« How Optimism and Pessimism Shape Our Views on Climate Policy—Part II: Evidence
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An Insightful and Provocative Keynote

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Herman Daly delivered a fantastic keynote address to AMS's workshop on Federal Climate Policy. The text is reproduced here in full.

Climate Policy: from "know how" to "do now"

Herman E. Daly

The recent increase in attention to global warming is very welcome. Most of the attention seems to be given to complex climate models and their predictions. That too is welcome. However, it is useful to back up a bit

and remember an observation by physicist John Wheeler, “We make the world by the questions we ask”. What are the questions asked by the climate models, and what kind of world are they making, and what other questions might we ask that would make other worlds? Could we ask other questions that would make a more tractable world for policy?

The climate models ask whether CO2 emissions will lead to atmospheric concentrations of 450-500 parts per million, and will that raise temperatures by 2 or 3 degrees Celsius, by a certain date, and what will be the likely physical consequences in climate and geography, and in what sequence, and according to what probability distributions, and what will be the damages inflicted by such changes, as well as the costs of abating them, and what are the ratios of the present values of the damage costs compared to abatement expenditures at various discount rates, and which discount rate should we use, and how likely is it that new information learned while we are constructing the model, will invalidate the results? What kind of world is created by such questions? Perhaps a world of such enormous uncertainty and complexity as to paralyze policy. Scientists will disagree on the answers to every one of these empirical questions.

Could we ask a different question that creates a different world? Why not ask, Can we systematically continue to emit increasing amounts of CO2 and other greenhouse gasses into the atmosphere without eventually provoking unacceptable climate changes? Scientists will overwhelmingly agree that the answer is no. The basic science, first principles, and directions of causality are very clear. Arrhenius discovered the basics a century ago. Focusing on them creates a world of relative certainty, at least as to the thrust and direction of policy. True, the rates, sequences, and valuations are uncertain and subject to debate. But as long as we focus on measuring these inherently uncertain empirical consequences, rather than on the certain first principles that cause them, we will overwhelm the consensus to “do something now” with ditherings about what we might someday consider doing if ever the evidence is sufficiently compelling. I am afraid that once the evidence is really compelling then our response will also be compelled, and policy choice will be irrelevant. To make the point more simply, if you jump out of an airplane you need a crude parachute more than an accurate altimeter. And if you also take an altimeter with you, at least don’t become so bemused in tracking your descent that you forget to

pull the ripcord on your parachute. We should be thinking in terms of a parachute, however crude.

The next question we should ask is, What is it that is causing us to systematically emit ever more CO2 into the atmosphere? It is the same thing that causes us to emit more and more of all kind of wastes into the biosphere, namely our irrational commitment to exponential growth forever on a finite planet subject to the laws of thermodynamics. If we overcome the growth idolatry we could then go on to ask an intelligent question like, “How can we design and manage a steady-state economy, one that respects the limits of the biosphere?” Instead we ask a wrong-headed, growth-bound question, specifically; “By how much will we have to increase energy efficiency, or carbon efficiency, in order to maintain customary growth rates in GDP?” Suppose we get an answer, say we need to double efficiency in ten years and we actually do it. So what? We will then just do more of all the things that have become more efficient and therefore cheaper, and will then emit more wastes, including greenhouse gasses—the famous rebound or Jevons effect. A policy of “efficiency first” does not give us “frugality second”—it makes frugality less necessary. In the nineteenth century words of William

Stanley Jevons,

“It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth.” (Jevons, 1866, p123) And further,

”Now, if the quantity of coal used in a blast-furnace, for instance, be diminished in comparison with the yield, the profits of the trade will increase, new capital will be attracted, the price of pig-iron will fall, but the demand for it increase; and eventually the greater number of furnaces will more than make up for the diminished consumption of each.” (Jevons, 1866, p124-125)

In modern words, if we increase miles per gallon we are likely to travel more miles because it is cheaper. Or suppose instead of driving more we save the money. What then do we do with it? Travel by airplane? Buy a second house? Invest in nuclear power or ethanol production? Better to pay it to our psychiatrist for the low-energy service of listening while we confess our sins. Yes, but doesn’t that help him pay for his airplane trip or second house? Jevons has us by the tail—“It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished

consumption. The very contrary is the truth". Our energy policy is all about "efficient patterns of consumption" and not at all about "sustainable aggregate levels of consumption". It is wholly a confusion of ideas to suppose that an efficient pattern of energy consumption is equivalent to, or even leads to, a sustainable aggregate level of energy consumption.

But if we go for "frugality first" (i.e. sustainable level first) as our direct policy variable (for example, a carbon tax, or a cap-auction-trade system) then we will get "efficiency second" as an adaptation to more expensive carbon fuels. "Frugality first gives efficiency second, not vice versa" should be the first design principle for energy and climate policy. Efficiency is an adaptation to scarcity that makes it less painful; it is not the abolition of scarcity, the so-called "win-win" solution beloved by politicians.

The second thing wrong with our misleading question is its assumption that we need to maintain current growth rates in GDP. There is a lot of evidence that GDP growth at the current margin in the US is in fact uneconomic growth—that is, growth that increases social and environmental costs faster than it increases

production benefits, growth that accumulates “illth” faster than it accumulates wealth. I know that there is still poverty in the world and that GDP growth in some countries is still economic—all the more reason to stop uneconomic growth and free up resources and ecological space for truly economic growth by the poor! That should be the second design principle.

You will not find the term “uneconomic growth” in the index of any economics textbook. My word processing program even underlines it in red warning me that I probably made a syntactical error! But it is not hard to see how the reality of uneconomic growth sneaks up on us. We have moved from a world relatively empty of us and our stuff, to a world relatively full of us, in just one lifetime. The world population has tripled in my lifetime and the populations of cars, houses, livestock, refrigerators, TVs, etc. have increased by much more. As we transform natural capital into manmade capital the former becomes more scarce and the latter more abundant—an inversion of the traditional pattern of scarcity. This inversion is furthered by the fact that manmade capital is often private property while natural capital frequently is an open-access commons.

In the empty world economy the limiting factor was

manmade capital; in the full world it is remaining natural capital. For example, the annual fish catch used to be limited by the number of fishing boats; now it is limited by the remaining stocks of fish in the ocean and their capacity to reproduce. Barrels of petroleum extracted used to be limited by drilling rigs and pumps; now it is limited by remaining deposits in the ground, or alternatively by capacity of the atmosphere to absorb the products of its combustion. There seems to be a race between peak oil and global warming, between source and sink limits—but both are natural capital so for my point it does not matter which proves more limiting. Economic logic stays the same—it says invest in and economize on the limiting factor. But the identity of the limiting factor has changed, and we have not adapted. We continue to invest in manmade capital rather than in restoration of natural capital. This further depletes natural capital and eventually drives down the value of complementary manmade capital, while spewing external costs all over the place.

The reason that mainstream economists do not see this is that they think manmade capital and natural capital are substitutes rather than complements. With substitutes you don't have a limiting factor, so they overlook the scarcity-augmenting fact of

limitationality. I am not sure why they do this, but suspect that they prize substitution's mathematical tractability more than complementarity's conformity to the first law of thermodynamics. Furthermore, conformity to the first law is ideologically inconvenient because it slows down growth. Some of you may have a better explanation, but the fact remains that natural resource flows and capital funds are treated as substitutes—when natural resources are included in the production function at all, which usually they are not!

In addition to this monumental error on the production or supply side, we have an equally monumental error on the utility or demand side—the failure to take seriously the fact that beyond a threshold of absolute income already passed in the US, welfare or self-evaluated happiness, becomes a function of relative income rather than absolute income. Since it is impossible to increase everyone's relative income, further absolute growth in GDP becomes a self-canceling arms race.

Enough of what is wrong. Can one offer a reasonable policy based only on first principles? Yes—one such policy is called ecological tax reform,— a stiff

severance tax on carbon, levied at the well head and mine mouth, accompanied by equalizing tariffs on carbon-intensive imports, and by rebating the revenues by abolishing regressive taxes on low incomes. Such a policy would reduce total carbon use, give an incentive for developing less carbon-intensive technologies, and redistribute income progressively. Yes, but how do we know what is the optimal tax rate, and wouldn't it be regressive, and is there really a "double dividend", as some have claimed, etc.? Once again we make the world by the questions we ask. We need to raise public revenue somehow, so why not tax carbon extraction heavily and compensate by taxing income lightly, especially low incomes? More generally, tax the resource throughput (that to which value is added) and stop taxing value added. Whether you tax the throughput at the input or output end is a matter of convenience, although I generally prefer the input end because depletion is spatially more concentrated than pollution. Also higher input prices induce efficiency at all subsequent stages of the production process, and limiting depletion ultimately limits pollution, at least in a gross aggregate sense.

Tax bads (depletion and pollution), not goods (income). Does anyone imagine that we currently tax

income at the optimal rate? Better first to tax the right thing and later worry about the “optimal” rate of taxation, etc. People don’t like to see the value added by their own efforts taxed away, even though we accept it as necessary up to a point. But most people don’t mind seeing resource scarcity rents, value that no one added, taxed away. And the most important public good served by the carbon tax would be climate stability, a benefit in which everyone shares. The revenue from the carbon severance tax could be rebated to the public by abolishing other taxes, especially regressive ones. And even though the incidence of the tax by itself is regressive with respect to income, it has the advantage that it is paid by all consumers, including the income tax evaders and avoiders.

Setting policy in accord with first principles allows us to act now without getting mired in endless delays caused by the uncertainties of complex empirical measurements and predictions. Of course the uncertainties do not disappear. We will experience them as surprising consequences, both agreeable and disagreeable, necessitating mid-course correction to the policies enacted on the basis of first principles. Recognizing the need for mid-course corrections

should be a third policy design principle. But at least we would have begun a process of moving in the right direction. To continue business as usual while debating the predictions of complex models in a world made even more uncertain by the questions we ask, is to fail to pull the ripcord. The empirical consequences of this last failure, unfortunately, are all too certain.

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