health Product Tax Study" Association of Hungarian Confectionery Manufacturers.

stimulate and reinforce trends towards lower fat/sugar/salt products across the entire sector because all HSSF foods are effected equally. A more distortive effect in terms of competitiveness occurs when the tax is discriminatory, in that a tax is levied on some products and not others with similar levels of salt, sugar or fat within the same or similar product categories. This scenario also creates winner and losers, but rather unequally within a product category or sector as consumer preferences may move from one HSSF product straight to another. Finland is the most prominent example of this. In all cases examined, it is found that there is some movement towards cheaper brands (manufacturers) or lower prices stores (retailers) of the taxed products, but less so when products have a particularly strong brand name.

3.6.2 *Competitiveness effects within the internal market (cross-border trade)*

Food taxes and the associated price increases of the taxed products may provide incentives for consumers to buy the tax liable products in another country, where these products are not taxed (cross border trade).¹⁵¹ Whether or not this incentive is large enough to actually lead to cross-border purchases depend on the relative price advantages between the countries and the transport costs (and invested time) associated with the shopping trip.

There is limited information regarding the actual impact of non-harmonised EU food taxes on cross-border trade flows. This might be explained by the fact that trade flows directly relatable to the introduction of such food taxes can prove to be difficult to measure as there are a number of other market, regulatory and economic factors that can result in a change of consumption and export/import flows.

As our data set does not contain information on the nationality of the purchaser of products, we need to find alternative evidence on cross-border trade. One possibility is to examine alterations in international trade flows. In case of strong cross-border effects, one should expect a strong reduction in demand in the country where the tax is levied, leading to reduced import (less demand for taxed products). At the same time, an increase of export of taxed products (in order to allow the neighbouring country to meet the increase in demand) should be expected.

The amount of taxes for which we have trade-flow information is limited. Hence we have not been able to formulate a robust conclusion on the impact of food taxes on cross-border trade flows.

Denmark - tax on saturated fat

An often cited example for the negative impact of non-harmonised food taxation is the increase in cross border shopping following the introduction of the Danish tax on saturated fat. Industry stakeholders say that the tax led to a registered 30% increase in cross-border shopping.

This figure and the statement itself were not confirmed by public health officials or the Danish case study. Jensen and Smed (2007) consider that cross border shopping may be valid for those citizens living close to the border, but for most people the transactions costs to travel outside the border are too high for purchases of oils and fats. According to the Danish Ministry of Taxation, the effect on cross-border trade as a result of the tax on saturated fat was limited. Figures suggest an increased cross-border trade as a result of the fat tax of around DKK 100 million (app. € 13 million) from 2010 to 2012.

¹⁵¹ Under European legislation, the imposition of taxes on sugar, salt and fat are permitted, but Member States are not allowed to apply border tax adjustments (imports taxed, exports exempt) to them, thus are not in a position to prevent tax avoidance by consumers through cross-border shopping.

On the other hand, an analysis by the Danish Chamber of Commerce based on a survey among app. 700 consumers points to an increase in the number of consumers having bought meat products in Sweden or Germany (from 23% in 2011 to 33% in 2012).

The analysis of causality between the tax and cross-border shopping is disturbed by other taxes of which rates were raised in the period as well. These were taxes on cross-border-sensitive goods, such as cigarettes, chocolate and sweets, beer, wine and bottled water, including soda water. The observed increase in cross-border trade may well be the result of these tax increases, and people have bought taxed products when they were at the border shop anyway.

Denmark – tax on confectionery and chocolate

The overall trend observed in the Ecorys data analysis of exports of sugars and sugar products in Denmark has shown an overall increase over the last five years, though there are some fluctuating on yearly basis. When the first increase in the tax on chocolate and sweets was introduced, the exports of sugars dropped but then started to grow and reached higher level than in 2009. The same happened when in 2012 the tax was increased again. When in 2013 the tax was increased for the third time, exports increased. The similar patterns are happening with imports of sugars and sugars products.

Bergman and Niels (2010) conclude that tax cuts aimed at reducing cross border shopping did not reduce cross border shopping. In fact, cross border shopping increased for soft drinks and beer.

Finland – tax on confectionery, ice cream and soft drinks

Cacao, chocolate and sugar confectionery

The overall trend of exports of sugars and sugars products has been positive over the last five years, though fluctuating some what. On the other hand, the overall trend of imports was negative. When the tax on confectionery was reintroduced the exports of sugars rose but then started to decline year after.

When the tax was increased in 2012, the level of exports continued to grow. The same pattern of fluctuations is visible in the imports of sugars and sugar products.

*Soft drinks*¹⁵²

The overall trend of exports of beverages has been negative over the last five years, though fluctuating some what. No specific effects around the time of introduction of the tax were identified. The imports of beverages follow the same pattern as the exports. No detailed information on soft drinks is available.

Cross-border effects were mentioned in the case study of Finnish tax on confectionery, ice cream and soft drinks¹⁵³. The breweries and the soft drink industry claim that, border trade between Finland and Estonia impacts Finnish retail sales of soft drinks liable to the tax. No detailed information on the size of the cross-border effect was obtained.

¹⁵² Drinks affected by the tax include soft drinks (carbonated drinks, syrup), mineral water, and fruit based drinks (e.g. fruit juice, syrups, and nectars), as well as some alcoholic beverages.

¹⁵³ Drinks affected by the tax include soft drinks (carbonated drinks, syrup), mineral water, and fruit based drinks (e.g. fruit juice, syrups, and nectars), as well as some alcoholic beverages.

Hungary – public health product tax

Confectionery

The overall trend of exports of sugars and sugars products has been positive over the last five years. The overall trend of imports shows the same pattern. When the tax on confectionery was introduced the exports of sugars rose but then started to decline the year after. In 2013 the level of exports continued to grow. The same pattern of fluctuations is visible in the imports of sugars and sugar products, though it seems less volatile.

Reflections and limitations

The similarity of an increase of export of sugars and sugar products in Finland and Hungary upon introduction of food taxes seem interesting and in line with expectations. The ensuing decline of exports in the following year may be a correction on the initial reaction, but this could not be confirmed in our data analysis.

The two other cases do not show the expected change in export patterns, with one of those cases actually showing an opposite reaction than expected. Due to the limited number of cases, no firm conclusions can be drawn on the basis of data analysis.

Other examples

In Ireland, cross border trade between Ireland and Northern Ireland generally flows in favour of the latter, with shoppers from Ireland purchasing goods in Northern Ireland to take advantage of lower product prices. The difference in price is driven primarily by the euro-pound exchange rate with cross border shopping fluctuating, generally in line with exchange rate fluctuations.

Industry predicts that an increase in the prices of SSBs as a result of an SSB tax would only exacerbate trade flow losses. On the other hand, some argue that as SSBs are a relatively cheap product, a price rise may not be large enough to motivate consumers to purchase these goods outside of Ireland. Moreover, health stakeholders highlighted the fact that there is no definite proof that people will cross the border to purchase SSBs.

3.7 Reflections and conclusions on the impact of taxes on competitiveness

How do food taxes impact the competitiveness of the agri-food sector?

This study shows that only limited evidence is available on the impact of taxes on the agri-food sector. In addition, the available evidence often points in different directions with opposite effects observed in different cases without any empirically founded explanation why these effects are opposite. Like with the analysis of the impact of food taxes on consumption, the influence of many other factors make it difficult to clearly isolate developments caused by food taxes from those caused by these other factors.

For the findings on consumption, we draw upon the framework for analysis (Figure 3.1 and Figure 3.2), introduced at the beginning of the chapter.

The basic relations to be tested in the study, and our findings:

1. Introduction of food taxes may increase costs for the firm, most notably administrative costs:

- The products upon which a tax is levied (either specific or ad valorem tax), and the ways these are classified and defined, can have significant implications for the administrative burden of the tax.

- For example, the use of CN-codes as tax base in Finland required the need for interpretation of unclear legislation, according to industry. In Denmark, tax levied on saturated fat focused on the fat used in the production instead of fat in the finished product, leading to importers having to obtain suppliers' declarations for the amount of saturated fat used in the production of the imported goods and intermediate goods.
- The calculation method has an important influence on administrative burdens, where administrative burdens are relatively high in cases where the tax is charged on ingredients;
- All taxes investigated in this study are levied on producers, or the first domestic seller for imported products. The lack of comparable food taxes levied on other parts of the supply chain make it impossible to assess the impact of this choice on administrative burdens using information on implemented taxes;
- As administrative burdens have a fixed cost character to a certain extent, the impact of these burdens on SMEs is relatively larger than the impact on larger producers.

2. Food taxes may negatively impact firm profitability:

- No clear picture on the impact of food taxes on profitability was obtained. The interviews and case studies provided examples of firms facing significant declines in profitability. However, this was not confirmed in our analysis of sector data, which show hardly any development in sector profitability. This may be due to differences in granularity of our data set;
- External factors, like the prices of raw materials, are likely to at least partly influence developments in profitability. Within the scope of this study it was not possible to correct for these external developments in assessing profitability;
- The profit margin for the taxed product is negatively affected which, together with the decline in demand for the taxed product, negatively impacts firm profitability. This may be somewhat offset by increases in profit on product substitutes of the same firm;
- It may be more difficult for SMEs to mitigate the impact of food taxes by means of product reformulation or increased profitability on substitute products due to their smaller product line.

3. Food taxes may lead to a decline in the need for labour inputs and thus employment:

- Production often occurs in the Member States using local employment. Moreover, there are large numbers of local SMEs that manufacturers work with, mostly active in bottling, packaging, advertising and retail. Therefore food taxes can have a direct effect on local employment, as well as a trickle down effect on employment through the value chain;
- Impacts on employment are difficult to determine, especially because many of the manufacturers and retailers produce more products than just those affected by the respective taxes. The loss of sales for producers and retailers in tax-affected products may be compensated by growth in other product lines. However, this is not always the case, not only for multinational companies that produce only a specific category of foodstuffs (for example sweet products), but especially for SMEs, which do not have as much flexibility to offset the loss of profit margins on other products;
- Figures on changes in employment provide mixed results, including a few examples where an increase in employment was observed in the year of introduction of the food tax, which we think is unlikely. This provides a strong indication that other factors play a more important role in the development of employment than food taxes.

4. Food taxes may lead to reduced investments:

- The analysis is restricted due to the relatively small number of observations. As various food taxes were only recently introduced, no data was available for some of the taxes;
- The industry is divided on the impacts that food taxes might have on investments and innovation. While some stakeholders claim that there has been a reduction in food innovation simply as a result of less capital available due to taxation, other sources suggest that product reformulation (requiring some additional investments) has increased in response to the introduction of taxes;

- There is no clear pattern between introduction of a food tax and investment levels at sector level. We observe a strong decline in one case and a strong increase in another, with also a couple of cases with unchanged trends in investment levels. However, as investment levels are often volatile, the short-term data available does not allow to test for structural changes in investment levels.

5. Food taxes may decrease labour productivity within a firm:

- The sector data analysis on labour productivity shows a mixed picture with productivity decreasing in two cases, but also an increase in productivity observed in another case. On the basis of the small number of observations, no robust conclusion can be drawn;
- No solid information from case studies or interviews is available to shed light on the observations in our data analysis.

6. Decline in demand due to food taxes may lead to internal market effects:

- The scope of the tax, that is, the definition of products upon which the tax is levied, is a significant influence on how easy it is for a consumer to substitute products and thus on competitiveness between firms within a member state;
- In some cases (Finland and Hungary), manufacturers of the taxed products have lost competitiveness to those manufacturers of the non-taxed goods due to the scope of the tax not covering all of the products within a category. It should be noted that some manufacturers may produce both the taxed products and non-taxed or lesser taxed product substitutes and therefore can offset losses between the respective product lines. In these cases overall competitiveness may not be so strongly effected. However, this is not necessarily so and particularly SMEs with less diversity in product lines are likely most effected;
- In all cases examined, it is found that cheaper brands (manufacturers) or lower prices stores (retailers) benefit from increased demand following introduction of a food tax, but less so when products have a particularly strong brand name;
- It should be noted that some manufacturers may produce both the taxed products and non-taxed or lesser taxed product substitutes, and both premium and non-premium brands, and therefore may be able to offset losses between the respective product lines. In these cases overall competitiveness may not be so strongly effected. However, this is not necessarily so and particularly SMEs with less diversity in product lines are likely most effected;
- The degree of cross-border shopping resulting from the introduction of the examined food taxes is limited. Other factors, in particular excise duties on other food categories, are more important drivers for the cross-border shopping effect;
- The analysis of international trade flows provides a mixed picture. In two cases we observe the expected changes, but two other cases do not show the expected change in trade patterns, with one of those cases actually showing an opposite development than expected. Due to the limited number of cases, no robust conclusions can be drawn.

4 Food taxes and other policy measures

In this chapter, we reflect on food taxes in a broader context of other policy measures aimed at improving population health. We present various other policy measures in order to provide an overview, drawing upon examples of where such policies have been introduced, the available literature and interviews.

Reflecting on the differences in impact of food taxes and of other policy measures on public health and sector competitiveness allows a better basis for the political choice on which policy measures to implement. To this aim, we also provide an inventory of various other policy measures that can be considered to influence dietary choices of consumers. It is generally assumed that the effectiveness of such policies improves when different measures are combined. For example, OECD (2010)¹⁵⁴ argues that this is because a combination of different measures increases the population coverage and can therefore exploit synergies between the different measures. It is also argued that a combination of measures may be more cost-effective than any standalone policy measure by itself¹⁵⁵.

The reflection on food taxes and other policy measures has a limited character in the sense that the amount of information collected and analysed in this study on other policy options is much less than the information collected on food taxed. This is a result of the scope of the study, which focuses exclusively on food taxes. Therefore, we provide an overview of various measures that could be considered by policy makers.

Below we first discuss the various categories of policy measures that are available. Then we provide illustrations of various policy measures in each category.

4.1 Categories of policy measures

One of the most basic options to respond to a policy issue is traditional regulation, prescribing what is permitted and what is illegal. Typical instruments of traditional regulation are laws, contracts and agreements. There are also alternatives to traditional regulation. The alternatives to traditional regulation fall into three main categories:

- Market-based instruments;
- Self-regulation and co-regulation approaches; and
- Information and education schemes.

Market-based regulatory instruments act to modify behaviour through economic incentives, in particular by changing the relative prices of the choices. Under the assumption of rational and economically motivated consumers, relative price changes should lead to changes in consumption. The main market-based instruments are fiscal measures, which include taxes and subsidies.

Self-regulation and co-regulation refer to policies where operators create their own regulation as alternative for governments regulation and administer their own rules. In the case of co-regulation governments provide legislative backing to enable the operators' arrangements to be enforced. In the case of self-regulation the operators are themselves responsible for enforcement.

¹⁵⁴ OECD Health Ministerial Meeting, Paris (2010) 'Health Choices'.

¹⁵⁵ OECD Health Ministerial meeting (2010), Ibid.

Information approaches refer to strategies which attempt to address perceived problems by providing more information, or changing the distribution of information to enable consumers to make better informed decisions. This includes education by means of campaigns or labelling.

Below we discuss how these policy instruments can be applied to encourage, prescribe or promote certain dietary choices by consumers.

4.2 Traditional regulation

Traditional regulation with respect to the food sector comes in two main forms: food regulation and marketing regulation.

Food regulation

One way to help people eat a balanced diet, is by making it impossible for them to purchase products that are high in sugar, salt and fat. This can, for example, be achieved by banning specific products completely, by banning specific ingredients or by prescribing the use of certain ingredients.

An example of food regulation is the Danish introduction of a limit of 2% on the trans fatty acids in food products in 2003¹⁵⁶. The effect of this policy was studied by looking at the amount of fats in different products. It was found that there was a significant decrease in the amount of products with trans fatty acids above 2%¹⁵⁷. Looking specifically at products from a fast-food chain, there were 8% trans fatty acids before the intervention and there were no trans fatty acids left one year after the intervention¹⁵⁸. Furthermore, saturated fats were reduced by 15%¹⁵⁹. Instead, there was an increase of monounsaturated fats by 15% and an increase of polyunsaturated fats by 7%¹⁶⁰. These unsaturated fats are healthier alternatives to the saturated fats and trans fatty acids. This shift in the shares of various types of fat is considered favourable from a public health perspective. Because traditional food regulation can prescribe certain measures to be taken, it can potentially be effective.

However, food regulation potentially also has drawbacks, such as high informational requirements to design an effective and balanced food regulation, enforcement costs of regulations, and welfare losses for consumers who like to enjoy the products as part of a balanced diet. A particular difficulty in this respect is that it is often not possible to label a certain product or ingredient as healthy or unhealthy, because the effect on health depends on various other factors (including the overall diet).¹⁶¹

Marketing regulation

Many governments have expressed concerns about the marketing of food products towards children that are dense in calories and have low levels of nutrition. Children are seen as vulnerable to marketing as they have not developed the cognitive processing skills to enable them to make informed food choices. Even though it could be argued that very young children might not be able

¹⁵⁶ World Health Organization (2013) 'Nutrition, Physical Activity and Obesity. Country profile: Denmark' Retrieved from: http://www.euro.who.int/__data/assets/pdf_file/0006/243294/Denmark-Who-Country-Profile.pdf.

¹⁵⁷ Drostby, P.M. 'The Danish Trans Fat Ban' Food Policy Division. Retrieved from: <https://cspinet.org/reports/generationexcess/drostby.pdf>.

¹⁵⁸ Drostby, P.M. Ibid.

¹⁵⁹ Drostby, P.M. Ibid.

¹⁶⁰ Drostby, P.M. Ibid.

¹⁶¹ Griffith, R. and O'Connell, M. (2010) 'Public Policy towards Food Consumption' *Fiscal Studies*, vol. 31, issue. 4, pp.481 - 507.

to make the purchases themselves, they may be able to persuade their parents to buy specific products for them and may also stay loyal to certain brands or products at a later age.

Regulation of marketing by the food industry has aimed to restrict the marketing of food products which are dense in calories and low in nutrition, especially towards children, as well as to promote the marketing of food products like fruit and vegetables.

Within the scope of this study, we have not done a comprehensive survey of available evidence on the effectiveness of marketing regulation. One study¹⁶² in Quebec (Canada) estimates that a ban on fast-food advertisement reduces the probability of purchasing a fast-food meal by 13% per week. Although there are no comparative figures for the impact of alternative policy measures on the consumption of fast-food meals, this study shows that marketing regulation can have an effect on consumption patterns.

4.2.1 Market-based instruments

Market-based instruments target financial incentives of consumers. In addition to food taxes, discussed in the previous chapters, the other main market-based instrument for the food sector is the provision of subsidies.

According to OECD (2006), market-based instruments are best used where there can be explicit monitoring of how well the instrument is achieving its objectives. The objective being targeted should therefore be explicitly quantifiable or measurable in some way. Quantification enables the government to assess how well the instrument is working and what modifications might be required to ensure it achieves its objectives.

According to OECD (2006), effective monitoring of the operation of market-based instruments is particularly important given the potential uncertainty regarding the impact of the policies. Unlike traditional regulation which may, for example, set a strict limit on some activity, many market-based instruments which work through incentives will depend upon the individual reactions and decisions of agents.

Subsidies

An alternative to taxing food products high in salt, sugar or fat is the provision of a subsidy for the food products low in calories and with high levels of nutrition. By providing a financial incentive for consumers to purchase such products, a similar effect on food consumption may be achieved as when taxing the alternatives with high sugar, salt and fat levels if relative prices between these products are effected similarly. A consequence of subsidies is that low income households may benefit if they choose for the subsidised products. However, subsidies are difficult to “target” as people that would have bought a low fat alternative in the absence of a subsidy also benefit from it. Moreover, people that receive a subsidy may still use the (actual or perceived) additional income on products high in salt, fat or sugar. One study¹⁶³ actually observed that people used the extra money they saved from the subsidy to buy more food overall, including the products containing high level of sugar, salt and fat. Finally, subsidies lead to additional government expenditures which require funding.

¹⁶² Dhar, T. and Baylis, K. (2011) 'Fast-food consumption and the ban on advertising targeting children: the Quebec experience' *Journal of Marketing research*, vol. 48, issue 5, pp. 799-813.

¹⁶³ Epstein, L.H, Dearing, K.K., Roba, L.G. and Finkelstein, E. (2010) 'The influence of taxes and subsidies on energy purchased in an experimental purchasing study' *Psychological Science*. volume 21, issue 3, pp. 406-414.

4.2.2 Self-regulation and co-regulation

Instead of regulation being imposed by government institutions, it is possible for the industry to engage in self-regulation. Examples of self-regulation include: codes of practice; industry based accreditation arrangements; and voluntary adoption of standards. The specific types of instruments or mechanisms, such as codes of practices, voluntary agreements, dispute resolution procedures that may be created under a self-regulatory regime are similar under a co-regulatory framework. It is the degree of government involvement and legislative backing that determines the difference between the two.¹⁶⁴

Three key areas where the use of self and co-regulation are particularly widespread are in the regulation of the professions, industry and business standards and codes of practice.¹⁶⁵ Self-regulation in industry is mainly used by industry groups to promote ethical conduct, product standards, and fair trading. While self-regulation may lead to a reduction in the amount of salt, sugar and fat used in products, it does not in general incentivise consumers to change consumption pattern and focus on a balanced and healthy diet, although it should be noted this depends on the specific self regulatory measures chosen.

In addition, health stakeholders expressed in interviews the view that they expect voluntary measures from the industry not to be fully effective. According to these stakeholders, additional policy measures need to be in place as a means to support health professionals and consumers in making the right choice and promoting public health. However, a consequence of self-regulatory measures is that optimal use is made of the available information within industry, which have an incentive to maximise the cost-benefit ratio of such measures.

4.2.3 Information and education schemes

Policy instruments focused on information and education aim to change behaviour by making more information available to allow consumers to make more informed decisions. These instruments are often characterised as being "light-handed" because the degree of direct government involvement in decision making or directing behaviour is more limited than with other instruments.

There are a number of ways in which government action can lead to greater information provision:¹⁶⁶

- The government can require information to be disclosed (this may require the enactment of laws obliging firms to make information available, possibly with penalties for non-compliance or the provision of incomplete information);
- Government can encourage information provision (without the passing of laws requiring provision); or
- Government can collect and make the information available directly to consumers and businesses.

The main tools for the provision of information and education are information campaigns, education and point-of-purchasing information.

¹⁶⁴ OECD (2006).

¹⁶⁵ OECD (2006).

¹⁶⁶ OECD (2006).

Campaigns

Campaigns refer to the use of mass media, such as websites, flyers, television commercials, physical advertisement and events, to promote and encourage certain behaviours in the general population. In order to make healthy diet choices, it is important that people are aware what products and nutrients are generally seen as being part of a balanced diet and why such a balanced diet is important. Therefore campaigns can be focused on providing consumers with information and raising awareness.

A difficulty with campaigns is in the design of the message. The question here is whether it is better to design a simple message for a large target group or to design various messages for different target groups of consumers.¹⁶⁷ One example of a campaign is the “5-a-day” campaign. This campaign was introduced in the UK in 2003. The results show the campaign had a positive effect, as the number of adults who eat five portions of fruits and vegetables a day increased by about 6 percent to 2006. However, after 2006 the number slightly decreased and stayed constant¹⁶⁸.

Furthermore, academic literature has found that the social norm is an important determinant in the food choice of people¹⁶⁹. In other words, the type of food eaten is dependent on what people believe to be the social norm. Moreover, people eat more if they believe others are eating more and vice versa. This finding is confirmed by another study¹⁷⁰ which shows that obesity may be furthered through social relations. Therefore campaigns that have the potential to influence the social norm of eating balanced diets may be an effective way to influence people’s food choices.

The effectiveness of such measures is not guaranteed though. Griffith and O’Connell (2010)¹⁷¹ argue that campaigns like the can trigger strategic responses of firms. They argue that the food industry in most European markets consist of oligopolistic markets¹⁷², where only a small number of firms are present which respond strategically to the actions of its competitors and consumers. This can lead to unintended results of information campaigns. For example, when the 5-a-day campaign leads to an increasing demand for fruits and vegetables, the companies might start increasing prices in order to maximise their profits¹⁷³. As a consequence, fruits and vegetables become more expensive and might therefore be consumed less by consumers, thus reducing the effectiveness of the campaign.

Education

The primary goal of education in relation to making better food choices is to inform consumers and increase awareness of the nutritional quality of different food products and the possible consequences of eating too much salt, sugar or fat. The rationale for education to promote balanced diets is that providing people with this information will help them to make better informed choices. In addition, it is believed that the practical experience with more food products like fruit and vegetables will improve the perspective towards it.

¹⁶⁷ Griffith, R. and O’Connell, M. (2010), Ibid.

¹⁶⁸ Health and Social Care Information Centre, NHS. Health Survey for England – 2011, Trend tables. 2012. Retrieved from: <http://www.hscic.gov.uk/catalogue/PUB09302>.

¹⁶⁹ Robinson, E., Thomas, J., Aveyard, P., and Higgs, S. (2014) ‘What everyone else is eating: a systematic review and meta-analysis of the effect of informational eating norms on eating behaviour.’ *Journal of the Academy of Nutrition and Dietetics*, vol. 114, issue 3, pp. 414-429.

¹⁷⁰ Christakis, N.A. and Fowler, J.H. (2007) ‘The spread of obesity in a large social network over 32 years’ *New England Journal of Medicine*, vol. 357, issue 4, pp 370-379.

¹⁷¹ Griffith, R and O’Connell, M. (2010), Ibid.

¹⁷² Griffith, R and O’Connell, M. (2010), Ibid.

¹⁷³ Griffith, R and O’Connell, M. (2010), Ibid.

A way of implementing education is to include cooking or gardening classes in school curricula. These way children are exposed to fresh food products and learn how to work with them. Other possible benefits of education would be that children learn the practices of cooking and gardening and get physical exercise¹⁷⁴. Some studies test this and find that cooking¹⁷⁵ and gardening¹⁷⁶ classes indeed could increase the consumption of fruit and vegetables. It is found that such classes increased the knowledge and preference for fruit and vegetables. Stakeholders across the board agree that education, raising awareness and community-based programs are good, helpful and more should be done.

Point-of-purchasing information

Another form of information provision is provision of information on the products themselves. Specific information about the ingredients and nutrition levels of the product are provided to consumers at the point of purchase. Labels are a commonly known example of this measure. Standardised labels create an easy to access way to compare different products and make informed choices. An important factor that plays a role with product labels is that it gives consumers immediate feedback about the choices they are about to make. Due to this feedback the consumer might reconsider his or her action and choose an option with lower levels of sugar, salt and fat and higher levels of nutrition.

¹⁷⁴ Centers for Disease Control and Prevention (2011) Strategies to Prevent Obesity and Other Chronic Diseases: The CDC Guide to Strategies to Increase the Consumption of Fruits and Vegetables. Atlanta: U.S. Department of Health and Human Services.

¹⁷⁵ Liquori T, Koch PD, Contento IR, Castle J. (1998) 'The Cookshop Program: Outcome evaluation of a nutrition education program linking lunchroom food experiences with classroom cooking experiences' *Journal of Nutrition Education*, vol. 30, pp. 302-313.

¹⁷⁶ Lineberger, S. E. & Zajicek, J. M. (2000). 'School gardens: Can a hands-on teaching tool affect students' attitudes and behaviors regarding fruit and vegetables?' *HortTechnology*, vol. 10, issue 3, pp. 593-597.



P.O. Box 4175
3006 AD Rotterdam
The Netherlands

Watermanweg 44
3067 GG Rotterdam
The Netherlands

T +31 (0)10 453 88 00
F +31 (0)10 453 07 68
E netherlands@ecorys.com

W www.ecorys.nl

Sound analysis, inspiring ideas