



Sample: Economics - Supply and Demand Model

Assignment questions

In 2012, the Australian Government introduced a scheme to put a price on carbon dioxide equivalent greenhouse gas emissions. Companies or corporations that emitted more than 25,000 tonne/yr were required to hand in units or permits equivalent to offset their emissions.

Initially these businesses received some free permits from the Government and then had to buy the balance at a fixed price (approximately \$24/tonne in 2013). The Government received the revenue from selling permits/units to electricity generators, just as if they received tax revenue so this was the equivalent of a tax on production. Major electricity companies or corporations were one of the most affected sectors because of a high reliance on coal as a source of electricity in Australia.

Prior to the Federal Election of September 2013, the government of the time promised to reduce the price on emissions. It was also the intention of that government to move towards an emissions trading scheme in which emitters could buy permits and offsets (such as forest plantings to sequester greenhouse gases) in an open market. The price would be set by supply and demand, not by the Government. Over time, the Government could however, reduce the number of permits available in the market.

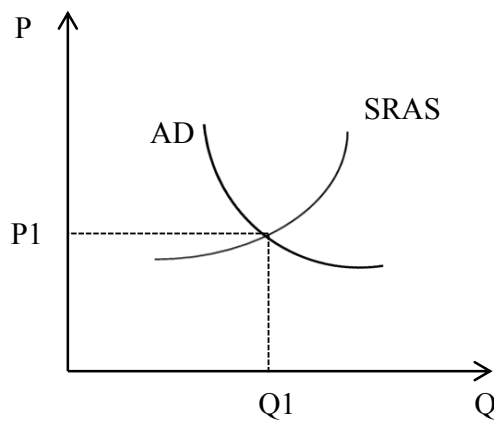
Following the Federal Election of September 2013, the new Government promised to remove the whole scheme so there is unlikely to be any development of emissions trading in the near future in Australia, though there are floating price schemes operating elsewhere, such as in the European Union (the EU ETS).

Use the case of the electricity industry to complete the following assignment tasks.

Question 1

Using a supply and demand model for electricity, show how the introduction of a fixed price on carbon emissions would theoretically affect supply and demand in the market for household electricity.

First of all, it's appropriate to define the concept of Supply-Demand Model. Supply and demand is an economic model of price determination in a market, that concludes that in a competitive market, the unit price for a particular good will vary until it settles at a point where the quantity demanded by consumers at current price will equal the quantity supplied by producers at current price, resulting in an economic equilibrium for price and quantity. So, an interaction of sellers and buyers in the market can help to determine the market price, thereby allocating scarce goods (in our situation, for instance, it helps to determine the market price for permits for carbon dioxide equivalent greenhouse gas emissions) efficiently. It is very important because this price is taken into account when deciding how much to consume, and also how much to produce. We can show it graphically:



AD – is aggregate demand (the total demand for final goods and services in the economy at a given time and price level)

SRAS – is short run aggregate supply (the total (or aggregate) real production of final goods and services available in the domestic economy at a range of price levels, during a period of time in which some prices, especially wages, are rigid, inflexible, or otherwise in the process of adjusting).

P1 – is an equilibrium price level.

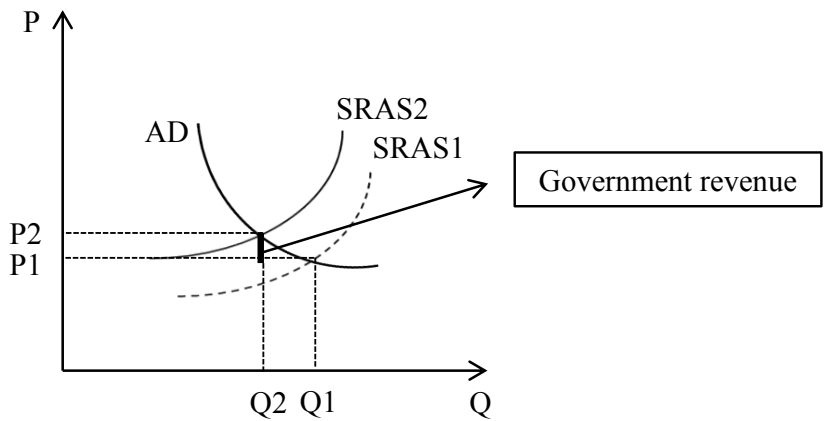
Q1 – is an equilibrium output.

The price plays an essential role not only for electricity producers (an increase in price level lead to the desire of electricity generators to produce more, because it's beneficial for them and provides an opportunity to earn more profits), but also for electricity consumers (an increase in price level lead to reduction in electricity demand due to the decrease in the purchasing power of households).

But there are also influences other than price that can play a role in keeping the market from being truly efficient and at equilibrium. For instance, we can name the following factors that can lead to shifts in demand/supply curves:

- State of economic activity;
- The level of taxation;
- Tastes and preferences of the consumers;
- Changes in the prices of related goods;
- Income of the consumers;
- The price of factors of production;
- A change in technique of production;
- Internal peace and stability etc.

In our situation the introduction of a fixed price on carbon emissions will have the same effect as introduction of a higher level of taxation. So, it tends to increase in price level for electricity. That will lead to decrease in customers demand for electricity and as a result aggregate supply curve will shift to the left. We can also show it graphically at the graph bellow:



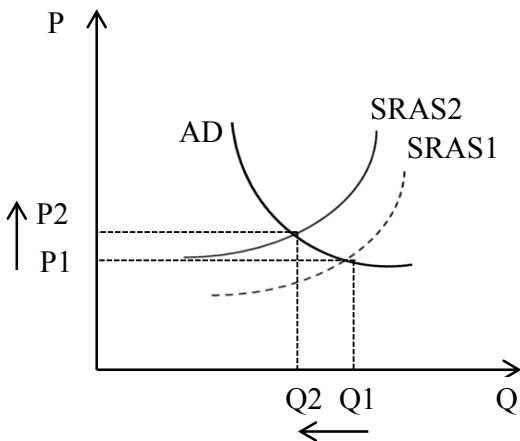
So, the customers will buy less at the higher price level.

Question 2

Is the burden of the emissions pricing likely to be borne more by suppliers or more by consumers of electricity? Using diagram(s) illustrate and explain your answer.

It's necessary to note that taxes or equivalent payments will typically constitute a greater burden for whichever party has a more inelastic curve, which means that a producer (consumer) will produce (demand) the same quantity no matter what the price. For example, if supply is inelastic and demand is elastic, the burden will be greater on the producers.

In our task we assume that both supply and demand are elastic. So, the burden of the emissions pricing is likely to be borne more by consumers, because they have to pay more receiving a smaller amount of electricity while suppliers sell smaller amount of the products but at higher price level. We can see it on the graph below:



So, as we can see at the graph, the introduction of a fixed price on carbon emissions will lead to shift in supply curve (from SRAS1 to SRAS2). So, the quantity of electricity generated by electricity producers will reduce from Q1 to Q2. At the same time the households begin to consume less (from Q1 to Q2). But for each new unit of electricity households have to pay a higher price. So, we can



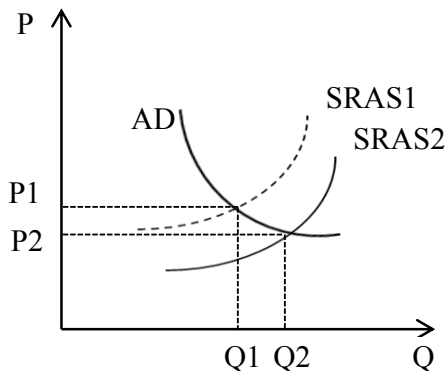
summarize that the burden of the introduction of a fixed price on carbon emissions falls on consumers.

Question 3

If the emissions price was reduced by half, show what would happen to:

- Demand for electricity
- The price of electricity to consumers
- Government revenue

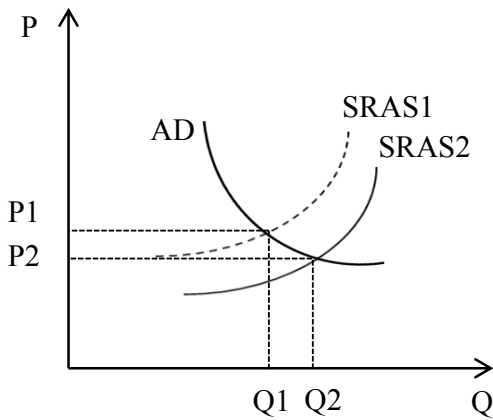
It is known that if the price rises more potential customers will decide that the item isn't worth the price and will either do without or find a cheaper substitute and vice versa – if the price falls it will lead to increase in demand for goods. So, demand for electricity will rise due to decrease in price level for electricity. As for government revenue it is necessary to note that it directly depends on the amount of electricity bought by consumers. So, if the amount of electricity consumed increases by more than half, the government revenue will increase. If the quantity of electricity consumed increases by less than half, the government revenue will decrease. And if the quantity of electricity consumed increases by half, the government revenue will remain constant. In other words if $(Q2/O1) < \frac{1}{2}$ - the government revenue will decrease, if $(Q2/O1) > \frac{1}{2}$ government revenue will increase and $(Q2/O1) = \frac{1}{2}$ - the government revenue will remain constant. We can also show it on the graph



Question 4

If the electricity producers increased their use of renewable energy sources, such as solar and wind power, show what would happen to Government revenue from the fixed price scheme.

In this case the aggregate supply curve will shift upwards because of increase in the amount of produced electricity. And the Government revenue will decrease because the electricity generators don't have to buy any permits for usage of renewable energy sources. So, we can summarize that if government uses the fixed price approach its revenue directly depends on carbon dioxide equivalent greenhouse gas emissions. The usage of renewable energy sources, such as solar and wind power lead to decrease in such emissions and thus to decrease in Government revenue.



Question 5

From an economist’s point of view, compare the fixed price approach to an emissions trading scheme, considering efficiency (lowest cost to all parties) and effectiveness (reduction i emissions). Explain your answer in terms of supply, demand and government revenue.

Now we are going to discuss the main advantages and disadvantages of two approaches that the government can implement to reduce carbon dioxide equivalent greenhouse gas emissions. And we’ll try to compare the effect of the fixed price approach and an emissions trading scheme on electricity producers’ activity and government revenue.

First of all we have to note that the emissions trading scheme is more beneficial for electricity generators because it reflects a producer's willingness to pay for costs and benefits of the permits for carbon dioxide equivalent greenhouse gas emissions. This can lead to cost reductions undertaken by producers of electricity. So, it is appropriate to determine the mechanism of market pricing using the demand and supply model (because the forces of demand and supply combine to determine the market price). Market forces will tend to generate prices for products that will bring the quantity demanded by consumers into equality with the quantity supplied by producers (Gwartney, Stroup, Sobel, and MacPherson., 2006). At this equilibrium price, the actions of the consumer-buyers and producer-sellers will be in harmony. Both will be able to realize their choices simultaneously. Therefore we can conclude that the advantage of an emissions trading scheme to the fixed price is that the price is set according to the market demand

But we also have to remember that the increase in demand will lead to increase in price level (Collin Fitzsimmons). It can be explained as follows: if demand increases and supply remains unchanged, a shortage occurs, leading to a higher equilibrium price. So, if the number of electricity producers wishing to buy permits and offsets (such as forest plantings to sequester greenhouse gases) in an open market increases, then the price of this product also will increase, adversely affecting the business activity. So, in this situation it may be more convenient for electricity producers to use fixed price approach instead of an emissions trading scheme to reduce their costs. The other argument that can be used in favor of fixed price approach is that If we consider the companies’ planning process, it can be more convenient for electricity generators to use fixed price approach instead of an emissions trading scheme, as in this case, it is easier to forecast future costs,



and therefore to form a more efficient strategy. We can also note that planning helps an organization chart a course for the achievement of its goals. This process includes identifying what has to be improved operationally in the upcoming year, so it plays essential role in business activity. The question of the importance government interference in economic activities has been debated for a very long time by the economists all over the world. With the growing importance of the role of government in economic welfare, the modern economists firmly believe that the sphere of government in economic development has no boundary. And the regulation of carbon dioxide equivalent greenhouse gas emissions must be an essential part of this regulation. We have seen that perfectly competitive markets can provide an efficient (socially and technically) level of goods and services to an economy's citizens, without any government involvement in the markets (Michael F. Williams). So, the government can use such instruments as permits and offsets (such as forest plantings to sequester greenhouse gases) to reduce the emission. We have to note that in this situation the fixed price approach is more efficient than an emissions trading scheme, because in this case the government can control the price level and can raise the prices in order to reduce the emission, which is impossible in the situation when we use an emissions trading scheme. The other point is government revenue, because the government obtained its revenue from selling the permits and offsets. On the one hand the the fixed price approach allows the government to choose the price for permits and thus regulate the revenue. But, the emissions trading scheme can lead to increase in demand for these permits and as follows to increase the government revenue. So, these two approaches have advantages and disadvantages both for the government and for the electricity generators. And it is important to weigh the pros and cons while implementing one of them.

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