

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

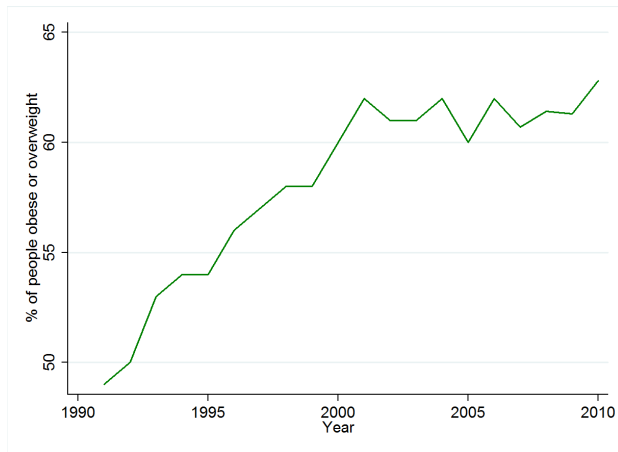
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November 2013

# 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*

# Poor diet and health outcomes

- Obesity is only one component of diet related disease (figures from World Heart Federation):
  - Universal reduction in dietary intake of sodium by about 1g of sodium a day (3g of salt) would lead to a 50% reduction in the number of people needing treatment for hypertension.
  - 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 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?

# Why should the government intervene?

- 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

- 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

- 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?

- Various policy options: affect both supply and demand of different food products
- These include:
  1. **Education and information campaigns**
  2. **Regulation**
  3. **Fiscal measures**
  4. **Cash transfers**

# 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

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- 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  $i \neq j$ ):

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

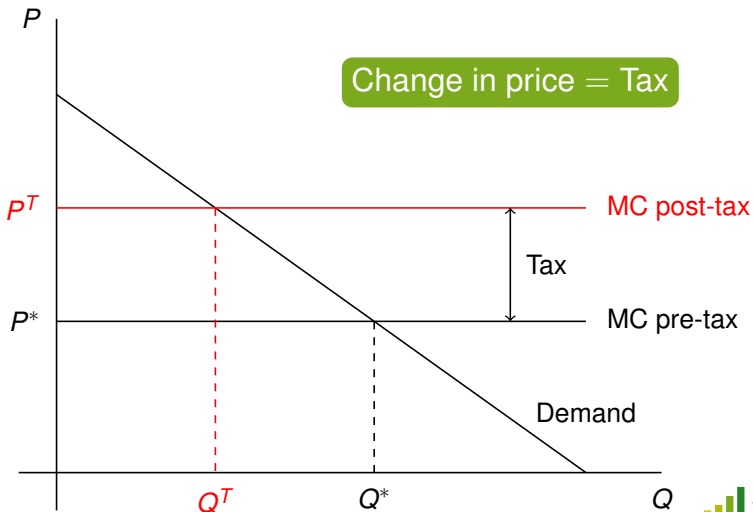
- $\epsilon_{ij}$  gives the % change demanded of good  $i$  given a 1% increase in the price of good  $j$
- If  $\epsilon_{ij} > 0$  then the goods are *substitutes*; if  $\epsilon_{ij} < 0$  the goods are *complements*
- Size of these effects will determine the nutritional impact of any price changes

# 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*

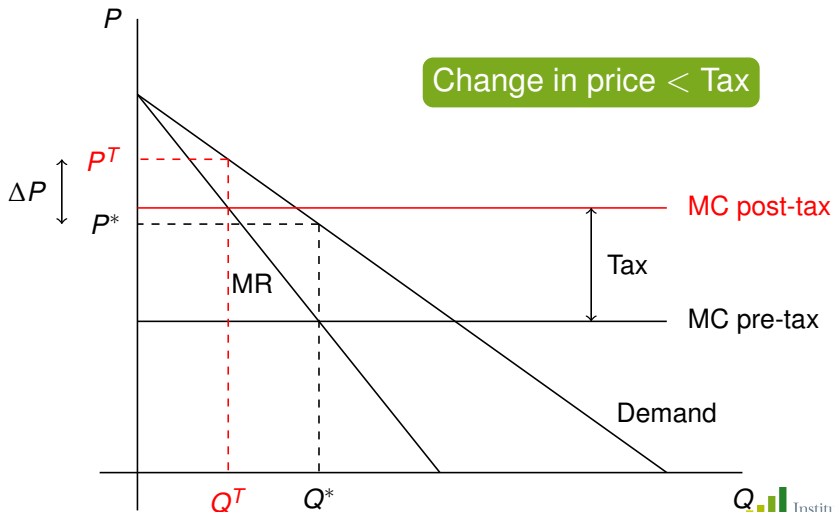
# Extent of tax pass through

Under perfect competition



# Extent of tax pass through

In a monopoly



- 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*

- 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

# 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



- 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:

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

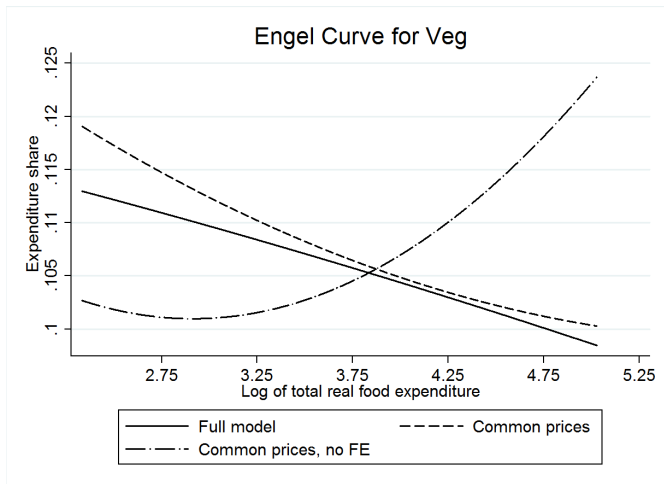
- Measures the relationship between expenditure share of a good and the agent's income, holding all other factors constant
- Shape of Engel curve depends on our choice of functional form of the demand system
- This gives us the following:

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

where  $w_i$  = expenditure share.

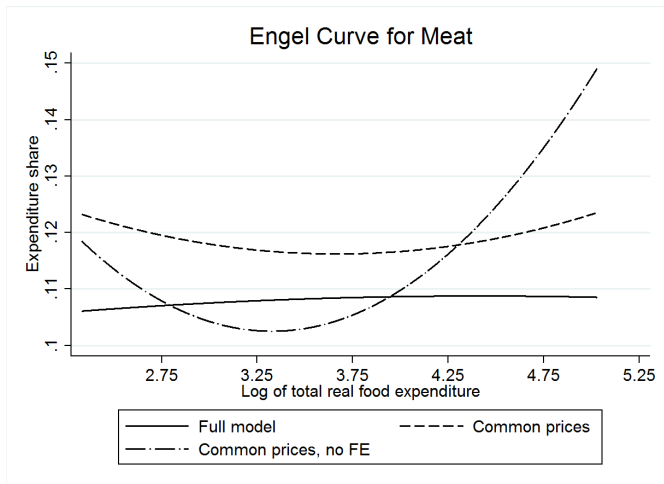
- **Luxury good:** Engel curve is upward sloping
- **Necessary good:** Engel curve is downward sloping

# Examples of estimated Engel curves



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

# Examples of estimated Engel curves



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

# 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