

Mechanisms to Reduce Emissions Uncertainty under a Carbon Tax

Marc Hafstead, Resources for the Future

Carbon prices provide strong incentives to reduce carbon dioxide emissions. A cap-and-trade program provides certainty with respect to future emission levels but uncertainty with respect to emissions prices. A carbon tax provides price certainty but uncertainty with respect to future emissions. Using a new reduced-form model of US carbon dioxide emissions (calibrated based on a sophisticated dynamic general equilibrium model), we introduce trend uncertainty in the growth rates in GDP and emissions intensity (emissions per unit of GDP), cyclical uncertainty in GDP and emissions intensity, and uncertainty in the elasticity of emissions intensity with respect to the carbon price. Using the model, we quantify the level of emissions uncertainty under pure carbon tax policies. We then introduce hybrid carbon tax policies that combine an initial price path with automatic price-adjustment mechanisms and evaluate how these mechanisms alter the distribution of future emissions. Finally, we estimate the tradeoffs between emissions uncertainty and expected costs under alternative adjustment rules and map out an efficient frontier for of automatic price-adjustment mechanisms.