The Cost of Controlling Climate Change

Prof. Sir James Mirrlees

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Climate change desires

• In December, the UN will hold a major meeting, to agree emission targets.

• Most governments have agreed that the increase in temperature since pre-industrial times should be kept below 2°C (on average).

• It is uncertain how temperature is related to carbon in the atmosphere. The real target is keeping carbon in the atmosphere from getting too high.
The nations are talking of an emission path that would rise from nearly 40 billion tons now, peaking in five years, than falling steadily, below 20 B in 2050, and continuing to fall to something small by the end of the century.

Since the ideal temperature increase is different for different countries, this much agreement is remarkable – and fragile.
Climate policy

• One way of achieving these results is carbon taxation, or similar institutions, such as cap-and-trade markets.
• The tax is applied at different rates to different fossil fuels, depending on the CO2 emissions that are generated.
• It is difficult to apply everywhere: how do you tax farm animals?
• There should be a subsidy to growing plants.
Effects

• What is the carbon tax to achieve?
  – Reduce consumption of carbon-emitting substances. E.g. less travel.
  – Encourage production of services by non-polluting techniques.
  – Provide incentives to develop new technologies that emit less, or no, carbon gases.

• Tax must continue and be expected to.

• Higher tax rates will have a bigger effect.
Long run effects

- With existing technologies, eventually:
  - Electricity will be by hydro, wind, solar, nuclear.
  - All domestic services will be electrical.
  - People will live closer to work, and stay at home more (because travel will cost much more).
  - Flying will be very rare. The great tourist sites will have to be enjoyed on (large-screen) video.
  - Red meat will be very expensive.
  - Only a little oil will be produced, in the mid-East; and no coal, anywhere.
Cost

• Quite possibly, this could be achieved only with quite high tax rates.
• Many countries have an incentive to prevent an agreement with these effects.
• What would a universal carbon tax cost? (Not counting the benefits as temperature and ocean-rise is moderated.)
• Or: how much would the real value of world product (GDP) be reduced?
Carbon tax in practice

- Fifteen countries have carbon taxes, some at tiny rates. The highest is Sweden, which currently taxes at US$105 per ton of carbon.
- Agriculture and industry are at a much lower level, irrationally.
- The tax on petrol (energy tax + CO2 tax) is HK$5.5/litre, of which the carbon tax is 2.44.
- Sweden has been reducing emissions. 10% down in 1990-2010. Carbon tax effect?
Cap-and-trade in practice

• The EU has an emissions trading system, where now permits are largely auctioned.
• The price is now around 5 Euros per ton (compared to the Swedish carbon tax of about 100). It used to be more like 20.
• The overall cap is clearly set too high. It is to be reduced at 1.7% a year.
• Traders can buy into overseas schemes, claimed to be often bogus.
Cost now

• There can be a “double dividend”. The carbon tax yields revenue, so that other tax rates can be lower than they would have been.
• Introducing a small tax where previously there was none, with compensating tax reductions costs consumers something much smaller than the tax collected. A 10% tax on petrol probably costs, in the true sense, 2-3% of the value of petrol used.
Cost now, continued

• If a tax is already in place, as is often true with petrol, the increased price reduces demand, so that even a 10% carbon tax might bring about no increase in tax revenue.

• Then the cost is well measured by petrol consumption times the tax rate.

• The cost could well be more.
Cost in the long run

• Officially, it is intended that by the end of the century, carbon emissions will be a small fraction of their current level. Quite right too.
• Consider the cost of having zero emissions.
• The carbon tax is so high that no-one pays it. Alternative technologies produce energy.
• A rough estimate of the cost is the carbon tax needed times emissions prevented.
Calculation

• On a generous view, the carbon tax applied in Sweden averaged US$50 per ton of carbon. Emissions were at most 15% reduced(?)
• Maybe US$400 per ton would eliminate emissions (after a time).
• World emissions are estimated to be about 3.5B tons now.
• This yields a cost estimate of US$1.4 trillion.
• Gross world product is US$75 T.
Is it worth it?

• So for humanity as a whole, 2% of their GDPs might be enough. And with a reasonable rate of innovation, that should overstate the need.

• It has been said that the cost of controlling climate change is quite moderate. Though these calculations were very rough, they support that view.

• Controlling global warming is an excellent investment.