THE CLIMATE CASINO: Risk, Uncertainty, and Economics for a Warming World by William Nordhaus, New Haven: Yale University Press, 2013

As many of you know, I attended Al Gore's Climate Reality Leadership training on August 1-3 this summer and committed to pursue action on climate change. As one of my first acts I requested our group to allow me to make a presentation on climate change. As we are a book club, we will follow our usual format of reading a book and discussing it. I requested that this discussion be held on November 20 so that we could participate in 24 HOURS OF REALITY: TRUTH IN ACTION, a daylong global conversation on the climate crisis and how we solve it, led by Climate Reality Leaders trained by former Vice President Al Gore. For those of you who register as a participant, using the link below, funds have been raised to have a tree planted on your behalf, so please do register in addition to providing your rsvp to Stu Callison as usual. The link is:

 https://realityhub.climaterealityproject.org/events/item/348/46165

SUMMARY for our discussion on November 20, 2019

I selected this book because it is a comprehensive approach by an economist to the complex issues confronted in considering climate change. Written for non-economists, it covers all the elements involved in understanding the human role in climate change, both what we now know and what we do not really know.

William Nordhaus has been a member of the faculty at Yale since 1967, in both the Economics Department and the School of Forestry and Environmental Studies. He also served as the chairman of the Boston Federal Reserve Bank between 2014 and 2015 and was a member of the Council of Economic Advisors during the Carter Administration from 1977 to 1979. In 2013, Nordhaus chaired a committee of the National Research Council that produced a report discounting the impact of fossil fuel subsidies on greenhouse gas emissions.

However, in a December 2016 discussion paper for the Cowles Foundation, his research using the updated DICE model described in this book "...confirms past estimates of likely rapid climate change over the next century if there are not major climate-change policies. It suggests that it will be extremely difficult to achieve the 2°C target of international agreements even if ambitious policies are introduced in the near term. The required carbon price needed to achieve current targets has risen over time as policies have been delayed."

Nordhaus was awarded the Nobel Memorial Prize in Economic Sciences in 2018. In detailing its reasons for giving the prize to Nordhaus, the Royal Swedish Academy of Sciences specifically recognized his efforts to develop "an *integrated assessment model*, i.e. a quantitative model that describes the global interplay between the economy and the climate. His model integrates theories and empirical results from physics, chemistry and economics. Nordhaus' model is now widely spread and is used to simulate how the economy and the climate co-evolve."

Many of the news outlets that reported on Nordhaus's prize noted that he was in the advance wave of economists who embraced a carbon tax as a preferred method of carbon pricing. Some climate

scientists and commentators were disappointed with the Nobel Prize going to Nordhaus (See links below.)

William Nordhaus offers in this book a template to apply to the challenge of addressing climate change.

Part I of the book addresses the science of climate change. What do we understand and what do we know about climate change? What causes it? What role do human beings play in the warming of the earth? This part covers how projections of global warming are made and how the predictions of warming with no major change in policies and human behavior will lead us to 3.5 C increase in average temperature from 1900 to 2100. Chapter 5 addresses what was known at the time this book was written about "tipping points" such as the rapid melting of large ice sheets such as Greenland, large-scale changes in ocean circulation such as the Gulf Stream, feedback interactions including the impact on warming of the release of locked-up carbon and methane from the melting of permafrost, and enhanced warming over the long run.

Part II of the discussion surveys the impacts of climate change with a focus on the effects of rising temperatures on human and natural systems. Nordhaus acknowledges the significant disruptions expected in low-income and tropical regions such as Africa, Latin America, coastal states, and the Indian subcontinent. Chapter 7 addresses farming, downplaying the risks for the near future, especially in developed economies where agriculture represents a declining share of GDP. Chapter 8 on health considers some of the work on climate change as too pessimistic. Chapters 9, 10, and 11 turn to sea-level rise, ocean acidification, hurricane intensification, and ecosystem losses. Chapter 12 attempts to evaluate what we know and do not know, what the impacts will be in the parts of the economy which Nordhaus considers to be manageable, as well as the unmanaged human and natural systems which lie outside the conventional marketplace.

These two parts of the book are interesting, but are likely to cover materials already familiar to most of our group. For those who have more than a basic understanding of climate change and who accept that humans have an important role in the accelerating process of global warming, I recommend reading the introductory chapter and then skipping the rest of these two sections. Even for those who have a more advanced knowledge of climate change's causes and effects, you may wish to learn about the integrated assessment models developed by Nordhaus. Or you may appreciate equations and not just bar graphs. In that case, I recommend reading these chapters and the relevant notes at the end of the book.

The heart of the book, for me, began in Part III which explains the economics of climate change. This book was written for the very general public and some of our group may be annoyed at the lengthy explanations of concepts such as externalities. If so, just skip them and consider whether this book does a good job of explaining what we already know. This section starts with a chapter on the options of adaptation and geoengineering, before moving on to mitigation (reducing emissions). Chapter 15 describes the costs of slowing climate change and addresses the consequences of less than full global participation. While he could not have known what would be agreed in Paris in 2015, I do not believe that these discussions are any less relevant. However, I do regret that updated cost information on wind and solar was not available to him in 2013 for his discussion of options on energy. Chapter 16 contains some of Nordhaus' most controversial conclusions as he addresses the prescriptive and

descriptive (opportunity-cost) options for establishing discount rates for models such as DICE. His rates have led to carbon prices over the years well below levels recommended by the IPCC and others.

Part IV constructs the framework for answering the question of how we act in the face of climate change. How much we should spend in efforts to reduce greenhouse gas emissions? What should be the time profile for reducing emissions? How should reductions be distributed across industries and countries? And what policy tools are most effective?

Part V covers the politics of addressing climate change.

QUESTIONS for our discussion:

A. <u>The Nordhaus model and its critics</u>

Does Nordhaus provide an effective framework for considering the challenge of climate change? The Nobel Prize committee thought so on October 8, 2018 when it awarded him the Nobel Prize. His models have served as a backbone for many of the IPCC reports.

Nordhaus explains the obstacles to adoption of action on climate change in Chapter 26. Looking at the following, has he adequately responded to the practical or logical problems in overcoming these obstacles to action?

- Prisoner's Dilemma
- Bias towards the present
- Faith in technology developing solutions making it unnecessary to act now

The DICE model incorporates UN population growth projections. Nordhaus discusses how the other variables in his model might vary, but simply accepts UN population numbers and makes no effort to discuss how they might be impacted by public policies or government investments. Project Drawdown (https://www.drawdown.org/solutions) includes education of women and family planning on its priority list for mitigating climate change. The study by J. Joseph Speidel, Deborah C. Weiss, Sally A. Ethelston and Sarah M. Gilbert "Population policies, programmes and the environment," https://royalsocietypublishing.org/doi/full/10.1098/rstb.2009.0162?keytype2=tf_ipsecsha&ijkey=e3de441963daeef914b5c4efdb4512d43195edc9& offers an extensive analysis of why reproductive health services require significant additional investment and why. This study maintains that the UN estimates of population growth rely on expansion of reproductive health services and are unrealistically optimistic.

Nordhaus and his work have been criticized for having provided cover for those who do not want to take action on climate change. In particular, he has been heavily criticized for protecting GDP over reduction in human-caused emissions. His endorsement of a discount rate based on the rates that can be observed in the market receives much of the heat. Do we agree with him or his critics?

https://www.latimes.com/opinion/op-ed/la-oe-linden-nobel-economics-mistake-20181025-story.html

https://foreignpolicy.com/2018/12/06/the-nobel-prize-for-climate-catastrophe/

These and other criticisms of Nordhaus's work followed the 2018 award of the Nobel Prize. The <u>Foreign Policy</u> article by anthropologist Jason Hickel focuses on Nordhaus' (1) dismissal of the option (p. 169) of choosing to mitigate climate change by reducing "our living standards by slowing economic growth," (2) using current market rates as the basis for the discount rates used in his models, and (3) insisting that since the sectors most vulnerable to global warming-- agriculture, forestry, and fishing—contribute relatively little to global GDP, costs will be minimal. (Nordhaus shows these sectors on page 137 as representing only 1.2% of US GDP in 2011).

      B.   <u>What can we do?</u>

https://www.drawdown.org/solutions   This website (already mentioned above in the context of population) offers a priority list of solutions for mitigating climate change. This ambitious list includes estimated CO2-ET reduction, cost, and benefit for many of the solutions.

Nordhaus robustly endorses the concept of a carbon tax or cap and trade. What do we need to do to get this on the agenda in the United States? In Virginia?

Is Maryland credible when it claims that it can meet more ambitious targets than those set in Paris while creating jobs and growing the economy?

OTHER RESOURCES

Michael E. Mann and Tom Toles<u>, The Madhouse Effect: how climate change denial is threatening our planet, destroying our politics, and driving us crazy</u>. New York: Columbia University Press, 2016. *Such an effective book that it kept me awake at night.*

Stephen Nash. <u>Virginia Climate Fever: How Global Warming will transform our cities, shorelines, and forests</u>. Charlottesville: University of Virginia Press., 2014. *Nash describes the impact of climate change in Virginia now and in the future. It outlines the dilemmas presented by the need to adapt and offers actions for mitigation which are appropriate at the state and local level. Inspired by this book, I reviewed the Maryland state plan.*

https://baltimore.cbslocal.com/2019/10/16/maryland-releases-draft-of-plan-to-reduce-greenhouse-gas-emissions-by-more-than-40-percent-by-2030/ *The State of Maryland updates its plan to reduce greenhouse emissions (news story)*

KEY STRATEGIES AND PROGRAMS in Maryland
https://mde.maryland.gov/programs/Air/ClimateChange/Documents/2019GGRAPlan/2019%20GGRA%20Draft%20Plan%20Executive%20Summary%20(10-15-2019)%20POSTED.pdf *Complete document for 2019*

https://mde.state.md.us/programs/Air/ClimateChange/Documents/2015GGRAPlanUpdate/GGRA%20Report%20FINAL%20(11-2-15).pdf *As I found the 2019 materials to be overly copious, I summarized for you below some of the major decisions and actions that Maryland was already reporting in 2015.*

1. EmPOWER Maryland. Enacted in 2008, the EmPOWER Maryland Energy Efficiency Act (EmPOWER) set a target to reduce both Maryland's per capita and total electricity consumption.

2. Maryland Clean Cars Program. Enacted into law on November 19, 2007, the Maryland Clean Cars Program adopted California's stricter vehicle emission standards.

3. Corporate Average Fuel Economy (CAFE) Standards. First enacted by Congress in 1975, the purpose of the CAFE standard is to reduce energy consumption by increasing the fuel economy of cars and light trucks.

4. The Maryland Renewable Energy Portfolio Standard. (RPS) Program Maryland became one of the first states to adopt a Renewable Energy Portfolio Standard (RPS) in 2004. In 2020 the law requires that Maryland attain 18 percent of its electricity from renewable sources, increasing to 20 percent renewables by 2022.

5. The Regional Greenhouse Gas Initiative (RGGI). The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort by nine Northeast and Mid-Atlantic States to design and implement a regional cap-and-trade program to reduce carbon dioxide emissions from power plants in the region.

6. Building and Trade Codes in Maryland. Given the long life of most buildings, upgrading State and local building codes to include minimum energy efficiency requirements provides long-term GHG savings.

7. Public Transportation Initiatives.

8. Managing Forests to Capture Carbon. Managing forests to capture carbon will promote sustainable forestry management practices in existing Maryland forests on both public and private lands. The enhanced productivity resulting from enrolling unmanaged forests into management regimes will increase rates of carbon dioxide sequestration in forest biomass, increase amounts of carbon stored in harvested, durable wood products which will result in economic benefits, and increased availability of renewable biomass for energy production.

9. Planting Forests in Maryland. Planting trees expands forest cover and associated carbon stocks by regenerating or establishing healthy, functional forests through practices such as soil preparation, erosion control, and supplemental planting, to ensure optimum conditions to support forest growth.

10. Zero Waste. Zero Waste is a concept that calls for the near complete elimination of solid waste sent to landfills or incinerators for disposal, and where, instead, the vast majority of Maryland's solid waste is reused, recycled, composted, or prevented through source reduction.

Questions/Comments

Lee Roussel
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On Monday, November 4, 2019, 01:08:48 AM EST, Lee Roussel <leedroussel@gmail.com> wrote:

I forgot to add this to my discussion paper. Since we are informal, you could just add it as is or forward it as part on your cover email. I have not yet had a chance to check it out. Too much work to do now in preparing for elections....

Lee

---------- Forwarded message ---------
From: **Margaret Byess** <margaret.byess@gmail.com>
Date: Sun, Nov 3, 2019, 13:20
Subject: Re: Draft notice for book club
To: Lee Roussel <leedroussel@gmail.com>

One more resource you may want to add and discuss. I assume you've seen the updated projections of sea level rise and the horrifying maps?

Here's the original study with the revised projections (just came out end of October):

https://www.nature.com/articles/s41467-019-12808-z

And some of the summary articles with more detailed maps of interest

https://www.climatecentral.org/news/report-flooded-future-global-vulnerability-to-sea-level-rise-worse-than-previously-understood

https://www.forbes.com/sites/jimdobson/2019/10/30/shocking-new-maps-show-how-sea-level-rise-will-destroy-coastal-cities-by-2050/?fbclid=IwAR3gu2y-VwJIsGGUUudxOBYkaV-LdHTyrBqJWFQ2nG4BRazGwvSg9yUzJbE#3831a041456c

And the interactive map itself

https://coastal.climatecentral.org/map/8/103.6833/10.7873/?theme=sea_level_rise&map_type=coastal_dem_comparison&elevation_model=coastal_dem&forecast_year=2050&pathway=rcp45&percentile=p50&return_level=return_level_1&slr_model=kopp_2014

Go take a look at VA and MD. And Vietnam, Thailand, Bangladesh, Iraq... Zoom in to see it better.

Sigh.