

by a quarter a gallon or less? Economists offer a disarming case for taxing carbon. But promises regarding taxes are notoriously unreliable; the 16<sup>th</sup> Amendment was adopted in part because Americans were promised that only the rich would ever pay an income tax. Once established, politicians will set tax rates based on predictable political forces.

Economic growth has been the exceptional condition in human history, not the normal, and growth only began with the establishment of the institutions of the market economy. Energy central planning would force abandonment of market allocation of factors of production. Given the potential for capture by interests looking to eliminate carbon emissions, a carbon tax could spell the end of growth, courtesy of government planning. Although catastrophe scenarios are usually invoked to motivate action on climate change, the true catastrophe would be to allow an excessive carbon tax to undermine prosperity. **R**

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# Politics and Climate Change

## What impedes a carbon tax?

BY SHI-LING HSU

**B**ob Litterman makes an important contribution to the discussion of the economics of climate change (p. 38). He cuts through much of the debate over climate policy and manages to leave the lay reader with a basic understanding of Capital Asset Pricing Model (CAPM) theory and how it could apply to climate policy. In my view, this essay should be required reading for climate policy wonks. The debate over climate change and climate policy is ossified, with very little insightful material being added. Litterman’s essay is truly different and useful.

I say this despite my disagreement with a number of his assertions about the state of the literature on climate science and

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climate policy; they seem to me to be based on a literature that is slightly outdated. But that only reinforces his tentative conclusion that carbon should be priced, and should be priced higher than the level that most economists believe to be optimal.

**Two camps** | Litterman’s thesis is that the risks of climate change are usefully analyzed as a hedge fund manager might. In the interests of making climate policy more palatable to those who doubt the science behind climate change, a climate policy like a carbon tax is sometimes described as a measure of “insurance” against the risk of climate change. But this is wrong; the risks of climate change are non-diversifiable. The damages from climate change are such that many interdependent claims could be filed in a short period of time. Private insurers did not and mostly could not diversify against the risks of a \$50 billion event like Hurricane Sandy, let alone the increased number of strong hurricanes that climate change is expected to bring about. If climate change were to bring about both stronger hurricanes and drought at the same time, then private insurance would be even less available. Litterman’s insight is that climate change thus becomes a pure question of risk aversion.

If you cannot diversify away risks, the question becomes, “how willing are you to assume risk? How much would you demand to assume risk?” It should surprise no one that respondents to this question fall roughly into two camps: the risk-averse climate policy advocates and the risk-taking climate skeptics. The two share little in common.

But Litterman’s essay delves into this further. Why, fundamentally, are some people risk-averse and some risk-taking when it comes to climate change? Part of the answer, clearly, depends on one’s view of the science of climate change. Skeptics of climate policy tend to doubt the robustness of climate science. But a more nuanced view is that climate skeptics are more risk-taking because they do not believe that the risk of climate change is high enough to justify the dampening of economic growth.

Some members of the risk-taking camp may also view climate change as a hedge, not a risk, because the harms from climate change would themselves reduce economic growth, thereby reducing emissions. In other words, climate change, because of the strong correlation between economic growth and greenhouse gas emissions, provides its own negative feedback mechanism. Litterman gives this view more credence than it deserves because the economic damages caused by climate change lag emissions by very long time frames. A lagged negative feedback mechanism would lead to a dynamic path of temporary but suboptimally high emissions, leading to later suboptimally high damages. The hedge view of climate change is flawed in this respect. Be that as it may, Litterman’s description is accurate. Some combination of these two beliefs leads this camp to believe that whatever economists say, the price of carbon should be lower. As Litterman points out, this view is predicated on the belief that the damages of climate change, while non-diversifiable, are not catastrophic.

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**Future damages** | Here, I quibble with two of Litterman's assertions:

- The risk of catastrophic damages is “clearly ... highly unlikely.”
- “[T]here is a general consensus among economists that future generations will be able to deal with the average impacts of climate change relatively uneventfully.”

Climate scientists are circumspect when it comes to projections, but it is no longer tenable to say that catastrophic damages are clearly highly unlikely. Positive feedback effects are still uncertain, but if anything the trends in climate science are that they are becoming more worrisome, not less. Second, economists have been strongly influenced by Martin Weitzman's seminal article on the catastrophic damages of climate change, such that a “general consensus” today would be less sanguine given the

possibility and gravity of catastrophic damages. Rather, the strongest argument for risk-taking is the one advanced by economist Robert Pindyck (which Litterman discusses): there are potentially many catastrophic risks out there, including the risk of pandemic, nuclear accident, or “runaway rogue computers”; why privilege climate change? Litterman does not resolve this, except to quote Weitzman in concluding that climate change is “especially worrisome.” In any case, Litterman's framework is helpful in getting beyond a vacuous debate: instead of dismissing either side as “irrational” or “unscientific,” it is worth trying to explain why people are more or less risk averse.

Litterman's second contribution is his attempt to shed light on society's risk aversion of climate change. If we are to choose between the risk-averse and the risk-taking, how do we choose? Here Litterman cites the “puzzlingly” large difference in yields between equities and government bonds. The risk super-premium that investors seem to demand from equities may indicate that investors (and society generally) are more risk-averse than economists might think. This also works itself out as an adjustment to the appropriate social discount rate. A higher aversion to climate risk would mean that society would demand more for assuming risk, and that the demanded return for alternative uses of money would be higher, reflecting a higher discount rate, and a concomitantly lower discount rate for climate investments. On the other hand, a risk-taking preference would demand less from alternative investments, leading to a higher discount rate for climate investments. As it turns out, much of what we think (or maybe feel) about climate change is a question of risk tolerance.

One might argue that it is impossible to glean a societal risk tolerance—and a societal discount rate—from any economic data. It could be, parenthetically, that the investors Litterman uses to study risk do not represent society's risk preferences generally,

and that a lower-income population sample would be more risk-taking. If that were true, then the large spread reflects only a risk aversion of the wealthiest, and the impoverished of the rest of the world could be perfectly willing to tolerate climate risks, those outcomes not being quite as different from their present situation. But even if it were possible to ascertain a risk preference for everybody, does that tell us how to price carbon?

**Political beliefs** | Ascertaining societal risk preferences is, under Litterman's approach, still pegged to knowledge about climate science. In the presence of uncertain information, is it really a societal risk preference that we are searching for, or is it something that has more to do with attitudes toward industrial society and environmental preferences? In surveys conducted jointly by the Yale Project on Climate Communications and the George Mason University Center for Climate Change Com-

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munication, respondents who characterize themselves as “very conservative” are 20 times more likely to be dismissive of the threat of climate change than those that characterize themselves as “very liberal.” Why? Why are Republicans 4.5 times more likely to be dismissive of climate change than alarmed by it, and why are Democrats seven times more likely to be alarmed than dismissive? Is there something else going on here? Is climate policy truly a behavioral question or a philosophical problem of how we handle our own epistemic limitations? To borrow from former defense secretary Donald Rumsfeld, we are dealing with “unknown unknowns”—things about which we don't even appreciate our own ignorance. Is how we deal with our ignorance an economic problem at all?

To that question, I would still answer yes. It is capitulating to French postmodernism to say that climate science is unknowable and there is no point in attempting to know. Both hard and social sciences have only made progress by accepting imperfect states of knowledge as the moving goalposts necessary to have any research, any discourse, and any progress at all. There is nothing to challenge if nothing is accepted as provisionally true and therefore worthy of challenge. The alternative is to throw up one's hands and declare defeat. The postmodernist dystopia is one in which there is only raw power, unchecked and uninformed by knowledge or ethics. Litterman's “three yards and a cloud of dust” is a valuable advance in a climate debate characterized by too much defense and disturbingly postmodernist tendencies to doubt the knowability of things.

**Toward a tax** | Where does that leave us? Litterman concludes

by recommending a carbon tax that is “no lower, and perhaps well above, a reasonable estimate of the present value of expected future damages.” That is clearly preferable to the current default option in the United States: regulation under the Clean Air Act. Even a low carbon tax, on the order of \$10 or \$15 per ton of carbon dioxide, should be acceptable to some fraction of the risk-taking individuals that view climate change policy as a hedge. Litterman tells us that even for the risk-takers, “emissions should be priced immediately, of course, but the appropriate price would be at a relatively low level today.” Three of Mitt Romney’s top economic advisers during his presidential campaign—Kevin Hassett (American Enterprise Institute), Glenn Hubbard (dean of the Columbia Business School), and Gregory Mankiw, (Harvard professor and former chief economic adviser to President George W. Bush)—have called for at least a modest carbon tax. For the risk-averse, a low carbon tax would be better than nothing, and even for them probably better than regulation under the Clean Air Act as well.

The approach of “trying out” a carbon tax because it seems to match the risk preferences of the greatest number of people may still seem unsatisfying to some. It is still moored in uncertain climate science and is orthogonal to the question of how we deal with our ignorance about climate change. An idea that I have advanced in the past is to create a prediction market for future climate outcomes. My proposal starts with a carbon tax that is initially set at a low level, but in every future year is indexed to a basket of climate outcomes in that year:

- global mean temperature
- days of unusually high or low temperatures
- extreme rainfall events
- duration of drought events
- global mean sea level
- ocean acidity
- hurricanes of a category 3, 4, or 5 level

If these seven climate outcomes prove to be severe, as climate scientists predict, then the indexed carbon tax will rise; if not, then it will remain at a low level. Moving averages can be used to smooth out fluctuations.

The point of this indexed carbon tax is not to incentivize emissions reductions; as discussed above, damages from climate change lag emissions by too much for this tax to “bite” at the right time. Rather, the point is to establish a liability backdrop for the prediction market. What I have proposed is, nested inside this indexed carbon tax, a cap-and-trade program for a small number of permits that can be redeemed in the future in lieu of paying the indexed carbon tax. The permits would be unitary exemptions from the tax, auctioned far in advance of their redemption date. What we would expect is that the prices for the future permits would reflect market expectations of future climate outcomes. That cap-and-trade program, exempting a small number of emitters from the indexed tax, is the prediction market. This “tax-and-cap-and-trade” program would produce market opinions on the science of climate change, scrubbed free of taint or ideology.

My proposal is aimed at trying to remove emotion from perceptions of climate science. Unsurprisingly, the problem of pricing greenhouse gas emissions raises a number of non-economic issues. It seems as though no matter how objective and data-driven you try to be, climate change inexorably pulls you back into a morass of unresolvable value judgments and moral arguments. Granted, climate science has sometimes given the world cause for skepticism, but shrillness has crowded out reasoned discourse.

Litterman is not the only person to have discussed the economics of climate change in this original way, but this short essay is the most rewarding and insight-rich piece that I have read in a long time. R

#### READINGS

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## Uncertainty Can Go Both Ways

BY DAVID R. HENDERSON

**B**ob Litterman (p. 38) makes some excellent points about the roles of uncertainty, size of damage, and economic growth in his discussion of how the government should “price” carbon emissions. However, he does not go far enough in considering the role of uncertainty. A deeper appreciation of uncertainty over the effect of carbon emissions on people’s lives leads to a wider range of reasonable policies than Litterman considers.

**Technology** | I first note the major issue on which he and I agree: the importance of economic growth. Litterman notes that even if, pessimistically, per capita incomes grow by only 1 percent per year, then “without factoring in climate damages, people will have 64 percent higher income in 50 years.” He reasons that climate risk “will reduce the dispersion of potential future growth scenarios” and that, therefore, it is “a potential hedge against other random factors affecting future economic well-being.” That’s an important, sophisticated point, and it is one that you would expect from a person who thinks about risk and hedges.

He also makes another, less-sophisticated point that could be just as—or more—important: the role of technology. He writes that in the distant future, when the effects of climate are expected by many to be more extreme than they are today, technology,

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