

# How, and should, the government tackle diet-related disease?

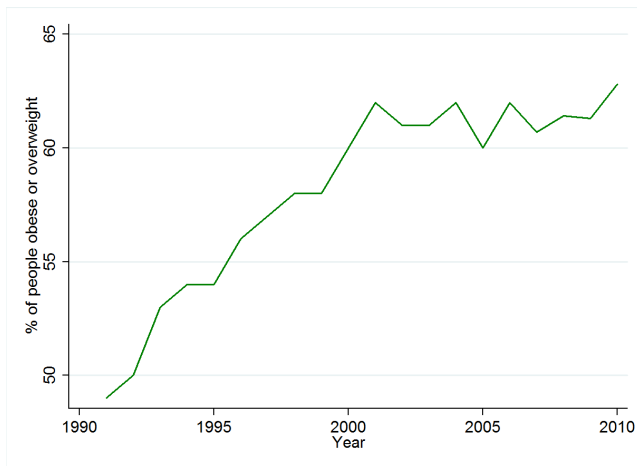
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# Upwards trend in obesity

Figure 1: % of people overweight or obese



# Obesity and health outcomes

- Increased risk of cardiovascular disease, hypertension, diabetes, joint problems, increased mortality

**Table 1:** *Relative risk factors for obese people of developing selected diseases*

Disease	Men	Women
Type II diabetes	5.2	12.7
Hypertension	2.6	4.2
Heart attack	1.5	3.2
Colon cancer	3.0	2.7
Angina	1.8	1.8

*Source: National Audit Office. Figures for England*

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  - Low fruit and vegetable intake accounts for about 20% of cardiovascular disease worldwide.
  - Wholegrains contain folic acid, B vitamins and fibre, all of which are important protectors against heart disease.

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  - Low fruit and vegetable intake accounts for about 20% of cardiovascular disease worldwide.
  - Wholegrains contain folic acid, B vitamins and fibre, all of which are important protectors against heart disease.
- Means we are also interested in the *composition* of people's diets, not merely the quantity of calories that they're consuming

# Why does this matter?

- The growth of poor health outcomes, in particular diet related disease, is a particularly topical issue:
  - Increased calls for government to intervene in order to reverse the upward trend in diseases related in poor diet
  - Variety of policies that could be used to do this

# Why does this matter?

- The growth of poor health outcomes, in particular diet related disease, is a particularly topical issue:
  - Increased calls for government to intervene in order to reverse the upward trend in diseases related in poor diet
  - Variety of policies that could be used to do this
- Why is economics useful in this context?
  - Make clear the rationale for government intervention
  - Think about the effects of various policies
  - Use this analysis to assess what might be the most effective option for government



- Motivation
  - Why should the government intervene?
  - What policy options are available?
- Theory and application I: fat tax
  - How will consumers respond?
  - Will a tax be passed on to consumers?
- Theory and application II: income and diet
  - Richer households have better diets - will giving poorer households cash transfers lead them to eat better?

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- Efficiency is achieved by allowing fully informed rational individuals to make choices, in which firms are price takers and the price reflects the cost of the action
- However, in the real world there are market failures:
  - 1 Information failings
  - 2 Imperfect competition
  - 3 External costs of consumption
- It could be that government could (although not necessarily) play a role in improving outcomes in these situations

# Information failings

- Can be split into two types:
  - ① People are capable of processing the information, but lack the necessary information to make informed choices
  - ② The cost of processing information is so high that people are cognitively unable to process it, even if all the information is there
- It is important to work out which of these dominates as it will determine which is the most appropriate (if any) policy
- Lack of information is likely to lead individuals to make choices that differ from those they would make if they used all the relevant information

# Information failings

## Examples

- Some consumers are ill informed about:
  - 1 their own nutritional needs
  - 2 the nutritional characteristics of a specific food product
  - 3 some of the costs associated with the consumption of certain foods
- Survey by the Food Standards Agency (2009): 48% of respondents thought that they did not need to worry about their saturated fat intake if they exercised regularly, were not overweight or ate lots of fruit and vegetables

# Imperfect competition

- Firms do not necessarily have an incentive to fully inform consumers about their products
- As a result, information provision by firms can be misleading
- e.g. a firm may highlight that its product is low in fat while failing to tell customers that it is high in sugar
- May respond to policies in ways that make the policy less effective

# Externalities

- An individual has no incentive to take into account the costs his food consumption imposes on others
- Poor diet is associated with bad health, which may impose costs on others, for instance by raising public health costs:
  - National Audit Office (2001): cost to NHS in 1998 of treating obesity-related health problems was £480 million (conservative estimate, could be as high as £2.1 billion)
  - British Heart Foundation (2009): costs of cardiovascular disease was £14.4 billion in 2006
- "Externalities": lost economic output due to sickness absence, premature mortality and lower productivity

# What policy options are available to government?

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- These include:
  - 1 Education and information campaigns
  - 2 Regulation
  - 3 Fiscal measures
  - 4 Cash transfers



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# Policy option 1: information campaigns

- Attempts to mitigate the problem of consumers not having access to all the information, but assumes that they can process it if provided with it:
  - Consumers may not understand the risks associated with their diet choices
- Examples: 'Change-4-life', '5-a-day' campaigns
- Need to take into account supply side response: supermarkets in the UK are not perfectly competitive
- Shifts in the demand curve will change the prices set, affecting all consumers (not just the uninformed ones)

## Policy option 2: regulation

- e.g. banning junk food in schools
- Bans are usually considered draconian
- There is often a tendency to ignore the utility that people get from consuming 'unhealthy' foods
- But some evidence that working with manufacturers (e.g. salt reformulation) may be effective
- It may be effective when people are unable or unwilling to process nutritional information

# Outline

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# Rationale

- Idea: increasing the price of unhealthy food will lead consumers to substitute towards healthier alternatives
- e.g. a 'fat tax': the more saturated fat a product contains the more it would be taxed
- Effectiveness of the policy depends on:
  - How people's consumption responds to price changes
  - How effective the tax is at changing price

# How do consumers respond to a price increase?

- Whether a tax succeeds in reducing consumption depends on how consumers respond to price changes
- If consumers have a very strong preference for the products being taxed, even a large increase in their relative price may fail to reduce consumption
- We use the *price elasticity of demand* to measure responsiveness to a change in price:

$$\epsilon = \frac{dQ/Q}{dP/P}$$

- Low  $\epsilon \Rightarrow$  reduction in quantity will be small relative to price increase

# How do consumers respond to a price increase?

## Other goods

- A change in the price of one good will affect people's consumption of other goods, not just the good that is being taxed
- We measure this using the cross price elasticity (when  $i \neq j$ ):

$$\epsilon_{ij} = \frac{d Q_i / Q_i}{d P_j / P_j}$$

- $\epsilon_{ij}$  gives the % change demanded of good  $i$  given a 1% increase in the price of good  $j$
- If  $\epsilon_{ij} > 0$  then the goods are *substitutes*; if  $\epsilon_{ij} < 0$  the goods are *complements*
- Size of these effects will determine the nutritional impact of any price changes

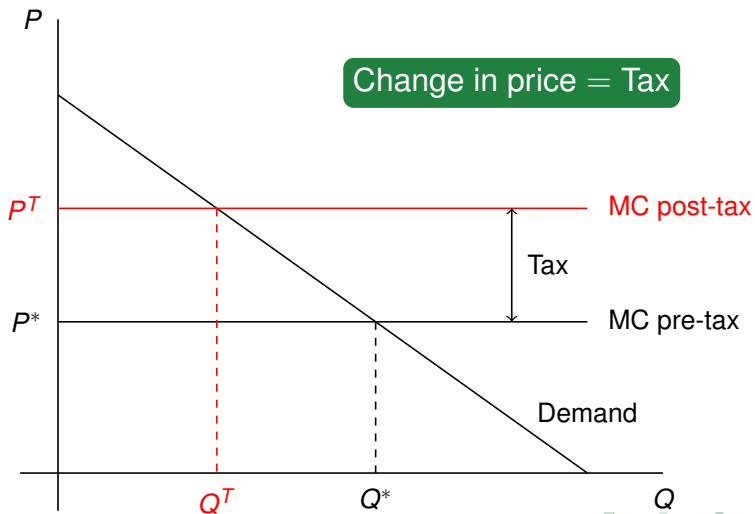


# Does a tax change the price?

- Many firms enjoy some *market power*: have some scope to choose how to change their prices in response to the tax
- Firms may choose not to pass on the entirety of the tax, meaning that the price increase is less than the tax imposed
- Or they may pass on more than the amount of the tax
- *Firms maximise profits, they are not ultimately interested in the health of consumers*

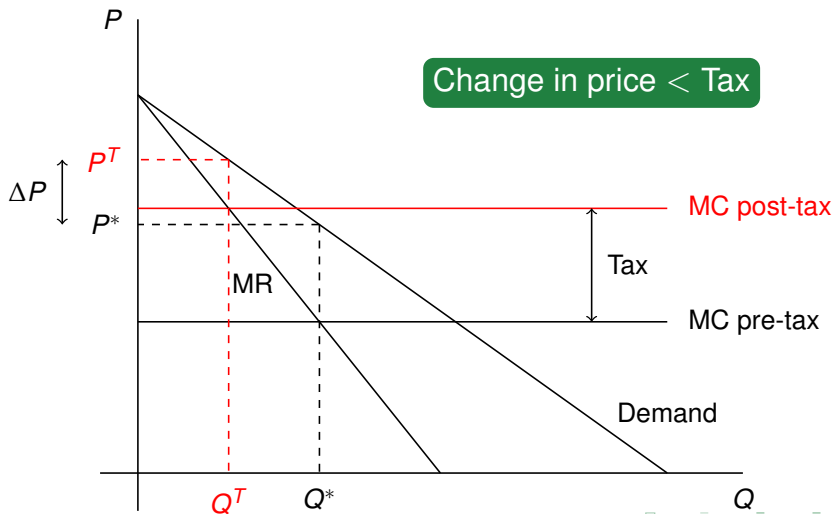
# Extent of tax pass through

Under perfect competition



# Extent of tax pass through

In a monopoly



# Tax pass through

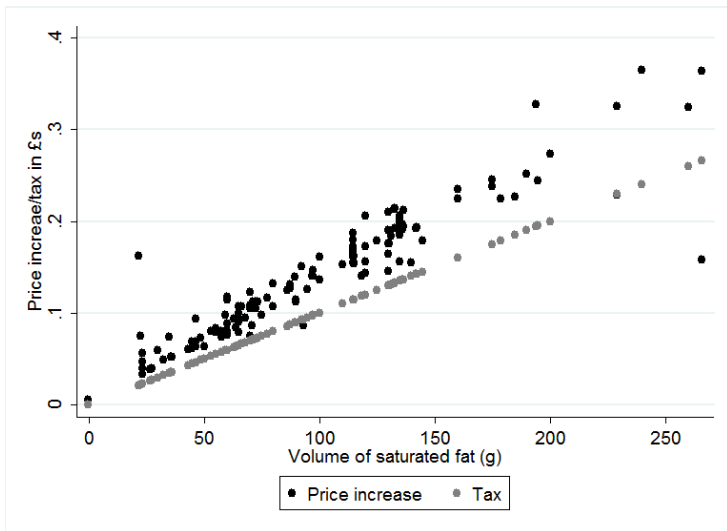
- The shape of the demand curve and market structure affect the degree to which a tax is passed through to consumers
- If we assume a linear demand curve and vary market structure we can look at the differing effects of a tax:
  - Under *perfect competition* a tax is entirely passed through
  - In a *monopolistic* world the price increase is less than the tax
- Depending on the demand curve and market structure the price increase could be *less than, equal to or greater than the tax imposed*

# Types of tax

- In the real world it is more complicated than this
- There are two ways to think about using taxes to affect food purchases:
  - ① Taxing 'bads' i.e. salt, or saturated fat
  - ② Taxing certain food types i.e. a tax on fizzy drinks
- Which tax is used (and whether it is a unit tax, or an ad valorem tax) will affect both firms' and consumers' behaviour
- Use data to simulate the effect of imposing a tax on saturated fat in the butter and margarine market

# Imposing a unit tax on saturated fat

## Responsiveness of firms



# Results from the rest of the study

- Differences between ad valorem and unit tax: pass through is less than 100% under the former, and more than 100% under the latter (on average)
- As a result, the unit tax reduces purchases of saturated fat by more, but an ad valorem tax raises more revenue
- Conclusions about the cost and efficacy of the two forms of tax based on the assumption of no firm response are therefore likely to be quite wrong.
- For instance, under the assumption of 100% pass-through, the two taxes result in similar costs and reductions in saturated fat purchases

# Caveats

- Researchers at the IFS find that a tax on saturated fat would succeed in reducing the amount of fatty food that some consumers purchase
- Two notes of caution:
  - ① Distributional consequences: low income households devote a larger fraction of their income in food purchases, also most likely to purchase high levels of saturated fat → tax would be *regressive*
  - ② May discourage consumers from consuming as much fatty food, but this may lead them to substitute towards salty or sugary alternatives



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# Socioeconomic gradient in diet

- We observe that households from higher socioeconomic groups have better diets, on average; so we might think giving poor households money might improve their diets
- But there could be underlying factors:
  - ① Differences in demographics/education levels
  - ② Different preferences
  - ③ Face different prices
  - ④ The fact that healthier foods are *luxuries*
- If it is due to (4) then cash transfers could improve the diets of poorer households

# Estimating a demand system

- To investigate this relationship we estimate a *demand system*
- This explains the share of expenditure of a food group  $w_i$  as a function of total expenditure,  $y$ , prices of all goods,  $\mathbf{p}$  and vector of household information,  $\mathbf{D}$ :

$$w_i = f(y, \mathbf{p}, \mathbf{D})$$

- One example of this is a quadratic relationship between total expenditure and its allocation:

$$w_i = \alpha + y\beta_1 + y^2\beta_2 + \mathbf{p}'\gamma + \mathbf{D}'\lambda + u_i$$

# Engel curves

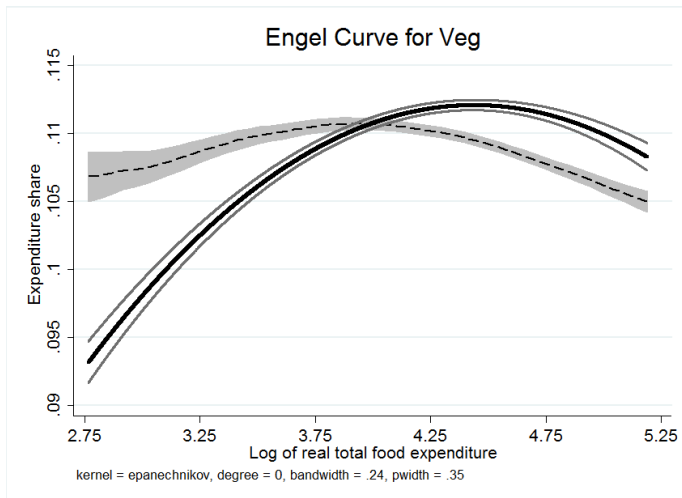
- Measures the relationship between expenditure share of a good and the agent's income, holding all other factors constant
- Shape of Engel curve depends on our choice of functional form of the demand system
- This gives us the following:

$$w_i = f(y, \bar{\mathbf{p}}, \bar{\mathbf{D}})$$

where  $w_i$  = expenditure share.

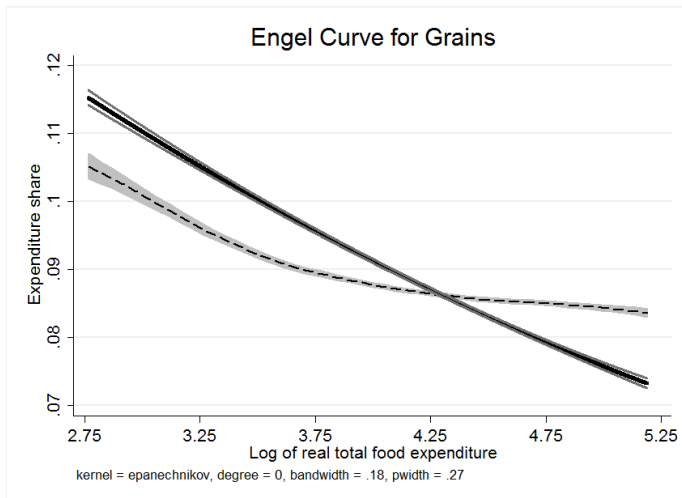
- **Luxury good:** Engel curve is upward sloping
- **Necessary good:** Engel curve is downward sloping

# Examples of estimated Engel curves



*Estimates from Griffith, O'Connell and Smith (2012)*

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# Summary of results

- Find that income has little impact on the quality of a person's diet once we account for the influence of prices and unobserved factors
- Short term cash transfers are not likely to be effective in improving the quality of people's diets
- Can think about the long term effects of increasing people's permanent incomes e.g. habits
- Can look at the correlation between the preference element of a household's food demand and their attitude towards food/lifestyle

# Conclusion

- Think about the composition as well as the quantity of calories that people consume
- Need to think about why governments should intervene in the food market
- Consider the likely response of consumers *and* firms