

# THE GREEN DELUSION

## Estimating the social cost of carbon



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*Even complex integrated assessment models may not be enough to capture the uncertainty around climate change.*

In 2009, the 'US Interagency Working Group on the Social Cost of Greenhouse Gases' was established to bring together scientific estimates of the social cost of carbon. In addition to its influence on the Obama and Biden administrations' climate policy, the group can be praised for choosing the most unimaginative and unnecessarily long name for a working group in the 21st century. The social cost of carbon is the economic cost of producing an additional ton of carbon dioxide emissions or its equivalent, and the development of integrated assessment models (IAMs) has made it possible to actually estimate this. The impact of the development of IAMs was large for both policymaking and academia; in 2018 William Nordhaus was even awarded the Nobel prize for integrating climate change into long-run macroeconomic analysis.

Despite its success, some notable economists including Sir Nicholas Stern and Joseph Stiglitz are now advocating against the usage of IAMs and instead favour alternative models. This article investigates how the IAMs are used to calculate the social cost of carbon and whether we should trust the estimates they produce.

### Choosing the right parameters

IAMs were used during both the Trump and Obama administrations. However, during the Obama administration, the social cost of carbon estimated by the models was \$52 per ton but this figure dropped to only \$1 per ton under the Trump administration. (Joselow, 2021) How can

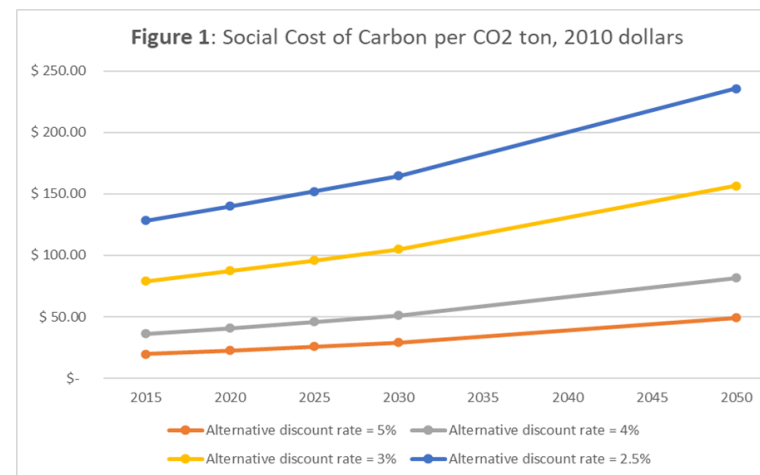
a scientific method such as IAM produce outcomes which are so radically different?

To answer the question, we need to first understand the model. The main logic behind IAMs is simple: the economy produces emissions, which cause damage to the climate, which in turn causes damage to the economy. The most famous of these models is the Dynamic Integrated Climate-Economy (DICE) model, wherein a social welfare function which includes discounted per capita consumption is maximised subject to multiple constraints. (Nordhaus, 2017)

Estimating the social cost of carbon using IAMs entails choosing a set of parameters. This is not a simple task and at least three decisions can have a large impact on the final outcome. Firstly, one must choose a discount rate to discount for future consumption. A larger discount rate means that agents have a larger preference for consuming now rather than in the future. Increasing emissions cause more damage to future consumption, which is why a larger discount rate leads to a lower social cost of carbon. Some economists like Sir Nicholas Stern advocate for using a very low discount rate: for example, in the Stern Review, the total discount rate is 1.4% (Stern, 2007) while William Nordhaus often uses discount rates between 3 to 5 per cent in his papers. The below figure shows based on Nordhaus (2017) how changing the discount rate changes the social cost of carbon.

Secondly, one must choose an appropriate damage function to evaluate the harm caused by emissions to the economy. The damage function is a mapping, which





shows how much economic damage an increase in temperature will cause. The damage function in DICE has not been calibrated for large temperature increases of over 3° Celsius, and has been criticised for neglecting the possibility of such catastrophic climate change. (Pindyck, 2019) If the risk of catastrophic climate change is taken into account, the social cost of carbon increases. (Weitzman, 2013)

Finally, one must choose how risk-averse they are. The climate sensitivity parameter is used to estimate the long-term temperature increase expected from a doubling of carbon-dioxide concentration in the atmosphere. The climate sensitivity value is chosen from a probability distribution, which assumes a level of probability for any change in temperature based on environmental modelling. DICE model uses an average of the likely value of climate sensitivity, but some economists have argued that the 95th percentile value should be instead adopted to account for the uncertainty around climate change. Using the 95th percentile and a discount rate of 1.5% Ackerman and Stanton (2012) calculate that the social cost of carbon in 2010 was already \$900 per ton and could increase to over \$1500 per ton by 2050.

The choice of parameters also explains why the Obama administration had a social cost of carbon 52 times larger than the Trump administration. During the Obama administration, the 3% discount rate from the DICE was used but Trump instead chose a 7% discount rate for future consumption.

For policymakers, the social cost of carbon is an indication of how much money should be used to reduce emissions, which is probably why the Trump administration increased the discount rate. Outside the US, IAMs have been used for example in the analysis of carbon markets: in the EU researchers were able to show that the price of emission allowances in the EU Emissions Trading System has remained below the social cost of carbon. (Bayer & Aklin, 2020) Recently, the price of emission allowances has climbed closer to the social cost of carbon and the cost of an emission allowance reached an all-time-high of 98.49€ in the EU during February 2022. (Trading Economics, 2022)

### How to value uncertainty?

IAMs have received a lot of criticism during the past few

years. One of the early critics was MIT economist Robert Pindyck (2017) who stated “IAM-based analyses of climate policy create a perception of knowledge and precision that is illusory and can fool policymakers into thinking that the forecasts the models generate have some kind of scientific legitimacy.”

Even more recently, Sir Nicholas Stern together with Joseph Stiglitz and Charlotte Taylor published a working paper advocating for using alternative models instead of IAMs. (Stern et al., 2021) The authors argue that IAMs are untrustworthy because researchers need to be very confident about all the key functions and parameters to produce valid estimates for the social cost of carbon. Stern et al. conclude that an IAM gives out a too simplistic view of the fundamental uncertainty surrounding climate change. Instead, they think the critical questions should be how large of a climate risk we are willing to take and whether we are willing to accept those risks on future generations. Thus, they believe that a better approach would be to set a specific policy goal such as reaching net-zero by 2050 and then evaluate the most cost-effective method of reaching that target with a variety of models.

The defenders of IAMs, such as Harvard Professor Joseph Aldy, say that climate policy should remain concentrated on developing the IAMs to be more realistic. In an article at Science (2021) Aldy argues together with three other economists that if a policy goal proposed by Stern et al. (2021) was set, then the technical task would be to compute a price for emissions that is consistent with the chosen policy goal. The authors worry that this kind of target-consistent pricing would hinge on political decisions. Sir Nicholas Stern commented for Scientific American that these arguments were “seriously flawed” but did not elaborate. (Joselow, 2021)

While calculating the social cost of carbon may benefit policymaking, the disputes around the reliability of IAMs may mean that they are not the best technique to achieve this. It may be simply impossible to put a single monetary value to a climate crisis that includes deep uncertainty and multiple dimensions in addition to the economic one. Carbon pricing in the form of carbon taxes and cap-and-trade schemes is likely to remain an important part of the battle against climate change, but we may never know what the optimal carbon tax should be.

# Greenwashing and the Olympics



## Sharia Tan

The past few weeks have been filled with exciting news about the 2022 Winter Olympics in Beijing. A mixture of excitement, anticipation, disappointment, and joy came with every game. The Olympic games are a prestigious stage where not only the best athletes of each country are brought together, but also the viewers and fans. The Olympics showcases many good values such as discipline and integrity. Olympism is an exalting philosophy of life, combining the qualities of body, will, and mind. Blending sport with culture and education, it seeks to create a way of life based on the joy found in effort (Olympics 2021). However, there are also less virtuous elements about the Olympic games that often get overlooked. In recent years, the issue of ‘greenwashing’ has been on the rise.

Greenwashing is the dissemination of false or incomplete information by an organization to present an environmentally responsible public image. Over the past decade, this phenomenon has become more and more common and the practice is certainly a cause for concern (Furrow 2008).

### The environmental impact of the Beijing Olympics

Winter Olympics require ample snow on the ground for many sports, but Beijing has an arid climate, and snow reliability is low. Hence, large amounts of artificial snow were made, and the process consumed large quantities of water and electricity contributing to significant carbon emissions (Hahn 2021).

Furthermore, the making of artificial snow has diverted

water away from local residents and farmers who are already facing water shortages in Beijing, hence, choosing it as the city to host the Olympics is far from sustainable. And if the Olympic venues are to be converted into permanent ski resorts, it will result in long-term unsustainable practice.

Not surprisingly, Chinese officials said the 2022 Olympics will be the most sustainable ever, especially with its widespread use of renewable energy, hydrogen-powered vehicles, and preexisting venues. Although many environmental activists and scientists do agree that it is a step in the right direction, they also say that these measures are a form of “greenwashing”. Given that all of these “sustainable measures” are not only driven by demand but also encourage more consumption of these sustainable or recycled products and services, they do not directly address the problem of overconsumption, which is the real cause of environmental damage. Without a plan to decrease demand and consumption, the problem will remain. Hence, we are looking at a double-edged sword as measure such as recycling requires more goods to be produced in the first place (Barton 2012).

### Looking back

Just a year ago, the Tokyo 2020 Summer Olympics also claimed to be the greenest games ever, however, studies have shown that it was the third-least since 1992 (Hahn 2021). The 2020 Olympics was the first ever to be carbon neutral and run entirely on renewable energy. But what does carbon neutral mean, and are these measures