Mines, Water Pollution, and Agricultural Productivity

Spatial Economics Project Presentation

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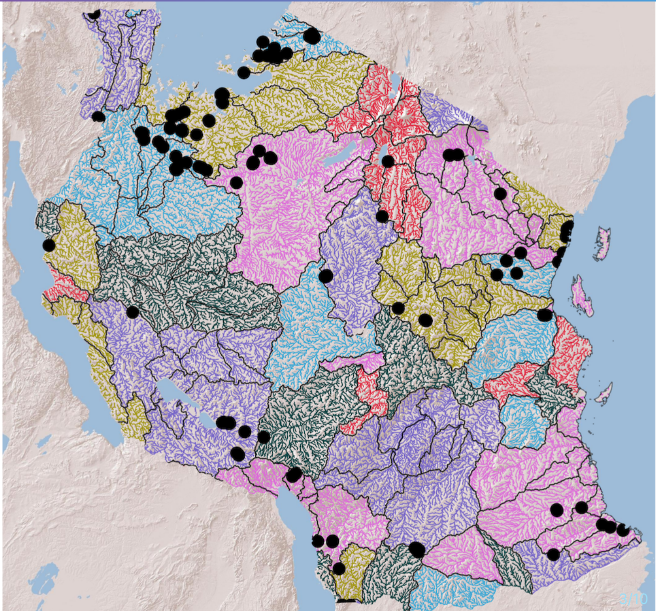
Recap

Data

First Results

The Idea

- We hypothesize that mines exert **negative effects on land fertility** via water pollution.
- This effect should only occur **downstream** of a mine, but not upstream.
- We have data on **river basins**, their flow order, (Lehner & Grill, 2013) and the location of **mines** (Maus et al., 2022).
- We can use annual maximum cropland **EVI** during growing season as a proxy for **agricultural productivity** (Didan, 2015)



The Specification(s)

$$Y_{mdt} = \beta_1 NearMine_{mdt} + \beta_2 Downstream_{mdt} + X_{mdt} + \eta_d + \varepsilon_{mdt} \quad (1)$$

$$Y_{mdt} = f(distance_{mdt}) + Downstream_{mdt} + X_{mdt} + \eta_d + \varepsilon_{mdt} \quad (2)$$

$$Y_{mdt} = f(distance_{mdt}) + f(distance_{mdt}) \times Downstream_{mdt} + X_{mdt} + \eta_d + \varepsilon_{mdt} \quad (3)$$

- Y_{mdt} measures agricultural productivity.
- $NearMine_{mdt}$ is an indicator if a basin is in proximity to a mine.
- $f(distance_{mdt})$ measures the distance of the basin's centroid to the nearest mine at the river.
- $Downstream_{mdt}$ indicates that the basin is downstream of a mine.
- m is the basin, d the district, and t the year; X_{mdt} are a set of of geographic and socioeconomic controls; η_d are district fixed effects.

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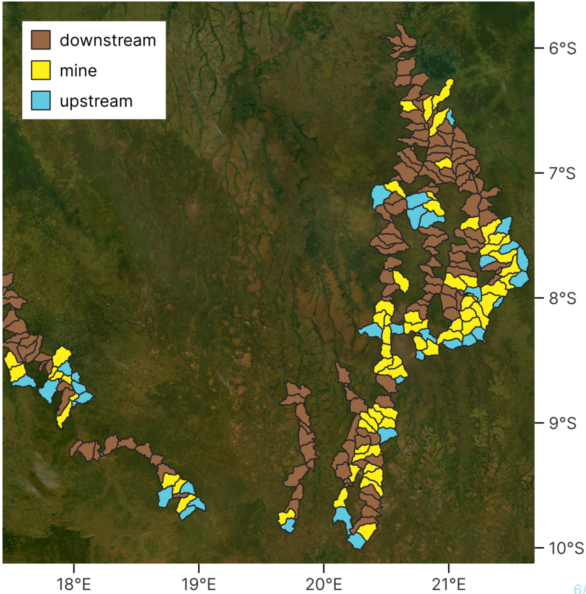
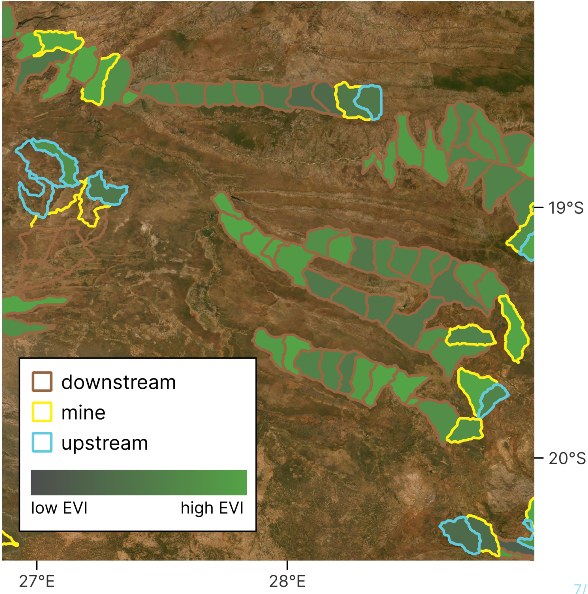
Identifying Upstream and Downstream Basins

- The map on this slide serves as an example and depicts the situation around some mines in northern Angola.
- There are much fewer **upstream basins** than there are **downstream basins**.
- Text
- Text



Identifying how Fertile a Basin Is

- The map on this slide serves as an example and depicts the situation around some mines in Zimbabwe.
- The greener the fill color of a basin is, the higher its **EVI**.
- From an **eyeball econometrics** point of view, we should see basins getting greener the farther downstream they are.
- Here, this seems to be the case. (In many other locations, it doesn't seem that way.)



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Disclaimer

Disclaimer: The results presented on the following slide(s) are very preliminary and *will* change before the presentation. Please refer to the current version of the slide set, which is available at https://github.com/maxmheinze/spatial/blob/main/project/presentation/slides.pdf

Thank You!

References I

Didan, K. (2015). MOD13Q1 MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid V006. https://doi.org/10.5067/MODIS/MOD13Q1.006

Lehner, B., & Grill, G. (2013). Global river hydrography and network routing: baseline data and new approaches to study the world's large river systems. *Hydrological Processes*, *27*(15), 2171–2186. https://doi.org/10.1002/hyp.9740

Maus, V., da Silva, D. M., Gutschlhofer, J., da Rosa, R., Giljum, S., Gass, S. L. B., Luckeneder, S., Lieber, M., & McCallum, I. (2022). *Global-scale mining polygons (Version 2)* (Dataset). PANGAEA. https://doi.org/10.1594/PANGAEA.942325