Climate, Amenities, and Banking: El Niño in the US

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General impression

- Expanding literature on the impact of banks on climate change
- Expanding literature on the impact of climate change on banks
  - ✖ Link to climate science often tenuous/partial: hurricanes, floods
  - ✓ This paper is more ambitious by studying El Niño

Comments

1. Mechanism: Local natural amenities?
2. Use of LASSO
3. Three open questions

Amenities as a "novel channel"

- "We find that El Niño deteriorates the value of natural amenities in the affected counties, reducing house prices and mortgage lending"
- Does the empirical evidence back up this interpretation?

Amenities as a "novel channel"

- "We find that El Niño deteriorates the value of natural amenities in the affected counties, reducing house prices and mortgage lending"
- Does the empirical evidence back up this interpretation?
  - ✖ Not really

Amenities as a "novel channel"

- USDA amenity measure
  - ✎ Combines six measures of a county's climate, topography, and water area
  - ✎ Environmental qualities most people prefer: warm winter, winter sun, temperate summer, low summer humidity, topographic variation, and water area

✖ Interaction variable? Cross-sectional measure is very coarse (above-median natural amenity rank)

✖ Outcome variable? For time-series variation, the authors resort to water and soil salinity

- "Vital inputs into natural amenities". Really? Explain why.
- Provide concrete examples of how salinity affects amenities...

Amenities or agriculture?

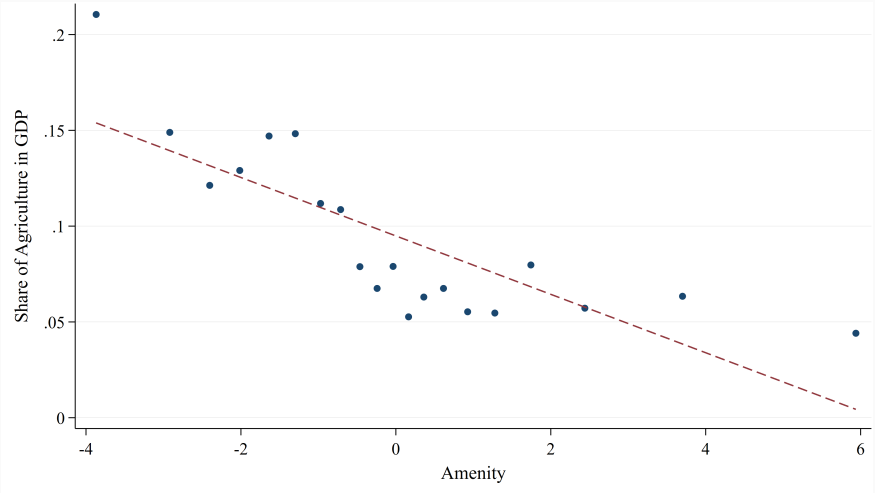
- Authors find large effects on water and soil salinity (+7.5% and +21.5% of mean)
  - ✎ Footnote 3: "Higher salinity lowers the quality of water and soil, lowering micro-nutrients and potential for vegetation"

- Their take: This leads to contemporaneous impacts on house prices as amenity quality drops

- My take: This matters because salinity impacts agricultural harvests / crop yields—and related country-level GE effects—rather than impact on 'amenities'

- In line with earlier literature on impact El Niño on crop productivity (Dingel et al., 2019) and commodity prices (Brunner, 2002)

Correlation between amenity quality and relative importance of agriculture



Approx. 3k counties in 20 bins. Source: Bureau of Economic Analysis and USDA, Economic Research Service

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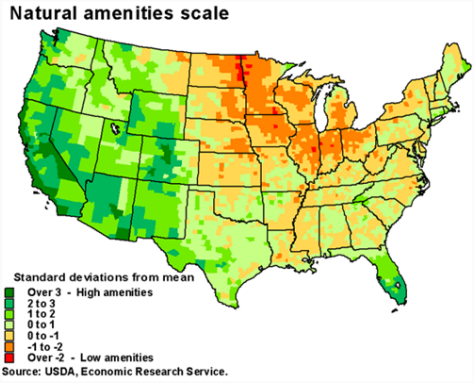

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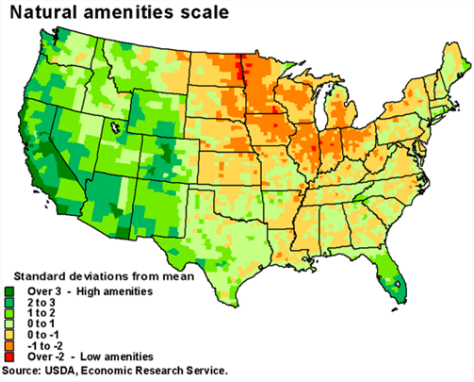
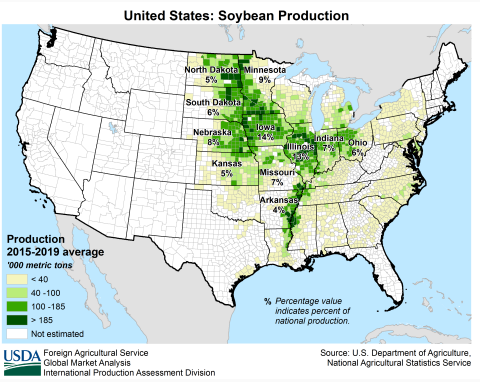




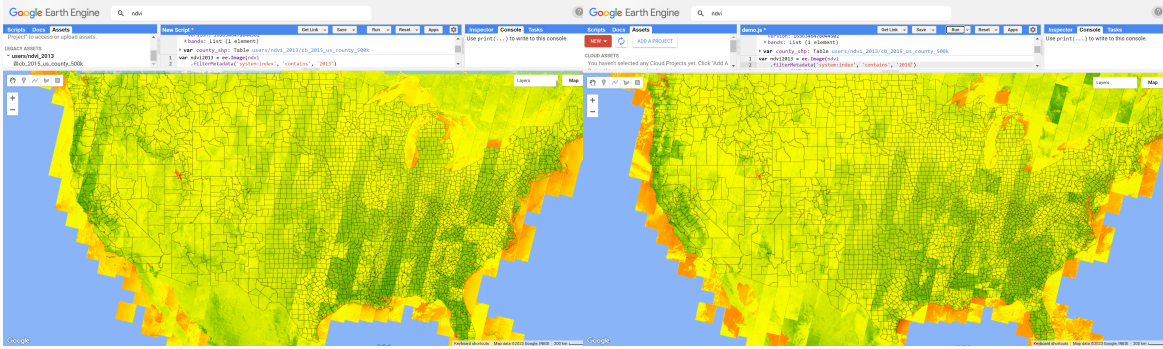
Amenities or agriculture?

- Suggestion: Measure impact El Niño on counties' agricultural productivity (strong effects on water and soil salinity are a credible first step in this causal chain)

- Crop yields:
  - Combine post-2000 digitized data from the US Agricultural Census with manual parsing of earlier censuses
  - Exploit cross-county variation in crop sensitivity to salinity:
    - Salt tolerant: Beets, citrus fruits, wheat
    - Salt sensitive: Common vegetables (lettuce, spinach), soft fruits, corn, soybeans

- Remote sensing: Normalized Difference Vegetation Index (NDVI) to capture plants' chlorophyll content

NDVI in 2013 and 2016



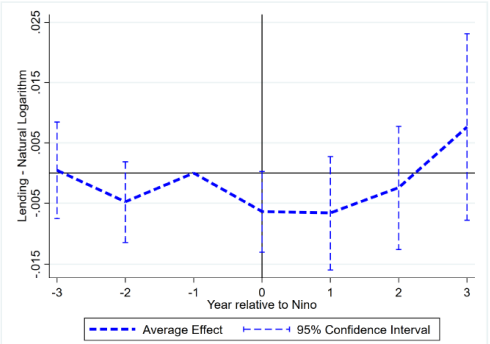
- Source: U.S. Geological Survey via Google Earth Engine

Amenities or agriculture?

An agricultural channel also fits better with the...

- ... the immediate and very short-term nature of the estimated impacts
- ... the similar impacts on loans for commercial and industrial activities

Figure A4: Event Study Specification and El Niño



LASSO

- Authors' objective: "Investigate whether there are specific bank characteristics that make them more resilient to climate shocks."
- LASSO:
  - Structured approach to build parsimonious models with improved prediction accuracy and enhanced interpretability
  - Way to decide on which covariates to include without overfitting the model
- Unusual to use LASSO to investigate treatment effect heterogeneity

LASSO

- Bank-level baseline regression:

$$Y_{bt} = \alpha_b + \gamma_t + \beta \text{Exposure}_b \times \text{El Niño}_t + \epsilon_{bt}$$

- LASSO selects *Operating leverage X El Niño* as a 'control interaction term':

$$Y_{bt} = \alpha_b + \gamma_t + \beta \text{Exposure}_b \times \text{El Niño}_t + \gamma \text{Operating Leverage}_b \times \text{El Niño}_t + \epsilon_{bt}$$

LASSO

$$Y_{bt} = \alpha_b + \gamma_t + \beta \text{Exposure}_b \times \text{El Niño}_t + \gamma \text{Operating Leverage}_b \times \text{El Niño}_t + \epsilon_{bt}$$

- Interpretation?
  - LASSO control coefficients like γ typically neither reported nor interpreted (Belloni et al., JBES, 2016)
  - β, the average treatment effect, hardly moves (cf. columns 1-3, Table 6)
- Instead, investigate CATEs (conditional average treatment effects):
  - Honest causal forest (Athey and Wager, 2018) or Generic ML (GATES/CLAN, Chernozhukov et al., 2021)
  - Can be adapted to a quasi-experimental setting (e.g. Deryugina et al., AER, 2019).

Three final questions

- Increase in natural disasters in the South linked to positive (or null) effect on bank lending...
- El Niño: cyclical and partly predictable (2-7 year intervals that last between 12-18 months). Should be priced into long-term lending decisions?
- Each El Niño event is very different: treatment status of a county is not constant across El Niño events

To conclude

Thought-provoking paper aiming to push the "banks and climate" literature forward:

- Impacts on salinity and bank outcomes appear reasonably credible to me
- I am not convinced by the amenity channel for three main reasons:
  1. Concept is nebulous
  2. Empirical implemenation is either coarse or very partial
  3. Timing of impacts seems off
- Consider more plausible mechanism(s), especially local shocks to agricultural productivity