

PEER REVIEW

By

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Carbon Valuation in UK Policy Appraisal: A Revised Approach: Part 1

Context

This paper seeks to respond to a very difficult and complex policy problem: how to account appropriately for carbon emissions in policy appraisal. The scientific evidence that leads to carbon emissions being a cause for policy concern is a major part of the difficulty and complexity. First, it is clear that carbon dioxide emissions and atmospheric concentrations are rising faster, with greater effects, than have been forecast. Second, there are growing concerns that the resulting climate change could drastically affect the habitability of the planet with catastrophic effects for human populations. Third, every link in the chain of scientific cause and effect from emissions to concentrations (through sinks) to temperature change to climate change to impacts on humans and the natural environment are beset with fundamental uncertainty. To date, initial estimates of these connections have proved to be conservative. As noted, emissions and concentrations are rising faster, with greater impacts, than had been anticipated. This process of acceleration narrows the window for effective policy to prevent the worst effects of climate change. All these points argue for strong and precautionary policy, and an appraisal process that supports this.

A further point is that, whatever the near-term effects of climate change, its impacts will take place over a time-scale of decades and centuries, rather than just years, with a consequent need to compare valuations in the future with those of the present. The controversy over discounting that was triggered by the Stern Review shows that there is no consensus even among economists about how discounting should be implemented for an issue like climate change. It is not surprising that it is not easy to find an appraisal process for an issue with such complexities, uncertainties and long-term effects that is robust and credible.

The policy context in respect of climate change is also complex and not encouraging. A global agreement of some kind may emerge from the Copenhagen Conference, but extrapolating from this to a global trajectory of carbon emissions and atmospheric concentrations and temperature changes will be as uncertain a process as estimating the impacts of climate change that will result. Yet whether the trajectory results in atmospheric stabilisation at 400, 500, 600, 700 or more ppm of CO₂e is of course crucial to the climate damages that will result. Moreover, even the countries like the UK which have explicitly recognised the dangers of climate change and invested considerable policy effort in reducing carbon emissions have not been particularly successful in doing so. Carbon emissions have been very resistant to reduction through policy. Just as scientists have under-estimated the scientific impacts of climate change, policy makers have tended to over-estimate the effectiveness of the policies they have put in place to address it. It is essential that any new policy appraisal method should seek to take account of and compensate this tendency towards a dual excess of optimism.

Appraisal through a Shadow Price of Carbon

The appraisal method adopted by the Government in 2007, which this paper recommends should now be discarded, was based on seeking to apply across the economy a Shadow Price of Carbon (SPC) that was derived from estimates of the Social Cost of Carbon (SCC). The paper gives many good reasons for this recommendation, some of which are related to the points raised in the previous section. But there are a number of other reasons of particular policy relevance, which are not spelled out in the paper and which are worth brief rehearsal.

The first reason is that use of SPC in this policy context is theoretically inappropriate and unsound. SPC (based on SCC) is a marginal concept: the cost imposed by the marginal tonne of carbon. Such a concept is inappropriate for a damage function that is suspected to have gross discontinuities, i.e. when a small increase in emissions can lead to a step-change increase in damages, especially when this is accompanied by gross uncertainty as to the level of carbon emissions that will lead to them. Of course, it is unclear whether the damage function due to carbon emissions really does have such discontinuities. But the policy point is that the whole issue of climate change has policy resonance precisely because of the *possibility* that it has such discontinuities. It is the possibility of catastrophe that drives public and political, and therefore policy, concern with climate change. There can therefore be no justification for using a valuation methodology that is invalidated by such a possibility

The second reason is that use of SPC may have been expected to reinforce, rather than compensate for, the dual excess of optimism referred to in the previous section. This is because an assumption of a strong global agreement, leading to a low atmospheric CO₂ emissions and concentrations, would justify the choice of a relatively low SPC, which would justify in turn relatively high-carbon policy decisions and investments, which would undermine the chances of achieving the low emissions that were part of the initial assumption. This phenomenon was well illustrated in the CBA reported in the Impact Assessment related to the decision on the third runway at Heathrow. Use of a SPC far lower than that related to BAU emissions, predicated on an assumption that a strong global agreement would reduce emissions and concentration increases far below their current trends, made a huge carbon-intensive, long-term infrastructure investment appear economically viable, when the generalisation of similar carbon-intensive investments across the world would make the assumed low emissions and concentrations quite unachievable.

There is a further policy-related reason why the move away from SPC is to be welcomed. Perhaps because of some of the valuation uncertainties already discussed, and concern about the possibility of catastrophic outcomes, the policy approach that has been adopted in respect of climate change is one based on targets: a target temperature (above all that will make catastrophic outcomes very unlikely¹), translated into a target atmospheric concentration of CO₂e, translated into global and national emission targets, which for the UK has led to an 80% CO₂e reduction target by 2050, with interim targets based on five-year carbon budgets. Clearly the target temperature (2°C) derives in some sense from perceptions that the climate damages to which it will give rise are socially acceptable (perhaps also with some intuitive comparison of the economic costs that might be incurred in seeking to go much below it), but it is not the result of anything that could be called CBA. Nor would use of the SPC have

¹ The paper says (p.15) that the CCC recommended carbon targets based on a desire to stabilise at 460-480 ppm CO₂e, at least partly because it wanted a probability of less than 1% of a greater than 4°C rise in global average temperatures, but Figure 3.3 suggests that the probability of exceeding 4°C at 450 ppm is already 8%. Is this not inconsistent?

helped policy makers to know, except in the broadest of senses over the long term, whether it was at the right level to achieve the targets. The SPC was a very blunt instrument, in terms of knowing whether it had been set at an appropriate level to achieve given policy objectives. Yet, if it became apparent over time that it was not at the right level, changing it could be subject to almost interminable delays because of the very many factors, arguments and uncertainties that could be brought into play, and the very strong interests that would be likely to line up behind defensible, but contrary, positions.

In short, the use of SPC in policy appraisal was counter-productive for either informing or steering policy, and was of very limited utility in terms of getting feedback as to its effectiveness in moving towards its targets. It is therefore greatly to be welcomed that the Government is planning to move away from this methodology that is theoretically unsound in relation to climate change, and that encouraged both excessive optimism about mitigation of climate change and activities that made such mitigation more difficult to achieve.

Appraisal through Costing Abatement

The new approach proposes to value carbon based on the estimated cost of the abatement measures that are projected to be necessary to meet the carbon reduction targets that have been adopted. The enormous advantage of this kind of cost estimate compared to SPC is that *it relates to real prices in the economy*. Marginal abatement cost (MAC) cost curves are built up by estimating the real costs of real technologies, starting with those that exist now and for which real cost experience exists, and estimating how these might change in the future. Of course, as the paper acknowledges, there are huge uncertainties involved in doing this, but they are uncertainties of a completely different and much lower order. They do not depend on ethical positions in relation to future generations; on the valuations of statistical lives or of the impenetrable but life-essential operations of ecosystems; or on guessing the wealth and WTP for climate stability of far distant generations. Here we are in the relatively reassuring and familiar (though, as already noted, still very uncertain) world of assessing technologies that we have experience with, in terms of prices that exist in markets, and using expert judgement to project how they might develop.

It can immediately be seen how much closer this valuation approach is to the objective of achieving the targets than is use of SPC. Certain measures are estimated to have a certain MAC. Ranking them by MAC and the carbon reductions they are estimated to be able to achieve enables policy makers to see at once through what measures carbon emission reductions need to be sought in order to achieve the targets at least cost. Even more important, feedback from implementation can be incorporated in policy relatively quickly, following evaluation of the effectiveness of the measure. If it is delivering lower carbon savings than estimated, then more measures, perhaps at higher cost, need to be implemented, and the carbon valuation adjusts upwards. If its cost has been underestimated, and it was the marginal abatement technology, then again the carbon valuation needs to be adjusted upwards to reflect this.

Of course, there are a number of practical issues involved in the shift from an approach based on SPC to one based on MAC, not least in relation to deciding how the many remaining uncertainties need to be taken into account. I will seek to explore these in my review of Part 2 of the paper. For the moment I am pleased to be able welcome this shift in approach away from a valuation methodology that is unsound and counter-productive, towards one which is based on real prices in real markets, that is aligned with the practicalities of making and

implementing policy in this crucial area, and that can give timely insights into whether policy is being effective in achieving the targets which have been set to protect human society from what Lord Stern is reported to have called the “almost unimaginable level of disruption and suffering” that would result from runaway climate change.

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