Models

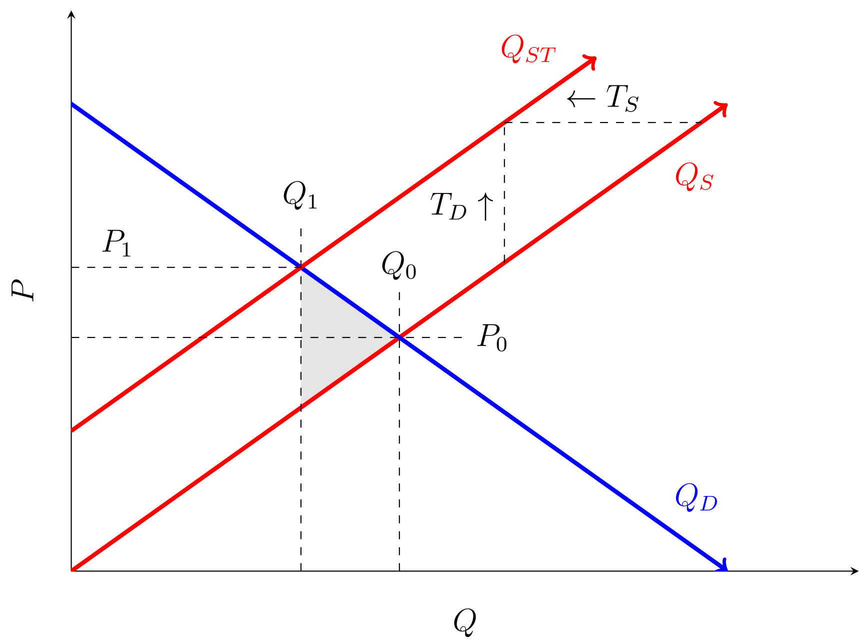
This subject deals with models; simplifications and idealisations of real world situations. While these might not be directly useful, they can help us gain an understanding as to how a more realistic situation might pan out.

Supply and Demand

Obesity

An example application of supply and demand can be observed in the rise of obesity among people in Australia in the recent past. This is a social problem which has implications for the economy and for government policy. A possible policy to counteract this issue is taxation of junk food.

The natural implication of taxation is that an increased price due to the tax will result in a lower equilibrium consumption quantity. We can consider the a model of supply in the junk food market to see the impacts. If we take a supply curve, which is upward sloping as a higher price implies a greater number of suppliers with incentive to produce such as $Q_S = P$ and a demand curve like $Q_D = c - P$ (negative, as higher price disincentivises purchase), we can plot the two to find an equilibrium price and quantity level.



If we want to desire the consumption level to some defined quantity Q_1, we need to increase the price by a relevant amount. If we charge a flat tax of some amount T, we will find that the price increases by exactly T. If this tax is applied on the supplier side, we will observe a reduction in quantity from Q_S to Q_ST, as shown by T_S. If it is applied on the demand side, we will observe an increase in price presenting an effective supply curve of Q_ST, as shown by T_D. In either case, the gray shaded region represents a deadweight loss of welfare and the tax revenue is given by $T \times Q$.

While conceptually this makes sense to us, in reality studies have found that such taxes have a smaller effect than predicted on consumption of junk food. This suggests that junk food is actually highly price inelastic at current quantities; it is not strongly affected by the price.

Price Elasticity of Demand

Price elasticity of demand is given by change in quantity per unit quantity divided by change in price per unit price. That is

$$E_P = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Which is simply the inverse of the slope of the demand curve multiplied by the ratio of price to quantity. This means that at low quantities, the ratio of price to quantity will be larger so the elasticity will be higher, as for a linear curve, the inverse of the slope is a constant. Generally elasticity is always negative, so we simply use the absolute value. Depending on the value of price elasticity we use certain terminology

- If $|E_P| > 1$ we say that demand is price elastic, which means that a given percentage change in price will lead to a greater percentage change in quantity.
- If $|E_P < 1|$ we say that demand is price inelastic, suggesting that a percentage change to price will produce a smaller percentage change in quantity.

Individual Choice

In reality, individuals might maximise welfare through different means, different quantities of junk food, etc. In microeconomics, agents need to make decisions between goods. Here, we will consider how agents will find an optimal basket of two goods. We can consider an example of how many hours one should study. If the benefit derived from h study hours is

$$B = \omega h$$

Where ω is some constant. Then our marginal benefit of studying is

$$\frac{\mathrm{d}B}{\mathrm{d}h} = \omega$$

If this was the only information we had, then it would be optimal to spend all time studying. However, we must also consider the costs involved in studying some amount, which we can model as

$$C = \frac{h^2}{4} \Rightarrow MC = \frac{\mathrm{d}C}{\mathrm{d}h} = \frac{1}{2}h$$

The net benefit of one hour of study is then $B - C = B_N = \omega h - \frac{h^2}{4}$. We can find the point to maximise benefit by setting the derivative of net benefit equal to zero.

$$\frac{\mathrm{d}B_N}{\mathrm{d}h} = 0 \Rightarrow \omega - \frac{1}{2}h = 0 \Rightarrow h = 2\omega$$

This is equivalent to finding $B' = C'$ or $MB = MC$.

This can be generally applied; if we want to incentivise an action, we should lower the marginal cost of this action and increase its marginal benefit.

Short-Termism

In some settings, we find that people consistently fail to make decisions which maximise their welfare. For example, in Africa governments often heavily subsidise mosquito nets and yet adoption is still fairly lower, because people don't consider the future benefit sufficiently.

We can model this as a *discount factor*, V which influences our evaluation of future benefit from a present investment. For a future benefit of magnitude G, at a present price of F, an individual will only make the transaction if for them

$$\frac{G}{V} \geq F$$

Thus, individuals with higher discount factors are likely to be disincentivised from making decisions that may appear to lead to a large increase in welfare for them in the future.