



POTSDAM INSTITUTE FOR
CLIMATE IMPACT RESEARCH

Temporal Dynamics of Internal Mobility in Response to Climate Extremes

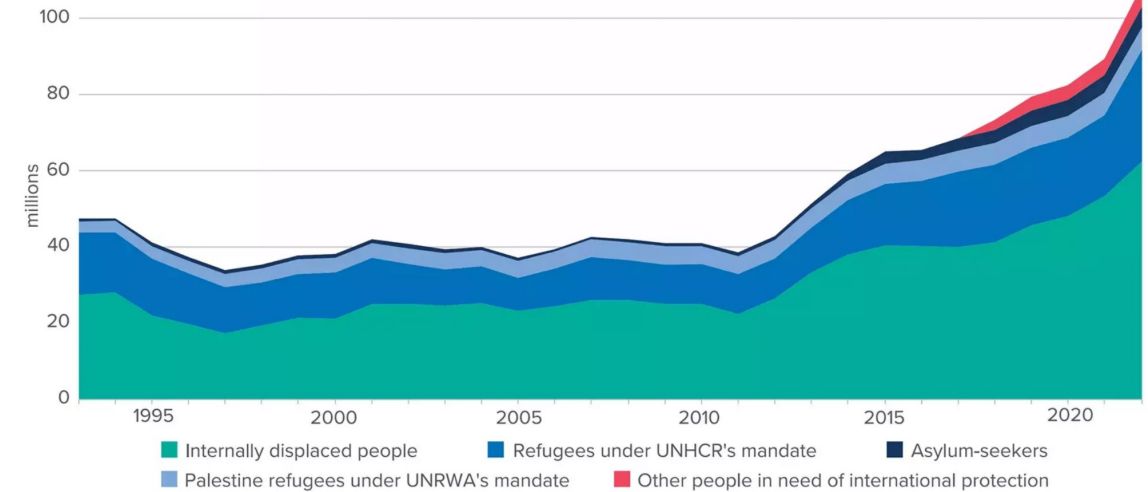
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&
ISIMIP modelers

ISIMIP-PROCLIAS Workshop, April 25 2024, Potsdam,
Germany

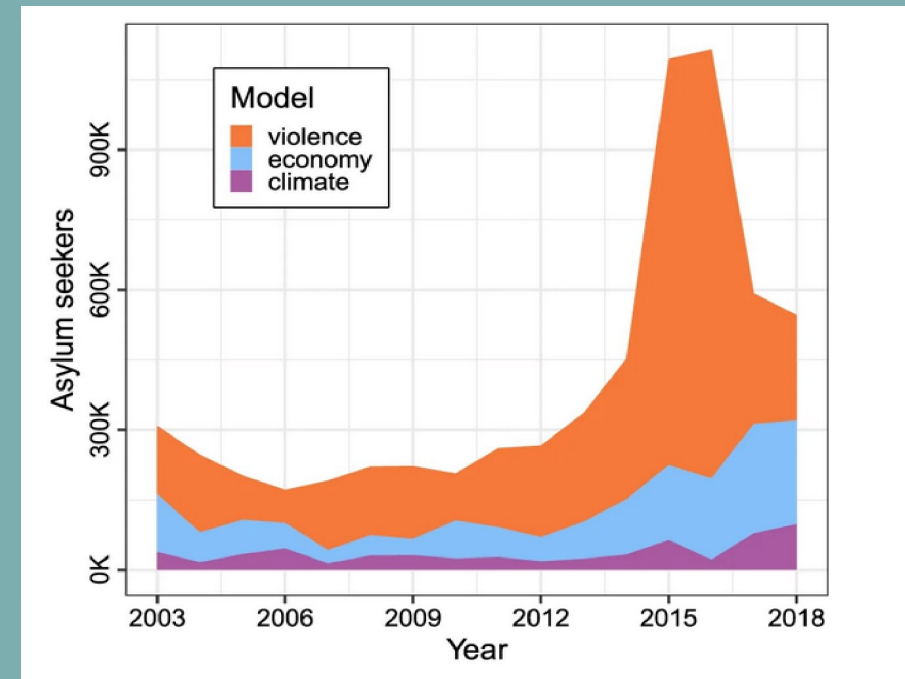
Overview

- 71.1 million displaced: 62.5 million due to conflict and violence, 8.7 million from climate disasters (IDMC 2023);
- Climate-related mobility more common within national borders (e.g. Hoffmann et al. 2020, Schutte et al. 2021);
- How do single and consecutive climate extremes affect human mobility and existing migration patterns?

UNHCR: People forced to flee | 1993 – 2022

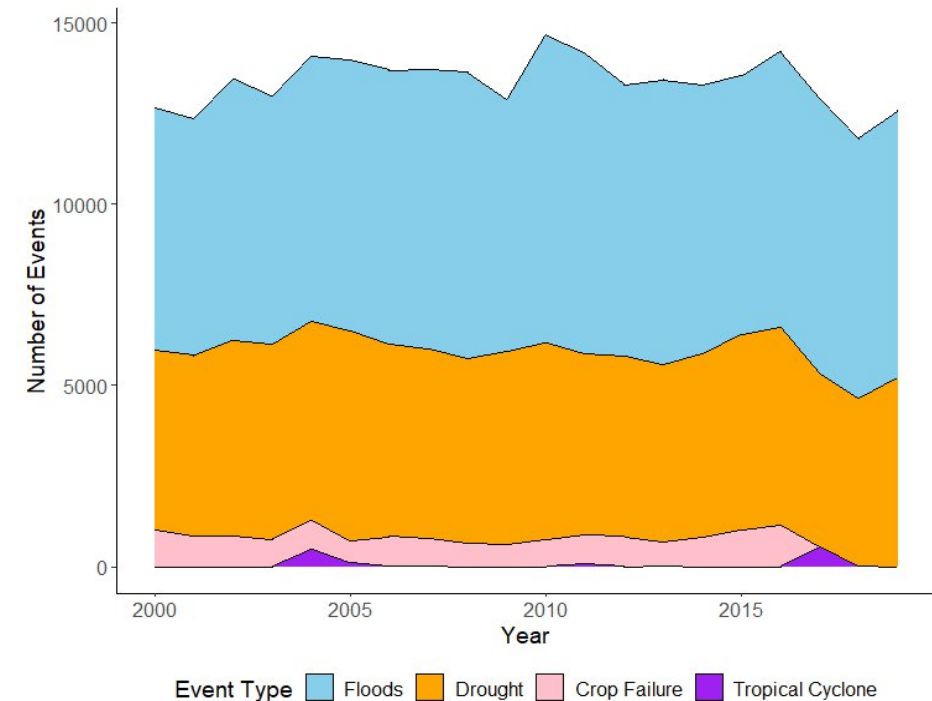
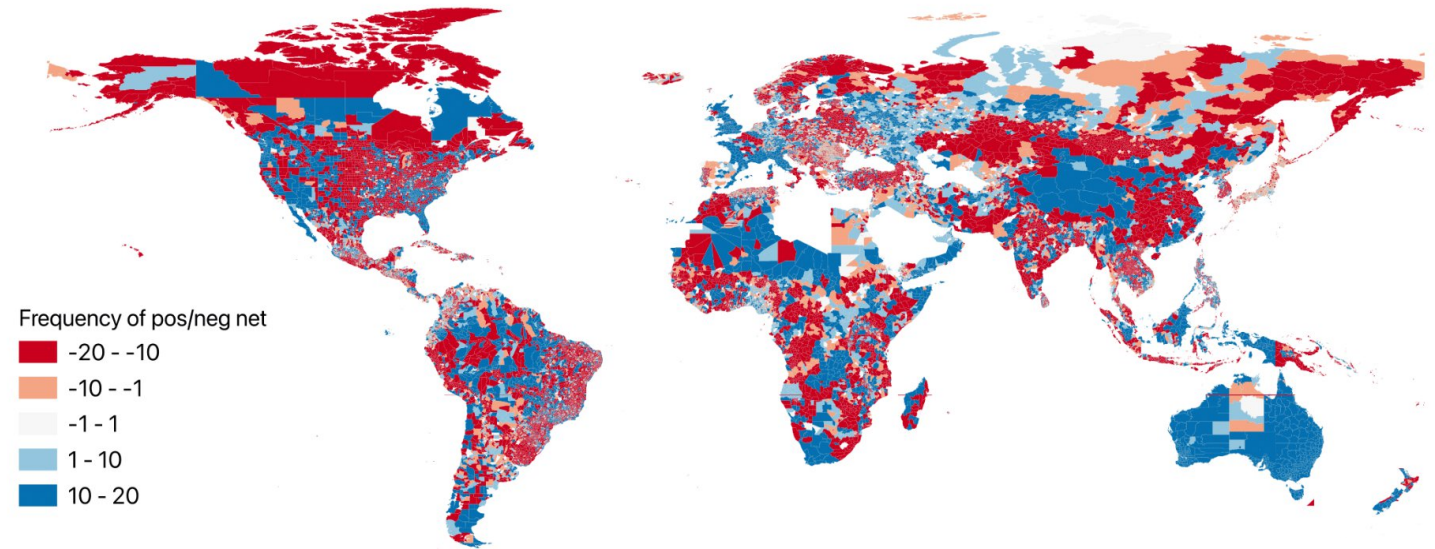


Random Forest model by Schutte et al. Nature Communication 2021



Data and Methodology

- **Net migration:** global annual data on a sub-national level between 2000 and 2019 (Niva et al. 2023);
- **Climate data:** ISIMIP, including droughts, floods, crop failures, and tropical cyclones (ISIMIP3a, Frieler et al 2024);



Data and Methodology

- conflict intensity (UCDP v. 23.1, Sundberg & Melander 2013)
- quality of governance (V-Dem project, Coppedge et al 2019,)
- subnational human development index (Smits et al. 2019)
- political inclusivity (Geo EPR, Vogt et al 2015)
- economic activity (DMSP-OLS Nighttime Lights, Elvidge et al. 2014)
- demographic factors (GPW v.4, CIESIN)

Figure 1 | New internal displacements and people forced to flee across borders by country of origin | 2009 – mid-2023¹²

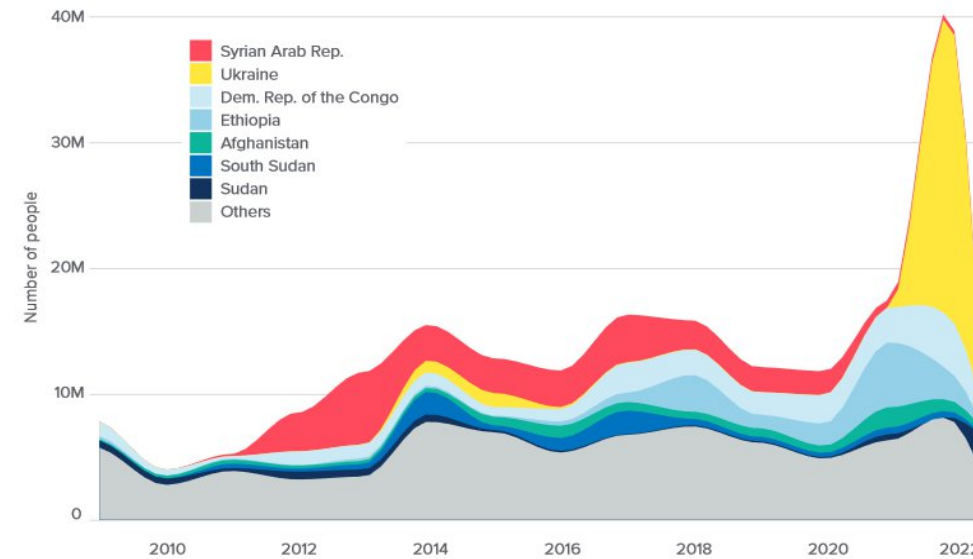
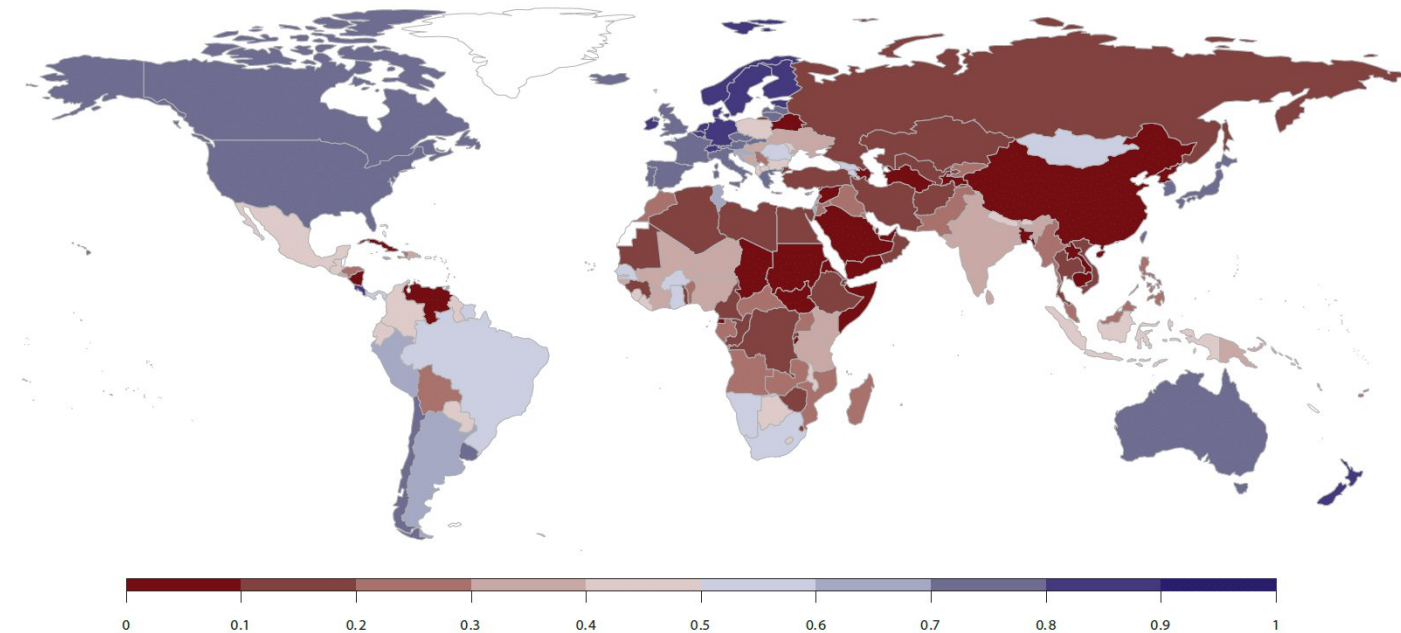
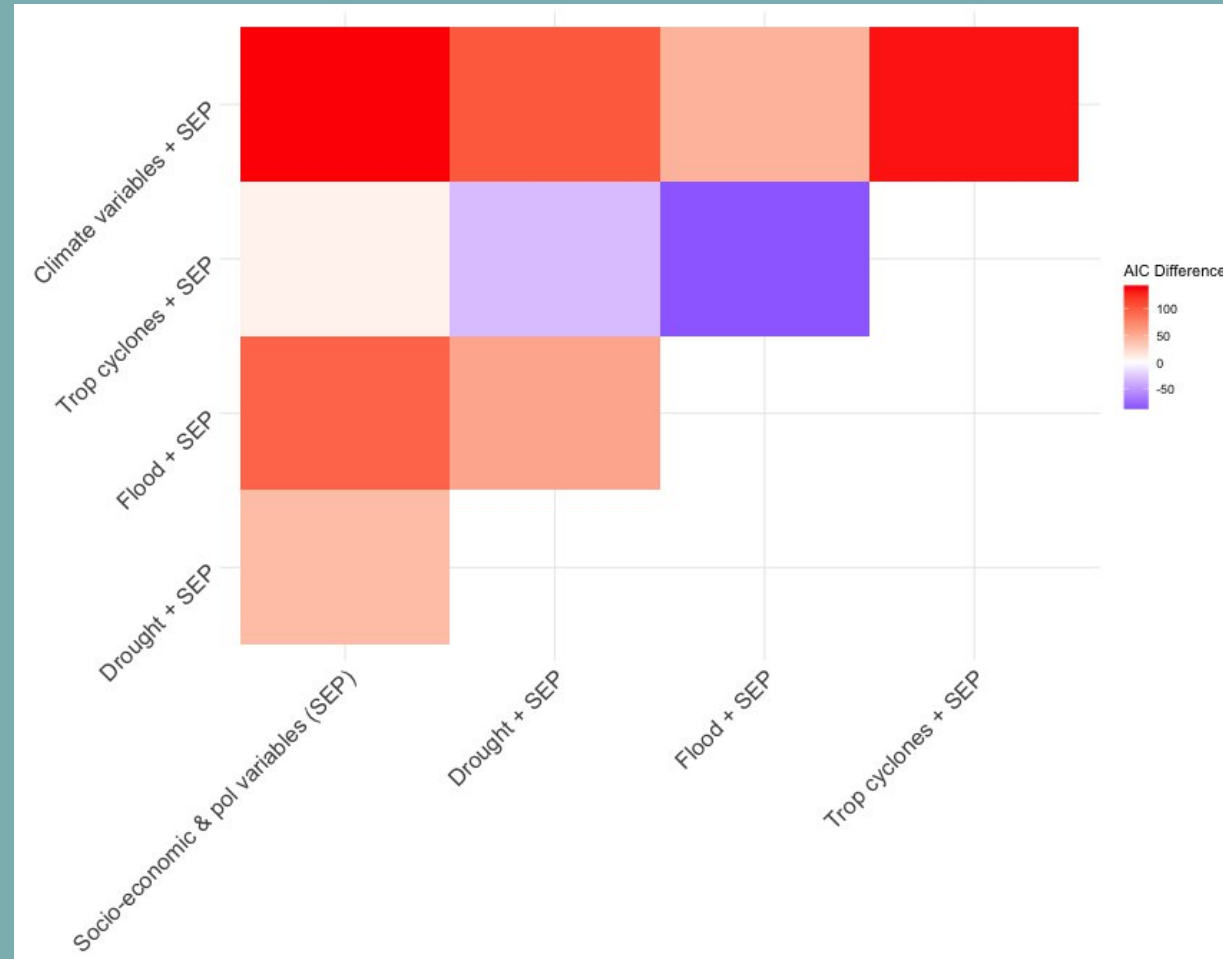


FIGURE 4: THE STATE OF LIBERAL DEMOCRACY IN 2020



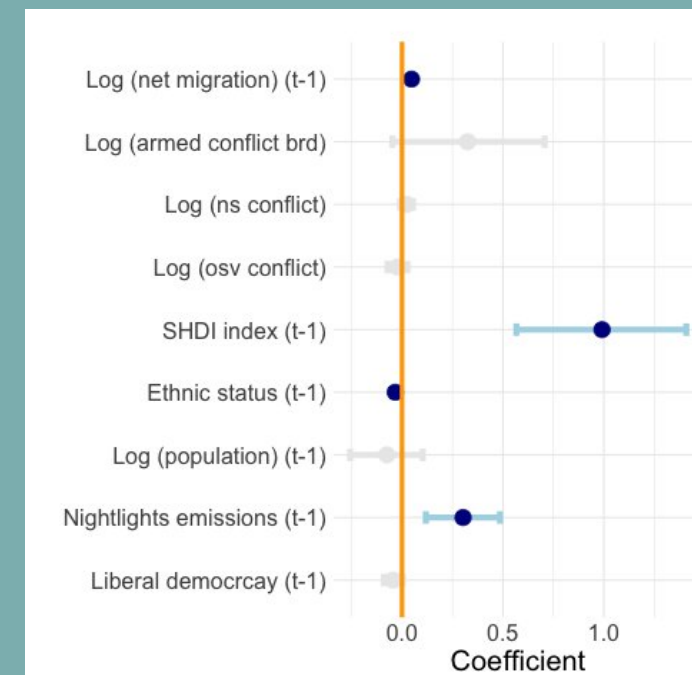
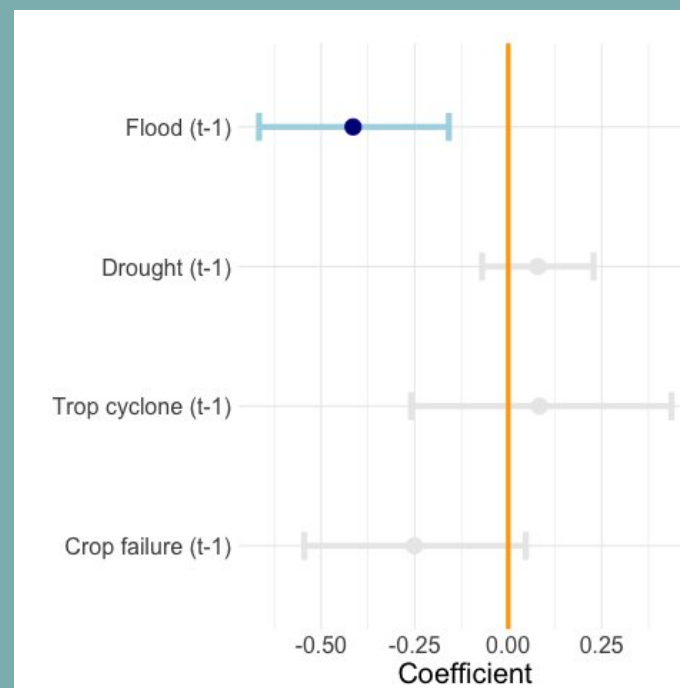
Source: PanDem Project (Edgell et al. 2021).

Including all climate impacts improves model fit



Findings - single events

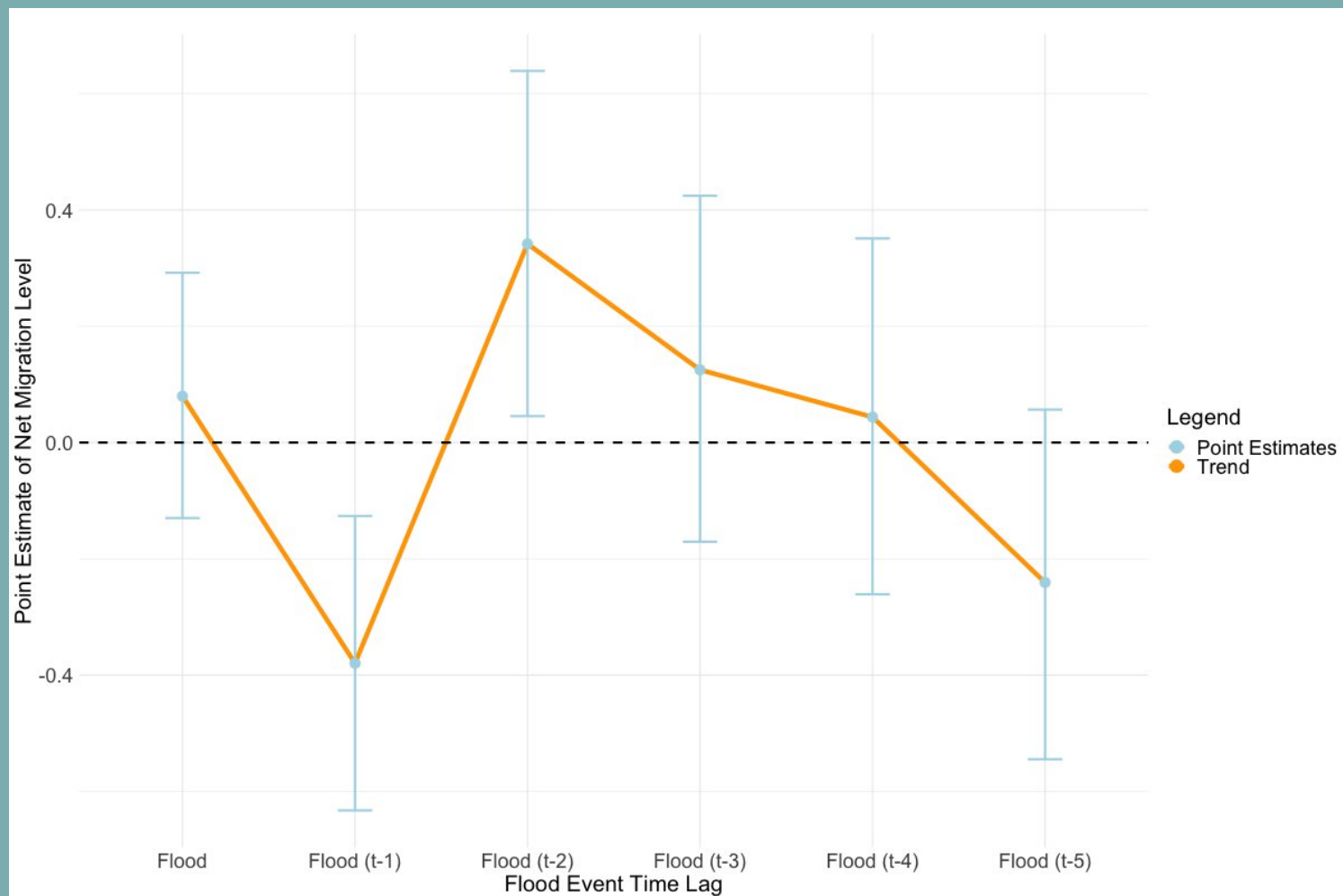
- Flood events are associated with decreased net migration;
- High human development index and nighttime light emissions link to positive migration; ethnic exclusion to negative;



Results from Bayesian vector autoregressive model (bvar R package (Kuschnig, N., & Vashold, L. (2021))

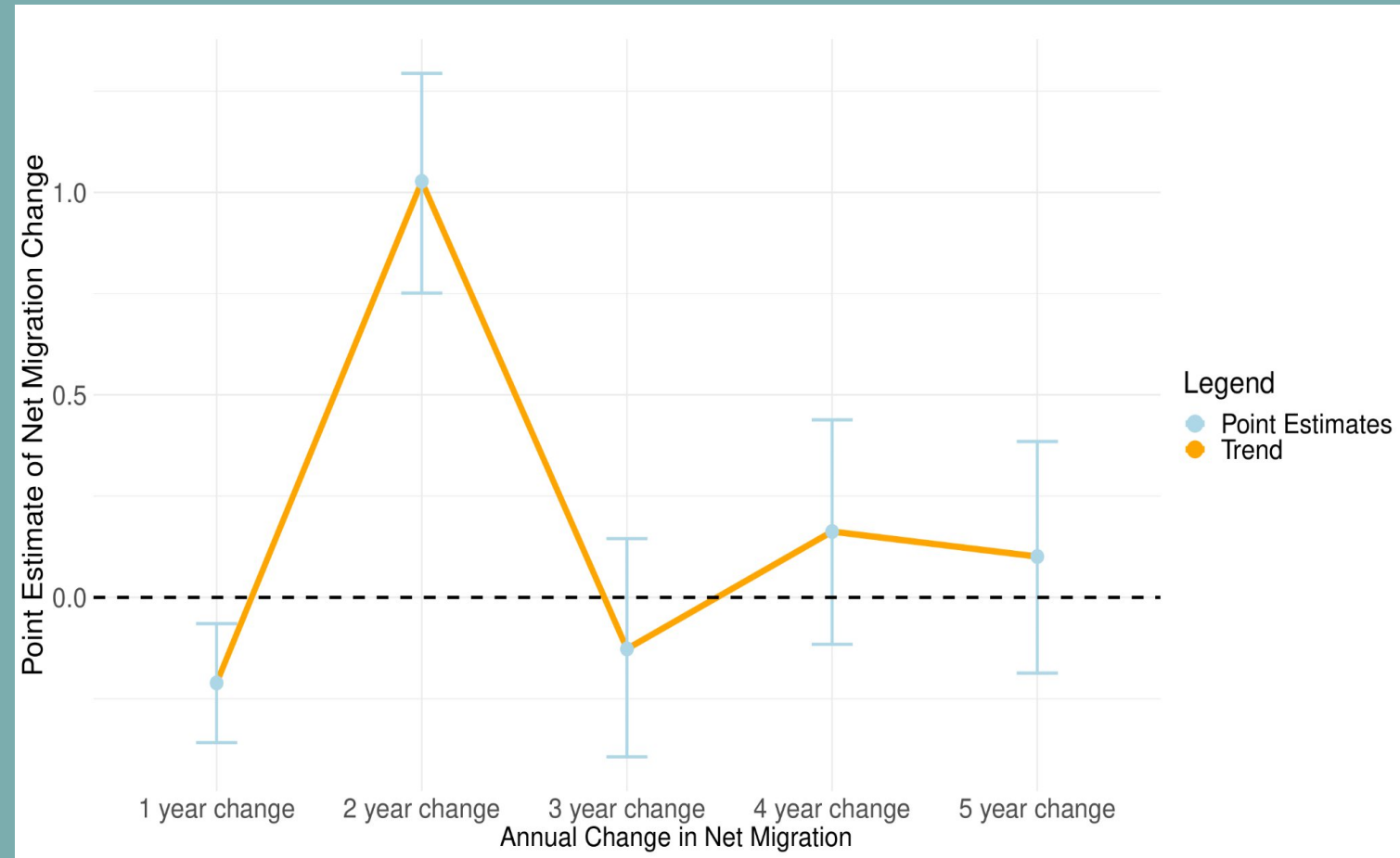
Findings - temporal dynamics

- Flood events from previous year are associated with a decrease in net migration;
- Two years later, a flood shows a positive trend in net migration;



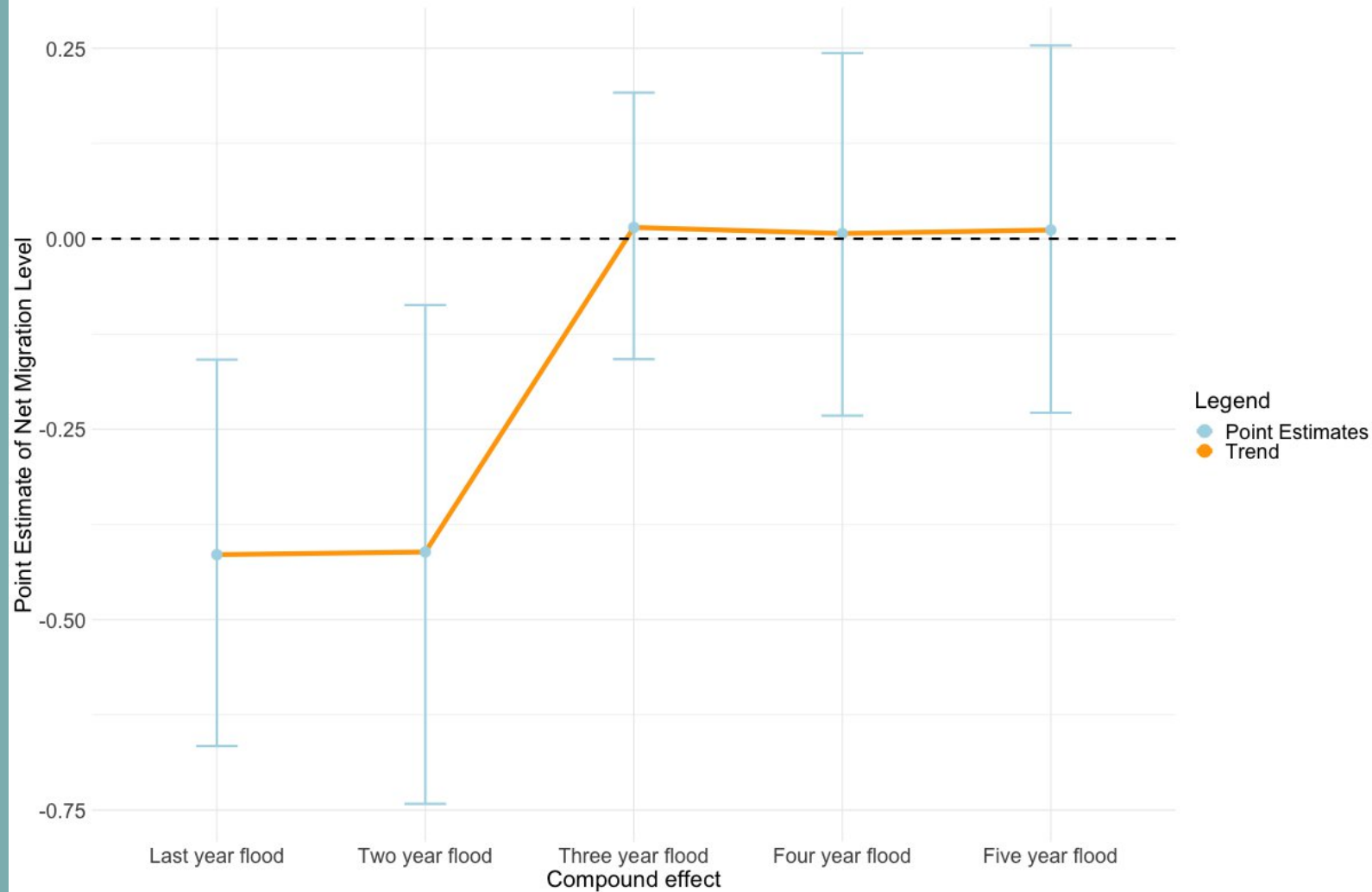
Findings - annual changes in migration

- *Changes* in migration help distinguish between regular migration patterns and those impacted by flood events;
- Flood events lead to a *reduced* change in net migration in areas that typically attract migrants;
- After an immediate negative effect on net migration, a positive trend emerges within the next year;



Findings - compound effect

- Multiple floods vs. single events: expected to differently impact relocation decisions.
- Isolated events: positive net migration after 2 years; accumulated events: ongoing negative effect;



Thank you.



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