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POLICY BRIEF

What Is vs. What Should Be in Climate Policy: The Hidden Value Judgments Underlying the Social Cost of Carbon

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The social cost of carbon (SCC) is a measure that describes the harm a ton of carbon dioxide (CO_2) emissions has on society when it is emitted into the atmosphere. The SCC is perhaps most prominently used as an input in benefit-cost analysis, which is produced for many regulations, including those targeting CO_2 emissions. The Biden administration recently updated its estimate of the SCC to $51 per ton,[1] and the administration is expected to use this updated figure when determining how much society should spend implementing regulations and other policies targeting global warming.

Although calculating the SCC involves using complex models (known as integrated assessment models) that rely on scientific inputs as parameters, these calculations also contain certain value judgments that one who is not careful could confuse with objective scientific facts. The purpose of this policy brief is to explain two such value judgments that go into the calculation of the SCC: the choice of the social welfare function, which determines how costs and benefits are aggregated across individuals to assess an overall impact on well-being; and the choice of the social discount rate, which determines how much weight future benefits and costs should receive relative to present ones.

THE SOCIAL WELFARE FUNCTION

The SCC is an estimate of the impact CO_2 has on social welfare, and it is used in economic analysis to assess whether policies intended to reduce the harm of CO_2 pollution are worth their cost. For example, if the SCC is set at $51 a ton (the Biden administration's estimate), and if a regulation reduces CO_2 emissions by one million tons today, then an economist might say that social welfare would fall if society spends more than $51 million implementing this regulation.

Although sometimes the SCC is described as a measure of the dollar value of the societal cost associated with a ton of CO_2 emissions, this description is not technically accurate. Although it is theoretically possible to express the SCC in terms of dollars, in practice most people express the SCC in units of social welfare, or what might be called *well-being dollars* (though the *well-being* descriptor is often conveniently dropped).

Despite having a dollar symbol in front of it, the SCC figure is calculated using a *social welfare function*, which describes how the well-being of society is affected by activities, such as public policies. It is a method of ranking policies or other outcomes in terms of their desirability. Although social welfare functions are controversial among some economists,[2] and there is no social welfare function that is universally agreed upon among economists for use in policy, they are also used extensively in economics, including in the fields of social choice, optimal redistributive tax policy, growth theory, and, relevant for the purposes of this brief, climate change economics.[3]

The main challenge with social welfare functions is selecting the one that is appropriate for the task at hand, as there are many different social welfare functions one could use. Also challenging is reaching any kind of consensus about this choice, since the selection of this function involves making value judgments.

For instance, one of the more famous social welfare functions is the *utilitarian social welfare function*. In this approach, welfare is measured by adding up the utility of each member of society. However, the choice to give equal weight to everyone's utility, as the utilitarian social welfare function does, could be viewed as controversial. Thus, some alternative social welfare functions give priority to certain individuals, such as those who are least well off.

The selection of the social welfare function is normative. That is to say, it is an ethical choice, not a scientific one, because it depends on one's values. Normative claims in analysis are distinct from positive claims in that they express some moral judgment, not objective scientific facts. For example, the claim "the shirt is red" is an objective fact that can verified, whereas the claim "the shirt is ugly" is a normative claim, because it depends on a value judgment.

The social welfare function that the SCC relies on comes from economic growth theory, specifically from a popular growth model known as the Ramsey model,[4] named after the early 20th-century mathematician Frank Ramsey. The social welfare function the Ramsey model uses is called the *discounted utility model*. In this model, society as a whole is treated as having preferences like a single person, so the social welfare function for society is simply an individual's welfare function.

One interpretation of the individual in the Ramsey model is that it represents the current generation of citizens. Economic growth models sometimes make a simplifying assumption that each generation can be encapsulated into a single agent.[5] Thus, each agent in the model represents a

collection of members of society alive at a given moment in time. The Ramsey model accounts for the well-being of just one agent who is meant to approximate the current members of society.

In the social choice literature, the discounted utility model is seen as describing a "dictatorship of the present."[6] The single agent in the Ramsey model (and, by extension, in the integrated assessment models that estimate the SCC) can be viewed as a dictator whose preferences are for the moment all that matters. The intuition here is that the present generation gets to be the dictator while it is living, and subsequent generations will get their turn to be dictator eventually.[7]

The choice to use a model in a climate change context that describes a dictatorship of the present is strange given that the purported aim of many climate policies is to increase well-being in the future. The Biden administration, for example, has asserted that a goal of its regulatory reforms is to promote the "interests of future generations,"[8] which would seem to be at odds with its choice to update and expand the use of the SCC; taking the perspective that the current generation is a dictator would seem, at least on the face of it, inconsistent with the administration's stated goals.

THE SOCIAL DISCOUNT RATE

One of the most important inputs into the calculation of the SCC is the *social discount rate*. The social discount rate describes how much less a future benefit should count relative to a present benefit. It forms a critical part of the social welfare function used to calculate the SCC because the social discount rate is the device that converts future impacts from monetary units into units of the agent's (in the Ramsey model) well-being.[9] Recall that the units in which the SCC is typically calculated are units on a social welfare scale. Social discounting is how outcomes across individuals and time are ranked so that they can be compared to one another on a common social welfare scale.

At a practical level, different social discount rates can result in huge swings in the value of the future benefits, owing to compounding. For example, 10,000 lives saved in 100 years are worth about 3,700 lives saved today using a 1 percent social discount rate, but those 10,000 lives are worth only about 1 life today at a 7 percent social discount rate.[10] As should be obvious from this example, the social discount rate is an ethical choice about how much weight benefits such as future health, well-being, and lives saved should receive in analysis. The selection of the social discount rate, like the selection of the social welfare function, depends on one's values.

Recently there has been a push toward using lower social discount rates, both in the context of the social cost of carbon and, more generally, in benefit-cost analysis.[11] Historically, conservatives and libertarians have been skeptical of using low social discount rates,[12] but it does not follow that low social discount rates necessarily correspond with more government intervention in the economy, and the SCC offers a prime example why that is so. Before discounting, integrated assessment models express CO_2 impacts in *consumption equivalent* form, meaning in terms of

impacts on society's consumption. Often overlooked is that if the social discount rate falls low enough, what matters from an efficiency perspective is investment. This is the famous "r must be greater than g" condition that has received considerable attention in recent years, owing to the influential work of French economist Thomas Piketty;[13] it is a convergence condition underlying economic growth models.

If a growth model fails to converge,[14] then a dollar of investment produces a consumption equivalent stream that is unbounded (i.e., infinite). In that case, any finite amount of consumption generally has no bearing on whether a project passes a benefit-cost test, because any amount of ongoing investment, no matter how small at the start, has a higher opportunity cost. With a low-enough social discount rate, the SCC actually drops out of the analysis because, according to the integrated assessment models, CO_2's impact can be expressed purely in consumption form. Thus, it would be inefficient to displace even a dollar of investment to obtain the benefits of reducing CO_2 pollution.[15]

CONCLUSION

There are many uncertainties associated with calculating the SCC, including forecasts about the extent of future emissions and the effects of those emissions as much as 200 years in the future. The aim of this policy brief is not to question those scientific inputs into analysis, but instead to bring attention to the assumptions that depend on value judgments. These are assumptions that lie outside the domain of objective facts that can be discovered through scientific exploration. As a result, they likely lie outside the competence and expertise of federal regulators.

The choice of the social welfare function, which aggregates benefits and costs across individuals, and the choice of the social discount rate, which ranks benefits and costs across time, are two examples of such value judgments. Although it is critical to assess the merits of the scientific assumptions and uncertainties inherent in the SCC calculations, the merits of the ethical and moral assumptions embedded in analysis may be even more important. When value judgments are confused with scientific claims, an illusion is created that policy is guided by objective scientific facts, when in fact it is expressing the preferences of analysts. Distinguishing positive and normative claims can help address this ever-looming challenge in modern climate policy.

ABOUT THE AUTHOR

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NOTES

1. Interagency Working Group on Social Cost of Greenhouse Gases, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990*, February 2021.
2. For a recent discussion critiquing the use of social welfare functions to guide policy, see Christopher J. Coyne, Thomas K. Duncan, and Abigail R. Hall, "The Political Economy of State Responses to Infectious Disease," *Southern Economic Journal* 87, no. 4 (2021): 1119–37.
3. John A. Weymark, "Social Welfare Functions," in *The Oxford Handbook of Well-Being and Public Policy*, ed. Matthew D. Adler and Marc Fleurbaey (New York: Oxford University Press, 2016), 126–59.
4. David Romer, "Infinite-Horizon and Overlapping-Generations Models," chap. 2 in *Advanced Macroeconomics*, 4th ed. (New York: McGraw-Hill, 2012), 49–100.
5. Peter Diamond, "National Debt in a Neoclassical Growth Model," *American Economic Review* 55, no. 5 (1965): 1126–50.
6. Graciela Chichilnisky, "An Axiomatic Approach to Sustainable Development," *Social Choice and Welfare* 13, no. 2 (1996): 231–57.
7. On this matter, see Kenneth J. Arrow, "Inter-Generational Equity and the Rate of Discount in Long-Term Social Investment," in *Contemporary Economic Issues*, vol. 4, *Economic Behaviour and Design*, ed. Murat R. Sertel (London: Palgrave Macmillan, 1999), 89–102.
8. Executive Office of the President, Modernizing Regulatory Review, 86 Fed. Reg. 7223 (January 20, 2021).
9. James Broughel, "Cost-Benefit Analysis as a Failure to Learn from the Past," *Journal of Private Enterprise* 35, no. 1 (2020): 105–13.
10. James Broughel, "The Social Discount Rate: A Primer for Policymakers" (Mercatus Policy Brief, Mercatus Center at George Mason University, Arlington, VA, June 2020).
11. Interagency Working Group on Social Cost of Greenhouse Gases, *Technical Support Document*; Michael Greenstone and James H. Stock, "The Right Discount Rate for Regulatory Costs and Benefits," *Wall Street Journal*, March 4, 2021.
12. James Broughel, "The Unlikely Story of American Regulatory Socialism," *Quarterly Journal of Austrian Economics* 24, no. 1 (forthcoming).
13. Thomas Piketty, *Capital in the Twenty-First Century* (Cambridge, MA: Harvard University Press, 2014).
14. In economic growth theory, this is known as the transversality condition.
15. It should be stressed here that this result—the SCC dropping out of the analysis—is an implication of the integrated assessment models, not a result of any claims being made by this author about the effects of CO_2 pollution. The integrated assessment models assume carbon dioxide pollution does not have growth rate effects, but this assumption could easily turn out not to be true. See Robert S. Pindyck, "Climate Change Policy: What Do the Models Tell Us?," *Journal of Economic Literature* 51, no. 3 (2013): 860–72; Richard G. Newell, Brian C. Prest, and Steven E. Sexton, "The GDP-Temperature Relationship: Implications for Climate Change Damages," *Journal of Environmental Economics and Management* (preprint, available online March 20, 2021).