Aligning value-added taxes on food with health and environmental considerations – two case studies for the UK and Germany

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Abstract

Diets in most high-income countries are both unhealthy and unsustainable. Fiscal incentives are seen as important policy measure for incentivising dietary changes to healthier and more sustainable diets. However, some fiscal incentives such as introducing new tax schemes face political resistance. Adjusting value-added taxes on foods important for health and environmental impacts could offer an alternative route to providing fiscal incentives without introducing new tax schemes.

Here we analyse the impact of increasing VAT rates on meat, a food group with high health and environmental impacts, and of reducing VAT rates on fruits and vegetables, food groups with beneficial health and low environmental impacts. We focused on two country cases studies, the UK and Germany. For the economic analysis, we used the Modular Applied General Equilibrium Tool (MAGNET) and coupled this to a comparative risk assessment of dietary risks and a life-cycle assessment of environmental impacts.

Our results indicate that VAT reform could provide fiscal incentives for dietary change with clear health and environmental benefits. We identified potential health impacts of abolishing preferential VAT treatment of meat products that range between 2,440-3,390 avoidable diet-related deaths in the UK and Germany, and emissions reductions of 4-7 MtCO2eq. The magnitude of impacts is comparable to those from levying a carbon price of about 50 USD/tCO2eq on foods. Our findings suggest that VAT reform might offer a suitable and effective second-best policy lever for encouraging dietary changes towards healthier and more sustainable diets.

Introduction

Diets in most high-income countries are both unhealthy and unsustainable [1]. Dietary risks, including high intake of red meat and low intake of fruits and vegetables, are a leading cause for premature mortality [2], and without dedicated changes towards diets lower in animal source foods and higher in plant-based ones, there is little chance of staying below a global warming of 2 degrees Celsius and avoiding dangerous levels of climate change [3].

Providing fiscal incentives to consumers that would encourage dietary changes towards healthier and more sustainable diets are seen as an important and effective policy measure to transform diets and food systems [4]. However, introducing novel tax and subsidy instruments can be politically controversial. At the European level and in countries such as the UK and Germany, civil society organisations and politicians engaged on the topic have therefore argued for adjusting existing tax schemes, especially value-added taxes (VAT).

Here we analyse the potential impacts of aligning VAT on food with health and environmental considerations in the UK and Germany. The countries were selected because the discussion on reforming VAT is a current topic of discussion, and both countries have VAT systems that except certain food groups. In the UK, all basic food stuffs including unprocessed meat and fruits and vegetables are zero rated, whilst in Germany they are subject to a reduced rate of 7% instead of the full 19%. There is potential in either country to further align the VAT system with health and environmental considerations.

Methods

We used a computable general equilibrium (CGE) model to analyse the impacts of VAT reform on food consumption, and then used the outputs in health and environmental assessments. For the policy scenarios, we focused on increases in VAT for meat and reductions for fruits and vegetables based on health and environmental considerations. For the UK, we modelled an increase in VAT rates on meat from 0% to the standard rate of 20%, and for Germany, we modelled an increase from the current reduced rate of 7% to the full rate of 19%. In the UK, fruits and vegetables are already zero rated, but for Germany, we also included a reduction of the VAT rate on fruits and vegetables from 7% to 0%.

For estimating the impacts of VAT reform on food consumption, we used the Modular Applied General Equilibrium Tool (MAGNET) [5], a CGE model with a comprehensive representation of agricultural policies that is regularly employed to assess the economic implications of agriculture and food policies at European and global levels [6,7]. The price elasticities of food products that determine supply-demand reactions are in line with available meta-analyses [8].

The standard version of MAGNET resolves 19 countries and regions, each with 34 sectors, including 26 agricultural ones. For our analysis, we split out Germany and the UK from the aggregate of European countries, and we adjusted the related projections of future socio-economic development. The development trajectory to 2030 which we use here was based on baseline data on trade and economic output for the year 2014 from the Global Trade Analysis Project (GTAP) and then takes into account projections of a middle-of-the-road growth path of real GDP [9], including labour growth, and projections of biophysical yield developments of crops and pastures caused by climate and area changes.

For estimating the health implications of VAT reform, we used the changes in food consumption in a comparative risk assessment (CRA) of dietary and weight-related risks [10,11]. Our CRA model included eight diet and weight-related risk factors and five disease endpoints. The risk factors were high consumption of red meat, low consumption of fruits, vegetables, nuts, and legumes, as well as being underweight, overweight, and obese, the

latter of which are related to changes in energy intake from all foods. The disease endpoints were coronary heart disease (CHD), stroke, type-2 diabetes mellitus (T2DM), cancer (in aggregate and as colon and rectum cancers), and respiratory disease.

We used publicly available data sources to parameterize the comparative risk analysis [10,11]. We adopted relative risk estimates that relate change in risk factors to changes in disease mortality from meta-analysis of prospective cohort studies to minimise bias from individual studies. Age-specific mortality and population data for the UK and Germany were adopted from the Global Burden of Disease project. Baseline data on the UK's and Germany's weight distributions were adopted from a pooled analysis of population-based measurements undertaken by the NCD Risk Factor Collaboration. We estimated changes in body weight based on the statistical relationship between calorie availability from all foods and body weight [12].

For analysing the environmental impacts of VAT reform, we paired MAGNET's estimate on VAT-related production changes with a set of environmental footprints [3]. The footprints include food-related greenhouse gas emissions, freshwater use, land use, and acidification and eutrophication potential. They are based on a global meta-analysis of over 38,000 farms producing 40 different agricultural goods that has been regionalised for different world regions, including countries in Europe.

Results

Increasing VAT rates on meat decreased meat intake in our scenarios on VAT reform. In the UK, meat intake was reduced by 9-10% (6-8.5 g/d, depending on the type of meat) following an increase in VAT rates by 20 percentage points. In Germany, meat intake was reduced by 6% (3-11.3 g/d, depending on the type of meat) following an increase in VAT rates by 13 percentage points. Food substitution was minimal, with feedbacks on other food groups of less than 0.3%. As a result of the consumption changes, total calorie intake was reduced by 26 kcal/d (1%) in the UK and 12 kcal/d (0.5%) in Germany.

The VAT-related changes in consumption impacted dietary risks and mortality. In the UK, diet-related mortality was reduced by 2,440 deaths (95% confidence interval (CI), 2,350-2520). About half of those were due to reductions in diet-related risks, in particular red meat intake (1,160 avoided deaths, 1,090-1,230), and the other half due to reductions in weight-related risks, in particular obesity (1,250 avoided deaths, 1,230-1,280). In Germany, diet-related mortality was reduced by 3,390 deaths (3,250-3,540). About two thirds of those were due to reductions in diet-related risks such as red meat intake (2,200 avoided deaths, 2,070-2,330), and one third due to reductions in weight-related risks such as obesity (1,140 avoided deaths, 1,110-1,170).

The VAT-related changes in consumption also affected environmental resource use and pollution. Food-related greenhouse gas emissions were reduced by 7 MtCO2eq (4%) in the UK, most of which was due to reductions in the intake of beef (47%), followed by reductions in poultry (20%), lamb (19%), and pork (16%). In Germany, the reductions in greenhouse gas emissions amounted to 4 MtCO2eq (2%), most of which was due to reduced intake of pork (41%), followed by beef (34%), poultry (16%), and lamb (12%). The other environmental indicators showed reductions with a similar attribution by foods. They included reductions in land use (-2.7% in the UK, -1.8% in Germany), water use (-2.7% in the UK, -2.0% in Germany), and eutrophication potential (-4.2% in the UK, -2.4% in Germany).

Conclusion

Our results indicate that VAT reform could provide fiscal incentives for dietary change with clear health and environmental benefits. The scenarios analysed in our study identified

potential health impacts of abolishing preferential VAT treatment of meat products that range between 2,440-3,390 avoidable diet-related deaths in the UK and Germany, and emissions reductions of 4-7 MtCO2eq. For comparison, implementing a climate tax on greenhouse gas emissions of about 50 USD per tonne of CO2-equivalents has been estimated to reduce diet-related by about 2,830 deaths in the UK and by about 5,000 deaths in Germany [13], and to reduction emissions by 3.5 MtCO2eq in Germany and 3.2 MtCO2eq in the UK. The magnitude of health and environmental impacts we identified for VAT reform is comparable in magnitude and might offer a suitable second-best policy lever for encouraging dietary changes towards healthier and more sustainable diets.

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