How can taxes be designed to discourage socially harmful behaviour?

Rebekah Stroud

Institute for Fiscal Studies

January 2020

Today's lecture

1. What are corrective taxes and what is their economic rationale?

2. How should corrective taxes be set?

3. Application: Alcohol

4. Internalities: A further rationale for corrective taxes?

5. Concerns about the distributional effects of corrective taxation

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Introduction to corrective taxes

Corrective taxes are taxes on specific goods that are designed to alter individuals' consumption decisions

- often implemented as excise taxes

- e.g. on motor fuels, tobacco and alcohol

- taxes on these goods comprise around **7% of total tax receipts**

Economic rationale for corrective taxes

More formally, corrective taxes are designed to correct for the presence of externalities in a market.

- **Externalities** arise whenever there is a cost to a third party that an agent fails to take account of at the point of taking a decision, where the cost is outside the market mechanism

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In the presence of externalities, the price of an activity does not reflect its true cost to society. Corrective taxes incorporate these additional costs into the price paid by the consumer, forcing them to take them into account.

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Externalities are a source of market failure

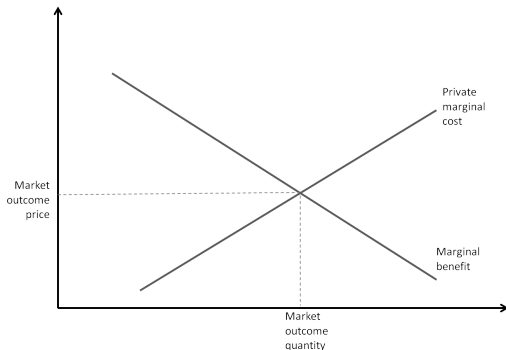Externalities are an example of **market failure**.

- A problem that violates one of the assumptions of the first fundamental welfare theorem and causes the market economy to deliver an outcome that is not efficient.

- i.e. it is possible to make someone better off without making anyone else worse off !

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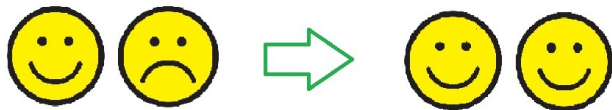
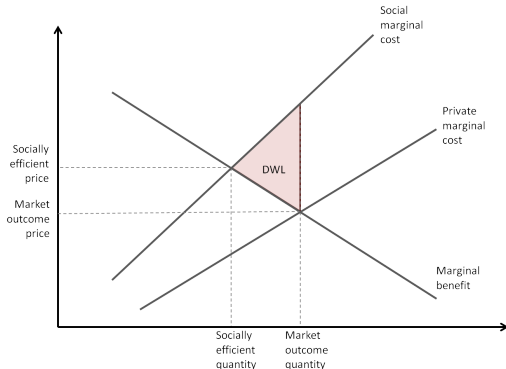How do individuals decide how much to consume?

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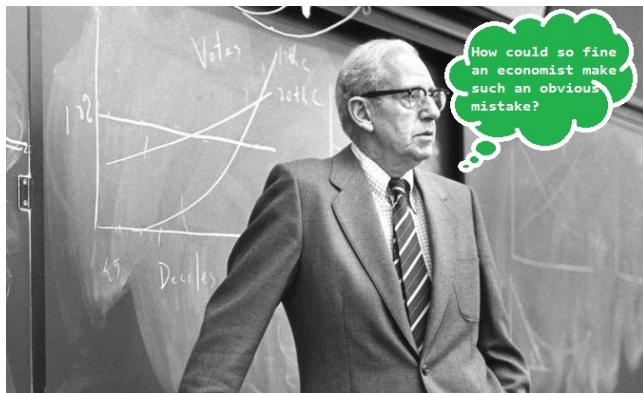
Coase challenged the idea that government intervention (e.g. taxes or quantity control) was needed to prevent people and companies from behaving in ways that harmed others.

He argued that, if certain conditions held, the affected parties could negotiate and settle conflicts privately to their mutual benefit.

Coase: is government intervention the only solution?

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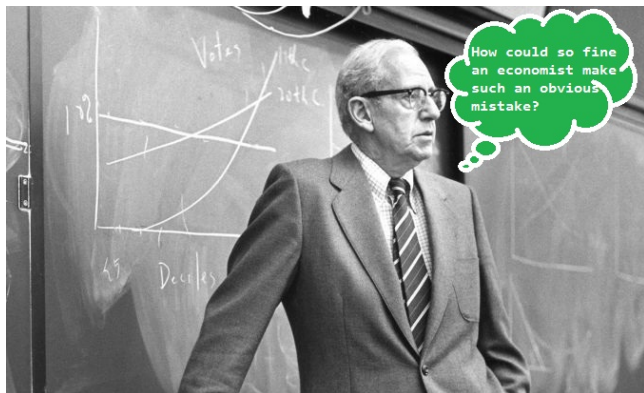
Coase theorem

When there are well-defined property rights and costless bargaining, then negotiations between the party creating the externality and the party affected by the externality can bring about the socially optimal market quantity.
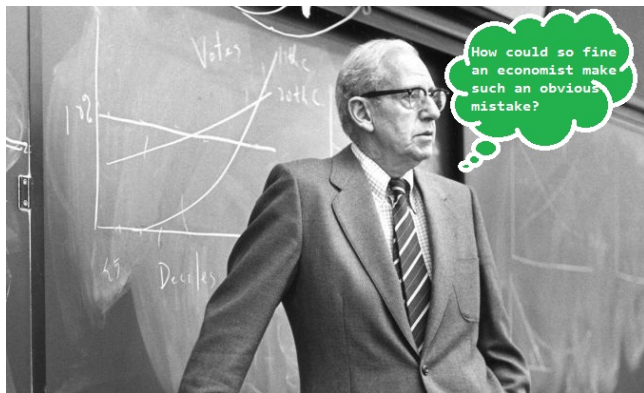
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Stigler invited Coase to dinner to explain his views to a group of 21
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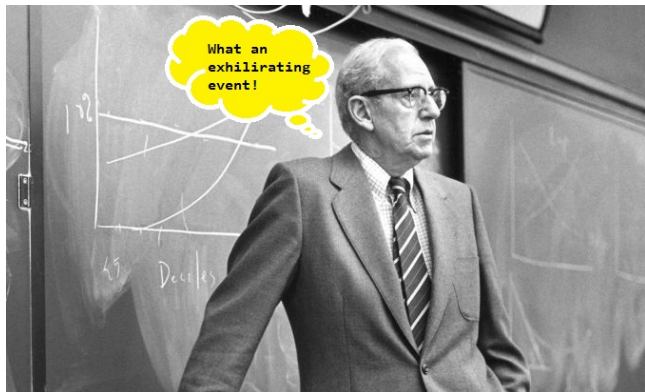
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As Coase himself acknowledged, in many cases, these are "of course, very unrealistic assumptions".

- Not always clear how property rights should be assigned (e.g. global warming)

- Bargaining is often costly from both a monetary and time perspective

Outline

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Setting corrective taxes

Pigou showed that the socially efficient outcome could be achieved by setting the tax equal to the marginal externality at the socially efficient quantity.

$$\mathbf{t}^* = \phi'(Q(\mathbf{t}^*))$$

- $\mathbf{t}$ is the tax policy
- $Q(\mathbf{t})$: quantity consumed of externality generating good
- $\phi(Q(\mathbf{t}))$: externality generated

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Setting corrective taxes

When deciding how much to consume people equate their marginal benefit from consumption to the marginal cost (which includes price).

- In the presence of externalities this leads to overconsumption relative to the efficient level.
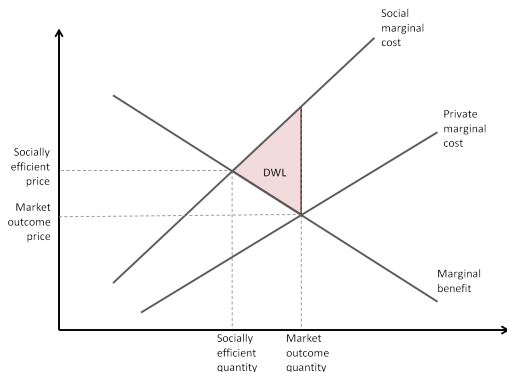
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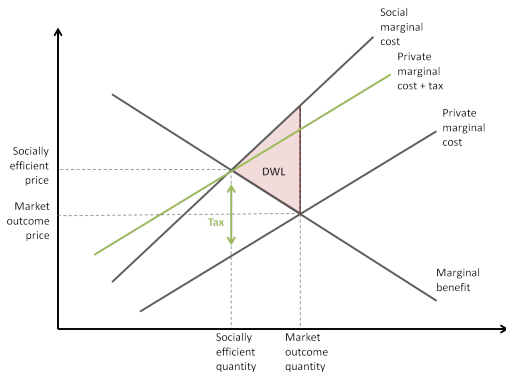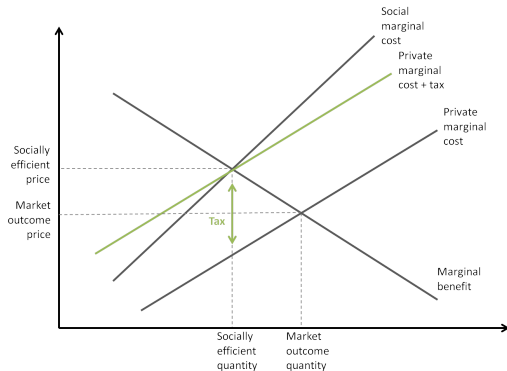
- By setting the tax rate equal to the marginal externality we align consumers' MB and PMC at the efficient quantity.

Unlike other taxes, corrective taxes do not create inefficiency, they restore efficiency (deadweight loss disappears!)

Recap

What are corrective taxes?

Corrective taxes are taxes levied on socially harmful activities to ensure their price reflects their social marginal cost, rather than the private marginal cost.

How should corrective taxes be set?

The tax should be set equal to the marginal externality at the efficient level. At this rate, the externality is internalised by the decision maker.

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This looks very simple, BUT, in reality there are complicating factors:

- Measuring the externality

- Restricted instruments available to government

- Variation across consumers

1. What are corrective taxes and what is their economic rationale?

2. Theory: How should corrective taxes be set?

3. **Application: Alcohol**

4. Internalities: A further rationale for corrective taxes?

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Health costs of alcohol consumption are high:

- 5.9% global deaths, and 5.1% of the global burden of disease and injury is attributable to alcohol (WHO, 2014)

- roughly 70% of liver cirrhosis is attributable to alcohol

Also linked to violence and crime:

- almost half of all violent crime is alcohol related

- around 1/3 domestic violence occurs when the perpetrator is under the influence of alcohol

- the alcohol attributable fraction of road traffic deaths is 16.6% for men and 6.7% for women

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Photo: Joel Goodman/LNP

How should we tax alcohol?

Recall that the optimal Pigouvian tax is to set the tax equal to the marginal externality:

$$\mathbf{t}^* = \phi'(Q(\mathbf{t}^*))$$

If the marginal externality generated by drinking a unit of alcohol is constant (across people and consumption occasions) we would want a **constant per unit of ethanol tax**

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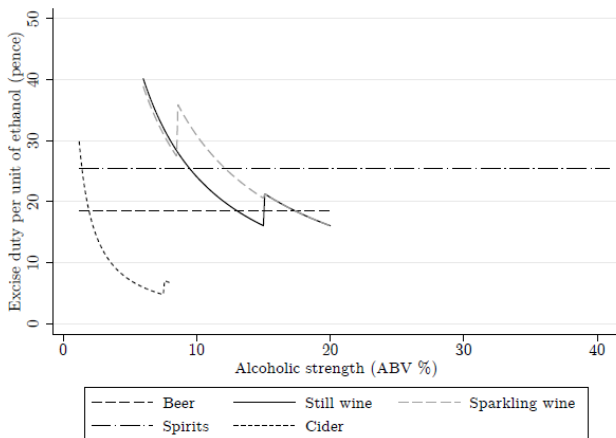Fiscal Studies

Excise taxes on alcohol

If $\phi'()$ were constant across all units of alcohol we would want a constant per unit tax.
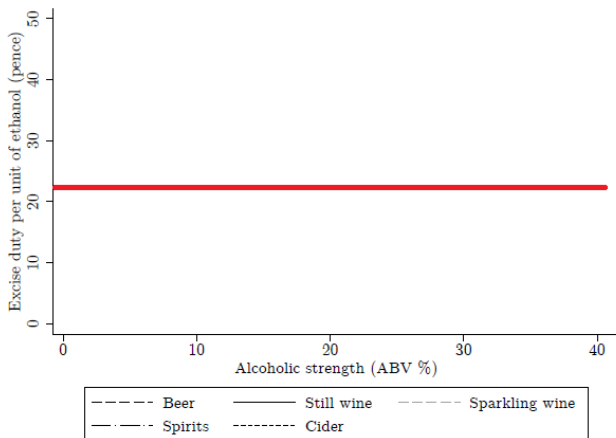
Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market' (red line added)

Excise taxes on alcohol
(1) wine and cider taxed per litre rather than per unit; (2) tax rates vary across beverages

Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market'

How should we tax alcohol?

If the marginal externality generated by drinking a unit of alcohol is constant (across people and consumption occasions) $\rightarrow$ constant per unit of ethanol tax.

How do we tax alcohol?

- Some drinks taxed per litre of product rather than per unit of ethanol

  - Not sensible

- The tax rates also vary across types of alcohol

  - Potential rationale for this

Optimal taxes should be levied on alcohol content
(as opposed to per litre)

Currently, cider and wine are taxed per litre of product rather than per quantity of ethanol

- this means that for a given tax rate per litre of product higher strength products face a lower per unit of alcohol tax rate

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For example the tax per litre of wine of strength (ABV) 5.5-15% is 288.65p.

- For wine of strength 8% this is 36p per unit of alcohol

- For wine of strength 15% this is 19p per unit of ethanol

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Key principle: corrective taxes should be levied as directly as possible on the externalities generating behaviour.

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Current excise taxes on alcohol
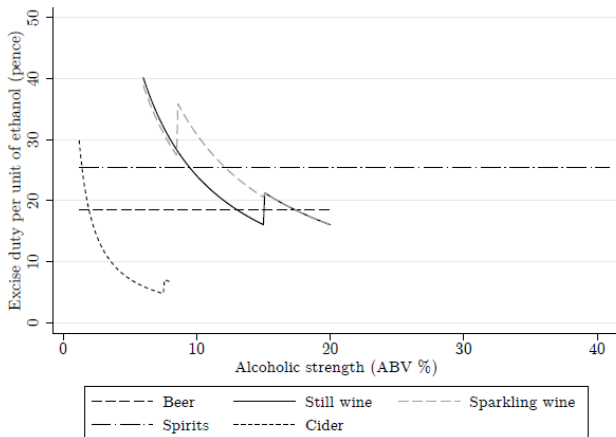
Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market'

There is a large amount of evidence that suggests that externalities are convex in alcohol consumption

- i.e. the more you drink the greater the external cost associated with one more drink

Variation in the marginal externality

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Threshold effect with some diseases: at low levels of alcohol consumption the risk is not elevated, but this risk increases sharply above a certain point.

Higher levels of alcohol consumption create an exponential risk of accidents:

- odds of injury from 8 pints almost 18 times greater than the odds of injury from 1 pint

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What is the optimal corrective tax in this case?

Recall that the optimal Pigouvian tax, that achieves the first best, is to set the tax equal to the marginal externality:

$$\mathbf{t}^* = \phi'(Q(\mathbf{t}^*))$$

In an ideal world this would mean charging a different tax rate to different individuals and varying across consumption occasions (i.e. lower rate on the first drink than the fifth drink).

- Increasingly feasible in a world of big data !

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If we have to set a **single tax rate** for all consumers we can no longer achieve the first best:

- there is a trade-off between reducing the consumption of people who consume more than is ideal and raising the prices faced by individuals whose behaviour does not generate external costs

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- there is a trade-off between reducing the consumption of people who consume more than is ideal and raising the prices faced by individuals whose behaviour does not generate external costs

Diamond (1973) showed that the **second best** ethanol tax in this case is to set the tax equal to a weighted average of the marginal externalities (index i refers to consumer):

$$\mathbf{t}^* = \sum_i \phi_i' w_i$$

Variation in the marginal externality
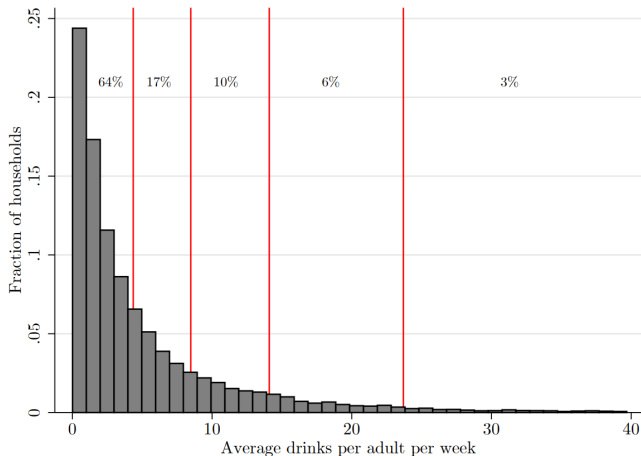
Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market'

What is the optimal corrective tax in this case?

We improve upon this by **varying rates** across products!

- It is the consumption of ethanol that generates externalities

- But ethanol is bundled together in products with other characteristics (e.g. alcohol type, strength, flavour etc.) and consumers have preferences over all these characteristics.
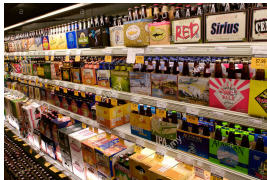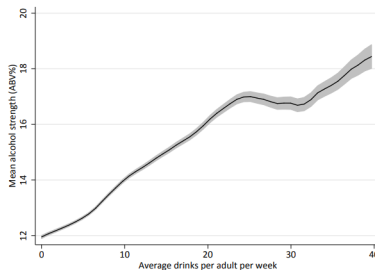

- If consumer preferences over alcohol products and their overall ethanol demand are correlated we can improve on Diamond taxation
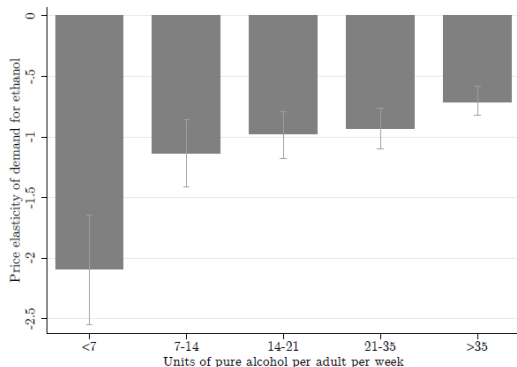
(a) Price
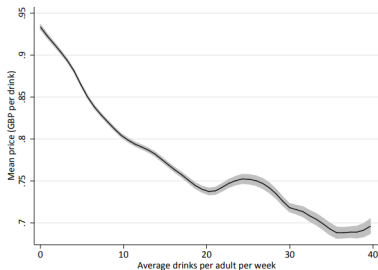
(b) Alcoholic strength

Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market'

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Whether a tax succeeds in reducing alcohol consumption depends on how much of a reduction in total ethanol consumption it encourages:

Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market'
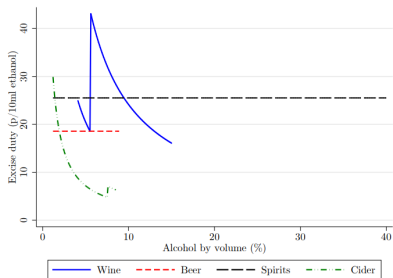
Improving the system

In 'Tax design in the alcohol market', Griffith, O'Connell and Smith (2017) characterise optimal corrective taxes in the alcohol market, and compare it to the current UK system.

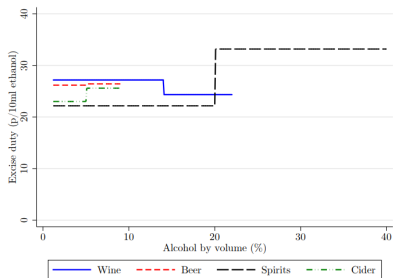They show that there is scope for **significant welfare gains** from:

1. levying taxes on ethanol rather than on volume

2. increasing the tax rate on cider

3. reducing the tax rate on spirits below 20% ABV, and increasing the rate on spirits above 20% ABV

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Improving the system

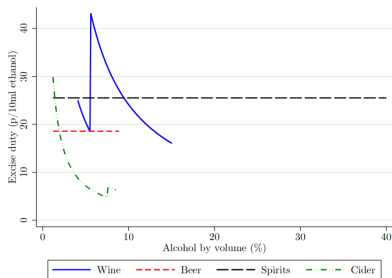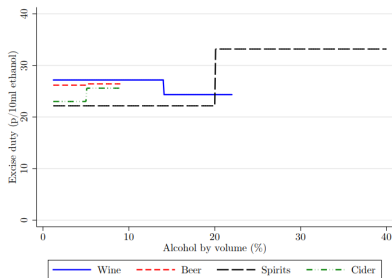(a) Current UK system   (b) Optimal UK system

Source: Griffith, O'Connell, Smith (2017), 'Tax design in the alcohol market'

(a) Current UK system   (b) Optimal UK system

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This characterisation of optimal alcohol taxes relies on estimates of both the magnitude and distribution of the external costs of alcohol.

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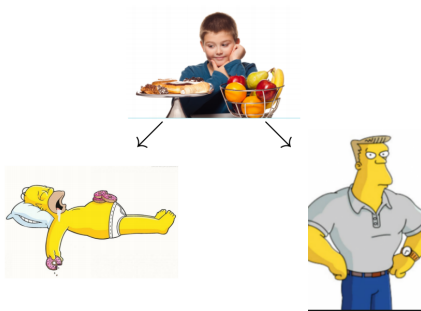
Internalities

Internalities are one of the rationales given for interventions to improve public health (e.g. soda taxes)

Eating a poor diet imposes large future costs on individuals (reduced productivity, worse health, higher mortality)

- Some of these generate costs borne by society (e.g. public health costs).

- But many of these are borne by the individual and there is evidence that people do not properly take these costs into account.

Failure to take costs to onself into account could arise if people are not fully informed about the health consequences of high sugar consumption, or if they suffer from self-control problems.

- e.g. O'Donoghue and Rabin (2000): time-inconsistent preferences

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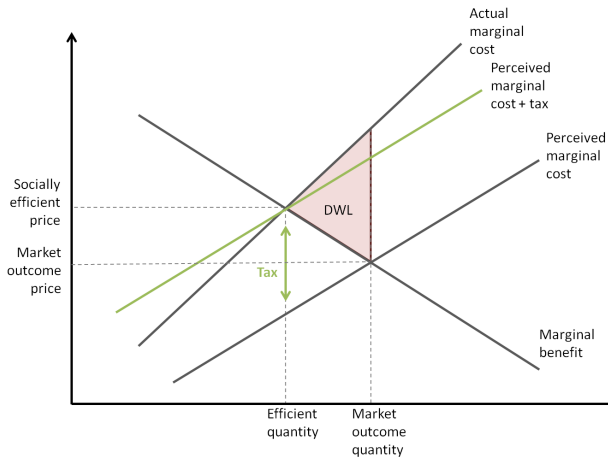# Self control problems
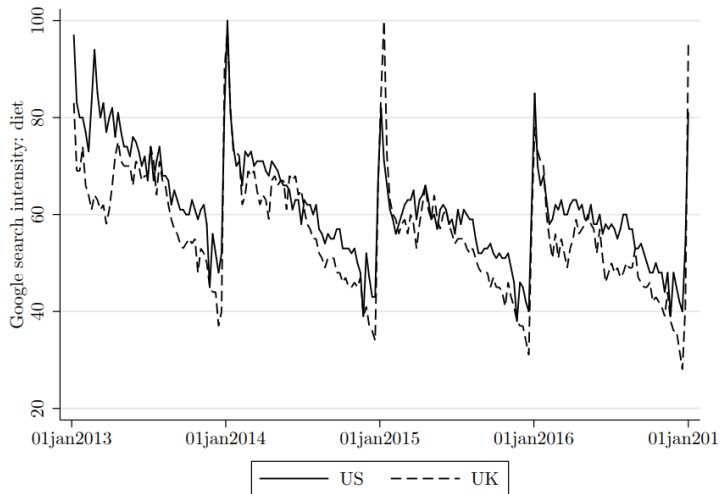
Correcting for internalities

Internalities: a justification for government intervention?

Two polar views on government intervention:

- **Paternalism (Libertarian View):** Individual failures do not exist and government wants to impose its own preferences against individuals will

- **Individual Failures (Behavioral Economics View):** Individual Failures exist - self-control problems, cognitive limitations

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In theory we should be able to distinguish between these views:

- e.g. do smokers support taxes on cigarettes?

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Individual failures view more convincing when considering children:

- e.g. soft drinks levy targeted at children

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Concerns about regressivity of corrective taxes

A common objection to the use of excise duties as corrective taxes is that they are regressive:

- i.e. take a greater percentage of tax revenue from those on low incomes

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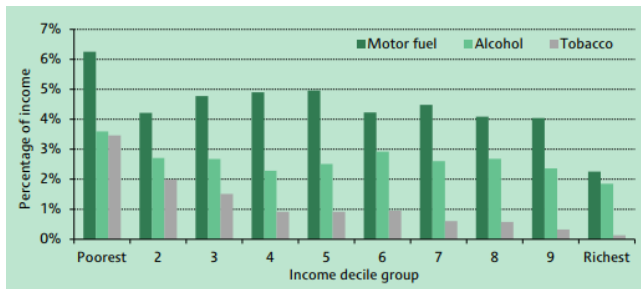# Concerns about regressivity of corrective taxes

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Source: Levell, O'Connell, Smith (2016), 'Excise duties'

Are corrective taxes regressive?

Looking at the portion of income spent on these items might not paint the most accurate picture!

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- some consumers with low levels of current income may have access to other resources

  - e.g. accumulated wealth from the past / borrowing in anticipation of higher future income.

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- ideally we want to know what fraction of consumers **total lifetime income** they spend on each good.

- looking at **total spending** rather than income may proxy better for lifetime income.

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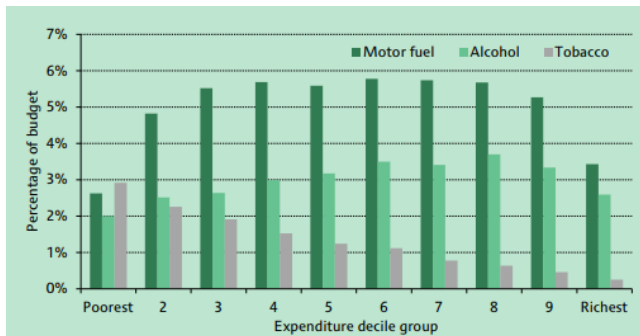
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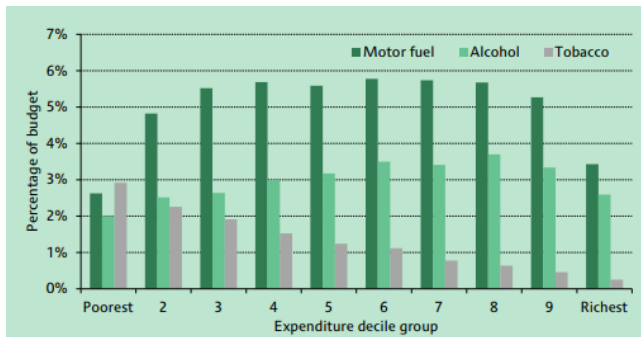
Source: Levell, O'Connell, Smith (2016), 'Excise duties'

Tobacco duties are still regressive but motor fuel and alcohol duties fall most heavily on middle income earners.

Concerns about regressivity of corrective taxes

Ultimately what matters for meeting distributive goals is the distributional impacts of the tax and benefit system **as a whole**, not the progressivity or regressivity of any single tax:

- excise taxes are an effective way of tackling externalities as they alter the **relative prices consumers face**

- policy makers can offset the regressivity of corrective taxes through adjustments to the income tax and benefit system

- understanding the distributional impact of excise taxes is important in determining how to offset excise tax reforms that on their own would be regressive

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Conclusion

Corrective taxes are effective instruments for correcting for the presence of externalities or internalities in a market.

Implementing them involves overcoming complicating factors:

- often poor measurement of the external costs

- variation in the marginal externality of consumption across individuals

- concerns about distributional effects

We can use economic theory and empirical analysis to tackle these issues and help guide better corrective tax design.

Crawford, Keen, and Smith, 'Value Added Tax and Excises', Dimensions of Tax Design (2010): includes an extended discussion about how we measure external costs of smoking / alcohol consumption, and the challenges in doing so.

Maynard, Godfrey, and Hardman, 'Conceptual Issues in Estimating the Social Costs of Alcohol' (1994): one such study that seeks to estimate the total externalities associated with alcohol consumption. They find the total external costs to be around 2.7 billion (in the UK), equivalent to some 17% of pre-tax alcohol expenditure.

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O'Donoghue and Rabin, 'The economics of immediate gratification' (2000): discussion of time-inconsistent preferences

Bernheim and Rangel, 'Behavioural Public Economics: Welfare and Policy Analysis with Non-Standard Decision Makers' (2005): advertising could lead individuals to make decisions not in their underlying interest

Gruber and Koszegi, 'The tax incidence when individuals are time-inconsistent: The case of cigarette excise taxes' (2004): where consumption involves addictive goods

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Additional Resources

Adam and Stroud, 'A roadmap for motoring taxation' (2019): evaluates the current system of motoring taxes as corrective taxes and how the system could be better designed

Griffith, O'Connell and Smith, 'Design of optimal corrective taxes in the alcohol market' (2017): characterises optimal corrective taxation in the soft drinks market

O'Connell and Smith, 'Corrective tax design in oligopoly' (2019): the theory in this lecture assumes perfect competition. This paper considers how optimal tax could be set differently in the context of imperfect competition

Griffith, O'Connell, Smith, Stroud, 'The evidence on the effects of soft drink taxes'(2019): discusses the international evidence on the effects of soft drink taxes and how such studies can be carried out

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