The Social Value of Temporary Carbon Removals and Delayed Emissions

Ben Groom[1,2] and Frank Venmans[3]

[1] Dragon Capital Chair of Biodiversity Economics, LEEP institute, Department of Economics, University of Exeter Business School.

[2] Visiting Professor, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science

[3] Associate Professor, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science

Abstract: An economic method to calculate the social value of temporary reductions in atmospheric carbon, either through carbon capture or from avoided deforestation, is presented. The method provides a means of making fungible different technologies and nature-based solutions in terms of avoided welfare losses arising from damages from climate change. The approach is compared to previous attempts in the physical and natural sciences and economics to price temporary emissions reductions which typically fail to integrate the climate and economics science properly. Since the damages from climate change are long-lived and the policy responses always have the prospect of being temporary, the approach taken here is extremely policy relevant. We provide worked examples of fungibility rules in the carbon offset market, the evaluation of switching to biofuels via Life Cycle Analysis, and argue against the ton-year approach found in the UNFCCC article 6.4 in favour of our approach. The paper concludes by addressing the potential criticisms stemming from discounting and intergenerational fairness, the uncertainty surrounding climate damages and the potential for temporary removals to detract from emissions reduction strategies.

Introduction

Here we outline the problem we try to solve in general terms: how to value temporary reductions/delayed emissions and why this is important.

Framing: We will frame this around the UNFCCC Article 6.4, the carbon offset market and Life Cycle Analysis of responses to climate change such as identifying the appropriate role for biofuels. That is, the value added of the Nature piece is extremely relevant to guide the responses to climate change.

In short: All interventions are temporary. A failure to deal with temporariness means a failure to address the problem properly. We outline the various sensitivities and economic and physical issues that arise when dealing with temporary reductions in atmospheric carbon. Issues not discussed in the Nature paper will include sensitivities with regard to discounting, technological change and learning. The paper will also address the typical criticisms of the economic approach to temporary emissions.

Writing approach: we will not be using equations but rather explaining the points in simple understandable terms. We will have a side paper (which we plan to submit elsewhere) which will provide the technical aspects of the points in relation to learning, technical change and option values.

The problem with temporary projects

We will outline the issues associated with the VCM (which really motivated out paper) and some of the misapprehensions in the climate literature about how to deal with this problem. Basically:

1) The physical sciences literature has is problematic in several ways including a) the statement of the problem in terms of carbon concentrations rather than temperatures; b) the avoidance of discounting necessitates arbitrary time horizons to define permanence; c) a preponderance of ton-year approaches as in the Article 6.4 and elsewhere.

2) The economics: economic approaches have failed to understand many aspects too: a) the climate science; b) the climate economics; c) the dynamics of the social cost of carbon versus the cost effective carbon price.

Valuing temporary emissions reductions

A verbal description of the Nature paper starting with:

1) Physical science solutions: Addressing the problems associated with physical sciences approaches in terms of the relevant outcome measure: not Global Warming Potential or Carbon concentrations, but rather the effect on temperature, basically the cooling effect.

2) Economic Solutions: a) the integrated assessment approach (climate model and damages); b) the role of infinite horizons and discounting; c) the impossibility of SCC growing quicker than the discount rate (a chief mistake from previous models)

3) Welfare Equivalence: Extended discussion

4) Cost Effectiveness assumes temporary emissions reductions are valueless

Other benefits from delaying emissions

Other benefits of temporary emissions reductions:

1) Learning by doing and generalised technological change during the temporary emissions reductions;

2) NBS are cheap by and large;

3) Possibility of bad outcomes from offsets: may prevent baseline emissions reductions from being reduced

4) Peak temperatures may be reduced, the probability of hitting tipping points is reduced

Examples of how the SVO can be deployed

We will discuss the following examples:

1) Offsets Equivalence: a) calibrate given recent papers on additionality: b) elaborate on the Nature paper equivalence table: what does this mean for economic analysis? Which

projects are worth it? How many uncertain temporary offsets are equivalent to a permanent emissions reduction? What does this mean for the offset/carbon credit market?

2) Biofuels example: we will elaborate on the SI in the nature paper

Objections to the economic approach to valuation of temporary reductions

Objections are likely to come in the following form (we have found)

1) You don't know the damage function, so…..?
2) We do not like discounting, so….?
3) Since temperatures are dependent on cumulative emissions, after the temporary project it is as if nothing has happened. So….?
4) Temperature level is not the only thing that is important. What about duration of temperature levels? What about ocean acidification? Etc.

We will discuss and mainly rebut these concerns.

Conclusion.