

Structure, Shocks, and Speed: Learning's Impact on Optimal Climate Policy *

Svenn Jensen^a

Christian Traeger^b

Abstract: This study explores how learning affects optimal economic policy-making, focusing on climate policy. Dynamic economic models with uncertainty depend on how agents anticipate and adapt to new information. We show that seemingly similar approaches to modeling learning can lead to very different risk premiums in policy decisions. Our analysis focuses on the uncertain climate sensitivity, the temperature response to greenhouse gas accumulation. We distinguish two uncertainty components: natural temperature variability and subjective uncertainty about nature's true climate sensitivity. We provide an analytic formula for optimal carbon pricing under anticipated Bayesian learning. Whereas a decreasing variance over time reduces the risk premium, we show that learning's impact on the prior mean ("updating shocks") has an opposing effect. We explore these two different channels and different model variations in a stochastic dynamic programming version of Nordhaus' DICE model, exploring the trade-off between a "wait-and-see" argument and a more cautious approach.

JEL Codes: Q54, Q00, D90, C63

Keywords: climate change, uncertainty, SCC, Bayesian learning, climate policy, dynamic programming, integrated assessment, DICE

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^aOslo Business School, Oslo Metropolitan University; svenn.jensen@oslomet.no.

^bDepartment of Economics, University of Oslo; ifo Institute, Munich; traeger@uio.no.