

# Open University Task

## Economics in Practice DD226

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### Case Study: Tobacco Tax – Utilising PED in a CBA

**Learning Objective:** To understand how the theory of Price Elasticity of Demand can be applied in a Cost-Benefit Analysis

**Task Description:** As a supplement to the buildings insurance activity you have been provided with, we will now work together to consider and calculate how the theory of Price Elasticity of Demand (PED) can feed into a Cost-Benefit Analysis (CBA). We will use the UK tobacco tax policy as a real-world case study, followed by questions utilising Excel.

**Contents:**

- Background Context to the UK's Tobacco Tax
- Questions
- Excel Worksheet: "Tobacco\_Tax\_Activity.xls"
- References and Notes
- Appendix A: Answer Key

**Online Resources:**

- [www.erutledge.com/elasticity](http://www.erutledge.com/elasticity)
  - PED examples and calculations
  - CBA basics with a real-world example
  - Access to electronic copies of the key reference materials

## **Case Study - Tobacco Tax in the UK**

Cost Benefit Analysis (CBA) is used extensively in assessing the potential impact of public policies involving government market interventions. In principle they are deployed to determine whether a policy intervention will result in overall net benefits to the economy and society. When government policy interventions involve the introduction of a tax CBA would require economists to estimate the price elasticity of demand (PED) in order to be able to predict the effect of the tax on consumption of the given good or service (e.g., the proposed sugar tax and, the extant alcohol and tobacco taxes).

### **Background to Tobacco Tax in the UK**

Smoking is one of the leading causes of preventable premature mortality in the UK, killing some 120,000 people in the UK every year according to the WHO (n.d.). In England alone there were a reported 489,300 hospital admissions related to smoking from 2017 to 2018 (Office for National Statistics, 2019). Evidence shows that price increases reduce both the quantity of tobacco products consumed and the prevalence of smoking – the share of smokers in the adult population. According to the Office for National Statistics (2019) 14.7% of the adult population in the UK smoked in 2018 or around 7.2 million people. Therefore, tax increases which lead to price rises are considered the most effective policy tool to reduce smoking and successive UK governments have raised tobacco taxes—often at rates well above inflation (WHO, n.d.)—in order to reduce the financial costs created by smoking for the UK.<sup>i</sup> Increasing tobacco taxation is likely to have several economic and societal benefits such as lower NHS costs on smoking related conditions, lower incidence of ill health, reduced early mortality, and increased productivity from less workplace absenteeism. In addition, governments can benefit from the increased tax revenues. On the cost side of the analysis, increasing taxes can lead to more tobacco smuggling and the need to increase policing of the illicit market for illegally imported tobacco products.

### **Estimates of Price Elasticity of Demand for Tobacco products in the UK**

In order to measure the effects of increased taxation and higher tobacco prices on the quantity of tobacco consumed or the prevalence of smoking economists need to estimate the PED for tobacco products. The results of academic research have found varying degrees of PED for tobacco in the UK. Research by Townsend (1996) published in the British Medical Bulletin found overall elasticity of tobacco consumption—to be -0.5, whilst Cullum and Pissarides

(2004) estimated it to be somewhat higher at -0.72. Whilst the PED looks at the effect of price changes on quantity demanded of a product e.g. the number of cigarettes consumed, in analysing the effect of a tobacco tax it is considered more meaningful to look at the prevalence elasticity and its effect on the prevalence of smoking in the UK. The prevalence elasticity is assumed to be 70% of the PED (Reed, 2010).

### **CBA of Tobacco Tax by the Charity ASH**

The public health charity ASH (Action on Smoking and Health) undertook a CBA of increasing the real price of tobacco products by 5% through taxation in 2010.<sup>ii</sup> Using a PED of 0.5% and a prevalence elasticity of -0.35% they estimated the cost-benefits for the UK as set out in Table 1 in the Excel spreadsheet provided.<sup>iii</sup> In 2010 the prevalence of smoking was 21% of adults, ASH calculated using the PED based prevalence elasticity that an increase of 5% in prices would reduce the prevalence of smokers by  $(21\% \times 5\% \times -0.35) = -0.3675\%$  which as a proportion of the adult population at that time represented a reduction in smokers amounting to 190,000 people (Reed, 2010, p. 2). The tobacco escalator of 2% above inflation was renewed in the November 2017 budget. More recently, in 2020, the charity ASH and the UK centre for Tobacco and Alcohol Studies made a representation to the Chancellor of the Exchequer to increase the tax escalator to 5% above inflation for cigarettes (ASH & UKTAS, 2020). However, in the 2020 Budget taxes on cigarettes and cigars were only increased by inflation plus 2% (Cavaglieri, 2020).<sup>iv</sup>

## Questions

**Refer to the previous pages and the tables in the Excel spreadsheet provided.**

*Q1) If the PED for tobacco products ranges between -0.5 to -0.72 is the demand elastic or inelastic? Why might this be the case?*

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*Q2) Refer to Table 1 – according to the CBA produced by public health charity ASH where do most of the benefits of a 5% tobacco tax come from?*

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*Q3) What costs of a 5% tobacco tax does ASH include in its CBA? Can you think of any additional costs that the charity has not included?*

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*Q4) If the prevalence elasticity of smoking is -0.35 (based on a PED of -0.5) and the recommended tax increase is 5% **use the data in Table 2** to calculate the reduction in the number of smokers.*

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*Q5) If the prevalence elasticity is at the higher estimate of -0.5 (based on a PED of -0.72) and the recommended tax increase is 5%, what will be the reduction in smoker numbers? How different is this to the result from Q4?*

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*Q6) Is it important to utilise different PED estimates in the CBA?*

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*Q7) Following the 2020 budget taxes on cigarettes were increased by 2% above inflation. Use the data in Table 3 to calculate the expected impact of the tax on reducing the number of smokers, what is the range of the estimated effect?*

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*Q8) Why do you think the government chose not to follow the recommendations of ASK and UKCTAS and instead of increasing the tax to 5% kept it at 2% above inflation?*

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## References and Notes

- ASH, & UKTAS. (2020). *HM Treasury Budget 2020 Representation from ASH and the UK Centre for Tobacco and Alcohol Studies to the Chancellor of the Exchequer*. Retrieved from [https://ash.org.uk/wp-content/uploads/2020/01/ASH\\_UKCTAS\\_Budgetsubmission2020FINAL.pdf](https://ash.org.uk/wp-content/uploads/2020/01/ASH_UKCTAS_Budgetsubmission2020FINAL.pdf)
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- <sup>i</sup> Cigarette tax includes both a specific and ad valorem tax component. From 1993 to 1999 tobacco duties were increased in real terms annually, initially by at least 3% on average and from 1997 by at least 5% on average. From 1999 real increases in the level of the tax was decided on a budget-by-budget basis. In 2000 tobacco tax increased by 5% in real terms and in subsequent years raised in line with inflation. The tax escalator—percentage increases ranging from 2%–5% above inflation—was reintroduced in 2011.
- <sup>ii</sup> ASH provides the secretariat for the All-Party Parliamentary Group on Smoking and Health (APPG); a cross-party group of Peers and MPs founded in 1976.
- <sup>iii</sup> In their CBA analysis the public health charity ASH followed the guidance set out at that time in the UK Treasury’s Green Book and methods used across government in Regulatory Impact Assessments, similar techniques are used in policy appraisal at the EU level and by international agencies – to be able to compare the effects of the tax all costs and benefits need to be converted into a single metric i.e., their monetary value (Reed, 2010, p. 14).
- <sup>iv</sup> Taxes on hand rolling tobacco were increased by inflation (RPI) plus 6% as previously hand rolling tobacco had been taxed much less than cigarettes (Cavaglieri, 2020).

## Appendix A: Answer Key

Refer to the previous case study and the tables in the Excel spreadsheet provided.

*Q1) If the PED for tobacco products ranges between -0.5 to -0.72 is the demand elastic or inelastic? Why might this be the case?*

It is inelastic, a large increase in price will result in a small fall in quantity demanded. Because tobacco is addictive people find it difficult to give up smoking and therefore continue to buy cigarettes regardless of price rises. Also, in the past there were few substitutes for tobacco, although this is changing and there are now alternatives such as vaping.

*Q2) Refer to Table 1 – according to the CBA produced by public health charity ASH where do most of the benefits of a 5% tobacco tax come from?*

They come from increased tax revenues and the value of extra life.

Discussion point: Raising taxes is clearly not the main aim of the policy.

*Q3) What costs of a 5% tobacco tax does ASH include in its CBA? Can you think of any additional costs that the charity has not included?*

ASH includes the cost of increased pensioner benefits (average £3.6mn) which would result from the higher life expectancy of people giving up smoking. They could have included the cost of extra policing of the illicit trade in cigarettes and the unequal effect on low income families.

*Q4) If the prevalence elasticity of smoking is -0.35 (based on a PED of -0.5) and the recommended tax increase is 5% use the data in Table 2 to calculate the reduction in the number of smokers.*

The reduction in number is 134,808 people (refer students to Excel calculations sheet if necessary)

*Q5) If the prevalence elasticity is at the higher estimate of -0.5 (based on a PED of -0.72) and the recommended tax increase is 5%, what will be the reduction in smoker numbers? How different is this to the result from Q4?*

The reduction in the number of smokers will be larger at 194,123

*Q6) Is it important to utilise different PED estimates in the CBA?*

Different PED estimates produce different results in terms of the reduction in smokers. For any CBA to be credible it would need to account for this range of results and report this. In fact, the ASH report does include a range of scenarios.

*Q7) Following the 2020 budget taxes on cigarettes were increased by 2% above inflation. Use the data in Table 3 to calculate the expected impact of the tax on reducing the number of smokers, what is the range of the estimated effect?*

A reduction of between 53,923 and 77,649 people.

*Q8) Why do you think the government chose not to follow the recommendations of ASK and UKCTAS and instead of increasing the tax to 5% kept it at 2% above inflation?*

The newly elected conservative government may have been swayed by fears of (1) losing voter support among groups which have high smoking propensity such as those in manual occupations (where 1 in 4 smokes), according to the ONS and/or (2) by manufacturers arguments that increased tobacco taxes increases illegal smuggling of tobacco which then requires greater funding for policing.