



Discussion of the Stern Review – 10th November 2006

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The Cambridge Energy Forum organised a timely discussion event to evaluate the contribution of the recently published final report of the Stern Review on the Economics of Climate Change¹ to UK policy, and implications for the economy as a whole.

In the traditional Cambridge Energy Forum disputation format two speakers alliterated their assessment of different aspects of the Stern Review. Both speakers are University of Cambridge economics staff, and both are active in the area of 'low carbon economics' and associated research themes. This was followed by an opportunity for forum members to share observations, questions, and statements with one another in relation to the Stern Review and implications for both the UK and Internationally. The first speaker looking at UK 'national' policy suggested the creation of a climate change tax, whilst the latter suggested a range of policy mixes at a global level.

To promote dialogue Cambridge Energy Forum the discussion operated under Chatham House Rules. The event was generously sponsored by TTP and the Electricity Policy Research Group, and was held at the Judge Business School, Cambridge.

The first speaker set out to provide an overview of the review and address certain questions in relation to the implications for a 'climate change tax'. They noted that the headline figures that the Stern Review final report promotes is that taking action now to mitigate climate change will cost the economy 1% of GDP, whereas no action would result is a permanent reduction of 5-20% GDP. The marginal impacts calculated by the Stern Review suggest a cost of \$85 per tonne of CO₂, which can be extrapolated using normal modelling metrics to a social cost of carbon of \$310 for every tonne emitted as CO₂. These figures were generated using the respected PAGE2002 models evolved by Judge Business School at the request of OFGEM.

In understanding why the conclusions of the Stern Review differ from previous assessments, whilst drawing upon the same IPCC generated data sources, one must understand the use of low discount rates in comparison to those assessments. This was done to aggregate the impacts of today's economic activity upon very long-term future impacts. A 0.1% 'pure time preference' rate was chosen which helped build an overall

¹ The Stern Review final report was published on 30th of October 2006, allowing Cambridge Energy Forum members 10 days to read and ingest the contents. The report is available here http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

discount rate of circa 2%, a lower figure than other studies resulting in correspondingly higher costs.

Additionally the Stern Review included the introduction for the first time of a range of non-economic impacts relating to healthcare, coastal region impacts, the risk of catastrophes such as thermo-haline cycle reduction and the melting of ice sheets at the poles. The inclusion of new scientific data in relation to climate feedback mechanisms and sensitivities, coupled with the a weighting that a \$1 impact in a developing nation is of greater impact than a \$1 impact in a developed nation. Finally the Stern Review final report included the use of a technique called 'balanced growth equivalence' to bring long term impacts back to the present day in economic terms.

Economic theory suggests that if every tonne of CO₂ is costing \$85 of damage, then a climate change tax set at around \$85 would be appropriate. There is a concern that the Stern Review have overlooked certain 'socially contingent' factors such as large scale migration, but overall the review team have been very thorough in gathering the relevant data for the final report. There are issues in relation to such a tax being set according to an 'unconstrained path' or 'optimal path' in relation to CO₂ concentrations the Stern review suggest an optimal path CO₂ concentration of 550ppm.

Current models predict that the tax should increase over-time at a mean rate of around 3% as the impacts of climate change are felt over time, though as additional information comes to light this figure may change by up to a factor of three either higher or lower. It is therefore important that no matter what economic mechanisms are implemented, some form of review process to ensure prudent response to scientific or economic information should be put in place.

In understanding what a straight climate change tax of \$85 would imply for the UK, it would suggest that during the first year of operation an additional £25 billion would be raised by the Treasury. Inclusion of both UK demarcated Air Travel emissions, coupled with CO₂ equivalence from emissions of the other five greenhouse gases (ghg), would increase this total to £33 billion, which would rise to around £40 billion by the year 2030 assuming the 3% per annum tax increase. In comparison to the current annual UK tax income of around £500 billion, the £33 billion is not a wholesale change, but is not insignificant when compared to say the annual Council Tax total of around £20 billion.

At the level of the individual household this implies price increases of 11p on every litre of petrol, 0.9p per Kwh of heat from gas, 1.5p per Kwh for electricity from gas, and 3.5p per Kwh from coal. Whilst these price increases are substantial compared to today's levels, more so for gas and coal than petrol which is already taxed heavily, but they are not too onerous, not for example by a factor of four or five.

The first speaker then postulated whether it is reasonable to use the results of the Stern Review to propose such a simple, flat, 'climate change tax' set at circa \$85. Their opinion is that it was; such a tax would be theoretically sound, leading to the polluters paying the costs of pollution, there are no exemptions and everyone is subject to the same rules, given that every tonne of CO₂ emitted has the same impact wherever, whenever, and however the emissions occurred. Indeed such a flat carbon tax is much less complicated to administer than say congestion charging, or personal carbon allowances, or the EU Emissions Trading Scheme (ETS). In order to address issues of social equity he suggested that 10% of the taxes raised by set aside to assist with

hardship cases, leaving the remaining 90% of new revenue that would have displaced and replaced existing distortions in the current UK energy market e.g. the Winter Fuel Payments.

The second speaker started with some general comments on the Stern Review final report pointing out that this was the first time an attempt had been made to translate the climate change models into economic costs. Whilst the headline figure of 1% GDP appears simple, a lot of work went into calculating that number, comprising extensive micro-economic modelling that included innovation modelling as to the impact of renewable technologies on specific sectors, industries and countries, coupled with bottom up engineering assessment models, all with the goal of reducing CO2 emissions by 60% by the year 2050. Another point the review emphasises is the need to start to address the adaptation costs to society in relation to the irreversible climate change that is already underway, whilst further refinement is required this cost estimate was in the region of \$40-150 billion per annum.

A third factor that the review brings out (and one in which surprisingly little work has been conducted) is that deforestation currently accounts for around 30% of climate change due to CO2 emissions. Picking up this last point, an assessment was made of the eight countries in which the majority of deforestation is occurring in order to gauge how much it would cost to compensate those countries for the lost opportunity cost entailed in curbing logging activity. This cost is around \$5 billion, a surprisingly small number in comparison to the above, highlighting that the costs of mitigating climate change are not the same everywhere.

The second speaker argued therefore that rather than attempt to establish a Global trading mechanism where for example Brazil is paid by EU entities the prevailing rate per tonne of CO2 in the EU (for example \$85), resulting in huge inflows of cash that are not really necessary. Perhaps tailoring a range of different payments, and different policies would be more appropriate. The speaker also noted this would involve employing many more economists.

The Stern Review argues that whilst there is value in establishing effective carbon prices, it stops short of clearly stating which policy should be pursued, instead suggesting a mix of policies to draw upon e.g. taxation in some places, carbon emissions trading in other places, coupled with stronger environmental regulation and enforcement as required. Implementing an effective CO2 price going forward can thus involve different sectors and different societies adopting different policy mixes. By having an effective carbon price across sectors, we can then identify the opportunities to reduce CO2 emissions at the lowest cost. The speaker then noted one particular statement:

“The next 10 to 20 years will be a period of transition, from a world where carbon-pricing schemes are in their infancy, to one where carbon pricing is universal and is automatically factored into decision making. In this transitional period, while the credibility of policy is still being established and the international framework is taking shape, it is critical that governments consider how to avoid the risks of locking into a high-carbon infrastructure, including considering whether any additional measures may be justified to reduce the risks.”²

² see Stern Review Executive Summary (October 2006), page XIX.

So it is not just tax or emission trading, but also additional measures to make sure that industry has sufficient credibility that are needed to evolve a low carbon economy.

The second speaker noted that whilst a flat rate carbon tax was a good mechanism, that could be established in the future, if one understands the political difficulties in establishing such a tax, and understands that the EU ETS is already in place, then evolution of the ETS scheme is the one that makes most immediate sense. It was suggested that the various EU governments move to carbon auctioning as soon as possible, for say 10% of allowances permitted under the 2008-2012 trading period. Additionally the governments can establish a price floor on these credits, thus helping establish a price floor in the trading market, assisting with the establishment of a long term carbon price. This in turn will give confidence to investors that wish to finance low carbon technologies. A third suggestion for the evolution of the ETS is to allow longer term futures options on carbon allowances, again impacting the market by providing long term price signals whilst allowing carbon traders the ability to hedge risk.

The Stern Review was also strong in the area of Technology Policy, in relation to the support of R&D and Demonstration projects. It is well known that governmental R&D funding creates spill-over effects, and early stage demonstration projects learning curve effects where society from the benefits of innovation, whilst the innovation reduces costs of deployment. For these reasons, coupled with the severity of impacts the Stern Review recommends multiplying the funds committed to deploying renewable technologies by a factor of 2 to 5 times the current level of \$35 billion per annum on a global basis.

In relation to international engagement the Stern Review suggests that it will cost \$20-30 billion per annum to facilitate low carbon technology investment in developing countries, and the Stern Review argues that we need to increase the efforts in this area. However the review does not suggest that this money is increased via mechanisms such as the Clean Development Mechanism, in which finance is provided to individual projects, but instead the funding should be leveraged to encourage policies within the developing countries to reflect CO₂ prices in the market and implement the necessary regulatory and institutional changes to achieve these goals.

Finally in relation to the theory of collective action, and noting the Stern Review use of 'game theoretical paradigms' the second speaker wished to convey a number of points drawn from economic theory. Firstly one must change the structure of incentives, to increase shared understanding, make links with the wider range of benefits to participants, and provide for side payments. The second is that of reciprocity, that if one has a repeated game structure it is easier to find a collective solution going forward, especially when you have frequent interactions, innovative negotiations, and increased transparency of process. Finally the importance of reputation; a leading country can create a collective dynamic by demonstrating a willingness to co-operate, and that actions of a leader has strong influence on the beliefs that others take in reaction to co-operation.

During the discussion that followed the Forum members observed the need to simplify messages and lessons from the Stern Review for specific audiences. Whilst the executive summary was a clear and concise text, and the headline 'takeaway' of 1% now or 5-20% regarded as simple, additional work will be needed by 'professional communicators' to tailor the lessons of the Stern Review to specific and general audiences. The general feeling of the forum was that the main text of the document is only interesting to the economically literate, and that perhaps a different message would be required for example 'Captains of Industry' who need a more punchy 'what's in it for me' style of factual delivery, they need to be able to tell their shareholders the right story as to why the time to take action is sooner rather than later. One of the speakers suggested that a similar effort to the Al Gore 'Inconvenient Truth' might be an appropriate action.

In relation to the accuracy of the report noted that critics in both the US and UK have noted that the report does not involve enough 'economic pain' to be true. Another noted in a recent lecture at LSE Sir Nick Stern himself admitted that the utmost accuracy was not necessarily the most important aspect of the review, but that the introduction of risk into the assessments, the risk of action now vs action delayed was the prime lesson to be taken away.

One particularly astute Forum member noted the tension that exists between conveying the seriousness of the climate challenge, whilst also addressing the political problems of addressing the issues to the public, thus causing political inaction. It was pointed out that the EU ETS had rolled out and worked, precisely because politicians hadn't a clue as to how it would work, including the likelihood of gaming by permitted entities. In addition it was noted that the subtext of the report, was one that was consistently concealed, which is that of the need for developed countries to compensate developing countries for the impacts of climate change. Once the depth of action required was realised by the public, the row over how much economic pain is required would escalate. Another member suggested that we need to move toward a tipping point of public opinion similar to that which nations felt during the second world war, where economic pain was felt by and accepted by most.

In relation to the ETS vs Taxes debate, (as opposed to ETS and Taxes), it was noted that global taxes were unlikely work owing to the sovereign nature of taxes and the nation state, coupled with the strong-arm lobbying of political parties by fossil fuel intensive industry whenever such measures have been suggested before. It was also noted that simply removing the \$100 billion per year subsidies for fossil fuel industries would at least level the playing field for renewable technologies as well as less carbon emitted to the atmosphere.

Which is a point that a number of Forum members made; it is all very well talking about which economic policy is preferable in whichever situation, but at the end of the day we need to stop emitting so much CO₂. To date the ETS has failed to make any impact in this regard, though it may do so in the future, especially when the problems are addressed via means such as those suggested by speaker two. Other members pointed out the oddity of having 550 ppm as a target, given this will result in a 5 degree rise in overall temperature. We are already at 430 ppm which indicates a 2 degree rise, with significant enough consequences. One member expressed disbelief that a mere 1% GDP commitment could address 'the greatest market failure in human history'.

A penultimate theme from Forum members was one of the need to address 'the non-rational consumer', whilst Cambridge Energy Forum is a space for rational debate, consumers notoriously are not, reminding us neatly to the points made start of the discussion, the need to address messages to different 'special' audiences in a manner that makes necessary action, meaningful to them.

To end on a positive note, Forum members suggested that introducing more 'carrots' as well as 'sticks' into the equation, may assist the 'irrational donkey' move toward taking action. For example reduced VAT on 'low carbon goods', and increased carbon taxation elsewhere. Another member advocated government should act to ensure increased consumer choice for example in the range of Bio-diesel blends, coupled with specific support for domestic rollout via guaranteed price payments for energy, as in Germany and Japan – i.e. that increasing consumer access and regulating for choice to 'low carbon technology' was the way forward.

All in all there were a number of different policy suggestions discussed, the Cambridge Energy Forum very much welcomed the opportunity to debate the merits of the various options. We would like to extend our thanks to our members, sponsors and speakers; as well as the hard work of the Stern Review team in forwarding the debate in relation to economic responses to climate change.