

Modeling Uncertainty in Climate Change: A Multi-Model Comparison

Valentina Bosetti

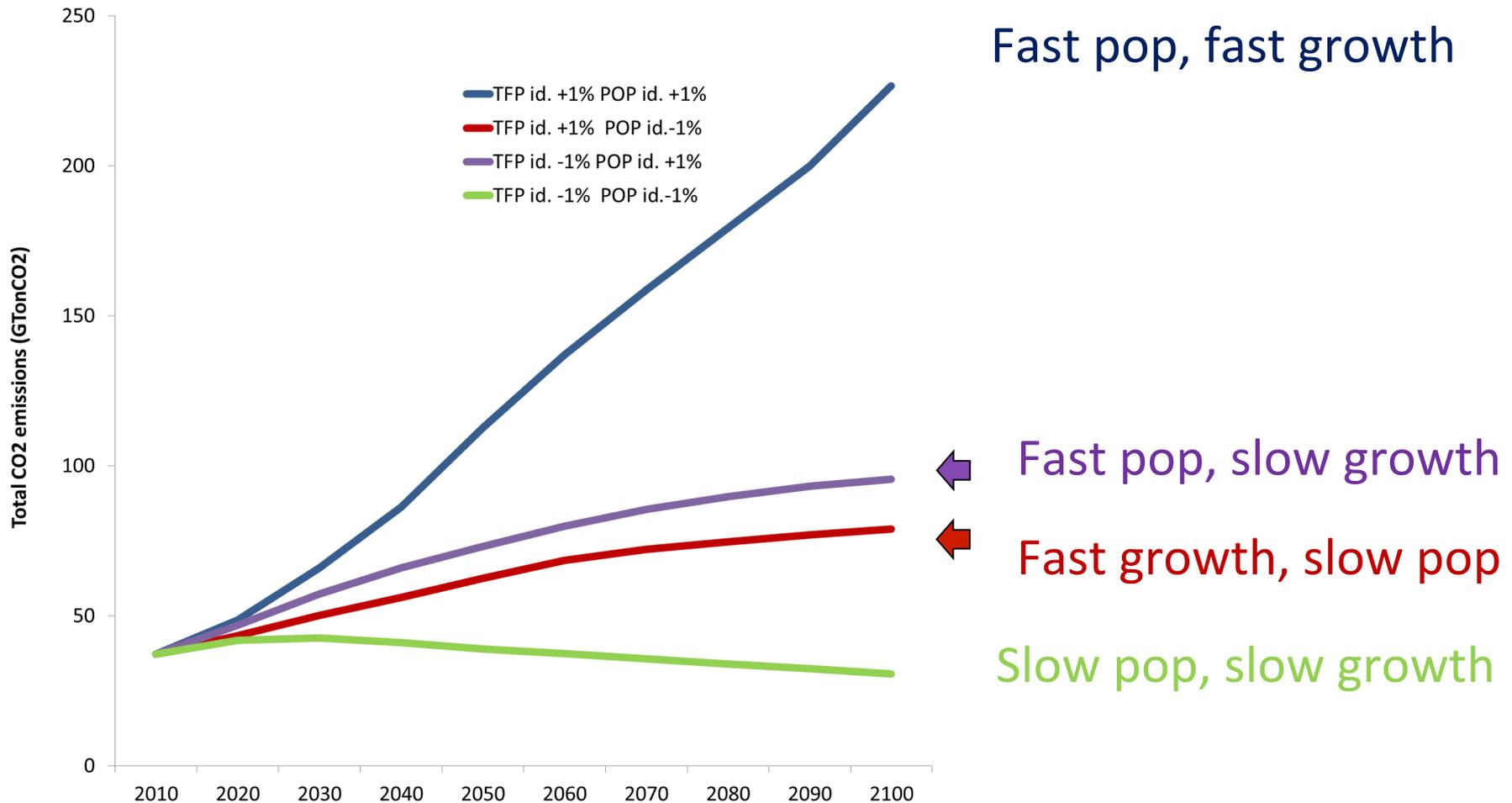
- WITCH, Low Response to TFP
- SCC
- What should we do next

WITCH, Lower T Response to TFP

CUMULATED EMISSION RESPONSE

- As was already documented in 2013 presentation, this is mainly due to implementation of GDP sensitivity.
 - TFP: increase productivity of all factors, including energy
 - POP: increase productivity of KL nest => energy-using effect since $\sigma < 1$
- Models implementing as increased labor productivity => larger effect expected

Effect of TFP vs. POP on CO2



Fast pop and slow growth has higher emissions than **fast growth and slow pop**

Fast growth => faster productivity improvement of all factors, including energy

Fast pop => only have a E-U effect

WITCH, Lower T Response to TFP

CONCENTRATION AND TEMPERATURE RESPONSE (see also van Vuuren et al, 2009)

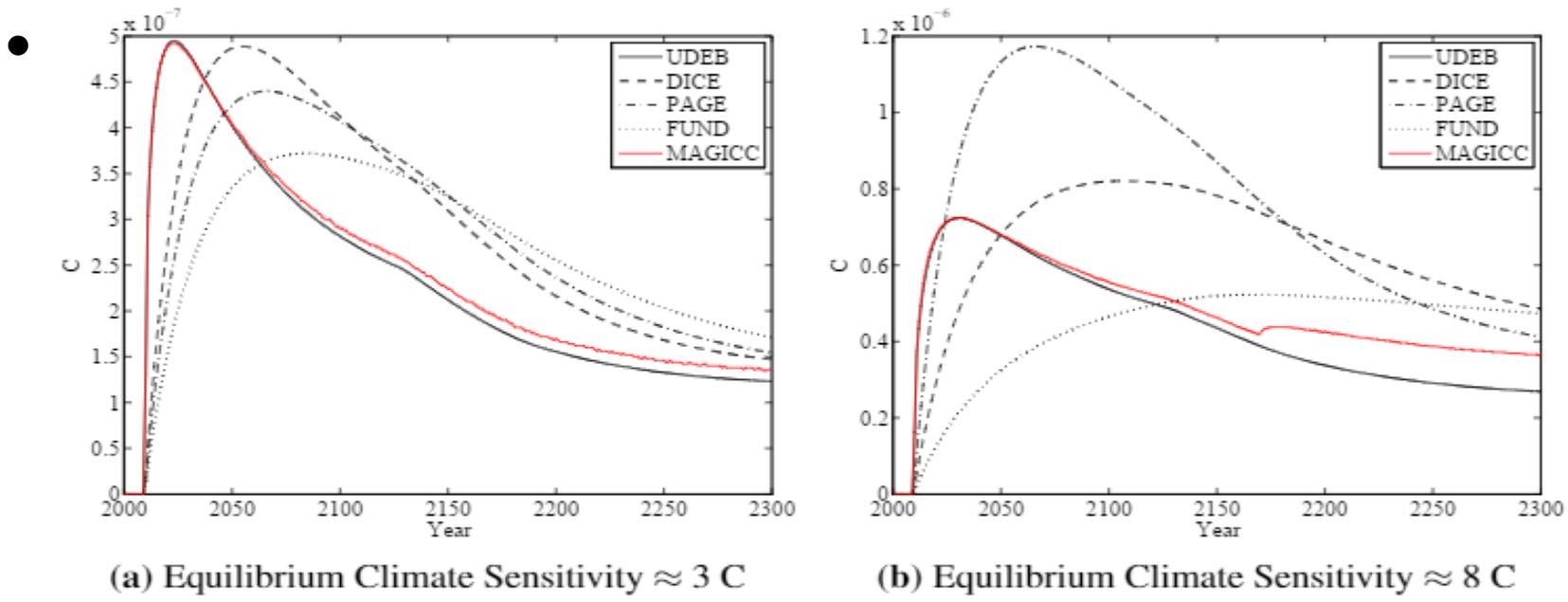


Figure 6: Temperature Perturbation From Additional Tonne of CO2 Emissions in 2010

WITCH, Lower T Response to TFP

CONCENTRATION AND TEMPERATURE RESPONSE

- We use latest version of MAGIC C, differences in feedback effects in carbon cycle and differences in climate module.
- Would be useful to disentangle different effects in the analysis

SCC and Fat tails

- SCC is highly responsive to different assumptions about aggregating weights
- The current damage function is not meant to reproduce fat tails
- Larger role of uncertainty in damages (vis a vis climate response) is already documented in Lemoine and Haewon and Drouet et al.

Emulators versus models

- How far out the model runs does the emulator go?
- Should we resample the extremes? (negative emissions in baseline)

What should we do next

- Comparison
- SSP5 range for 2100
- SSP1 range for 2100
- Median for
- Tails way out of less driver
- Are SSP5 and
- Can we learn
- SSPs? Can we learn something from JFS and apply it here?

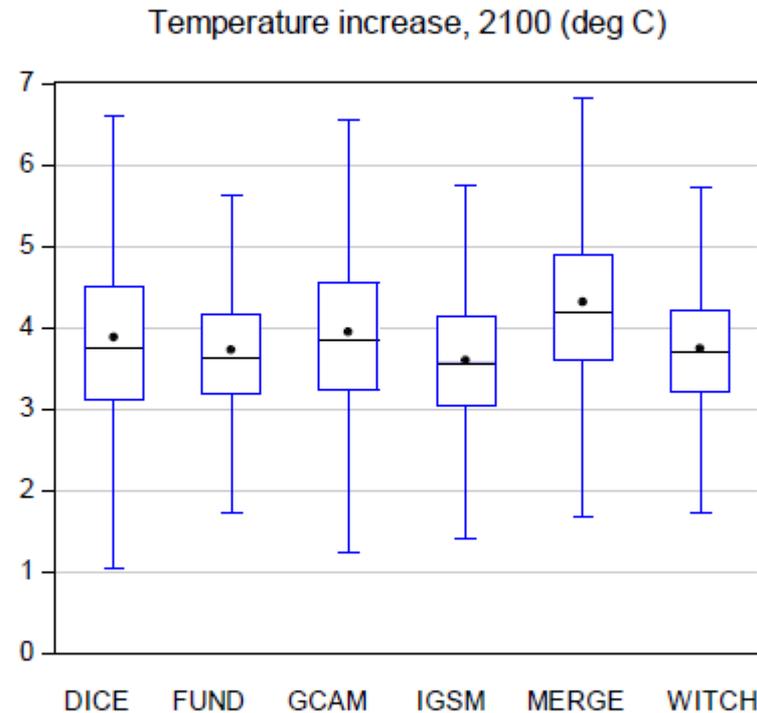


Figure 7. Box plot for the increase in temperature across models in 2100.

What should we do next

GDP PDF

- Jacknife
- Should we cover multiple experts ? Who are the experts?
- Didn't they give GDP per capita values?
- Should we use World Bank as one data point?

Should we use correlation between GDP and POP draws to have consistent words?

What should we do next

ANALYSE MITIGATION

- Reduced model of Abatement Effort in response to tax? Why did we do the tax run otherwise?
- Uncertainty over technical change or future cost and availability of technology is key and it is missing
- Maybe answer Keywan's question?

What should we do next

DISCUSS SOME CLAIMS

- Claim on low importance of model uncertainty should be qualified.
- Claim on Fat tails should be modified.

Who are we foregetting?

- Reilly et al., 1987;
- Webster et al., 2002;
- O'Neill and Sanderson, 2008;
- Rozenberg et al., 2010
- Bosetti et al., 2015
- Emulators and Approximate Dynamic Programming...