Title: Social Cost of Carbon when We Wish for Robustness

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Abstract: We compute the social cost of carbon (SCC) when decision makers want robust estimates in the face of deep (or "Knightian") uncertainty. We introduce the notion of full-path accumulated robust preferences from stochastic control theory to an integrated assessment model. Robust preferences are appropriate for analyzing climate-related problems because, given the large uncertainty in climate science, they enable decision makers to attain solutions that are robust to a wide range of climate change scenarios. We solve the resulting model, which includes uncertainty about climate change and about the ensuing economic damage, and show the existence of optimal solutions and time-consistent optimal deterministic Markov policies. Additionally, we also prove that the standard Hansen-Sargent recursive utility provides an upper bound of this full-path utility. In our baseline model specification, we find that the year 2020's optimal SCC is US$162 per tCO2 with an average annual growth rate of 2.5%—setting the world on a 1.37◦C path, which requires full decarbonization by 2068. We introduce the notion of SCC robustness premium, which we define as the additional SCC price tag for robustness. For a plausible range of preference parameters the SCC robustness premium in 2020 is between US$1.41 and US$25.89 per tCO2, with US$2.20 per tCO2 in our baseline calibration. Over time this premium grows significantly. The forecasts of our model facilitate managerial decision-making during the world's transition from a carbon- and emission-intensive economy to a regenerative economy. The high estimates for the SCC predict drastic rises in emission cost for high-emission industries.