

# Self Introduction

Stanford Sustainability Lunch

Ivo Welch

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# Level

(I am assuming you do not know much about me or my work, and that your primary expertise is not in economics.)

# About Me

- ▶ I am a general economist
  - ▶ though I have sat in a finance department
- ▶ I work on both *theory* and *empirics*.
- ▶ I work half solo, half with coauthors
- ▶ I maintain an extensive website.
  - ▶ e.g., posted my textbook on “climate-change, economics, technology” *for free* on website.

- ▶ I am interested in questions and answers to them, not in methodology per se (unless I think methods are wrong)
- ▶ I am not interested in ideology or dogmatism
  - ▶ I am not a “laissez-faire is always best” economist,
  - ▶ ...but I also do not commit Plato’s original sin, either.
  - ▶ Not “gvmnt or not?”, but “how much?” and “how good?”
- ▶ Good Evidence » My Priors
  - ▶ I am neither left-wing nor right-wing.

- ▶ I am committed to
  - ▶ research should try for a best answer,
  - ▶ and other researchers should critique or even tear it down,
  - ▶ with as little attacks on personal integrity as possible.
    - ▶ (non-scientific and conflict-of-interest interference seems worse in climate change than in other research areas.)
    - ▶ (in GCC, skeptical questions of mine have surprisingly often been greeted with surprising hostility and defensiveness.)

- ▶ I am strongly an environmentalist
  - ▶ ...but not a “stupid knee-jerk” one.
  - ▶ I lament that environmentalism has gone down many ignorant self-righteous and wholly ineffective paths.
  
- ▶ For me, environmentalism and sustainability is about global climate change, but also about pollution, overfishing, population growth, ecosystem collapse, epidemics, fossil-fuel phaseout, etc.

# Why Am I Here?

- ▶ I want to meet you to help me work on meaningful questions to make the world a better place.
  - ▶ don't be surprised if I email/ask you.
  - ▶ tell me what I am getting wrong.
  - ▶ and I want to learn what other academics are interested in. I like interesting research of all kinds.

- ▶ Most important questions today relate to sustainability
  - ▶ did less such work early in my career...wiser now?
  - ▶ I spent my last three years learning and organizing my background knowledge about climate change, taught a course, and wrote a textbook to spread the word.
  - ▶ if I get anything wrong, *please* tell me.



# Current Work

## Textbook

- ▶ puts together well-known pieces,
- ▶ but outcome is not so expected, maybe not even to you,
- ▶ though not the stuff of academic research publication.

## Research

- ▶ in advanced stage, but not posted yet.
  - ▶ empirics: 50 years of GCC damages was related to geography not poverty.
  - ▶ theory:  $\partial SCC / \partial \sigma^2$ .

# Textbook

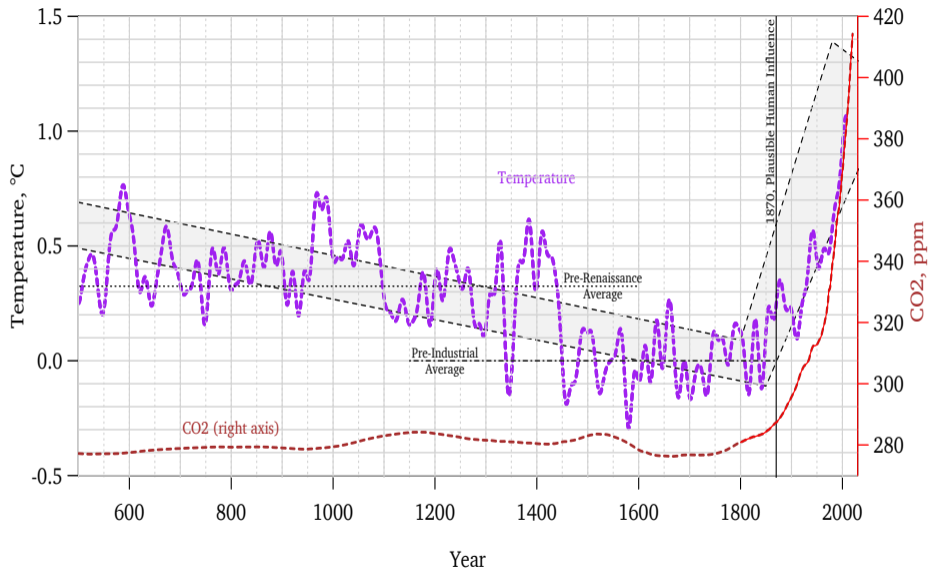
1. Earth Sciences
2. Social Sciences
3. Engineering, Technology, Business Solutions

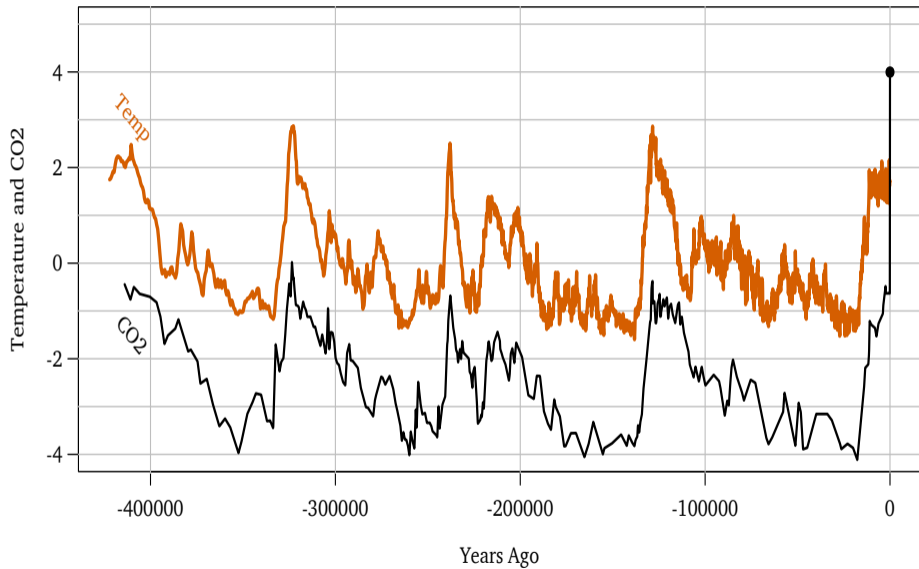
(eventually tradebook, too.)

# 1. Earth Sciences

- ▶ Not my core expertise!
- ▶ I am a consumer, not a producer of knowledge.

- ▶ book mostly sticks to IPCC (RCPs),
  - ▶ world is probably on RCP 4 or RCP 6 (not 2 or 8),
  - ▶ much more greatly concerning is 4-6°C tail (with lower probability).
- 
- ▶ book is not particularly novel, just well organized.
  - ▶ **only difference:** immunizes students against bad use of some historical associations, due to poor “identification” (endogeneity). contrast: last 150 years hockeysticks.





## 2. Economics / Social Sciences

# Kaya Identity Worldwide

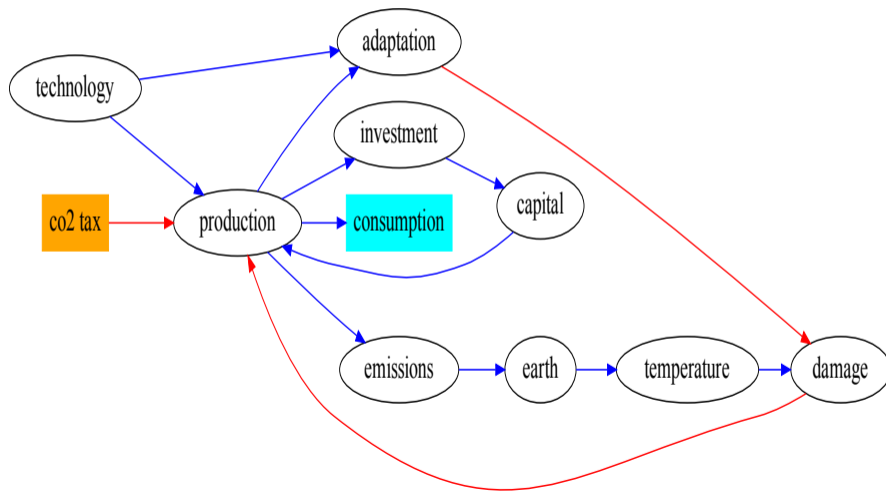
- ▶ 1/3 due to population growth
- ▶ 2/3 due to increasing standards of living
  - ▶ don't think primarily plastic straws;
  - ▶ think abundant food, medicines, transportation, retirement.



# Economics

- ▶ Free-riding, Externalities, Time-To-Build, etc. (R&D)
- ▶ Integrated Assessment Models (IAMs)
  - ▶ economic and earth models over 100-200 years
  - ▶ *very* uncertain on economics; primarily extrapolative
- ▶ famous \$30-\$150 / tCO<sub>2</sub> tax and/or SCC (SCCO<sub>2</sub>)
- ▶ Me: prefer simple models, with caveats.

# Nordhaus Type Models



What's Wrong with IAMs and \$50/tCO<sub>2</sub> ?

# What's Wrong with IAMs and \$50/tCO<sub>2</sub> ?

- ▶ consumption  $\neq$  biosphere
- ▶ unclear population-growth handling.
  - ▶ value of not-born person's consumption?
- ▶ economic forecasting is much harder than pretended
- ▶ technological progress forecasting is difficult, too.
- ▶ even earth sciences are not perfect.

still, sketch models are not only perhaps better than complex models, but also surely better than no models. and, still, do not take them too seriously, please.

# What's Wrong with IAMs and \$50/tCO<sub>2</sub> ?

IMHO, the whole approach is wrong.

Smart people can disagree with me.

...but hear me out.

# Wrong Tree!

- ▶ There is no world government
  - ▶ lucky us!
  - ▶ there is no one to set and enforce a global tax!
  - ▶ treaties are no substitutes.
    - ▶ no serious free-rideable ones ever (yet).
    - ▶ not Montreal, either.

- ▶  $\geq 2/3$  of world emissions are about to come from non-OECD countries.
  - ▶ 2050: 12 Gt OECD; 31 Gt not OECD
  - ▶ “we” are no longer the primary starring players
  - ▶ big challenges now are India, China, SE Asia, etc.
    - ▶ not an ethical or fairness statement at all;
    - ▶ all they want is what we already enjoy!
  - ▶ factual prediction only:
    - ▶ non-OECD won't be willing to give up increasing, and
    - ▶ OECD voters will not repent and pay for non-OECD, for decades, through recessions, and regimes.
    - ▶ and we have other conflicts (e.g., with China and Russia)

*(PS: green tech mostly comes from OECD. Reduced growth not ideal.)*

# Simpler Version

- ▶ Countries will not decarbonize for the same reason why they won't give up their militaries.
- ▶ Actionable? If you found out that nuclear war was twice as bad as you thought before, what difference would it really make?
  - ▶ we already know nuclear war and GCC are bad enough.
  - ▶ why are environmentalists focusing primarily on global SCC / tax at COPs and not on better alternatives?
    - ▶ common hostility to technology and capitalism?



# Informed *Opinion*

- ▶ Consumption renunciation will not happen on large scales at important places
  - ▶ neither individual renunciation (carbon footprints),
  - ▶ nor country-wide renunciations (COP treaties).
  - ▶ did not work for decades. (only tech helped.) why now?
- ▶ Feel free to disagree (and try). I hope I am wrong and you will be right.
- ▶ I don't trust these approaches will be successful.
- ▶ Do you think *the world* can rely (greatly) on them?

# Controversy?

- ▶ It seems to me that there is not that much that is actionable about which parties disagree about.
- ▶ The disagreements are often distractions:
  - ▶ When Koonin complains about IPCC being off by 5cm on GSR, maybe for ideological reasons, what difference will it make in today's global response?
  - ▶ (Scientific? Yes. Actionable? No.)
  - ▶ (I find it unpleasant to argue intent, both sides.)

### 3. Engineering, Technology, Business

- ▶ Book argues that only approaches not strongly against self-interest can be effective.
- ▶ Not a nihilistic approach, **at all!**
- ▶ Many things we can **efficiently** subsidize:
  - ▶ energy-storage research; impact investing; local fossil-fuel taxes; tree planting; grid creation and improvements; smart education; pricing; better regulation; etc.
- ▶ Not “shake and lament” every year again. (madness...)

# Why a Textbook?

- ▶ Failed to find a good consistent overview articulation of basics for my own teaching
  - ▶ book includes dissent,
  - ▶ please tell me if anything is wrong,
  - ▶ but not that it's “dangerous to tell the truth.”
- ▶ Without text book, it is harder to spread smarter approaches.
  - ▶ perhaps more influential than whatever narrower topics I could write about in the AER.
- ▶ *Please email me all other good textbooks.*

# My Current Empirical Research

- ▶ (with Romain Wacziarg)
- ▶ Not released yet (for **triple-check** of findings)
- ▶ Too important to allow getting it wrong.
- ▶ Preliminary, do not share

# GCC harm: Poverty or Geography?

- ▶ Historical, empirical. Easier than prediction.
- ▶ After our first (internal) draft, we found an existing (prominent) paper about 10 years old,
- ▶ so we had effectively sort-of reinvented the wheel,

# GCC harm: Poverty or Geography?

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- ▶ except existing paper turned out to be wrong.

Correct Answer: Geography, Not Poverty

# Many Detail Issues

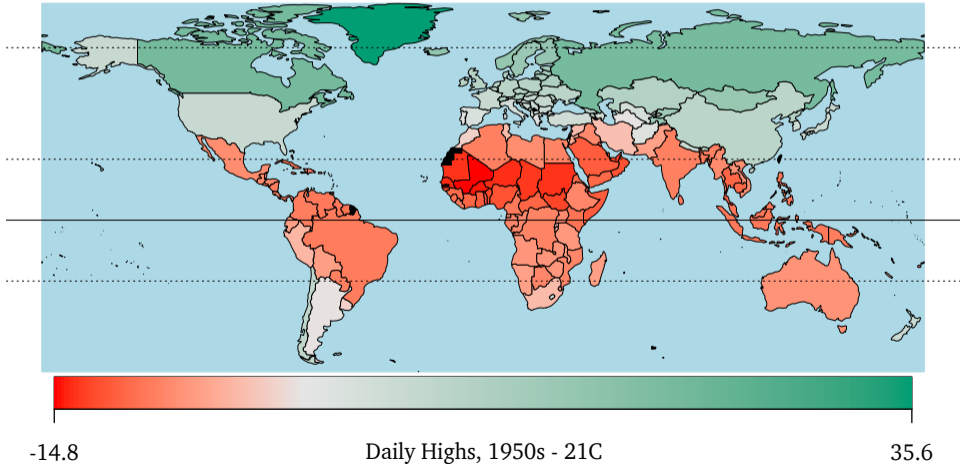
- ▶ choice of temperature data bases
- ▶ choice of GDP change data bases
- ▶ population vs. area vs equal weighting
- ▶ daily high vs daily mean; precipitation; winter-summer
  - ▶ not that bad; equator has less seasonality



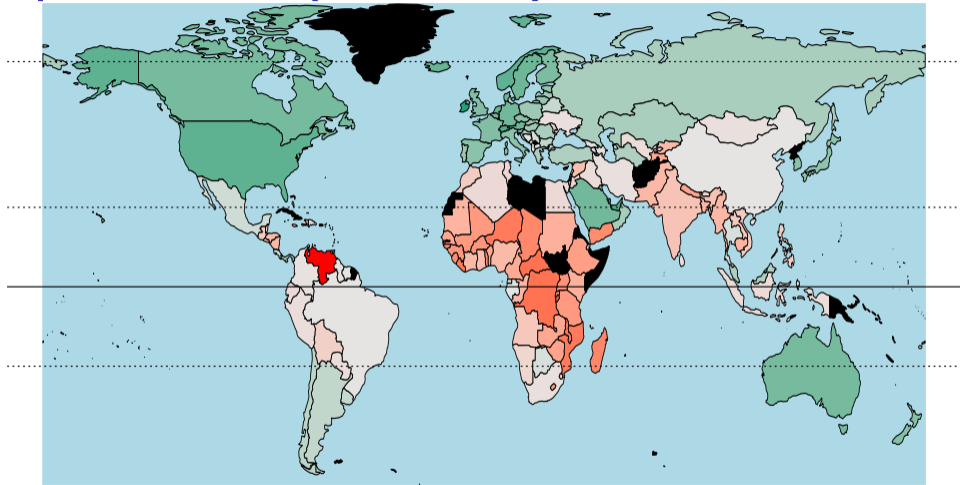
- ▶ control of year and fixed-area effects (and cross effects)
- ▶ want identification to come from within-country **changes**
  - ▶ easy to mess this up.
  - ▶ two other papers got this part right.
- ▶ correlated predictors, of course.

(All net harm so far only in poorest / hottest third of countries. Lots of people [soon more], little wealth. No net harm in other two-thirds. )

# Map: Hotness of Country



# Map: Wealth (ca 2019)



-4.1

Log PWT Per-Capita - Median

2.05

# Econometric Specification

$$\Delta\text{GDP}/P = c \cdot \text{Temp} + b \cdot \text{Temp} \times (\text{SplitDummy}) + a_i + \dots$$

$$\Delta(\Delta\text{GDP}/P) = c \cdot \Delta\text{Temp} + b \cdot (\Delta\text{Temp} \times (\text{SplitDummy})) + \dots$$

- ▶ Question: Is  $b \geq 0$  (by Poverty or Heat)?
  - ▶ harm was in poor countries.
  - ▶ adds hotness only as control, marginally insignificant. ok.
  - ▶ not shown: even alone, same specification suggests *zero* harm in hot countries.

# Why Wrong?

- ▶ Modest: 1960 classification of poverty to explain growth in 2000s?!
  - ▶ Korea = poor. Venezuela = rich
- ▶  $\Delta GDP/P$  is a growth rate. Temp is a level.
  - ▶ instead, regress  $GDP/P$  vs.  $temp$ ,
  - ▶ or, regress  $\Delta GDP/P$  vs.  $\Delta temp$ ,
  - ▶ ...and all results become sensible and clear

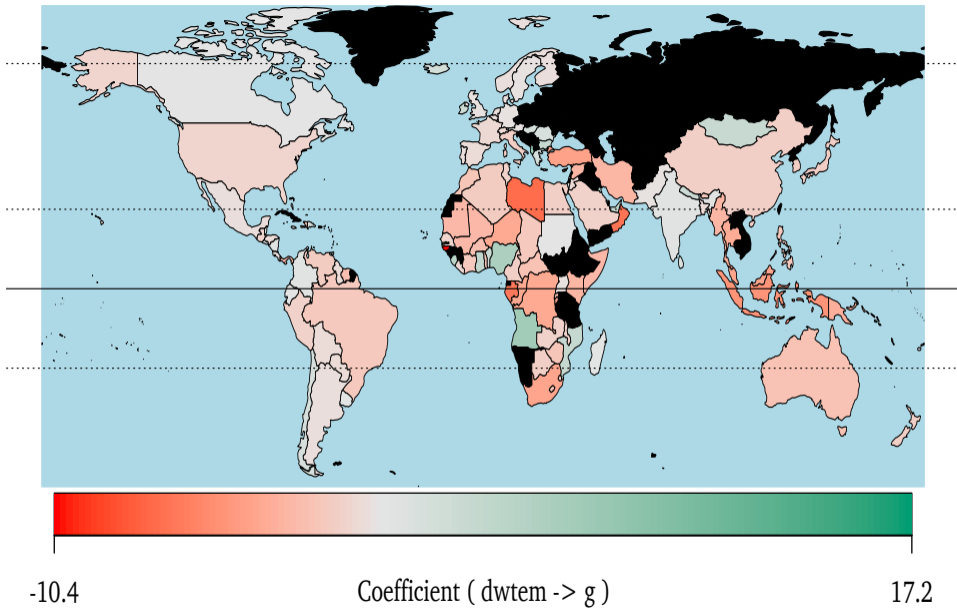
⇒ IT'S TEMPERATURE, NOT POVERTY!

# Map: Response Coefficient

Red = When country had hotter year, GDP/P dropped.

Green = When country had hotter year, GDP/P increased.

- ▶ formal inference comes from regressions, not these graphs.
- ▶ are coefs redder in poorer or hotter countries?
  - ▶ strong id from incongruent countries.
  - ▶ think Mongolia vs Saudi Arabia.
  - ▶ (Botswana, Caribics, Central African Republic, Guyana, Malaysia, Singapore)
- ▶ PS: lots of other factors to growth. cross-cross-effects, etc.



## Omitted Other Areas of Mine

- ▶ Real options research about  $\partial \text{SCC} / \partial \sigma^2$  in IAMs,
  - ▶ a little schizophrenic (ultimately not so important) point.
- ▶ or why I am depressed about ecosystem collapse,
- ▶ or why my “informational cascades” rational herding work has become prominent,
- ▶ or why learning new things (and improving things around me) is why I love being in academia.



# Resources

- ▶ <https://climate-change.ivo-welch.info/>
- ▶ <https://www.climate-change.ivo-welch.info/home/16-cribsheet.html>