



# The impact of tax reforms designed to encourage healthier grain consumption

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## ABSTRACT

In this paper, we simulate the effects of tax reforms aimed at encouraging healthier grain consumption. We use a rich data set on household grain consumption in 2003 from the market research institute GfK Sweden, combined with information on the nutritional content of the consumption. We estimate behavioral parameters, which are used to simulate the impact on the average household of tax reforms entailing either a subsidy on commodities particularly rich in fiber or a subsidy of the fiber density in grain products. Our results suggest that to direct the fiber intake towards nutritional recommendations, reforms with a substantial impact on consumer prices are required. Regardless of the type of subsidy implemented, the increase in the intake of fiber is accompanied by unwanted increases in nutrients that are often overconsumed: fat, salt and sugar. Funding the subsidies by taxing these nutrients, or less healthy commodities, helps to counteract such developments.

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## 1. Introduction

Over the last few decades, technological change has contributed to advances in both food production and transportation, leading to more cost-efficient food production and greater availability of processed and prepared foods. As a result, welfare has been enhanced by falling relative prices of food. On the downside, the modern diet, combined with a more sedentary lifestyle, has proven to be an important factor in a number of serious illnesses, including some types of cancer, cardiovascular disease, diabetes, osteoporosis, and dental caries, as well as overweight and obesity—both major risk factors of many of the diseases mentioned. For instance, cancer and cardiovascular disease account for almost two thirds of the total disease burden in Europe, and poor nutrition is estimated to cause about one third of cancer deaths and one third of deaths from cardiovascular disease (WHO, 2004).

The negative health effects caused by modern food consumption also impose considerable burdens on healthcare budgets and, hence, on taxpayers. In the U.S., direct costs on healthcare from poor nutrition and insufficient exercise account for 7 percent of personal

healthcare expenditures (Kenkel and Manning, 1999). In the UK, annual food related direct costs of ill health has been estimated to USD 9.3 billion (Rayner and Scarborough, 2005). In Sweden, obesity and overweight alone have been estimated to account for direct costs on the Swedish national healthcare system of USD 0.4 billion (Persson et al., 2004) and indirect costs of USD 1.5 billion (Persson and Ödegaard, 2005), which is about 3 percent of total direct and indirect costs of all illnesses (Socialstyrelsen, 2003).<sup>1</sup> Per capita direct costs of obesity and overweight are similar in Denmark (Juel et al., 2007). If current trends prevail, diet-related costs will increase even further. The externalities imposed on taxpayers could justify government intervention aimed at encouraging healthier food consumption.<sup>2</sup>

In this paper, we analyze the effects of tax reforms aimed at directing the fiber intake towards nutritional recommendations published by public authorities. Increasing the intake of dietary fiber is vital to achieve healthier food consumption, and thereby create external benefits for taxpayers. A high intake of dietary fiber has many health benefits, such as helping to maintain a healthy

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<sup>1</sup> The reported amounts in USD are based on the USD/GBP and USD/SEK exchange rates on the 27th of November 2008. USD 0.3 billion is equal to GBP 6 billion, while USD 0.3 billion and USD 1.1 billion is equal to SEK 3.6 and SEK 12.4, respectively.

<sup>2</sup> For a comprehensive review of externalities that could justify policy interventions to improve dietary quality, see Strnad (2004).

body weight (Burton-Freeman, 2000; Liu et al., 2003), and controlling and preventing heart diseases (Liu et al., 1999; Mann, 2002), diabetes (Brand-Miller et al., 2003; Schulze et al., 2004; Willet et al., 2002), and colorectal cancer (Schatzkin et al., 2007). Because of the health benefits of a fiber rich diet, the Swedish National Food Administration (SLV) recommends the average Swedish consumer to greatly increase his/her fiber intake. The average woman is recommended to increase her intake by a minimum of 56 percent, and the average man by at least 38 percent.<sup>3</sup>

The most important sources of dietary fiber are grain products, fruit, and vegetables. Grain products are also the food group that contributes most to our daily energy intake, as well as perhaps the group with the greatest variety of food products, in terms of nutritional quality of the food. In this study, therefore, we focus on the effects of tax reforms on grain consumption.

The nutritional recommendations above provide us with the overall policy objective of increasing the fiber intake from grain consumption by a minimum of 38 percent.<sup>4</sup> To translate this into recommendations for grain product consumption, SLV recommends that the average person (a) doubles her overall intake of bread and breakfast cereals, while (b) ensuring that half of the bread and breakfast cereal consumption is wholesome—high in fiber and low in fat, salt and sugar (SNÖ, 2003). To help consumers identify wholesome products, the SLV certifies wholesome products with the “Keyhole” symbol. Throughout this study, the Keyhole certification criteria are used as identifiers for wholesome products.<sup>5</sup>

While aiming to increase the fiber intake, it is desirable for the average consumer to avoid increases in several other nutrients. The average fat consumption in Sweden amounts to 33–35 percent of total energy consumed, exceeding the recommended 30 percent of daily intake. This is mainly due to a relatively high intake of saturated fat (Becker and Pearson, 2002; SNR, 1997). The average consumption of salt, excluding added table salt, is more than 40 percent above recommended levels for women and almost 80 percent above recommended levels for men. For added sugar, the intake of the average Swedish consumer is right at the recommended level (Becker and Pearson, 2002; SNR, 2005). Throughout this study, we will often refer to fat, saturated fat, sugar, added sugar, and salt as the “unhealthy” nutrients, as the average household is likely to overconsume these nutrients. For individuals who consume too little of these nutrients, however, an increased intake would be health enhancing.

For the analysis, we estimate a demand system for grain products based on two micro-data sets: household expenditure data (HUT) on grain products from the market research institute GfK Sweden and household expenditure data on soft bread from Statistics Sweden. The parameters estimated in the demand system are used to simulate the results of tax reforms aimed at directing grain consumption towards the policy objectives above. Taxes or subsidies on both the commodity and nutrient level are considered: we

simulate the results from reforms entailing subsidies of wholesome products (i.e., products fulfilling the Keyhole certification criteria), as well as reforms entailing a subsidy of the fiber density of the product. We also simulate the results of revenue-neutral reforms, where these subsidies are funded by commodity taxes on goods, or excise duties on the nutrients that are often overconsumed in the Western world.

Empirical research on the subject is limited. A few studies analyze the effect on consumption of taxes on food defined as unhealthy. Chouinard et al. (2007) analyze the effect of imposing ad valorem taxes on the fat percentage in milk products and conclude that these taxes have small effects on the intake of fat. Kuchler et al. (2005) find that ad valorem taxes on salty snack foods ranging from 0.4 to 30 percent would have minor effects on consumer behavior and dietary quality. Jensen and Smed (2007) analyze the effect on consumption of a wider range of policy instruments, by including subsidies of particularly healthy food. They show that it is less costly to achieve an increase in fiber intake by subsidizing the fiber content directly, compared to subsidizing products rich in fiber. They find that subsidies of fiber, or products rich in fiber, however, lead to unwanted increases in the intake of less healthy nutrients. Schroeter et al. (2008) simulate the impact on body weight from different tax reforms and find that both a tax on food away from home and a subsidy of fruit and vegetables actually may increase the body weight of both the average male and average female. Cash et al. (2005) simulate the impact on the incidence of coronary heart disease and ischemic strokes of subsidies of fruit and vegetables. They find that such subsidies by a large margin pass a cost–benefit test, though, and that a 1 percent subsidy in total prevents 9680 cases of disease.

Small taxes on unhealthy foods, such as soft drinks, snacks, or junk food, have been imposed in Australia, Canada, Finland, Norway, and some states of the U.S., for instance. However, these taxes are generally aimed at generating public revenues rather than affecting consumer behavior (Jacobson and Brownell, 2000). The fact that some countries have already imposed differentiated VAT rates, based on the health status of foods, further increases the importance of empirical research on the effects of such policy measures.

To the best of our knowledge, this is the first study analyzing the effects of economic policy instruments that are designed to direct consumption towards specific nutritional recommendations.<sup>6</sup> This paper, therefore, provides unique and valuable insights into the impact of tax schemes that could be used to improve the quality of the modern diet, or even attain nutritional recommendations.

The outline of the paper is as follows. In Sections 2 and 3, we present the modeling framework and data used to estimate the demand system for grain products. Section 4 contains the estimation results. In Section 5, the simulations are described and Section 6 contains the simulation results. Finally, Section 7 provides a summary and conclusions.

## 2. Estimating the demand system

To model demand for grain products, we use the microeconomic data sets described in Section 3 below. We are unable to observe households' total consumption of grain products as some are consumed outside the home (e.g., in restaurants and schools). The relative intake of different grain products is likely to be well

<sup>3</sup> The average woman consumes 112 g of dietary fiber per week, and the average man 126 g (Becker and Pearson, 2002). Recommended levels are 175–245 g of dietary fiber for men and women (SNR, 1997).

<sup>4</sup> The recommended increase in fiber intake is general, i.e., it is not specific to grain consumption. However, we assume that the increase in fiber intake should be proportional for all food groups. To simplify, we also assume that the recommended minimum increase in fiber intake for the average man (38 percent) holds for the average household, regardless of gender of the household members.

<sup>5</sup> Breakfast cereals fulfilling the following criteria are allowed to carry the Keyhole symbol: fat: max. 7 g/100 g, sugar: max. 13 g/100 g, sodium: max. 500 mg/100 g, and fiber: min 1.9 g/100 kcal. For soft bread, the certification criteria are: fat: max. 7 g/100 g, sugar: max. 10 g/100 g, sodium: max. 600 mg/100 g, and fiber: min 1.9 g/100 kcal. And for crisp bread, the criteria are as follows: fat: max. 8 g/100 g, sodium: max. 600 mg/100 g, and fiber: min 1.9 g/100 kcal.

<sup>6</sup> A few related studies worth noting are Srinivasan et al. (2006), who analyze the impact on consumption of different foods in OECD countries from a potential adjustment of food consumption to WHO dietary guidelines, as well as Buzby et al. (2006) and Young and Kantor (1999), who analyze the implications for U.S. agriculture, should consumers meet selected dietary guidelines.

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