COMMENTARY

New Study Admits Even Modest Carbon Tax Would Hurt the Next Two Generations

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One of the main themes of my writings on climate change at IER has been warning the public that the "consensus science" they are hearing from the media, pundits, and certain political figures is utterly divorced from the actual published literature, especially when it comes to the *economic analysis* of government policy. A new, cutting edge working paper from some big-name economists—including Laurence Kotlikoff and Jeffrey Sachs—confirms my point.

In this case, here is the shocking fact that their paper tries to grapple with: Even with a

relatively modest carbon tax, the rise in energy prices is so painful that it swamps the benefits of slower climate change, and this is true for our kids *and* grandkids. It is only when we get to our *great-grandchildren* that humanity on net would start to actually benefit from even a modest carbon tax introduced today. So the next time you hear someone say, "We need to take vigorous action on the climate for future generations!" you can clarify, "*Actually*, your proposals would hurt the next two future generations. You want to hurt us, our kids, and our grandkids, in order to help our great-grandkids and beyond—who will all be fantastically rich compared to us, by the way."

The Kotlikoff et al. paper is quite technical, so I'll just summarize the take-away points for a lay audience. I will also spend time at the end of the article explaining what *their proposed solution is*, for this thorny problem. To avoid confusion, I want to be clear: The authors of this new paper are *for* a (modest) carbon tax. But they are warning that the current discussion, even among economists, tends to look at "what's best for humanity from now until the end of time," rather than checking to make sure *each generation* gains from a new climate policy. As we'll see, Kotlikoff et al. suggest a massive fiscal transfer that allows present generations to run up a huge (additional) government debt that our descendants must then effectively pay back with higher taxes, in order to compensate their forebears for suffering through higher energy prices due to a carbon tax.

The point of my article isn't to endorse the overall recommendation of Kotlikoff et al.; along with climate scientists at Cato, I've published a comprehensive critique of the usual economist's case for a carbon tax. Rather, by shining a spotlight on the cutting edge in the development of the literature on carbon taxation, I want readers to see just how detached the *actual* discussion among experts is from the breezy claims about "we have 12 years left to save our children" that we hear from pundits and political officials.

How An "Optimal" Carbon Tax Can Punish Unto the Third Generation

To set the stage for my interpretation, let's first quote from the authors' own

description of their results. (Note, readers who don't have access through the NBER link above can also see a version of the paper posted at Kotlikoff's website.) The title of the paper is, "MAKING CARBON TAXATION A GENERATIONAL WIN WIN." Here's an excerpt from the Abstract:

> **Carbon taxation has been studied primarily in social planner or infinitely lived agent models, which trade off the welfare of future and current generations.** Such frameworks obscure the potential for carbon taxation to produce a generational win-win. This paper develops a large-scale, dynamic 55-period, OLG [Overlapping Generations—rpm] model to calculate the carbon tax policy delivering the highest uniform welfare gain to all generations. The OLG framework, with its selfish generations, seems far more natural for studying climate damage. Our model features coal, oil, and gas, each extracted subject to increasing costs, a clean energy sector, technical and demographic change, and Nordhaus (2017)'s temperature/damage functions. Our model's optimal uniform welfare increasing (UWI) carbon tax starts at $30 tax, rises annually at 1.5 percent and raises the welfare of all current and future generations by 0.73 percent on a consumption-equivalent basis. **Sharing efficiency gains evenly requires, however, taxing future generations by as much as 8.1 percent and subsidizing early generations by as much as 1.2 percent of lifetime consumption. Without such redistribution (the Nordhaus "optimum"), the carbon tax constitutes a win-lose policy with current generations experiencing an up to 0.84 percent welfare loss and future generations experiencing an up to 7.54 percent welfare gain.** [Kotlikoff et al., bold added.]

Although I realize this is difficult technical language for the layperson to parse, here's what the authors are saying: If we take the "gold standard" (their term later on) in this literature and use Nordhaus' 2017 model calibration, it will recommend an "optimal

carbon tax" that correctly—according to standard economic theory and the best estimates from the climate science research—balances the tradeoff between reducing emissions and harming economic growth.

However—and this is a huge caveat—Nordhaus' approach assumes there is a benevolent, overarching "social planner" who lumps all of humanity together, and only makes a technical allowance for a (modest) discount on the happiness of future generations in accordance with standard economic theory.

In practice, the authors point out, Nordhaus' "optimal carbon tax" would actually mean that people living or born today and in the near future will be *harmed* on net by the policy, because they will suffer worse economic harm from higher energy prices, than they will be spared in climate change damages from reduced emissions. It's only when we get several generations into the future, that Nordhaus' "optimal carbon tax" actually starts making human beings better off, compared to the status quo.

This is a critical point for Americans to realize. They are constantly being hectored that if they "cared for their children" they would support a large carbon tax and other aggressive interventions. But we see that this isn't true: If we even adopt a *modest* carbon tax—one that still allows 4 degrees Celsius warming (over twice the 1.5 degree currently touted by climate activists as the necessary target), according to the authors (p. 22)[1]—then we are harming ourselves, our children, and our grandchildren, *relative to the "do nothing" baseline*. It's only our great-grandchildren, who (on average) are going to be fantastically wealthy compared to us, who will actually start reaping net benefits from even this modest reduction in the path of emissions.

The Specifics

The general point of this new paper has been made before; I myself have frequently pointed out to audiences that the entire climate change approach involves making relatively poor people (i.e. us) even poorer, in order to shower benefits on relatively rich people (i.e. future generations). However, the benefit of the Kotlikoff et al. paper is that they quantify exactly how much *each generation* wins or loses under the latest

Nordhaus calibration, by taking his (Nobel-Prize winning) model and changing as little as possible to make their calculations. Furthermore, since Jeffrey Sachs (one of the co-authors) is a prominent *proponent* of "action against climate change," the skeptical outsider can be reassured that these results are genuine and not the result of bias or disinformation.

Here are some specific results of their model, which I have adapted from one of their tables:

Impact of "Optimal Carbon Tax" on Different Cohorts, Depending on When Born

Birth Year (Relative to Start of Nordhaus Carbon Tax)	Change in Well-Being During Remainder of Life (Due to Higher Energy Prices But Less Climate Change)
-45	4.50%
-35	3.17%
-25	0.97%
-15	-0.28%
-5	-0.83%
0	-0.89%
5	-0.94%
15	-0.82%
25	-0.51%
35	-0.08%
45	0.40%
55	0.92%
100	4.56%
200	7.50%

Source: Kotlikoff et al., Table 3 (p. 27).

In the table, I've highlighted the rows pertaining to people who are born 15 years *before* the year the Nordhaus carbon tax is implemented, all the way up through

people born 35 years *afterwards*. This group of humans can roughly be summarized as the "children and grandchildren" of the adults who make the decision to go ahead and install the carbon tax.

As the right side of the table indicates, *this entire segment of the humanity*, spanning the next two generations, is hurt on net by the carbon tax. That is, the economic damage resulting from the penalty on fossil fuels hurts the kids and grandkids more than they gain from mitigated climate change during their lifetimes, relative to what would have happened under "business as usual."

According to the simulations of the authors, it is only when you get to people born *45 years*after implementing the carbon tax—many of whom would be the *great*-grandkids of adults who supported the tax decades earlier—that humanity actually starts reaping net benefits from the whole scheme. It's only from this point forward that the accumulated difference in climate change is large enough to compensate for the higher energy prices created by the carbon tax.

In the bottom two rows of the table, I've shown what happens 100 years and 200 years out: We see that people born at these times experience a net gain of 4.56% and 7.50% in "welfare" (the technical economic term in the paper), respectively.

(A parenthetical note for purists, so that no one accuses me of skullduggery: I've also included at the top of the table the results for people who are born decades before the carbon tax. The authors report that these people gain too, because they own reserves of coal, oil, and natural gas, and hence benefit from higher energy prices. However, this seems to be a mistake in economic reasoning. Yes, a tax on emissions will drive up the price of energy, but that hardly helps the owners of coal; that's why people accuse certain energy companies of lobbying against carbon taxes. I have emailed the authors of the paper for clarification.)

Making Sense of the Results

Here's some intuition (from me, not the authors) to help the reader understand the big

picture: Suppose the Nordhaus model of the damages from emissions and climate change were basically correct, and the environmental economists recommended a carbon tax of around $30/ton that would steadily rise over time.

But then engineers discover a new technique that will eventually allow them to very easily and cheaply remove carbon dioxide from the atmosphere, beginning in the year 2060. In other words, suppose we suddenly realize that only climate change damages that occur between now and the year 2060 will matter, because afterwards scientists will be able to very easily calibrate atmospheric concentrations of CO2, much like setting the thermostat in a household.

In this thought experiment, what would happen to the "optimal carbon tax"? It would obviously collapse to about $0/ton (with Nordhaus' other parameter choices for his model). The main point of humanity slamming the brakes on emissions was the flow of avoided climate change damages that would accrue to humanity *after* 2060. The human race would effectively be making a large upfront investment for several decades, in order to eventually start reaping the payoff.

This intuition is what the authors of the new NBER study have quantified, shown in the table above. They are showing that when you take the leading model in the literature (i.e. Nordhaus' with its 2017 calibration), and then decompose "humanity" into discrete groups who are born in different years, it turns out that the costly investment project doesn't begin reaping net dividends until 45 years after it's begun.

The odd fact about climate change policy is that the current generation, the next generation, and the *third* generation are being asked to reduce their standard of living, in order to shower benefits on our great-grandkids and their descendants. Incidentally, this is why the seemingly arcane debate over the proper "discount rate" to use in climate change analysis is so crucial—the costs of a carbon tax are concentrated in the first few decades, while the ostensible benefits are spread out into the far distant future.

"But What About the (Great-Grand-) Children?!"

The obvious response to my above reasoning is to say, “Okay sure, the present generation—and I guess, the next two as well—are being asked to make sacrifices for our distant descendants. But isn’t that the responsible thing to do? We don’t want to saddle our great-grandchildren and beyond with an unlivable world!”

But again, this type of language is not supported by the “gold standard” (the term used by Jeffrey Sachs et al. in their paper) modeling of climate change damages. Look again at the bottom two rows in the table above. The “optimal carbon tax” boosts the welfare (it’s fine to think of it in terms of “real lifetime income”) of the people born 100 years later by 4.56%, and the people born 200 years later by 7.50%.

But hang on a second. If we didn’t have to worry about climate change, there would presumably be standard economic growth on average, over the next two centuries. Let’s be conservative and say real income per capita would grow 1% per year, without worrying about climate change. That means people in 100 years would have a standard of living 170% higher than ours, while people in 200 years would have a standard of living 630% higher. Then if they got ravaged by unchecked climate change—because we selfishly refused to harm our own narrow self-interest by restricting emissions—the people in 100 years would “only” have a lifestyle about 160% richer than ours, while the people in 200 years would “only” have a lifestyle 580% richer than ours.

Kotlikoff Et Al.’s Proposed Debt Solution

This post is already long, so let me very briefly explain the actual proposal in the Kotlikoff et al. paper. Since Nordhaus’ “optimal carbon tax” would—as shown above—hurt early generations in order to benefit distant generations, the authors propose to use fiscal policy to effectively transfer wealth from future generations to present ones.

In other words, they propose to flip the standard fiscal debates on their head: When people usually talk about our need to “stop running deficits at the expense of our children and grandchildren,” Kotlikoff et al. say that’s *exactly* what we should do, to compensate ourselves for the pain we are suffering by implementing a new carbon tax. (Incidentally, this discussion has nothing to do with the use of carbon tax receipts to

offset other taxes, as the authors make clear on page 7.)

This twist in their paper is another reason I was so fascinated by the article, as I happened to have taken part in a big debate among economists over whether it even makes sense to say government debt could "burden future generations." (My allies and I said "yes," while Paul Krugman and Dean Baker said "no." See my article here or a PowerPoint lecture here.) So it was interesting to see Jeffrey Sachs et al. implicitly throw Krugman under the bus, in a double way: (1) We *can* make future generations poorer by running up the government debt, thank you very much, and maybe we *should* do so, because (2) a carbon tax will impose large net damages on humanity for the next few decades. (In case readers miss my joke, Krugman also denies that a carbon tax will be painful.)

"Ah," the clever reader may now say, "you had been leading us to believe that a carbon tax was a bad idea. But Kotlikoff et al. have found a way to salvage it! Win-win for everybody!"

But hang on a second. Do you know how big a "fiscal transfer" is necessary, in order for early generations to compensate themselves for the cooler planet they're handing off to the future? According to the study: "*The size of the debt to GDP ratio required to effect the win-win is significant [for Nordhaus' default parameters]. The…debt to GDP ratio [from the compensatory transfer program] is 0.52 in year 50, 0.78 in year 100, 0.82 in year 200, 0.70 in the year 1000, stabilizing at 0.48 in the long run…*" (p. 25).

This is shocking. And to be clear, this is *putting aside the other government debt*. What the authors are saying is that we, our kids, and our grandkids should give ourselves a big tax cut, letting the government debt mushroom to an *additional* 52 percent of GDP a half-century after the tax, and hand that off to our heirs, who will be saddled with a large tax *hike* to service this extra burden of Treasury debt.

To borrow a line from Al Gore, this strikes me as a "risky scheme."

Conclusion

The public is being grossly misled about the economics of climate change policy. It's true that many prestigious economists endorse a modest carbon tax, but their recommendations would still allow vastly more warming than the UN's popular goals, which have become the norm in policy discussions with little explanation.

Moreover, even using fairly pessimistic projections, future generations will be far richer than we are, *with or without* any government actions on climate change. And as a clever new working paper from Laurence Kotlikoff and Jeffrey Sachs (among others) reveals, even a modest carbon tax will cause *net* damages to us, our kids, and our grandkids. It's only when we get to the fourth generation that the "optimal carbon tax" from the literature starts yielding more climate change benefits than it causes in economic harm.

Those who have the training to actually read and parse the economics of climate change literature can appreciate just how awful the reporting and typical "policy wonk" discussion is. It's almost as if the self-anointed experts are science deniers.

In any event, opponents of a carbon tax can now adopt the slogan: "Do it for the children!"

[1] One of the reasons I very much enjoyed this paper is that the authors are refreshingly frank. For example, in footnote 24 (p. 22) they acknowledge that the "optimal carbon tax" from Nordhaus' model does not come close to hitting the popular UN targets: "The crucial reason for the relatively large increase in temperature permitted under the optimal policy compared, for example, with the Paris accord, which vowed to limit the rise in surface temperature to 1.5 to 2 degrees, lies in the Nordhaus (2017) damage function. With this function, a 4-degree increase in average temperature leads to major, but still moderate long-run damages."

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