



Case Studies

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Case 1.2

Green Economics

Taking account of environmental costs

People have become concerned by a number of environmental problems in recent years. These include:

- [The greenhouse effect](#). This is caused by carbon dioxide and other ‘greenhouse’ gases emitted by power stations, various industries, livestock and vehicles. The fear is that these gases will cause a heating of the Earth’s atmosphere. This will lead to climatic changes which will affect food production. It will also lead to a raising of sea levels and flooding as part of the polar ice caps melts.
- [Acid rain](#). This is caused by sulphur and nitrogen emissions from power stations, industry and cars. It has been blamed for ‘Walsterben’ (forest death) in Central Europe and the contamination of many lakes and streams, with the death of fish and plant life.
- [Depletion of the ozone layer](#). This is caused by the use of CFC gases in aerosols, refrigerators and the manufacture of polystyrene foam. The ozone layer protects us from harmful ultra-violet radiation from the sun. A depletion of this layer could lead to increased skin cancer. The use of CFCs has been banned in most countries.
- [Nuclear radiation](#). The fear is that accidents or sabotage at nuclear power stations could cause dangerous releases of radiation. The disposal of nuclear waste is another environmental problem. The disasters at [Chernobyl](#) in 1986 and at [Fukushima](#) in 2011 are two dramatic examples of the release of nuclear radiation.
- [Land and river pollution](#). The tipping of toxic waste into the ground or into rivers can cause long-term environmental damage. Soils can be poisoned; rivers and seas can become polluted. It is not just industry that is to blame here. Sewage pollutes rivers and seas. Nitrogen run-off and slurry from farming are also major pollutants. In recent years, fracking has emerged as a new technology that can extract shale gas. Some people are concerned about the [impact of fracking on water supplies](#) and the potential to pollute land above fracking sites.

It was not until the late 1960s and early 1970s that the ‘environment’ became more firmly part of the political agenda in most European countries. It was largely a response not only to the spectacular growth of the western economies, but also to the continued and extensive industrialisation of the Eastern bloc countries such as Poland and the USSR.

‘Green groups’ sprang up round the world. These groups realised that if economic growth was to be sustained then environmental damage could grow at an alarming rate.

The problems such groups have encountered in attempting to change attitudes and economic strategies have been immense. Certain governments have been reluctant to enter international environmental agreements perceiving them to be against their national interest. The cut in sulphur dioxide emissions from power stations is one such example.

The costs of pollution abatement are high, especially in the short run. As long as these short-run costs are greater than the perceived costs of continuing pollution, then industry and government will continue to incur them. The consequences of this, however, could be devastating and far more costly in the long run, in both a financial and an environmental sense.

What can [economists](#) ([see also](#), [and also](#)) say about the causes of these environmental problems? There are three common features of these problems:

- *Ignorance.* It is often not for many years that the nature and causes of environmental damage are realised. Take the case of aerosols. It was not until the 1980s that scientists connected their use to ozone depletion.
- *The polluters do not pay.* The costs of pollution are rarely paid by the polluters. Economists call such costs *external costs*. Because polluters rarely pay to clean up their pollution or compensate those who suffer, they frequently ignore the problem.
- *Present gains for future costs.* The environmental costs of industrialisation often build up slowly and do not become critical for many years. The benefits of industrialisation, however, are more immediate. Thus governments, consumers and industry are frequently prepared to continue with various practices and leave future generations to worry about their environmental consequences. The problem then is a reflection of the importance people attach to the present relative to the future.

Environmentalists recognise these problems and try through the political process and various pressure groups, such as [Friends of the Earth](#) and [Greenpeace](#), to reduce people's ignorance and to change their attitudes.

They stress the need for clean technologies, for environmentally sound growth and for greater responsibility by industry, consumers and government alike. Policies, they argue, should prevent problems occurring and not merely be a reaction to them once they are nearing crisis point. If growth is to be sustainable into the long term, with a real increase in the quality of life, then current growth must not be at the expense of the environment.

Questions

1. Should all polluting activities be banned? Could pollution ever be justified? Explain your answer.
2. Fracking has been the subject of vigorous local protests in the UK. What challenges does this present for policy makers?

Activity: individual or group

Investigate a particular industry of your choice and consider the impact on the environment of production by this industry. Also consider any environmental impacts of the consumption of its products.

Choose a particular firm in this industry. Does it have an explicit environmental strategy? How has this affected its production and/or consumption of its products? Is it influenced by government environmental policies?

As a group, you could compare the answers of individual students for their chosen industries and firms and discuss whether there are common themes that emerge across different industries and firms.

Answers to Box Questions

Chapter 2

Box 2.1: The demand for lamb

Using equation (1), calculate what would happen – *ceteris paribus* – to the demand for lamb if:

- (a) the real price of lamb went up by 10p per kg;
- (b) the real price of beef went up by 10p per kg;
- (c) the real price of pork fell by 10p per kg;
- (d) real disposable income per head rose by £100 per annum.

Are the results as you would expect?

- (a) The demand would go down by 1.37 grams per person per week (i.e. 10×-0.137).
- (b) The demand would go down by 0.34 grams per person per week (i.e. 10×-0.034).
- (c) The demand would go down by 2.14 grams per person per week (i.e. -10×0.214).
- (d) The demand would go down by 0.513 grams per person per week (i.e. 100×-0.00513).

In terms of (a) and (c) the results are what you would expect. A rise in the price of lamb results in a fall in the quantity demanded, indicating a downward-sloping demand curve. A fall in the price of pork results in a rise in the demand for lamb – what you would expect if they are substitutes.

In terms of (b), however, the negative impact of the increase in the price of beef on the demand for lamb appears to indicate that they are complements in consumption (see answer to question 3. below). If, as is likely, consumers regard them as substitutes, it would have been expected that the demand for lamb would have risen.

Also, if lamb were a normal good, a rise in income would have resulted in a *rise* in demand for lamb, not a fall (see answer to question 2. below). As it is, the equation appears to indicate that lamb is an inferior good.

1. How does the introduction of the variable TIME affect the relationship between the demand for lamb and (a) its real price; (b) real disposable income per head?

- (a) The demand for lamb is more sensitive to a change in its price than in the first equation (the coefficient has changed from -0.137 to -0.151).
- (b) The demand for lamb is less sensitive to a change in real personal disposable income per head than in the first equation (the coefficient has changed from -0.00513 to -0.000391).

2. Does lamb appear to be a normal good or an inferior good?

An inferior good, albeit less so in the second equation than in the first. The reason for this reduction that, by introducing the *TIME* term, we are now allowing for the *fall* in demand for lamb over time as a result of a shift in tastes away from meat. In other words, the second equation allows us to take this factor into account when looking at the effect of a change in real disposable income per head on the demand for lamb.

3. What does the negative coefficient of P_B indicate?

It implies that lamb and beef are complementary goods, which is clearly *not* the case. It would be expected that they are substitutes (with the price of beef having a positive coefficient), such that as the price of beef rises the demand for lamb would go *up* as consumers switch from beef to lamb. The text in the box following on from this question explains why the coefficient was negative rather than positive.

1. *To what extent is model (3) an improvement on model (2)? (Hint: is lamb now a normal or inferior good?)*

The model now suggests that lamb is a normal good (the sign on Y is positive in equation (3), whereas it was negative in equation (2)). It also includes a lagged consumption of lamb variable (consumption in the previous year) and a variable for a major complement (potatoes). The signs on these two additional variables (positive and negative respectively) are as you would expect. Also the adjusted R^2 has risen from 0.913 to 0.958.

2. *Use the three equations and also the data given in the table below to estimate the demand for lamb in 2000 and 2010. Which model works the best in each case? Why? Explain why the models are all subject to error in their predictions.*

Equation 1:

$$\begin{aligned} 2000: \quad Q_L &= 144.0 - (0.137 \times 467.0) - (0.034 \times 480.5) + (0.214 \times 381.1) - (0.00513 \times 17,797) \\ &= 144.0 - 63.98 - 16.34 + 81.56 - 91.30 \\ &= \mathbf{53.94} \text{ (grams per person per week)} \\ 2010: \quad Q_L &= 144.0 - (0.137 \times 506.2) - (0.034 \times 470.1) + (0.214 \times 381.1) - (0.00513 \times 19,776) \\ &= 144.0 - 69.35 - 15.98 + 81.56 - 101.45 \\ &= \mathbf{38.78} \text{ (grams per person per week)} \end{aligned}$$

Equation 2:

$$\begin{aligned} 2000: \quad Q_L &= 121.4 - (0.151 \times 467.0) - (0.0213 \times 480.5) + (0.180 \times 381.1) - (0.000391 \times 17,797) \\ &\quad - (1.728 \times 27) \\ &= 121.4 - 70.52 - 10.23 + 68.60 - 6.96 - 46.66 \\ &= \mathbf{55.63} \text{ (grams per person per week)} \\ 2010: \quad Q_L &= 121.4 - (0.151 \times 506.2) - (0.0213 \times 470.1) + (0.180 \times 381.1) - (0.000391 \times 19,776) \\ &\quad - (1.728 \times 37) \\ &= 121.4 - 76.44 - 10.01 + 68.60 - 7.73 - 63.94 \\ &= \mathbf{31.88} \text{ (grams per person per week)} \end{aligned}$$

Equation 3:

$$\begin{aligned} 2000: \quad Q_L &= -37.520 - (0.128 \times 467.0) + (0.0757 \times 480.5) + (0.122 \times 381.1) + (0.00415 \times 17,797) \\ &\quad - (1.529 \times 27) + (0.679 \times 56) - (0.0519 \times 44.9) \\ &= -37.52 - 59.78 + 36.37 + 46.49 + 73.86 - 41.28 + 38.02 - 2.33 \\ &= \mathbf{53.83} \text{ (grams per person per week)} \\ 2010: \quad Q_L &= -37.520 - (0.128 \times 506.2) + (0.0757 \times 470.1) + (0.122 \times 381.1) + (0.00415 \times 19,776) \\ &\quad - (1.529 \times 37) + (0.679 \times 46) - (0.0519 \times 53.5) \\ &= -37.52 - 64.79 + 35.59 + 46.49 + 82.07 - 56.57 + 31.23 - 2.78 \\ &= \mathbf{33.72} \text{ (grams per person per week)} \end{aligned}$$

As the chart and table in the box show, the consumption of lamb was 54 grams pppw in 2000 and 44 grams pppw in 2010. Taking the two specific years together, equation 3 predicts better than equation 2, but equation 1 predicts better than the other two equations.

All models are subject to error in their predictions as they cannot take account of all determining factors. Even the ones that are included will change in their effects over time.

3. Use model (3) and the data given in the table to explain why the demand for lamb fell so dramatically between 1980 and 2010.

There was a general shift away from the consumption of lamb, as shown by the negative coefficient on the TIME term; the real price of lamb rose over the period and P_L has a relatively large negative coefficient; the real price of potatoes rose and P_C also has a negative coefficient; the real price of both beef and pork, however, fell and the P_B and P_P terms have *positive* coefficients.

Box 2.2: UK house prices

1. Draw supply and demand diagrams to illustrate what was happening to house prices (a) in the second half of the 1980s and the period from 1997 to 2007; (b) in the early 1990s and 2008-12; (c) 2014-16 in London, and in a region outside SE England.

- (a) Demand was rising rapidly. There was thus a continuing rightward shift in the demand curve for houses and a resulting rise in the equilibrium price.
- (b) Demand was falling. The leftward shift in the demand curve for houses led to a fall in the equilibrium price.
- (c) In London demand was rising strongly, so the demand curve shifted rightward as in (a). In some areas outside the SE England demand increased but at a slower rate. In other areas demand remained flat so there was no systematic movement in the demand curve and prices were stable.

2. What determines the supply of housing? How will factors on the supply side influence house prices?

Although they are less important than demand-side factors, they are, nevertheless important in determining changes in house prices. Two of the most important are the expectations of the construction industry and house buyers. In terms of the construction industry, if house building firms are confident that demand will continue to rise, and with it house prices, they are likely to start building more houses. The resulting increase in the supply of houses (after the time taken to build them) will help to dampen the rise in prices. The expectations of house owners are also important. If people think that prices will rise in the near future and are thinking of selling their house, they are likely to delay selling and wait until prices have risen. This (temporary) reduction in supply will help to push up prices even further.

Another important factor that influences the supply of housing is planning regulations. Building firms may be confident of increasing demand in certain regions of the country but are unable to build new houses because they cannot secure planning permission. The government has tried to ease planning regulations in recent years.

3. What is the role of the prices of 'other goods' in determining the demand for housing?

'Other goods' may be substitutes, or complements, or neither. Substitutes for owner-occupied housing include rental property – if rents are high that may increase demand for house purchase. Although we have to be careful here, since high house prices will also be a determinant of high rents. Less obvious substitutes will include food, fuel and other necessities, since the less disposable income households have, the lower their demand for housing will be. In terms of complements, the cost of doing up a house may be important; furnishings, decoration materials and consumer goods such as washing machines may all be relevant.

4. Find out what forecasters are predicting for house prices over the next year and attempt to explain their views.

You can find details from websites B7–11, accessed from the [Hotlinks section](#) of the Sloman Economics website. Your explanation should focus on the various factors listed in the box. The impact of uncertainty following the result of the EU referendum is likely to be a significant factor.

Box 2.3: Stock market prices

1. If the rate of economic growth in the economy is 3 per cent in a particular year, why are share prices likely to rise by more than 3 per cent that year?

Because share prices tend to reflect *changes* (or anticipated changes) in the rate of economic growth. Thus if economic growth rose (or was anticipated to rise) from 1 to 3 per cent (a 200 per cent increase in the rate of economic growth), share prices may rise by considerably more than 3 per cent. If, however, economic growth fell (or was anticipated to fall) from 5 to 3 per cent, then share price would be likely to *fall*. Since 3 per cent economic growth is above the long-term average, economic growth is more likely to have *risen* to 3 per cent than fallen to 3 per cent, with share prices correspondingly rising by more than 3 per cent.

2. Find out what has happened to the FTSE 100 index over the past 12 months and explain why (see site B27 on the hotlinks part of the website).

Your explanation should focus the various factors influencing demand and supply as outlined in the box.

3. Why would you expect the return on share prices to be greater than that offered by a bank savings account?

There is little, or no, risk involved in putting money in the bank. Banks rarely fail, and since 2007 governments have demonstrated that they are unwilling to let them do so. In contrast, the value of shares fluctuates and there are potentially large losses to be made, as well as substantial gains. To invest in the stock market, people need higher expected returns to compensate them for this extra risk.

Box 2.4: Advertising and its effect on demand curves

1. Think of some advertisements which deliberately seek to make demand less elastic.

Those that strongly promote a brand, so that in the consumer's mind there are no close substitutes.

2. Imagine that 'Sunshine' sunflower spread, a well-known brand, is advertised with the slogan: 'It helps you live longer'. What do you think would happen to the demand curve for a supermarket's own brand of sunflower spread? Consider both the direction of shift and the effect on elasticity. Will the elasticity differ markedly at different prices? How will this affect the pricing policy and sales of the supermarket's own brand? What do you think might be the response of government to the slogan?

It depends on the extent to which the consumer is led to believe that sunflower spreads *generally* help you to live longer, in which case the demand for the supermarket's brand is likely to shift to the right and become less elastic as consumers are less prepared to switch to non-sunflower spreads. If, however, the consumer is led to believe that it is specifically 'Sunshine' spread that makes you live longer, then the demand for the supermarket's brand (and all others) will shift to the left.

Box 2.5: Any more fares?

1. Estimate the price elasticity of demand between 40p and 50p and between 50p and 60p.

The mid-point formula for price elasticity is $\Delta Q_d / \text{average } Q_d \div \Delta P / \text{average } P$.

Thus between 40p and 50p, price elasticity equals $-2/5 \div 10/45$

$$= -2/5 \times 45/10 = -9/5 = -1.8 \text{ (elastic)}$$

And between 50p and 60p, price elasticity equals $-1/3.5 \div 10/55$

$$= -1/3.5 \times 55/10 = -11/7 = -1.57 \text{ (elastic)}$$

2. Was the 50p fare the best fare originally?

No. A profit of £2 000 000 – £1 800 000 = £200 000 was made. At a price of 40p, however, a higher profit of £2 400 000 – £1 800 000 = £600 000 could have been made.

3. The company considers lowering the fare to 30p, and estimates that demand will be 8.5 million passenger miles. It will have to put on extra buses, however. How should it decide?

If it lowers the price to 30p, the revenue will rise to £2 550 000 (30p × 8.5m). But putting on extra buses will also increase costs. It will be worth lowering the price, therefore, only if the increase in revenue is greater than the increase in costs. (See section 6.6 of the text.)

*Box 2.6: Using calculus to calculate the price elasticity of demand

Calculate the price elasticity of demand on the above demand curve at a price of (a) 5; (b) 2; (c) 0.

Given that $Q_d = 60 - 15P + P^2$

then $dQ/dP = -15 + 2P$.

Thus using the formula, $P\epsilon_d = dQ/dP \times P/Q$, the elasticity at each of the above prices equals:

$$(a) (-15 + (2 \times 5)) \times (5/(60 - (15 \times 5) + 5^2))$$

$$= -5 \times 5/10 = -2.5$$

$$(b) (-15 + (2 \times 2)) \times (2/(60 - (15 \times 2) + 2^2))$$

$$= -11 \times 2/34 = -0.65$$

$$(c) (-15 + (2 \times 0)) \times (0/(60 - (15 \times 0) + 0^2))$$

$$= -15 \times 0/60 = 0$$

Box 2.7: Short selling

1. Why would owners of shares, such as pension funds, lend them to short sellers rather than selling the shares themselves and then buying them back later?

Because either (a) they estimate that the price is unlikely to fall or not fall far enough to be more profitable than earning the fee from the short sellers or (b) they are unwilling to take the risk (i.e. they are more 'risk averse' (see section 5.1) than the short sellers).

2. Why are the potential benefits of short selling for the economy?

Short sellers may help to identify shares that are over valued and so lead to prices adjusting more quickly to the underlying market level. Short selling may also help to increase the level of liquidity in a market. Some economists have published research (e.g. [Beber and Pagano, 2013](#)) that suggests that the ban on short selling during the financial crisis was actually harmful for the economy.

3. *'Naked' short selling has been banned in many countries. What exactly is naked short selling?*

Short selling is where traders sell shares they have already borrowed or agreed to borrow off other dealers. 'Naked' short selling is where traders sell shares they have not already borrowed or have not made any agreements with dealers to borrow. In other words they do not know for sure whether they can obtain the shares they have agreed to sell! If they do not obtain the shares in the time period required for the transaction to be completed it is known as a 'failure to deliver'.

Box 2.8: Dealing in futures markets

If speculators believed that the price of cocoa in six months was going to be below the six-month future price quoted today, how would they act?

They would make a future contract to sell cocoa in six months' time at the future price quoted today (even though they do not yet have any cocoa to sell!). They hope then to buy cocoa in six months' time at the lower (spot) price in order to supply it as agreed. In other words, they buy at the lower spot price and sell at the higher future price. Their profit, after commission, is the difference in price.