HEDG
HEALTH, ECONOMETRICS AND DATA GROUP

THE UNIVERSITY of York

WP 13/07

The Poverty Effects of a "Fat-Tax" in Ireland

David Madden

March 2013

york.ac.uk/res/herc/hedgwp

The Poverty Effects of a “Fat-Tax” in Ireland

David Madden

(University College Dublin)

March 2013

Abstract: To combat growing levels of obesity, health related taxes have been suggested with taxes on foods high in fat or sugar. Such taxes have been criticised on the basis of their regressivity and potentially adverse impact upon poverty. This paper analyses the effect of such taxes on a range of poverty measures and also examines the effect of a revenue-neutral tax subsidy mix with a tax on unhealthy food combined with a subsidy on more healthy food. Using Irish expenditure data, the results indicate that taxes on high fat/sugar goods on their own will be regressive but that a tax-subsidy combination can be broadly neutral with respect to poverty.

Keywords: Poverty efficiency, consumption dominance.

JEL Code: D12, I18, I32.

Corresponding Author: David Madden,
School of Economics,
University College Dublin,
Belfield,
Dublin 4,
Ireland.

Phone: 353-1-7168396
Fax: 353-1-2830068
E-Mail: david.madden@ucd.ie

The Poverty Effects of a Fat Tax in Ireland

1. Introduction

Obesity has become a major health policy issue in a number of countries (for a European perspective see Kurzer and Cooper, 2011, while for a US perspective see Flegal et al., 2012). The World Health Organisation recognises obesity as a disease and it is also a substantial risk factor for high blood pressure, heart disease, type 2 diabetes, gall bladder problems and various forms of cancer.

Obesity is also a major public health issue in Ireland. In 2005 a report was produced by the National Taskforce on Obesity and an extensive list of recommendations was provided. In 2009 a review of these recommendations was carried out and since the original recommendations were only partially implemented a Special Action Group was set up to work across Government Departments and agencies. Amongst the statistics motivating these concerns were the results of the National Adult Nutrition Survey (which looked at data from the 2008-2010 period) and which indicated that 24 per cent of adults were obese and 37 per cent were overweight (Irish Universities Nutrition Alliance, 2011).

At a very basic level, rising obesity may be explained by increased calorie intake and/or reduced calorie expenditure. Other factors such as the fat or carbohydrate composition of food may also affect weight patterns. This suggests that measures to combat obesity should address (a) the amount which people eat, (b) the composition of what people eat and (c) exercise levels. This paper concentrates primarily on factors (a) and (b) by examining the role of taxation in altering the level and composition of people's diets. More specifically, amongst the measures suggested to combat obesity for both adults and children are increased consumption of fruit and vegetables and lower consumption of fatty and sugary foods. Presuming that consumption of these products follows the standard laws of demand then taxation policy can play a role in altering diet composition. Tax increases (decreases) on certain food products should lead to a reduction (increase) in their consumption. Moreover, a revenue-neutral tax reform comprising higher taxes on fatty and sugary food accompanied by lower taxes on fruit and vegetables should alter the composition of people's diets and may have a beneficial impact in terms of obesity.[1] Tax increases on goods with high sugar or fat content have been labelled "fat-taxes" and frequently arise in the policy debate on obesity (it would be more accurate to describe these taxes as "health-related" taxes but the phrase "fat-tax" has entered common usage and so we will use it here). While the accompanying subsidy to fruit and vegetables has not been discussed to the same extent, since tax reforms are usually evaluated on a revenue-neutral basis, it may be useful to couple the "fat-tax" proposal with a subsidy to other low-fat foods.

Fat taxes have become part of the policy response to obesity in a number of countries. For example a tax on saturated fat was imposed in Denmark in 2011 and then later removed in 2012. It was removed owing to difficulties in implementation and also the belief that it had encouraged cross-border shopping in order to evade the tax. In 2011 Hungary introduced a tax on foods with high fat, sugar and salt content, while France introduced a "soda tax" on sugar sweetened beverages (SSBs) in 2012. In Ireland consideration has been given to the introduction of a tax on SSBs and the health impact of such a tax was considered by an assessment group in 2012 (for a recent review of the link between SSBs and obesity see Basu et al, 2013). As yet, no such tax has been introduced in Ireland (for a recent review of such taxes see Mytton et al, 2012).

As has been pointed out for both Europe and the US a notable feature of obesity is the pronounced socio-economic gradient (see Sanz de Galdeano, 2005, for Europe, Drewnowski and Specter, 2004, for the US and Madden 2010, 2012 for Ireland) with obesity levels highest amongst low-income groups. Drewnowski and Darmon (2005) suggest that this link may be observed owing to the relationship between dietary energy density and dietary cost. Refined grains, added sugars and added fats are amongst the cheapest sources of dietary energy, whereas typically the more nutrient dense foods such as lean meats, fish, fresh vegetables and fruit are more expensive, often by a factor of ten or even a hundred. Thus low-income consumers with limited resources are more likely to select diets with high contents of refined grains, added

[1] Nearly half of food in Ireland is zero-rated (mostly basic food and fruit and vegetables) so that a tax decrease on fruit and vegetables would effectively involve a subsidy on these items.

sugars and added fats as the most cost-effective way to meet daily calorie requirements. Such foods may also be more convenient and palatable. In 2004 an editorial in *The Lancet* stated: "As long as a meal of grilled chicken, broccoli, and fresh fruit costs more, and is less convenient, than a burger and fries or a peanut butter sandwich, then the battle against obesity will be lost." (Anon., 2004).

Arising from the socio-economic gradient of obesity is the objection that a fat-tax would be potentially regressive since consumption of fatty/sugary foods is disproportionately concentrated amongst low-income groups. For example, it was on this basis that in the UK the Report of the National Task Force on Obesity rejected the introduction of a fat tax (see Report of the National Task Force on Obesity, 2005). This paper explicitly examines the impact of a combined revenue-neutral tax-subsidy reform on poverty using Irish household expenditure data. We formally evaluate this tax reform solely on the basis of its impact on a wide range of poverty indices. We do not attempt to evaluate its impact upon obesity or upon health in general.[2] Our analysis concentrates upon a tax on a subset of goods which we think would be likely candidates for a fat-tax. Given its topicality in the Irish context, we also specifically look at the case of a tax on SSBs. In both cases we look at the effects of the tax on its own and also in conjunction with an off-setting subsidy on other, more healthy, foods.

The evidence we will present below will confirm the conjecture that a fat-tax on its own will lead to an increase in poverty. However, we also show that a tax on fatty foods and/or SSBs in conjunction with a subsidy on selected foods may have a neutral impact upon poverty.

A further contribution of the paper is that we provide a quantitative estimate of this increase in poverty in the sense that we obtain an estimate of its impact upon a specific poverty measure. The particular measure we use is one which can be expressed in a money metric, thus providing some idea of the degree of compensation which would be required to offset the poverty impact of a fat-tax.

[2] For a general discussion of the merits of fat-taxes, see Leicester and Windmeijer (2004). Marshall (2000) discusses the effects of fiscal measures on diet and ischaemic heart disease. For a discussion of health interventions in general see Madden (2007)

The remainder of the paper is organised as follows: in section 2 we discuss the evaluation of tax reforms in general and in particular explain the derivation of consumption dominance curves, which we use to evaluate the fat-tax. In section 3 we discuss our data and present evidence on consumption dominance curves for our selected items of “good” foods, “bad” foods and SSBs. In section 4 we provide a quantitative estimate of the poverty effect of a fat-tax, while section 5 presents concluding comments.

2. The Evaluation of Tax Reforms

The evaluation of tax reforms is an important aspect of public policy analysis. Evaluating large-scale tax reforms involves the calculation of measures of equivalent and/or compensating variation and can demanding in terms of information requirements. Thus analysts need to evaluate demand responses over quite wide ranges of price changes for each household. The results obtained may be sensitive to theoretical and econometric assumptions in ways quite unsuspected by the analyst (see Deaton, 1981 and Ray, 1986).

The difficulties associated with non-marginal tax reforms have led a number of analysts to concentrate on marginal tax reforms.[3] This approach has the advantage of not requiring estimates of individual demand and utility functions. Instead the impact of the marginal tax reform can be assessed directly from observed data alone (as in the case of non-marginal reforms results obtained may also be sensitive to econometric specification, although the evidence suggests they are less so, see Madden, 1996). For a general discussion of the information requirements for marginal and non-marginal tax reforms and for the potential bias involved in using marginal first-order approximations, see Banks et al (1996).

The most typical approach to marginal tax reform has been for the analyst to specify a social evaluation function and then assess potential tax reforms on the basis of efficiency and equity. In most cases it is possible to check sensitivity of results to the

[3] See, among others, Ahmad and Stern (1984), Besley and Kanbur (1988), Yitzhaki and Thirsk (1990), Yitzhaki and Slemrod (1991), Madden (1995), Mayshar and Yitzhaki (1995) and Makdissi and Wodon (2002).

degree of inequality aversion in the social evaluation function. Nevertheless, it is still the case that this approach is open to the criticism that the results obtained may be specific to the particular social evaluation function adopted and that a different social evaluation function might produce different results. More recently, analysts have found a way around this problem by checking whether various forms of "dominance" apply when analysing tax reforms. Thus tax reforms are assessed on the basis of whether they would be approved by all those who agree on some generally-defined normative properties of a social evaluation function. This approach is similar to that of checking for Lorenz and Generalised Lorenz Dominance when comparing income distributions or checking for poverty dominance when comparing truncated income distributions.[4]

This paper follows the approach of Makdissi and Wodon (2002) in using *consumption dominance* curves to assess the impact of indirect tax reforms on poverty. This approach allows us to evaluate the impact of a particular indirect tax reform on a wide class of additive poverty measures. It holds an advantage over the concentration curve approach of Yitzhaki and Thirsk (1990) and Yitzhaki and Slemrod (1991) who are limited to tests of second order dominance. Consumption dominance curves permit testing of restricted dominance for orders higher than two.

Consumption dominance curves were first introduced by Makdissi and Wodon (2002) and we follow their exposition here. Suppose we start off with an additive index of poverty, which a government wishes to reduce:

$$P(F,z) = \int_0^a p(y^E(q,y)z)dF(y)$$

where F is the distribution of household resources defined over the interval [0, *a*].[5] $z<a$ is the poverty line defined in equivalent income space, y^E is equivalent income, q is a vector of unitary market prices e subject to taxes t such that $q=e+t$ and y is income. Equivalent income is defined implicitly as $v(q^R, y^E) = v(q, y)$ where q^R is a

[4] For Lorenz and Generalised Lorenz dominance see Atkinson (1970) and Shorrocks (1983). For poverty dominance see Atkinson (1987) and for an application to Ireland, see Madden and Smith (2000).
[5] Note that as a measure of household resources we could use income or expenditure. In this paper we use total equivalised household expenditure. This is discussed in further detail in section 3, but for the present we explain the model in terms of income.

reference price vector and *v(.)* is the indirect utility function. Thus equivalent income can be regarded as a monetary measure of welfare. While the poverty line could be defined in actual income space, it is probably more convenient to define it in equivalent income space since in this instance the indirect tax reform will not change the poverty line. The poverty measure *p* is non-negative for all households and zero for those with income above *z*. The poverty line should be a continuous function *s*-time differentiable over [0, *a*] with

$$(-1)^i p_1^i (y^E (q,y)z) \geq 0 \forall i = 1,2,....s,$$

where $p_1^s(.)$ is the *s*-th derivative of the function *p*(.) with respect to its first argument. This assumption implies that for *s*=1 an increase in equivalent income reduces poverty. For *s*=2 it ensures that a transfer from a richer to a poorer individual reduces poverty (the well-known Pigou-Dalton condition) while for *s*=3 it implies that poverty is reduced with a progressive transfer at a low level of income accompanied by a regressive transfer at a high level of income, provided those transfers do not increase the variance of the income distribution (Duclos, Makdissi and Wodon, 2002, label this "Kolm efficiency").

Suppose we have a marginal tax reform involving two goods, *i* and *j*. The change in poverty for an individual with income *y* is

$$dp(y^E(q,y),z) = p_1^1(y^E(q,y),z)\frac{\partial y^E(q,y)}{\partial t_i}dt_i + p_1^1(y^E(q,y),z)\frac{\partial y^E(q,y)}{\partial t_j}dt_j.$$

If the vector of reference prices used for computing equivalent income is the pre-reform vector of prices, then using Roy's Identity, the change in equivalent income following the marginal change in the tax on good *i* is

$$\frac{\partial y^E}{\partial t_i} = -x_i(q,y)$$

i.e. the Marshallian demand for good *i*. If the tax reform is to be revenue-neutral then this requires that

$$dt_j = -\gamma\left(\frac{X_i}{X_j}\right)dt_i \text{ where } \gamma = \frac{1+\frac{1}{X_i}\sum_{k=1}^{K} t_k \frac{\partial X_k}{\partial q_i}}{1+\frac{1}{X_j}\sum_{k=1}^{K} t_k \frac{\partial X_k}{\partial q_j}}$$

and X_k is aggregate total consumption of the kth good. Thus γ can be regarded as the differential efficiency cost of raising one euro of revenue by taxing the jth commodity and using the proceeds to subsidise the ith commodity.[6]

Substituting we have

$$dp(y^E(q,y),z) = -p_1^1(y^E(q,y),z)\left[\frac{x_i(y)}{X_i} - \gamma\frac{x_j(y)}{X_j}\right]X_i dt_i.$$

The Consumption Dominance Curve (CD-Curve) for order s is now defined: for s=1 it is $C_k^1(y) = \frac{x_k(y)}{\overline{X}_k}$ i.e. the ratio of consumption of good k for a household with income y divided by aggregate consumption of the good. The CD-Curve of order s=2 is $C_k^2(y) = \int_0^y C_k^1(u)dF(u)$ while for order $s \geq 3$ it is $C_k^s = \int_0^y C_k^{s-1}(u)dF(u)$. Thus for s=2 the CD-Curve is the share of total consumption of good k consumed by households whose income is less than y.

The change in poverty can then be re-written as:

$$dp(y^E(q,y),z) = -p_1^1(y^E(q,y),z)\left[C_i^1(y) - \gamma C_j^1\right]X_i dt_i.$$

This gives the change in poverty at income y and thus the total change in poverty is given by integrating the above expression across y

$$\frac{dP(F,z)}{dt_i} = -X_i dt_i \int_0^a p_1^1(y^E(q,y),z)\left[C_i^1(y) - \gamma C_j^1(y)\right]dF(y)$$

Makdissi and Wodon (2002) then prove that a necessary and sufficient condition for $dP(F,z)dt_i \leq 0$ for all additive poverty indices, for all orders of dominance $s \in \{1,2,3,...\}$ and for all poverty lines $z<z^+$ is $C_i^s(y) - \gamma C_j^s(y) \geq 0, \forall y \leq z^+$. Note that this proposition can also be applied to the case of welfare, rather than poverty dominance. In this case rather than testing for dominance in the interval $[0, z^+]$ we test in the interval $[0, \infty)$.

---

[6] Note that we are assuming that any tax increase is passed on 100% to consumers. In the case of a perfectly competitive industry this will be the case. Where the industry is not perfectly competitive the situation is considerably more complicated, and the degree of pass-on can be under or over 100%. In this instance the convenient assumption of 100% pass-on may also be a reasonable approximation. See Crawford et al (2010).

In a subsequent contribution, Duclos et al (2009) derived the appropriate expressions for single tax changes, where there is no offsetting change in another tax to preserve revenue-neutrality. In this case the issue is not whether a single tax change increases or decreases poverty. Rather it is whether the distributional effects of a tax change is "pro-poor". They distinguish between relative pro-poorness and absolute pro-poorness. Intuitively a tax decrease (increase) is relatively pro (anti)-poor if it benefits (harms) the poor by a greater proportion than the non-poor. Similarly a tax decrease (increase) is absolutely pro (anti)-poor if it benefits (harms) the poor by a greater absolute amount than the non-poor.

In the case of single tax changes we check the following expressions:

$$CD_i^{R:s}(z) = \begin{cases} \left[\dfrac{x_i(z,q)}{\overline{X}_i(q)} - \dfrac{z}{\mu} \right] f(y), s = 1 \\ \int_0^z CD_i^{R:s-1}(y)dy, s \geq 2 \end{cases}$$

and

$$CD_i^{A:s}(z) = \begin{cases} \left[\dfrac{x_i(z,q)}{\overline{X}_i(q)} - 1 \right] f(y), s = 1 \\ \int_0^z CD_i^{A:s-1}(y)dy, s \geq 2 \end{cases}$$

where the superscripts "R" and "A" refer to relative and absolute pro-poorness respectively, $\overline{X}_i$ refers to average consumption of good i, μ is average income and s is the order of dominance. Then a marginal increase in the tax on good i is (relatively/absolutely) pro-poor for all poverty indices $P(z) \in \Pi^s(z)$ and for all poverty lines up to z^+ if $CD_i(z) \geq 0 \forall z \in [0, z^+]$.

In the next section of this paper we calculate CD-Curves for different goods and for tax/subsidy combinations and test for poverty dominance. We confine the analysis to relative CD curves but results for absolute curves are available on request.

3. Data and Results

The data we use is the Irish Household Budget Survey (HBS) of 2009/2010 published by the Irish Central Statistics Office (CSO, 2012). This is a nationally representative survey carried out approximately every five years (prior to 1994 it was carried out every seven years) and collects a variety of information for about 6000 households. Households answer questions over a two-week period about expenditure patterns, sources of income plus other information regarding demographic and housing circumstances etc. The primary function of the HBS is the calculation of weights for use in the construction of the consumer price index, but the wealth of information on households has also made it a valuable source of data for research into other areas such as inequality and poverty (e.g. Madden, 2000). In all, there were 5891 completed households in the 2009 survey.

As our measure of household resources we use total expenditure and to minimise the potential influence of measurement error (typically most severe at the top and bottom of the distribution) we follow the practice of Barrett et al. (2000) and trim the top and bottom 3 per cent of observations in the expenditure distribution leaving us with a sample size of 5539 households (note the qualitative results are not sensitive to this). For a general discussion of the relative merits of income and expenditure in poverty analysis see Decanq et al (2013).

Before discussing what items we regard as “good” and “bad” foods, we wish to scale household expenditure to take account of differing household size and composition. There is an extensive literature on the appropriate choice of equivalence scale.[7] Here we adopt the simple expedient of dividing expenditure by the square root of family size.

A final, related, issue is whether the focus should be on poverty on a per person or per household basis. Atkinson, Rainwater and Smeeding (1995) maintain that if no adjustment is made to household expenditure for household size then it makes sense to accord an equal weight to each household. However, should an adjustment along the lines of the equivalence scale described above be made to expenditure then person

[7] See Deaton and Muellbauer (1980) for a discussion.

weights are more appropriate. Thus each household is weighted by the number of persons therein. This is in addition to the sampling weights applied by the Central Statistics Office to account for differential response etc.

The next question to answer is which foods should be liable for the fat-tax. Information on Irish dietary habits can be obtained from the publication *Dietary Habits of the Irish Population: Results from Slán* published by the Health Promotion Unit of the Irish Department of Health and Children (Harrington et al, 2008). However, while this publication contains much valuable information on diet it does not provide a breakdown of the main sources of saturated fat in the Irish diet. Thus we take the figures provided by Moore (2000) in his study of UK dietary patterns. His analysis indicates that about 44 per cent of saturated fat in the UK diet comes from consumption of whole milk, cheese, butter, biscuits, buns, cakes, pastries, puddings and ice-cream. Examination of the Irish Household Budget Survey reveals that the categories closest to this are:

Fresh Milk (including school-provided milk), but excluding infant/baby milk
Fresh Cream
Cheese
Butter
Biscuits
Cakes and Buns
Sweets and Chocolate
Ice Cream and Ice Lollies
Crisps, potato and cereal snacks
Soft drinks (not low cal)

These goods we refer to collectively as "bad food". We also carry out separate analysis for SSBs, which consist of the last item on the list above.

As our category of "good food" we take fresh fruit and all vegetables (fresh, frozen and tinned). We exclude tinned fruit as these items are frequently sold in syrup or other highly sugared liquids. In the appendix we list the formal HBS codes for "bad foods" (including SSBs or soft drinks as a sub-category) and "good foods".

Before calculating CD-curves for these categories of goods it is important to explain that the particular form of fat-tax suggested here is to some degree arbitrary. It would be possible at the margin to include/exclude other goods in either category. Nor should the inclusion of any particular food item in either list be interpreted as a recommendation that such an item should be taxed/subsidised. If a fat-tax were to be introduced then presumably there would be fairly intense analysis with much debate and lobbying as to what goods should or should not be taxed/subsidised. The purpose of this paper is to show how the poverty impact of such a tax could be assessed and to investigate if it is possible to find tax.subsidy combinations with minimal effect on poverty while also having positive health outcomes.

Having said that, it is likely that any proposed fat-tax would have broadly the same features as the one we analyse here. The fat-tax analysed here is also fairly blunt. Since some fat in a diet is desirable, what we would ideally like to tax is *over-consumption* of fat/sugar. From a practical point of view this is not feasible, so the implementation of a tax on high fat/sugar goods will, perhaps unfairly, penalise those people who consume such products in moderation. However this same argument could be applied to the high tax levels on alcohol since there is research to suggest that moderate alcohol consumption brings health benefits (for a more detailed discussion of these issues, see Leicester and Windmeijer, 2004).

As a preliminary to calculating CD-Curves for these items it may be useful to provide some summary statistics on their consumption and also to look at their Engel curves. First in table 1 we present budget shares for good and bad food and for SSBs for all households below 60% of median equivalised expenditure i.e. a reasonable estimate of z, the poverty line. We note that the budget share for good food is about half that for bad food, and that the budget share for SSBs is considerably lower again.

The primary purpose of this paper is to examine whether a fat-tax is poverty efficient. Thus the pattern of consumption of different food types across the expenditure distribution is crucially important. To gain some preliminary insight into this we examine the Engel curve for good food, bad food and SSBs. The Engel curve gives the relationship between expenditure on a good and some underlying measure of household resources (typically income or expenditure) conditional on other household characteristics. Thus a very general specification for an Engel curve is

$x_i^h = f(y^h; z^h)$ where x_i^h is expenditure by household h on good i, y^h is household income/expenditure and z^h is a vector of relevant household characteristics.

One of the most popular specifications for Engel curves is that suggested by Working and Leser (henceforth WL), where the budget share of a good is dependent upon the log of total expenditure. In this case, should the Engel curve be flat i.e. the coefficient on the log of expenditure is zero, then it implies that the budget share allocated to that good is independent of total expenditure.[8] A positive coefficient (slope) implies that the good is a luxury while a negative coefficient (slope) implies it is a necessity.

Most evidence suggests that it is rare to find a flat Engel curve, in the sense that the coefficient on log expenditure in the WL specification is zero (see Blundell, Pashardes and Weber, 1993). Indeed for some goods it may be the case that they are necessities at some levels of expenditure but luxuries at other levels (see Banks, Blundell and Lewbel, 1997), thus implying that quadratic log expenditure terms are required for some budget share relationships. In this case the WL specification is not adequate since the absence of a quadratic log expenditure term constrains the good to be either always a necessity or always a luxury. Banks, Blundell and Lewbel (1997), when analysing UK data, find clothing and alcohol to be goods which are luxuries at some income levels but necessities at others.

Thus it is useful to examine the curvature of the Engel curves for good and bad food using kernel regression. This approach allows the data to determine the local shape of the Engel curve rather than imposing a linear and/or quadratic relationship.[9] A comparison of the kernel regressions of the budget share for food types against log of total expenditure can give a broad indication of the linearity or non-linearity of the relevant Engel curves.

Figure 1 shows the graph of the kernel regression of equivalised budget shares for good food, bad food and SSBs respectively against log of total expenditure

[8] This specification has the advantage that it has a basis in utility theory unlike the more *ad hoc* log and double-log specifications.

[9] For a discussion of kernel regression which specifically addresses the shape of Engel curves see Blundell and Duncan (1998).

(equivalised) for 2009 for households up to twice the poverty line. We choose this range of expenditure as it covers all incomes up to what could be regarded as a "reasonable" poverty line. We use the kernreg1 command in *Stata* with *Stata* choosing the optimal bandwidth and the Gaussian kernel chosen.

For all goods, the Engel curves over this range are non-monotonic with some parts sloping up and some sloping down. However were we to smooth the curves by choosing a higher bandwidth then all three Engel curves would be downward sloping, indicating that these goods are broadly necessities and that taxing them is likely to be anti-poor.

We now analyse the CD-Curves. First we analyse the CD curves for the single tax change and for order of dominance s=1. The case of s=1 refers to poverty indices such that an increase in the income of any one individual will weakly reduce the poverty index. Note that owing to the property of anonymity these indices are symmetrical, since exchanging the incomes of any two people in the distribution will not affect poverty (see Duclos et al, 2009).

Figure 2 shows the relative CD curves for good food, bad food and SSBs. We normalise expenditure by dividing by the poverty line (which we set at 60% of median equivalised expenditure). Thus a value on the horizontal axis of 2 indicates twice this poverty line. We provide values of the CD curve for expenditure values up to twice the poverty line since this embraces what could be regarded as a reasonable range of possible poverty lines (note that we do not observe anyone with expenditure below about 0.3 times the poverty line). The condition is that if these curves are greater than zero for all poverty lines up to the maximum poverty line, then an increase in tax on these goods will be anti-poor in the sense that it imposes a relatively greater burden on the poor than the non-poor. We can see that this is the case for all three goods, reflecting the stylised fact that food comprises a relatively greater proportion of the budget of the poor than the non-poor. While there are a very small number of households at very low expenditure whereby the CD curve for good food is below zero, this is most likely to reflect measurement error.

Note that since we observe dominance at order s=1 we do not need to examine it for higher orders.

We now turn to a tax reform, whereby we combine a tax increase on one good (or set of goods) with a tax reduction on the other. In this case we have to check whether the difference in the CD curves is positive/negative and where we also have to make an adjustment reflecting the differing deadweight losses for both taxes as reflected in the value of the parameter γ. We compare good food/bad food and good food/SSB as these are the most likely policy combinations i.e. a subsidy on the former financed by a tax on the latter.

The first task is to decide upon a value for γ. Typically we would expect to calculate this from consumer demand studies. However, most consumer demand studies deal in broad aggregates of goods (e.g. for Ireland, see Madden, 1993) and rarely make distinctions between high and low-fat foods. One exception to this is the analysis of own and cross-price elasticities of demand for foods consumed in the home in the 2000 UK National Food Survey (see Lechene, 2000). However, calculation of γ requires knowledge of the pattern not just of own-price elasticities of demand for good and bad foods, but also their cross price elasticities with all other taxed goods. Such information is extremely difficult to arrive at, so we adopt the working assumption that $\gamma = 1$. The evidence from Lechene suggests that for own-price elasticities at least this may not be too unreasonable an assumption.

The CD-curve diagrams are rather unclear in terms of eye-balling, so in figures 3 and 4 we present what we call the CD-Diff curves for our policy combinations for orders one and two. This is the graph of the CD-Curves for good food minus that for bad food and then for SSBs. These graphs are drawn over the same range of expenditure as the curves for the single price change.

In terms of interpreting these curves, bear in mind that if the CD Diff curve is positive over all plausible ranges of a poverty line, then a reduction in the tax on good food financed by an increase in the tax on bad food will be poverty reducing. Figure 3 shows that the CD Diff curve for s=1 is at first positive up to a value of the poverty line which is just below half the poverty line, 0.3 times median income. The curve is then negative up to a point just below the poverty line when it appears to fluctuate above and below zero. It then becomes negative again for the remaining range of poverty lines. Since the CD Diff curve is only positive for quite a narrow range of possible poverty lines, we clearly do not observe poverty dominance.

For the good food/SSB combination we see that the CD Diff curve is at first positive and then fluctuates above and below zero up to about 0.6 times the poverty line. It is then positive up to about the poverty line and then negative for subsequent ranges of expenditure. Once again, it seems reasonable to suggest that we do not observe poverty dominance.

What about CD Diff curves when s=2? These are the class of poverty indices which respect the Pigou-Dalton transfer principle i.e. a transfer from a richer individual to a poorer individual should weakly decrease poverty. Figure 4 shows these curves for our two policy combinations. Looking first of all at the good-food bad-food combination this curve is slightly above zero for very low values of expenditure but is then below zero for all subsequent values. Thus once again, poverty dominance is not observed. In fact, the reverse policy combination (a subsidy on bad food financed by a tax on good food) would be poverty dominating for all poverty indices obeying the Pigou-Dalton principle. However this is unlikely to achieve the intended health outcome!

What about the good food-SSB combination? This curve is very close to zero for expenditure levels up to about 0.7 times the poverty line. It then becomes positive and stays positive up to about 1.3 times the poverty line. Thus it could be argued that this policy combination is poverty dominating for a relatively narrow range of expenditures. If we believe that reasonable values for the poverty line include expenditure levels at or above about 0.75 times median expenditure then poverty dominance is not observed.

To summarise this section: poverty dominance analysis using CD and CD Diff curves indicate that on their own taxes on any of the three goods we are examining would be relatively anti-poor. If we look at potential tax-subsidy combinations then a tax on bad food accompanied by a subsidy on good food would also be anti-poor. However a tax on SSBs accompanied by a subsidy on good food would be pro-poor for a limited range of the poverty line and for a certain class of poverty indices. As we move towards higher values of the poverty line however the combination becomes anti-poor.

So far we have looked at the *direction* of the effect of these taxes. It may also be worth going beyond this to try to provide some estimate of the *magnitude* of these effects. To do that however will require that more structure be placed on our poverty measure and that a specific index must be chosen. That is the subject of the next section.

4. The Quantitative Effect of a Fat-Tax on Poverty

The results in section 3 reflect the fact that consumption of most food stuffs is concentrated among lower expenditure households. Thus a fat tax on its own would be poverty-increasing for a wide range of poverty indices. We also observed that it may be possible to construct a tax/subsidy reform which would have a limited or perhaps even beneficial impact upon poverty. In both cases it may be useful to obtain a quantitative estimate of these impacts. Apart from giving a more concrete estimate of the poverty effects of a tax/subsidy reforms it would also provide information on the degree of adjustment elsewhere which would be necessary to ensure that such reforms would be "poverty-neutral". For example, in the National Anti-Poverty Strategy introduced in Ireland in 1996, it was agreed that budgetary policies should be assessed in terms of their effect upon poverty. The exercise here is one possible approach to providing quantitative estimates of such an effect. Note that when we use the term "poverty-neutral" we mean in the aggregate. For example a tax on SSBs accompanied by off-setting compensation payments to poor households would still in all probability involve winners and losers even though the aggregate effect on poverty could be zero. We discuss this further below.

We first of all look at the effect of a single tax increase. To find the change in poverty following a change in tax (price) we have to first of all specify a poverty index. There is a large literature on choice of poverty index (see for example the discussion by Foster and Sen, 1997) and we follow Besley and Kanbur (1988) who look at the effect of a tax increase on the P_α measures of Foster, Greer and Thorbecke (1984).

Employing the notation from before these measures are

$$P_\alpha = \int_0^z \left(\frac{z-y}{z} \right)^\alpha f(y)dy$$

When $\alpha = 0$ this measure collapses to $P_0 = \int_0^z f(y)dy = H$, the fraction of households below the poverty line. When $\alpha = 1$ the measure is $P_1 = \int_0^z \left(\frac{z-y}{z} \right) f(y)dy = HI$ where $I = \frac{z - \bar{y}^p}{z}$ is the poverty gap ratio for the average poor household. Thus, given a normalisation, P_1 is effectively a measure of the total poverty gap of the poor or alternatively the amount of money necessary to eradicate poverty (assuming of course that this money could be perfectly targeted and there would be no other costs). In terms of the normalisation used here, P_1 shows the sum of all the proportional poverty gaps (the gap as a fraction of the poverty line) divided by the total number of households.

So what is the impact of a tax increase on the P_1 measure? Besley and Kanbur (1988) show that a first order approximation of the effect on P_1 of a tax increase is given by

$$\frac{\partial P_\alpha}{\partial t_i} = \frac{\alpha}{z} \int_0^z \left[\frac{z-y}{z} \right]^{\alpha-1} \left(-\frac{\partial y}{\partial q_i} \right) f(y)dy \, .$$

When α=1 this collapses into $\frac{dP_1}{dt_i} = \frac{\bar{x}_i^{\,P}}{z} H$, where $\bar{x}_i^{\,P}$ is the average consumption of good i by the poor. Thus intuitively the impact is given by the headcount ratio times the relative importance of consumption of good i by the poor, as a fraction of the poverty line.

In turn the effect on P_1 of a revenue neutral tax-subsidy reform for two goods, i and j, is given by

$$\frac{dP_1}{dt_i} = \frac{\bar{x}_i}{z} H \left(\frac{\bar{x}_i^P}{\bar{x}_i} - \frac{\bar{x}_j^P}{\bar{x}_j} \right).$$

In the case of a proportional tax, say τ_i, where $q_i = p_i(1+\tau_i)$, then the above expressions are amended to:

$$\frac{dP_1}{d\tau_i} = \frac{p_i \bar{x}^P{}_i}{z} H \text{ and } \frac{dP_1}{d\tau_i} = \frac{p_i \bar{x}_i}{z} H \left(\frac{p_i \bar{x}_i^P}{p_i \bar{x}_i} - \frac{p_j \bar{x}_j^P}{p_j \bar{x}_j} \right).$$

Since P_1 translates into a money metric it seems a natural poverty measure to use to obtain an approximate quantitative estimate of the effect of a tax change on poverty. We now calculate ΔP_1 for the tax changes we examined in section 3.

Assuming we have a discrete change in taxation of 10%, then the change in poverty should be $\Delta P_1 = 0.1.\frac{\bar{x}_i^P}{z} H$. Concentrating for the moment on "bad food", our data indicates that average (equivalised) weekly expenditure on bad food for the poor is €11.16, while the poverty line (60% of the median of weekly equivalised expenditure) is €265.66, then $\frac{\bar{x}_i^P}{z} = 0.042$. Given a value of H=0.168, that gives an approximate value of ΔP_1=0.000706 or approximately 0.07%.

To translate this into money terms, we need to multiply 0.000706 by the poverty line, convert back to non-equivalised expenditure and then gross up to the total number of households in the state. The non-equivalised poverty line is €488.7 per week, and the total number of households is 1461579 (the reference number used by the Irish Central Statistics Office in the HBS). This gives a money equivalent of the increase in poverty amounting to about €26.2m in annual terms, suggesting that such a transfer could be made to poor households to "compensate" them for the fat-tax.

The equivalent figure for a 10% tax on SSBs is about €3.7m reflecting the fact that they comprise a much smaller fraction of the budget of poor households.

What about the effect of a tax/subsidy mix between good food and bad food/SSBs? In this case we have to multiply the expression for the tax only effect by the factor $\left(\frac{p_i\bar{x}_i^P}{p_i\bar{x}_i}-\frac{p_j\bar{x}_j^P}{p_j\bar{x}_j}\right)$. Our data shows that this factor is $\left[\frac{11.16}{15.25}-\frac{5.03}{6.98}\right]=0.01069$ for the good food/bad food mix and $\left[\frac{1.59}{2.26}-\frac{5.03}{6.98}\right]=-0.01709$ for the good food/SSB mix.

Thus the proportional impact of this tax-subsidy mix on P_1 would be to raise poverty in good food/bad food combination by about €0.28m and to *lower* poverty by about €0.06m in the good food/soft drink combination. Given the degree of approximation involved it seems safest to assume that the impact on poverty of either one of these combinations would be zero.

There are a couple of important background assumptions which must be mentioned: first, we are assuming that in the case of a fat-tax only, that such a transfer can be perfectly and costlessly targeted. However, even supposing we could identify those households below the poverty line (which is a strong enough assumption), then further identifying those who consume bad food/soft drinks and tailoring compensation to fit their consumption of these taxed goods would appear to be well beyond even the most efficient taxation service. Thus in all probability compensation would be provided to all households below a certain threshold and while the average amount of compensation might be about "right", some poor households would gain (those whose consumption of bad food or SSBs was very low in the first place) and some would lose. Of course all non-poor households lose since we assume they are not compensated. If policy makers wished to err on the side of making sure that the losing households do not lose too much, then the figure of €26m may be an underestimate.

However, in arriving at this figure we have "grossed" up the marginal change to estimate the effect of a 10% increase. Essentially we are assuming that

$$\Delta P_1=\frac{p_i\bar{x}^P{}_i}{z}H.\Delta\tau_i$$

with $\Delta\tau_i = 0.1$. Such an increase is arguably non-marginal and strictly speaking we should present a measure such as a compensating or equivalent variation, which will allow for the fact that agents may substitute away from bad foods and towards other goods, thus partially mitigating the burden of the tax. This would be even more relevant if price elasticities were higher for lower income groups (and there is some Danish evidence suggesting this, see Smed et al, 2007). Banks, Blundell and Lewbel (1996) present evidence on the extent of the bias which can arise from using first rather than higher order approximations for the effects of tax increases. Depending upon a variety of assumptions such as whether a direct or money metric measure of welfare is used, this can range from 0.2% up to over 10%.

Thus overall, we have two potential sources of bias, which work in opposite directions. On that basis, perhaps the estimates provided above are not too far off the mark and provide a useful first approximation to the poverty effects of a tax change.

5. Conclusion

The analysis presented here has confirmed the conjecture of the Report of the National Task Force on Obesity that a fat SSB taxes on their own are likely to be regressive in their effect. However, if such taxes were to be combined with a subsidy on various "healthy" foods, then it possible to put together a package whose impact on poverty would be negligible. It should also be pointed out that this paper has concentrated purely on the economic effects of the tax and has ignored the potential health benefits. If the fat/SSB tax leads to substitution towards healthier food (and evidence suggests that such substitution is greater amongst lower-income groups where obesity is more concentrated) then ultimately some health benefits should be observed and such benefits could well be progressive.

This paper also ignores the issue of whether rising obesity levels constitute a market failure sufficient to merit government intervention in the form of a fat-tax (in the same way as say market failures in the form of the external effects of alcohol and tobacco warrant high taxes on these commodities). If the degree of market failure regarding obesity is relatively mild then it could be argued that a fat-tax is unduly paternalistic and that aside from providing information on the fat and sugar content of different foods, policy-makers should leave individuals free to choose their own diet (for a comprehensive discussion of these issues see Cawley, 2004). Furthermore, there is some recent evidence suggesting that the relationship between body mass index (BMI) and mortality may not be monotonic, with higher BMI over some ranges (in particular 25-30) appearing to have a protective effect in terms of mortality and BMI for grade 1 levels of obesity (i.e. BMI from 30 to 35) having no significant impact upon mortality (Flegel et al, 2013).

Detailed discussion of these issues is clearly beyond this paper. However, in terms of the narrower issue of the distributional impact of a fat/SSB tax, what this paper has demonstrated, for Ireland at least, is that such taxes are generally regressive but that this regressivity can be almost completely mitigated by choice of an appropriate accompanying subsidy.

References

Ahmad E., and Stern, N. (1984): "The Theory of Reform and Indian Indirect Taxes", *Journal of Public Economics,* Vol. 25, pp. 259-298.

Anonymous (2004): "Who Pays in the Obesity War?", *The Lancet*, Vol. 363, p. 339.

Atkinson, A., (1970): "On the Measurement of Inequality", *Journal of Economic Theory,* Vol. 2, pp. 244-63.

-------------- -, (1987): "On the Measurement of Poverty", *Econometrica*, Vol. 55, pp. 749-764.

----------------, L. Rainwater and T. Smeeding (1995): *Income Distribution in OECD Countries: Evidence from the Luxembourg Income Study*. Paris: OECD.

Banks, J., R. Blundell and A. Lewbel (1996): "Tax Reform and Welfare Measurement: Do We Need Demand System Estimation?" ***,** Economic Journal,* Vol. 106, pp. 1227-1241.

Banks, J., R. Blundell and A. Lewbel (1997): "Quadratic Engel Curves and Consumer Demand", *Review of Economics and Statistics*, Vol. 79, No. 4, pp. 527-539.

Barrett, G., T. Crossley and C. Worswick (2000): "Consumption and Income Inequality in Australia", *Economic Record,* Vol. 76, pp. 116-138.

Basu, S., M. McKee, G. Galea, and D. Stuckler (2013): "Relationship of Soft Drink Consumption to Global Overweight, Obesity and Diabetes: A Cross-national Analysis of 75 Countries", *American Journal of Public Health*, Vol. 103 (5), pe 1-17.

Besley, T., and R. Kanbur (1988): "Food Subsidies and Poverty Alleviation", *Economic Journal*, Vol. 98, pp. 701-719.

Blundell, R., and A. Duncan (1998): "Kernel Regression in Empirical Microeconomics", *Journal of Human Resources*, Vol. 33, pp. 62-87.

----------., P. Pashardes and G. Weber (1993): "What Do We Learn About Consumer Demand Patterns from Micro Data", *American Economic Review*, Vol. 83, pp. 570-597.

Cawley, J, (2004): "An Economic Framework for Understanding Physical Behaviour and Eating Activities", *American Journal of Preventive Medicine*, Vol. 27 (S3), pp. 117-125.

Crawford, I., M. Keen and S. Smith (2010): "Value Added Tax and Excises", in *Dimensions of Tax Design*: *The Mirrlees Review*, Institute for Fiscal Studies. London.

CSO (2012): *Household Budget Survey 2009-2010*. Stationary Office, Dublin, Ireland.

Cutler, D, E. Glaeser and J. Shapiro (2003): "Why have Americans Become More Obese?", *Journal of Economic Perspectives,* Vol. 17, pp. 93-118.

Deaton, A., (1981): "Optimal Taxes and the Structure of Preferences", *Econometrica*, Vol. 49, pp. 1245-1260.

-------------, and J. Muellbauer (1980): *Economics and Consumer Behaviour.* Cambridge University Press, Cambridge.

Decancq, K., T. Goedemé, K. Van den Bosch, and J. Vanhille (2013): The Evolution of Poverty in the European Union: Concepts, Measurement and Data. ImPRovE Methodological Paper No. 13/01. Antwerp.

Drewnowski, A., and S. Specter (2004): "Poverty and Obesity: The Role of Energy Density and Energy Costs", *American Journal of Clinical Nutrition,* Vol. 79, pp. 6-16.

---------------------, and N. Darmon (2005): "The Economics of Obesity: Dietary Energy Density and Energy Cost", *American Journal of Clinical Nutrition,* Vol. 82 (suppl), pp. 265S-273S.

Duclos, J-Y., P. Makdissi and Q. Wodon (2002): "Socially Efficient Tax Reforms", *mimeo.*

---------------, ----------------- and Arrar (2009): "Pro-poor Tax Reforms with an Application to Mexico", IZA Discussion Paper No. 4511.

Flegal, K., M. Carroll, B. Kit and C. Ogden (2012): "Prevalence of Obesity and Trends in the Distribution of Body Mass Index Among US Adults, 1999-2010", *Journal of the American Medical Association*, Vol. 307, pp. 483-490.

Flegel, K., B. Kit, H. Orpana and B. Graubard (2013): "Association of All-Cause Mortality with Overweight and Obesity Using Standard Body Mass Index Categories", *Journal of the American Medical Association,* Vol. 309, pp. 71-82.

Foster, J., J. Greer and E. Thorbecke (1984): "A Class of Decomposable Poverty Measures", *Econometrica*, Vol. 52, pp. 761-766.

Foster, J., and A. Sen (1997): "*On Economic Inequality* after a Quarter Century" in *On Economic Inequality* by A. Sen. Clarendon Paperbacks. Oxford University Press. Oxford. New York.

Harrington, J., Perry, I., Lutomski, J., Morgan, K., McGee, H., Shelley, E., Watson, D. and Barry, M. (2008*):* *SLÁN 2007: Survey of Lifestyle, Attitudes and*

Nutrition in Ireland. Dietary Habits of the Irish Population. Department of Health and Children. Dublin: The Stationery Office.
Irish Universities Nutrition Alliance (2011): National Adult Nutrition Survey. IUNA.

Kurzer, P., and A. Cooper (2011): "Hold the Croissant: The European Union Declares war on Obesity"**,** *Journal of European Social Policy*, Vol. 21, pp. 107-119.

Lechene, V., (2000): "Income and Price Elasticities of Foods Consumed in the Home", http://statistics.defra.gov.uk/esg/publications/nfs/2000/Section6.pdf .

Leicester, A., and F. Windmeijer (2004): *The 'Fat Tax': Economic Incentives to Reduce Obesity*. Institute for Fiscal Studies. Briefing Note No. 49. IFS. London.

Madden, D., (1993): "A New Set of Consumer Demand Estimates for Ireland", *Economic and Social Review*, Vol. 24, pp. 101-123.

---------------- (1995): "An Analysis of Indirect Tax Reform in Ireland in the 1980s", *Fiscal Studies*, Vol. 16, pp. 18-37.

---------------., (1996): "Marginal Tax Reform and the Specification of Consumer Demand Systems", *Oxford Economic Papers*, Vol. 48, pp. 556-567.

------------------(2000): "Relative and Absolute Poverty Lines: A New Approach", *Review of Income and Wealth,* Vol. 46, pp. 181-200.

-----------------**(2007)**: "Health Interventions and Risky Behaviour" in *The Provision and use of Health Services, Health Inequalities and Health and Social Gain*. Brian Nolan (ed.), Brenda Gannon, Richard Layte, Pat McGregor, David Madden, Anne Nolan, Ciaran O Neill, Samantha Smith Dublin: Economic and Social Research Institute.

-----------------**(2010):** "The Socioeconomic Gradient of Obesity in Ireland", *Economic and Social Review(forthcoming).*

------------------**(2012):** "A Profile of Obesity in Ireland, 2002-2007", *Journal of the Royal Statistical Society, Series A-Statistics in Society*, Vol. 175 (4): pp .893-914.

----------------, and F. Smith (2000): "Poverty in Ireland, 1987-1994: A Stochastic Dominance Approach", *Economic and Social Review*, Vol. 31, pp. 187-214.

Makdissi, P., and Q. Wodon (2002): "Consumption Dominance Curves: Testing for the Impact of Indirect Tax Reforms on Poverty", *Economics Letters*, Vol. 75, pp. 227-235.

Marshall, T., (2000): "Exploring a Fiscal Food Policy: the Case of Diet and Ischaemic Heart Disease", *British Medical Journal*, Vol. 320, pp. 301-304.

Mayshar, J., and S. Yitzhaki (1995): "Dalton Improving Tax Reform", *American Economic Review*, Vol. 85, pp. 793-807.

Mytton, O., D. Clarke and M. Rayner (2012): "Taxing Unhealthy Food and Drinks to Improve Health", *British Medical Journal*, Vol. 344, e2931.

National Task Force on Obesity (2005): *Obesity – The Policy Challenges. The Report of the National Taskforce on Obesity.* Health Promotion Unit. The Department of Health and Children.

Ray, R., (1986): "Sensitivity of "Optimal" Commodity Tax Rates to Alternative Demand Functional Forms", *Journal of Public Economics*, Vol. 31, pp. 253-268.

Sanz de Galdeano, A., (2005): "The Obesity Epidemic in Europe", CSEF Working Paper No. 143.

Shorrocks, A., (1983): "Ranking Income Distributions", *Economica*, Vol. 50, pp. 3-17.

Smed, S., J. Jensen and S. Denver (2007): "Socio-economic Characteristics and the Effect of Taxation as a Health Policy Instrument", *Food Policy*, vol. 32, pp. 624-639.

Yitzhaki, S., and J. Slemrod (1991): "Welfare Dominance: An Application to Commodity Taxation", *American Economic Review*, Vol. 81, pp. 480-496.

---------------, and W. Thirsk (1990): " Welfare Dominance and the Design of Excise Taxation in the Côte d'Ivoire", *Journal of Development Economics*, Vol. 33, pp. 1-18.

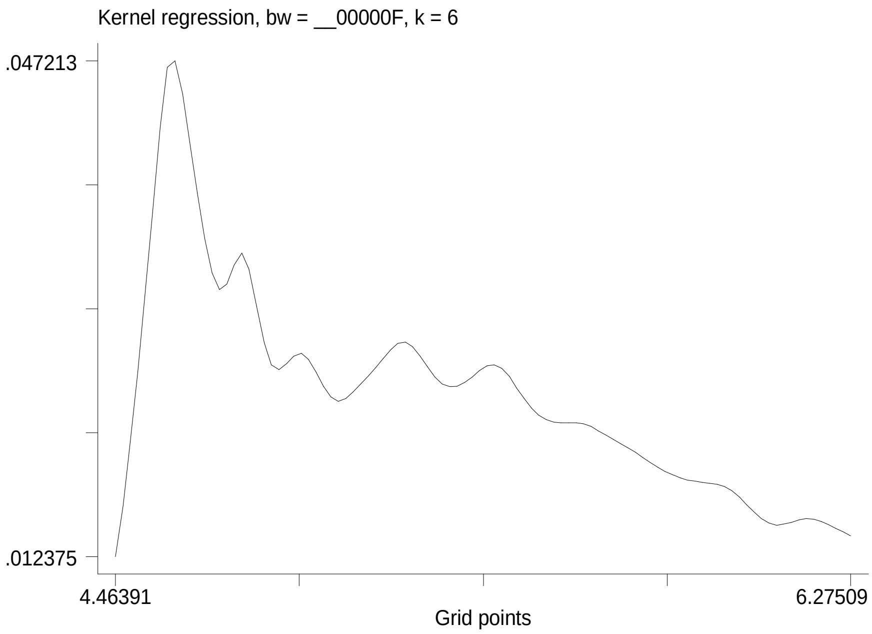
Tables

Table 1: Equivalised Budget Shares for Good and Bad Food for those below poverty line of 60% of mean expenditure

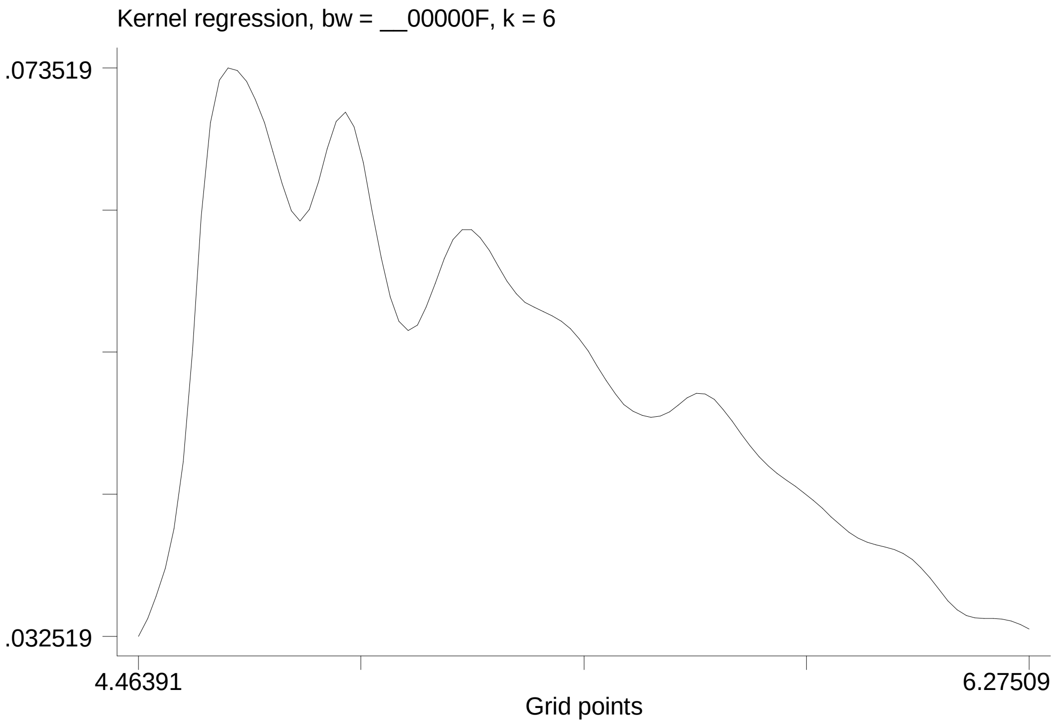
	Mean	St. Dev	Min	Max
Good Food	0.024	0.020	0	0.152
Bad Food	0.054	0.032	0	0.203
SSBs	0.008	0.009	0	0.077

Figure 1: Kernel Regressions – Good Food, Bad Food and SSBs

Good Food



Bad Food



SSBs

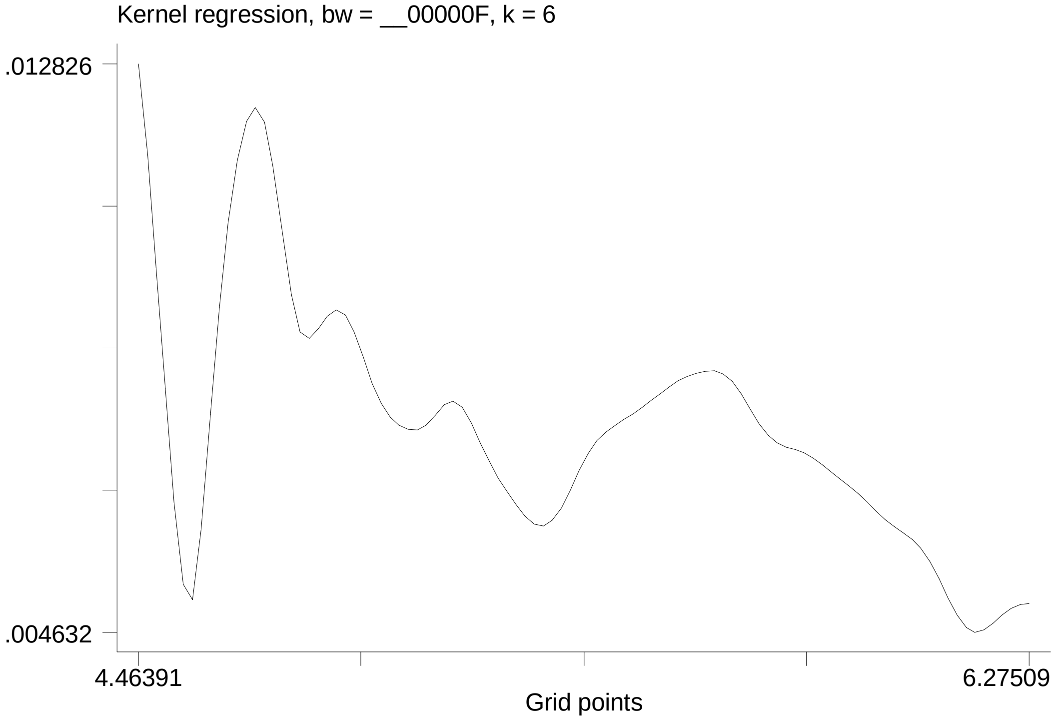
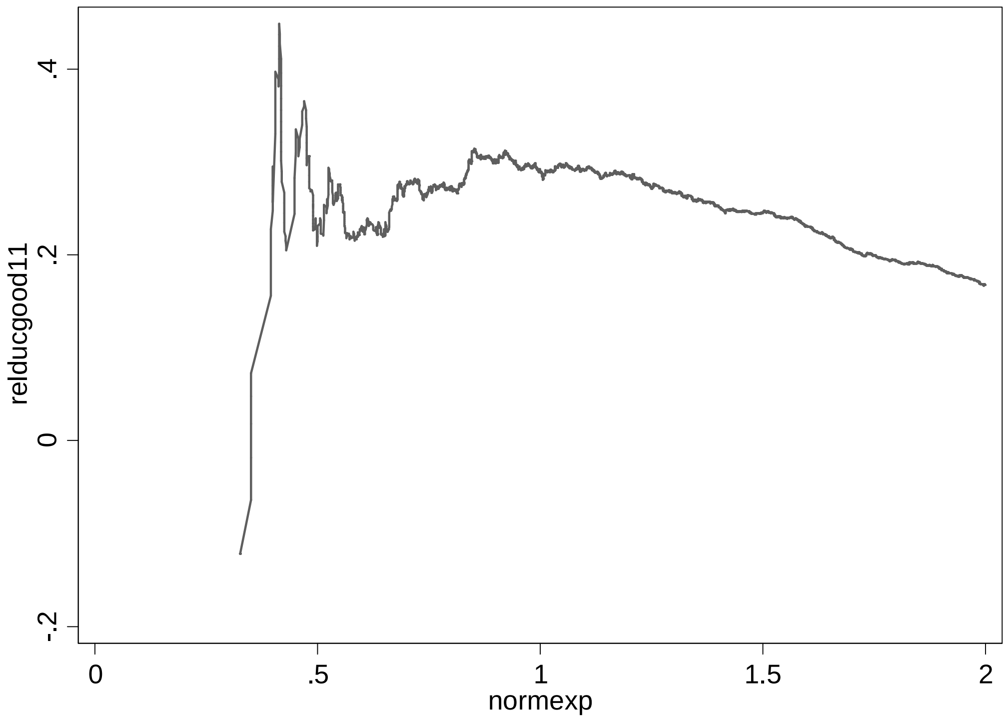
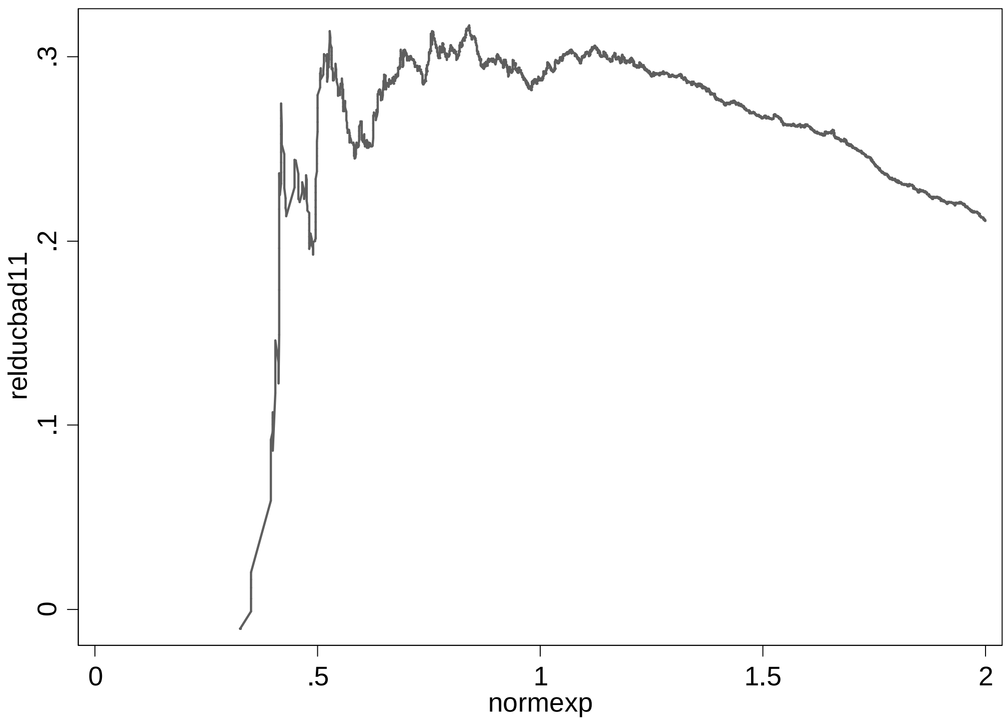

Kernel regression, bw = __00000F, k = 6
.012826
.004632
4.46391
6.27509
Grid points

Figure 2: Relative Pro/anti -poor CD curves for Good and Bad Food

Good Food



Bad Food



SSBs

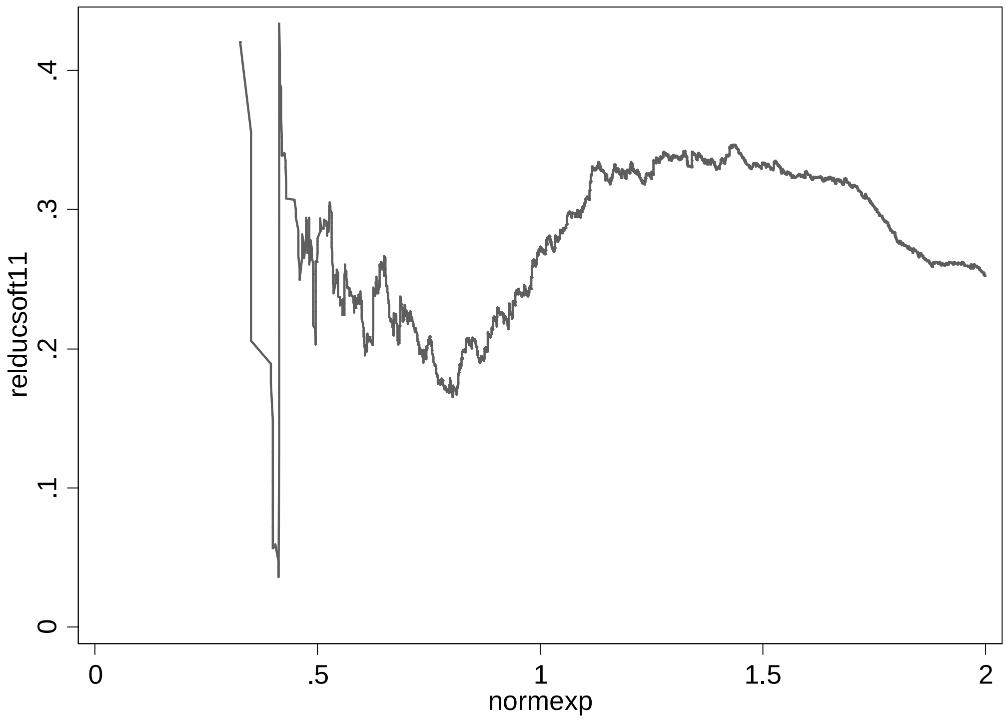


Figure 3: CD Diff curves for Good and Bad Food, s=1

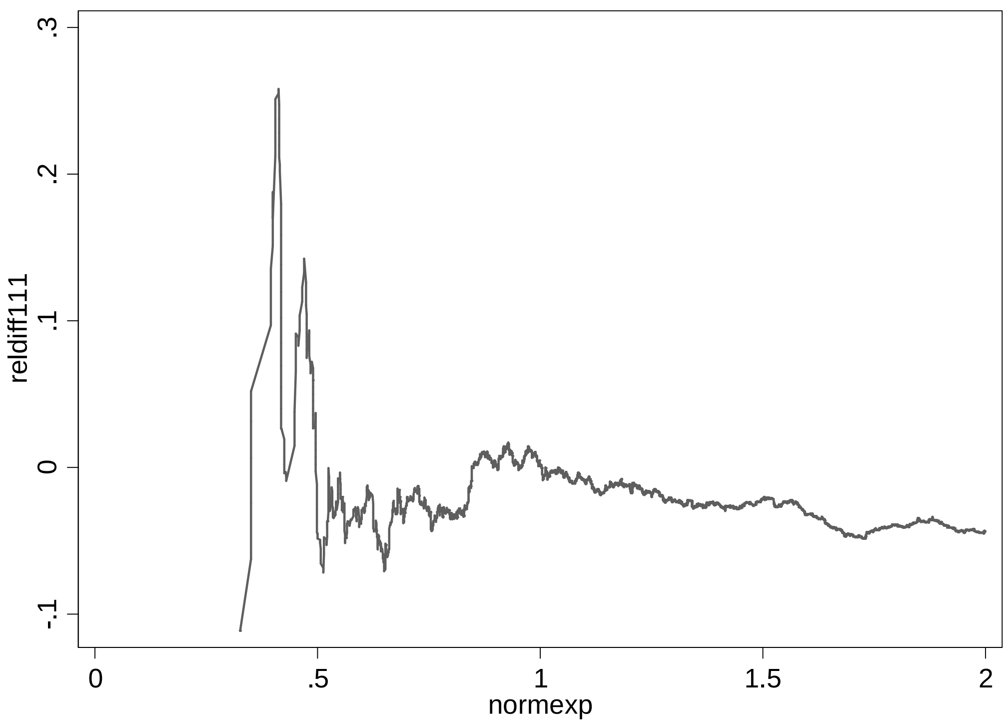


Figure 3: CD Diff curves for Good Food and SSBs, s=1

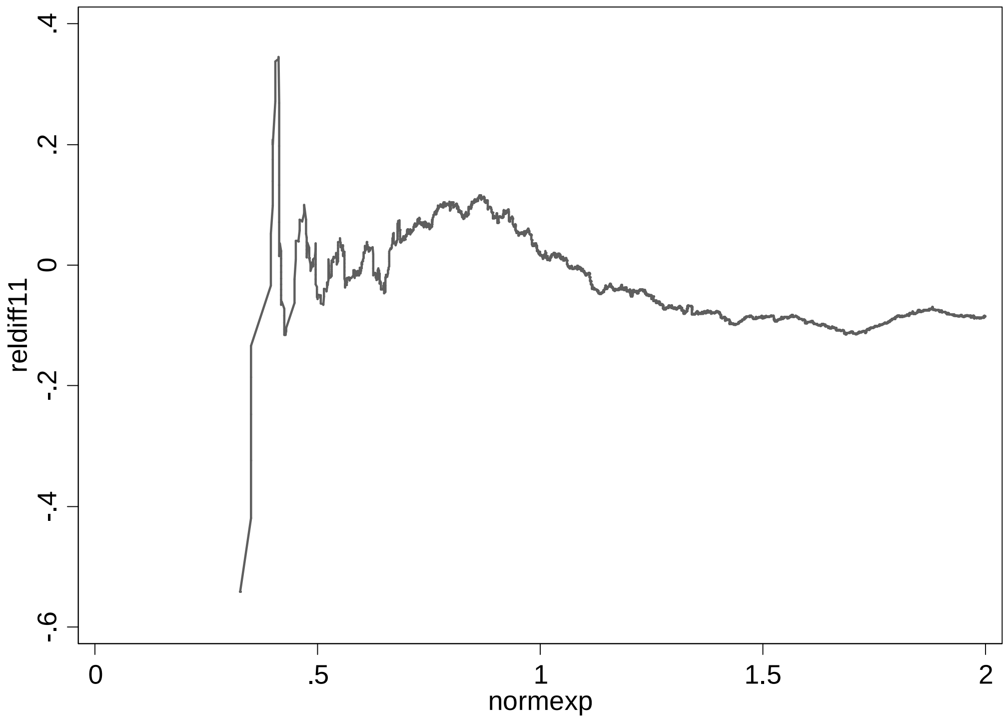


Figure 4: CD Diff curves for Good and Bad Food, s=2

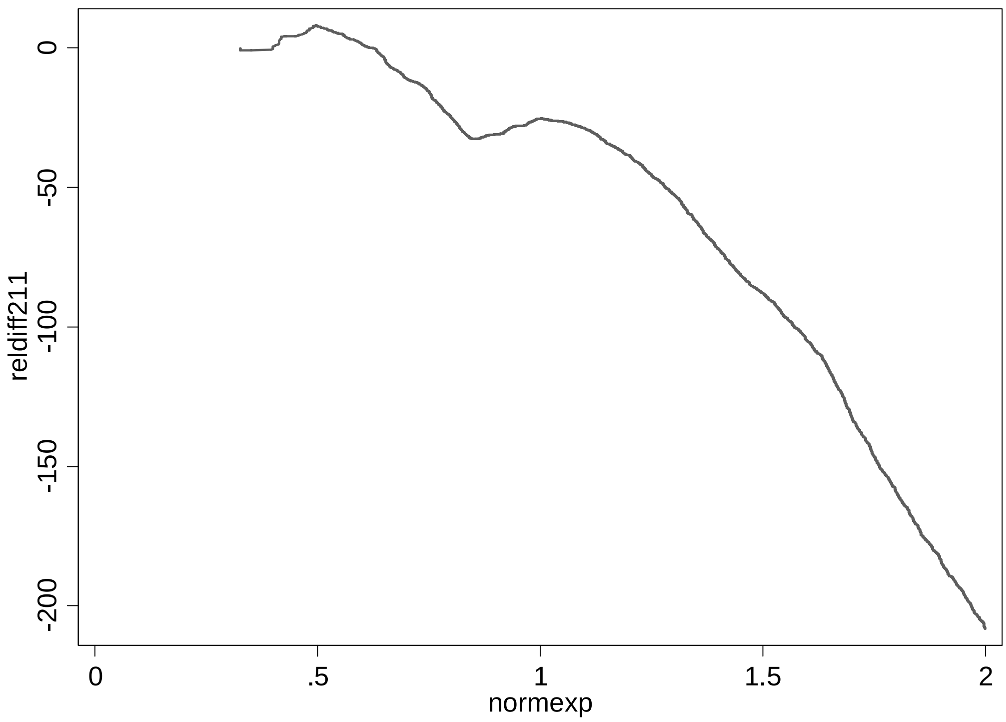
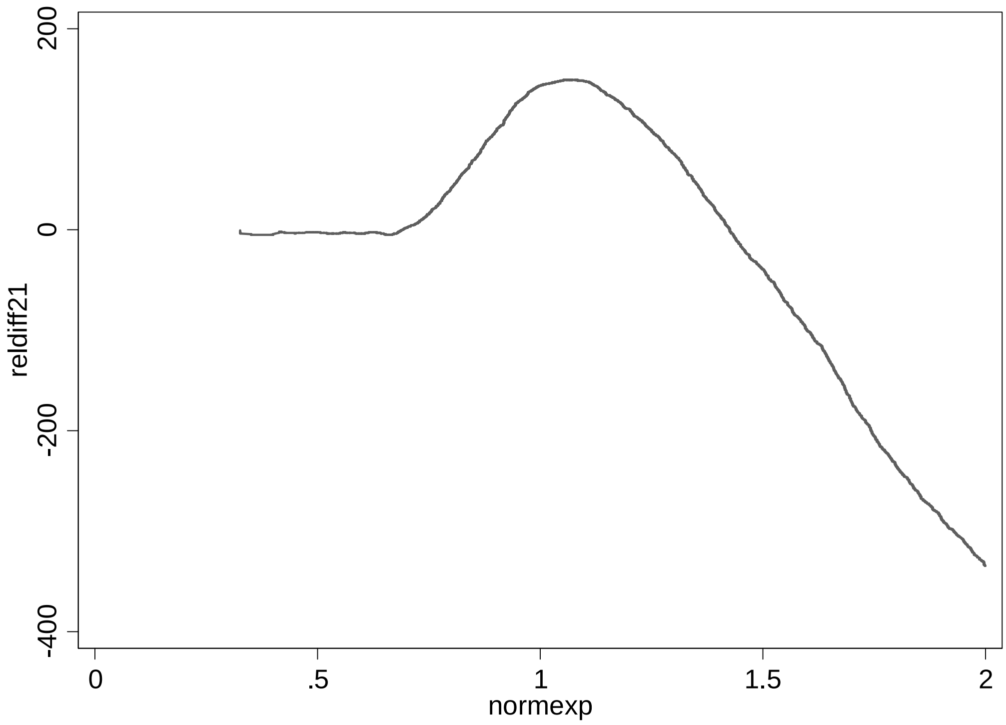


Figure 4: CD Diff curves for Good Food and SSBs, s=2



Appendix

HBS Codes for Food categories

"Bad Food"

HBS Code	Description
087-092	Buns, scones, cakes, pastries, desserts, puddings etc
094-095	Chocolate biscuits, sweet biscuits, wafers
102-103	Whole milk, school milk
106-107	Milk drinks, condensed/evaporated milk
110	Other dried milk products
112-113	Cream, imitation cream products
116-123	All cheeses, butter, margarines >62% fat
243-255	Peanut butter, Chocolate bars, snacks, sweets, potato snacks, crisps, ice cream
278, 280	**Soft drinks (not low-cal)**
302-304	Confectionery, crisps, ice cream products

"Good Food"

HBS Code	Description
184-193	All fresh fruits
199-200	Lettuce, stemmed vegetables
202-217	All fresh vegetables