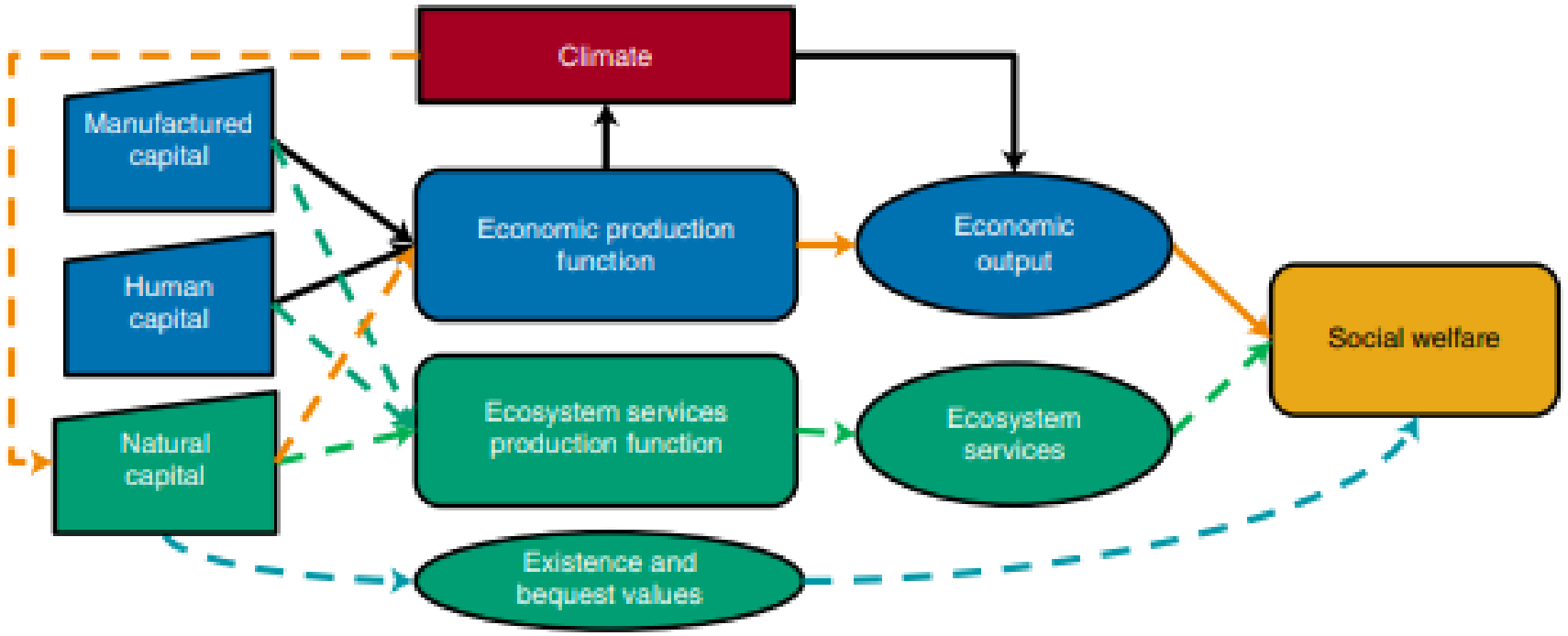
Integrating the Environment into Macroeconomic Projections

Lessons Learned from 2 Examples

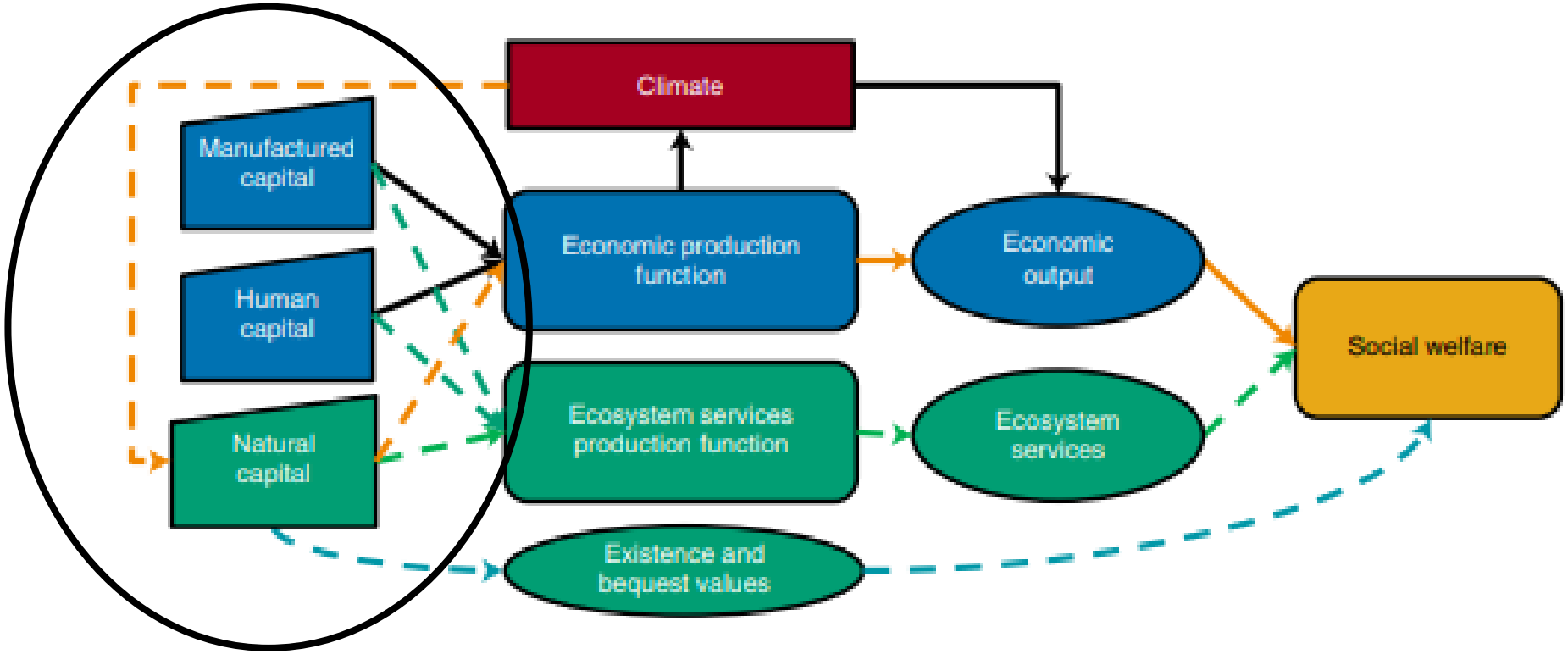
Prepared for “DG ECFIN-OGWG Workshop on Natural Capital Measurement and Modelling” November 30 2023

Example 1: Modifying a Climate IAM to Integrate Natural Capital



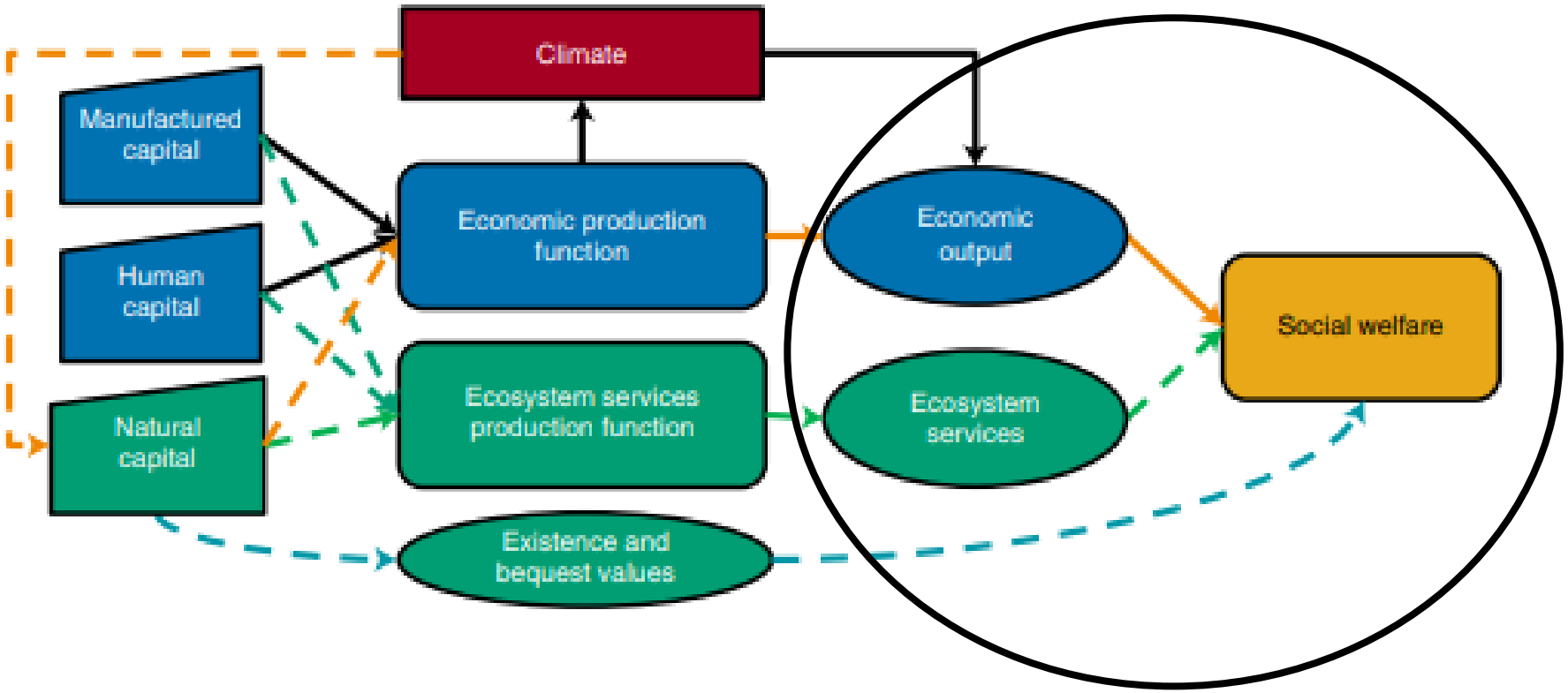
Bastien-Olvera and Moore, 2021

Example 1: Modifying a Climate IAM to Integrate Natural Capital



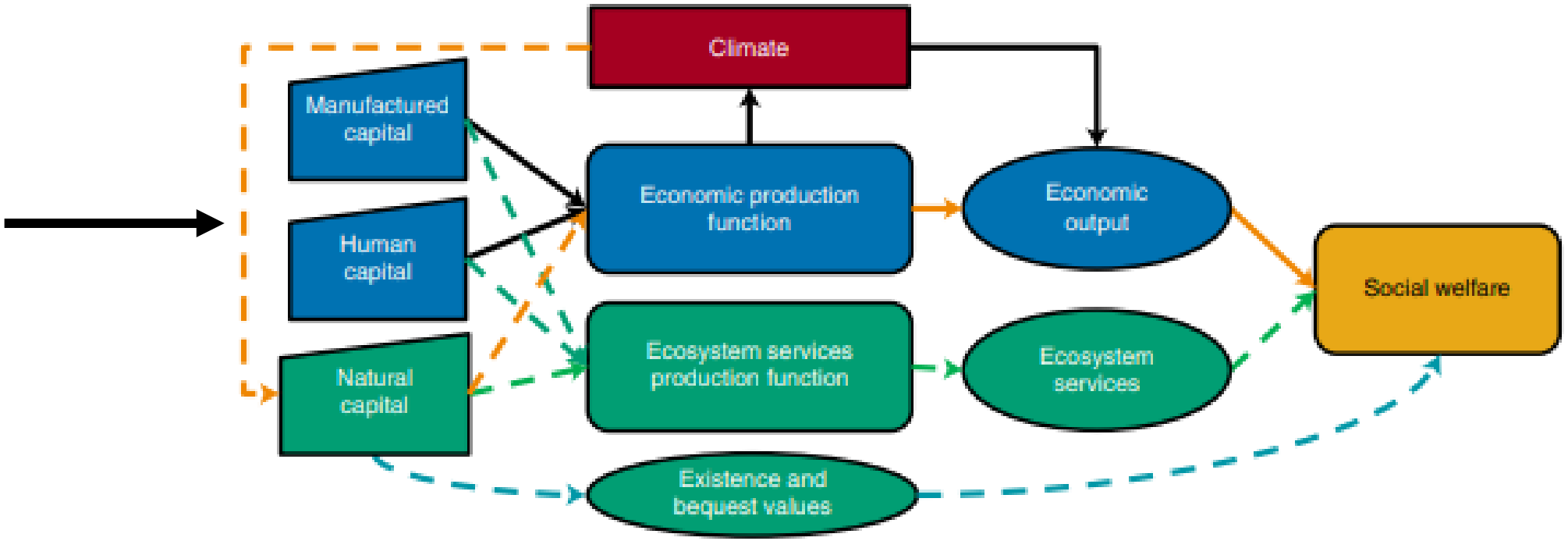
Bastien-Olvera and Moore, 2021

Example 1: Modifying a Climate IAM to Integrate Natural Capital



Bastien-Olvera and Moore, 2021

Example 1: Modifying a Climate IAM to Integrate Natural Capital



Bastien-Olvera and Moore, 2021

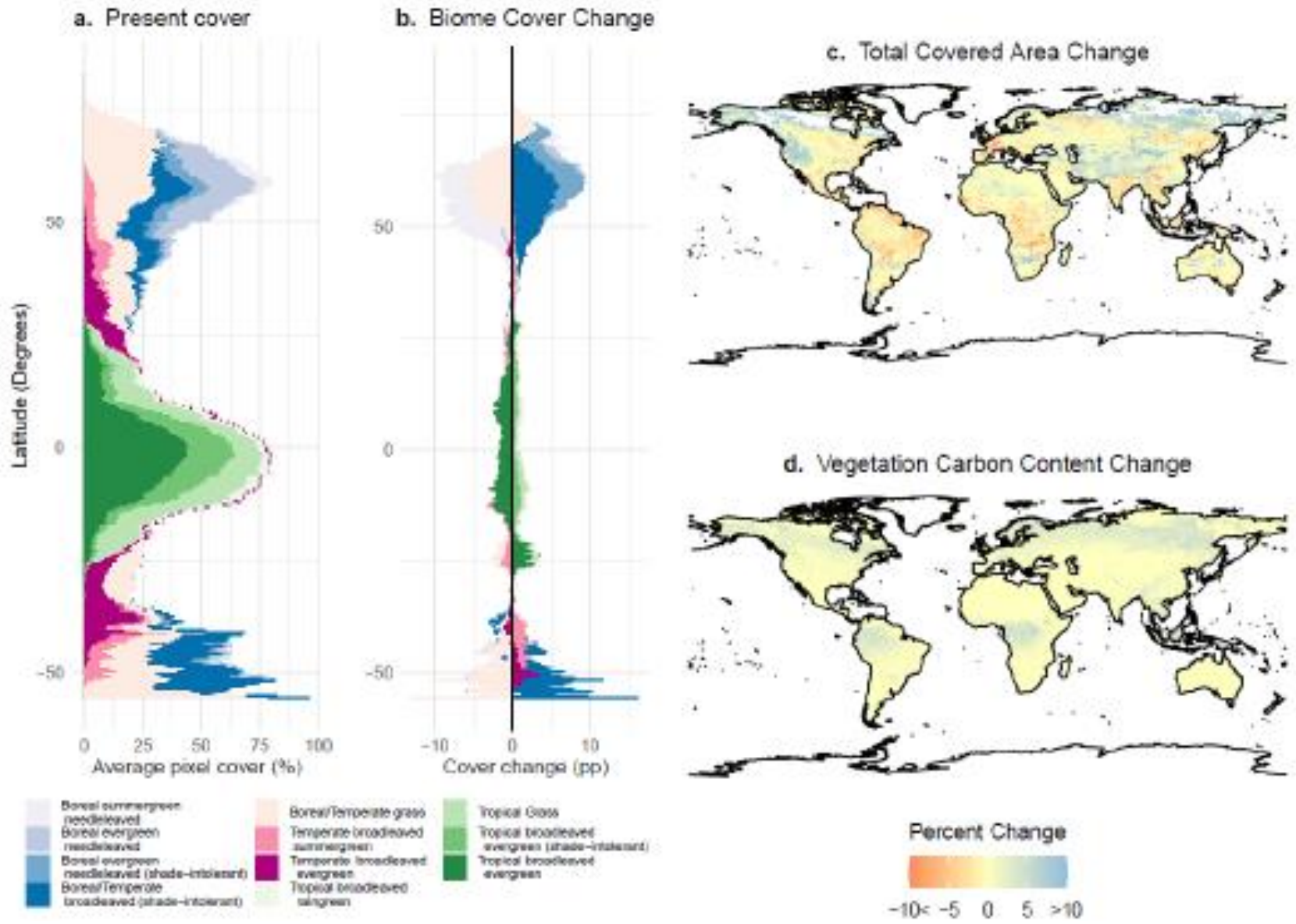
Example 1: Lessons Learned

1. Specification of production function and damage functions matter, even if only focused on market outcomes

2. Intersecting externalities – climate change effects are dependent on future resource conservation

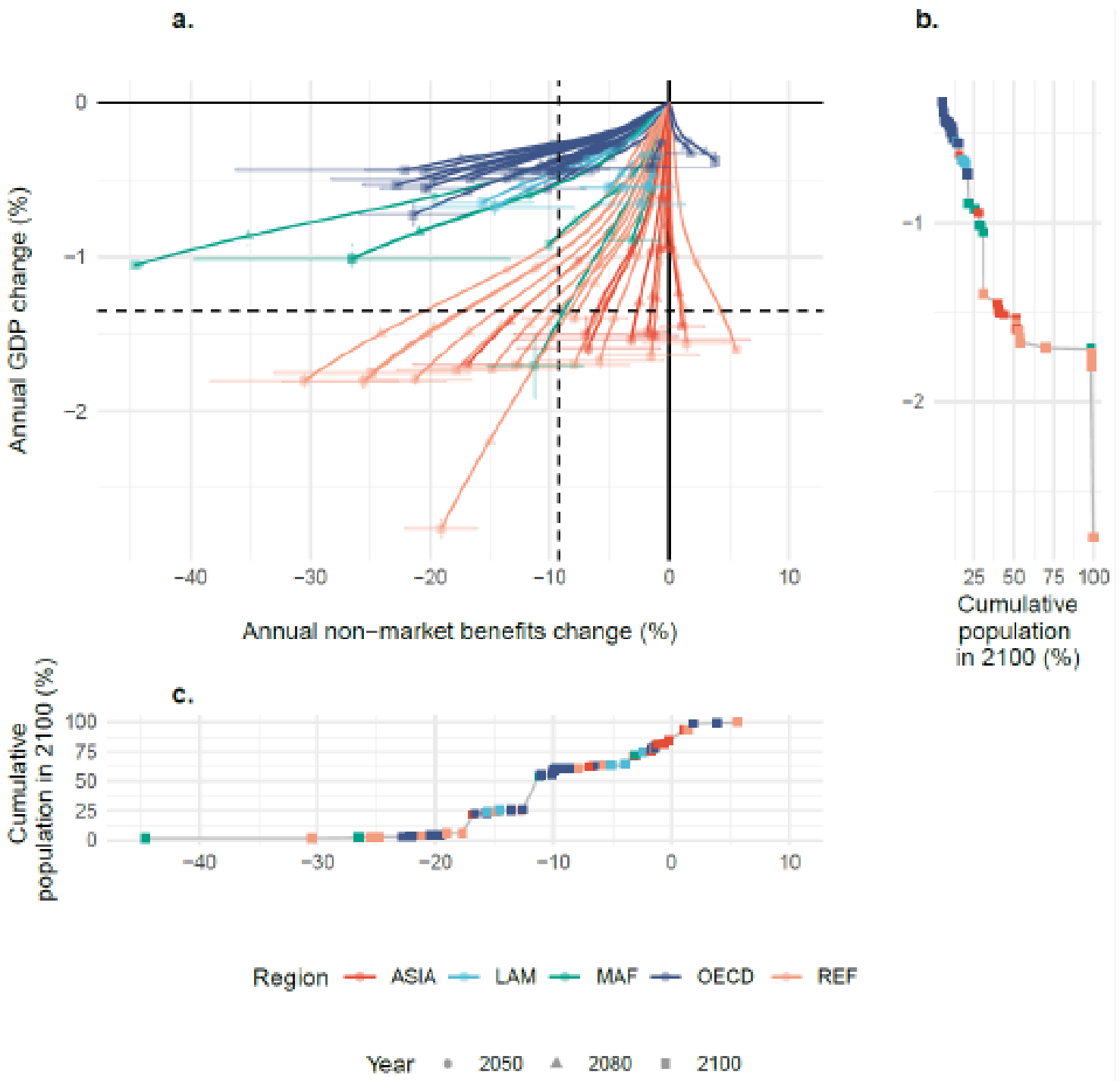
3. Empirics matter but parameterization is challenging

4. Assumptions on restoration, investment, adaptation, and natural capital dynamics matter, but hard to pin down empirically



Changes in terrestrial vegetation under 2° warming

Bastien-Olvera et al. forthcoming, *Nature*



Changes in 2100 GDP and non-market welfare benefits due to terrestrial vegetation change from climate

Bastien-Olvera et al. forthcoming, *Nature*

Example 2: Integrating Climate into the Macroeconomic Forecast

METHODOLOGIES AND CONSIDERATIONS FOR INTEGRATING THE PHYSICAL AND TRANSITION RISKS OF CLIMATE CHANGE INTO MACROECONOMIC FORECASTING FOR THE PRESIDENT'S BUDGET

March 13, 2023

CEA and OMB, 2023

Figure 1: Individual Damage Functions and Aggregate Function Used for Scenarios including Physical Climate Risks in the FY 2024 Long-Term Budget Outlook

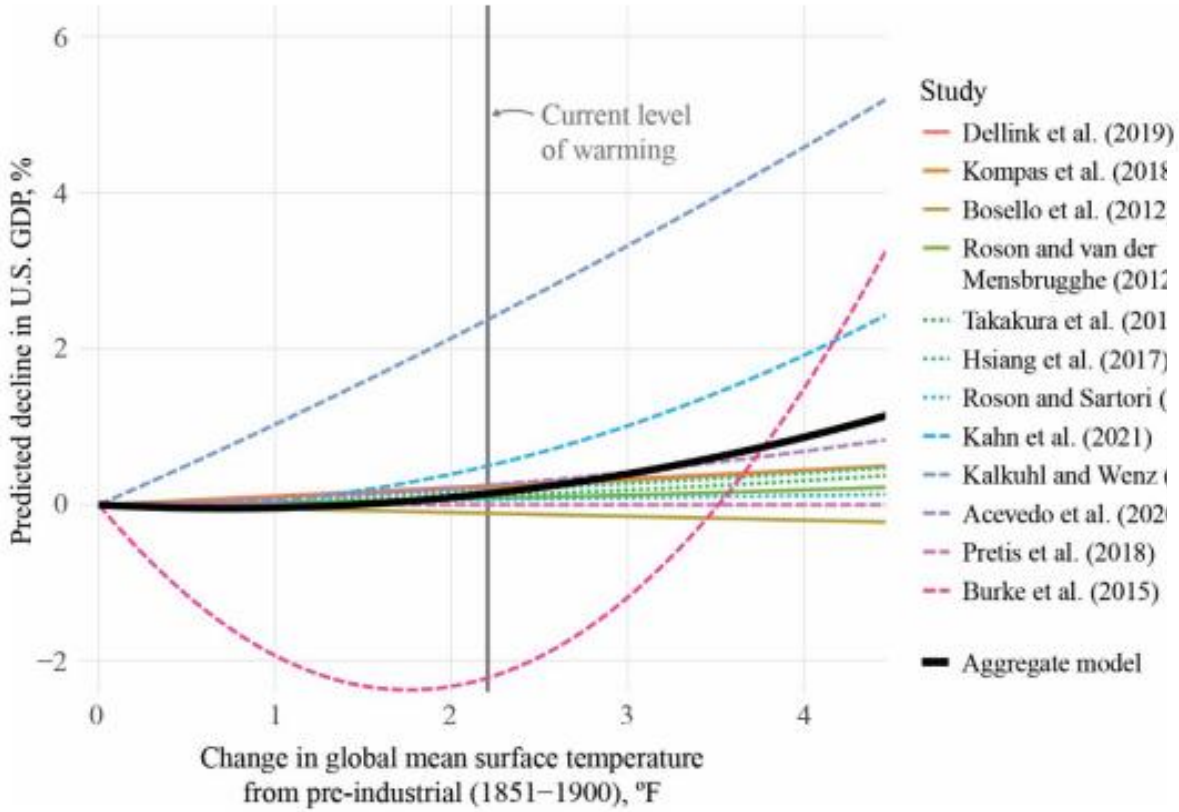


Figure 2: Debt-to-GDP Ratio Projections under Scenarios including Physical Climate Risks in the FY 2024 Long-Term Budget Outlook

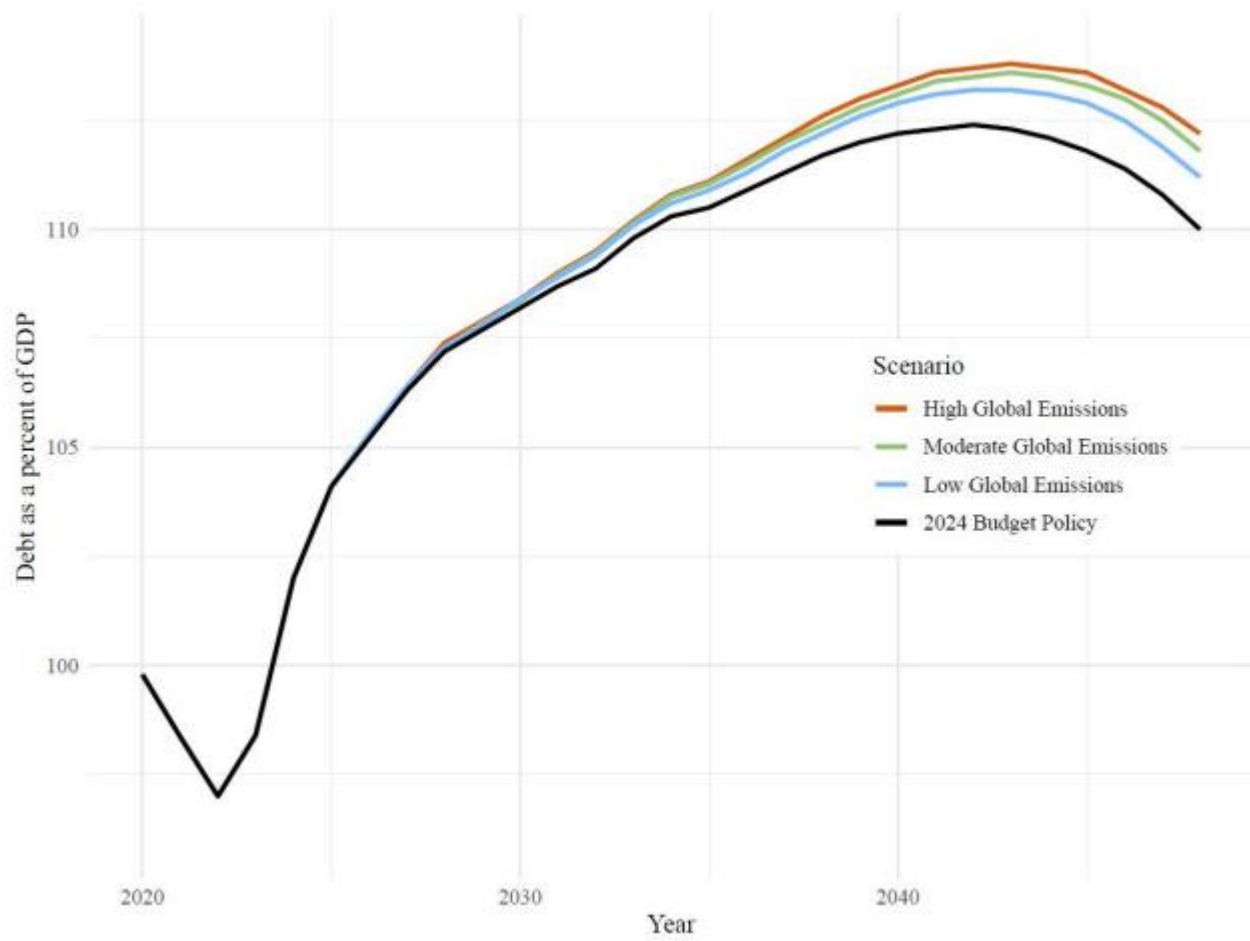
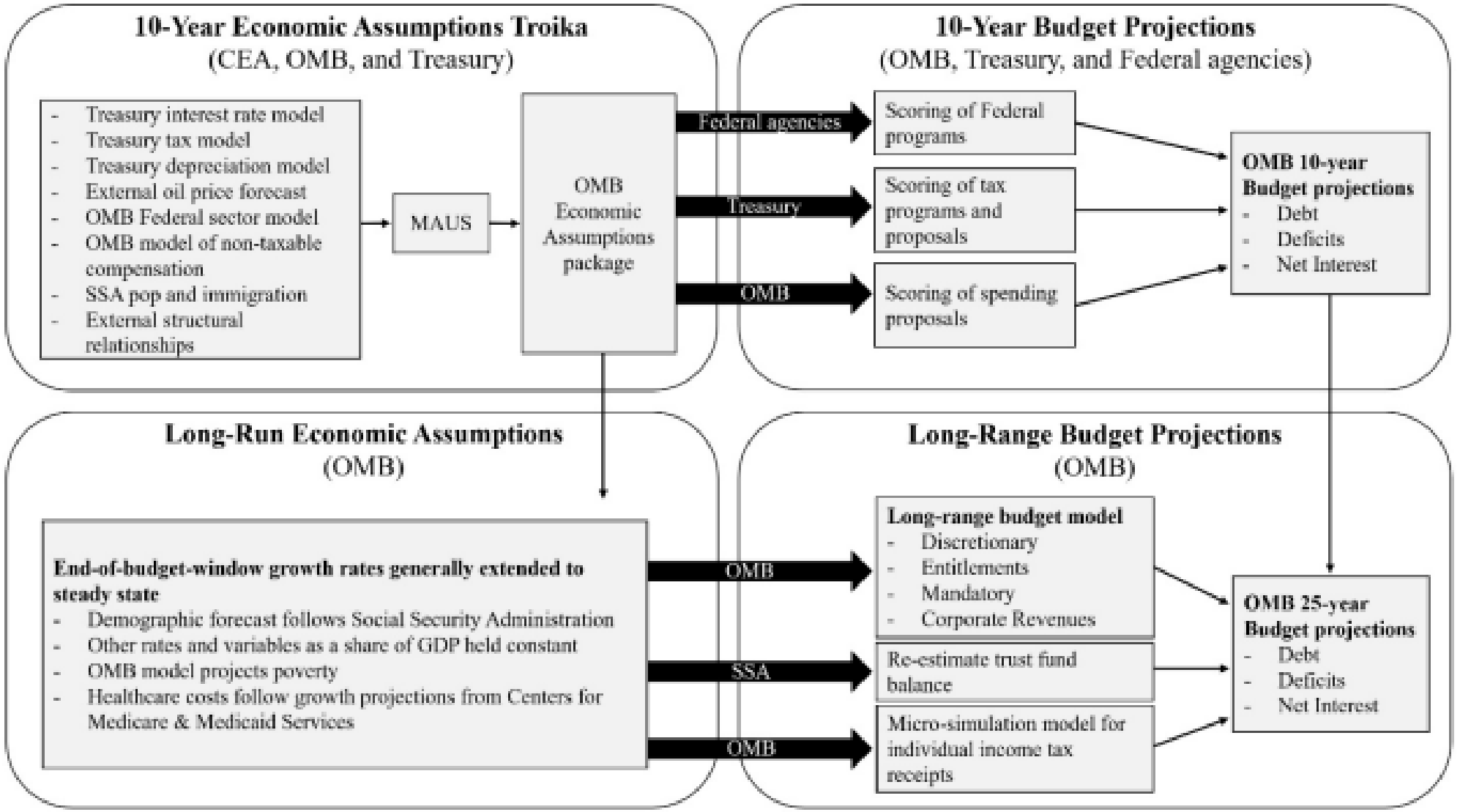
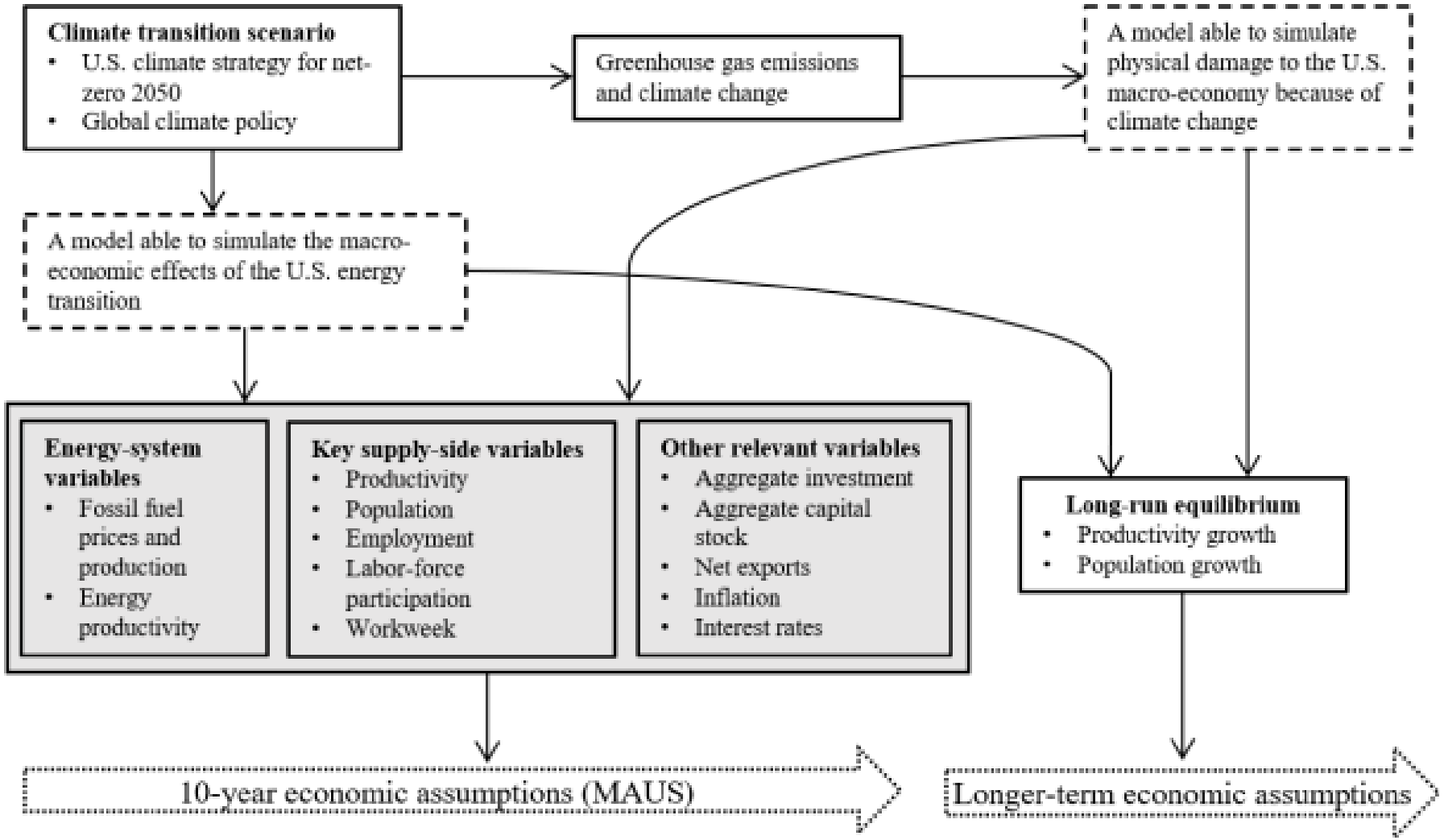


Figure 3: Illustration of the process for developing economic assumptions and 10- and 25-year Budget projections



CEA and OMB, 2023

Figure 4: Illustration of modeling framework able to integrate climate risks into the economic assumptions.



CEA and OMB, 2023

Example 2: Lessons Learned

- Different economic policy applications require different information
  - Climate (and natural capital) economics has been oriented around policy evaluation
  - Very long term (e.g. 2300), focus on welfare
  - Forecasting / macroeconomic projections have different requirements: shorter-term, focus on macroeconomically relevant variables (capital stocks, labor, TFP)

- Modeling sophistication in climate, clean energy, (ecology) at least comparable to modeling for longer-term (>10 years) economic projections

- More structural models of longer-term economic growth might be able to connect more easily to ecological / climate models

- Tension in understanding risks vs projecting central case

Conclusions

- This is an exciting and important area to be working in!
- We don’t need to invent completely new economics, but maybe we do need to reexamine assumptions embedded in existing models
- The capabilities in the sciences to support this work is impressive – but needs to be repurposed / reoriented for economic policy applications. Translation can be difficult.

Thank you!

Questions?