Comments on:
“When Trade Burns the Air”

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Key contributions

- Novel look at pollution havens and agriculture
- Brings together at least 11 large datasets about agricultural fires and trade in Southeast Asia
- Atmospheric science, plus a full-blown trade model
- Asks where the smoke from SEA agriculture goes
- Affects 40 countries and ~4 billion people. Pollution (PM 2.5) damage of 11 cents per dollar of exports from SEA
- This is 2.32% of the gains from trade on average, and > 100% in neighbors like China

Key contributions

- Full grid-to-grid model of pollution damages
  - Maps each cell of farmland into damages everywhere else
    - Uses state-of-the-art air transport model (HYSPLIT)
- Expands the thinking about pollution havens well beyond bilateral trade
  - When China imports palm oil from Indonesia (~$3B/yr), it should pay damages to Singapore
  - Incredible detail on spillover patterns

Two strands of comments

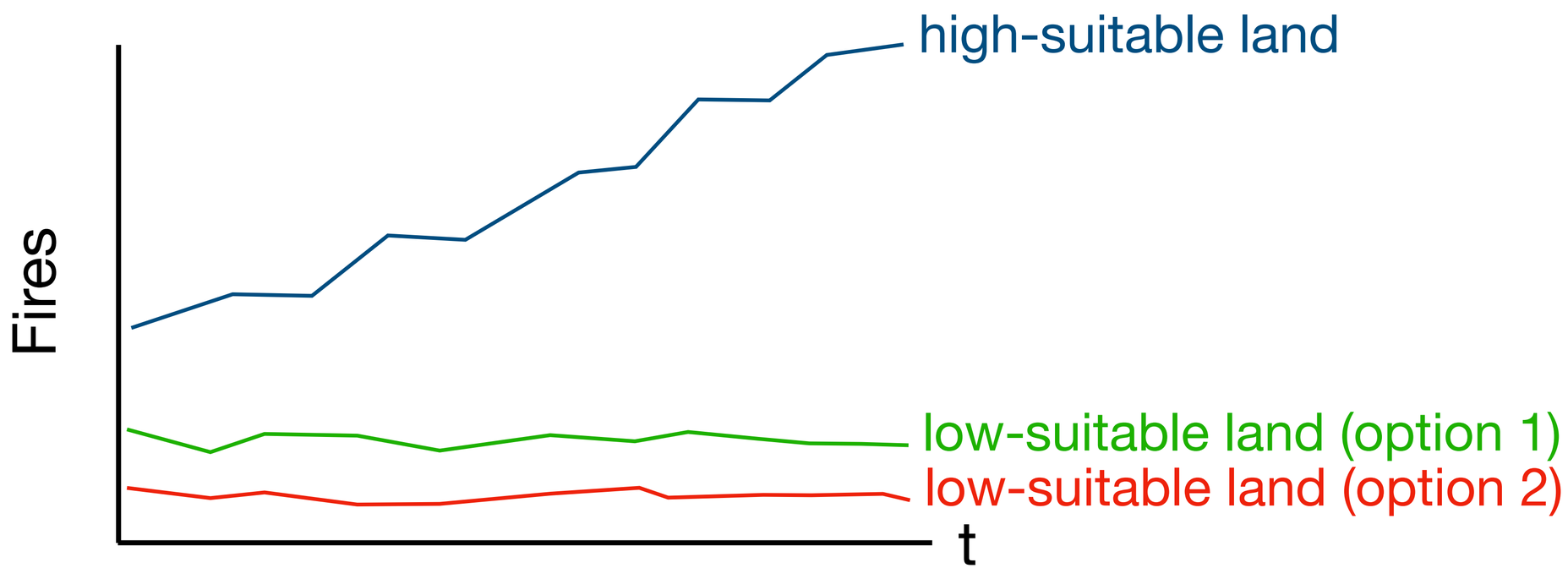
1. How to sharpen identification of the trade flows → fires effect

2. Big picture and ideas for more counterfactuals

   - The detail in the model permits an incredible number of interesting things!

Identification

- Estimation of the ratio of fires on suitable vs. unsuitable land (a 1% increase in trade creates 6.5% more fires)
  - If unsuitable land has fewer fires (option 2 below), then does the reported ratio climb even if the export effect is fixed?
- Endogenous forces correlated with growing trade, like GDP growth, may also act on the suitable areas



Identification

$$Fires_{cit} = \alpha + \sum_{k=1}^{3} \beta_k log(AgExport_{ct}) \times Suit_i^k + \theta_{ct} + \pi_i + \gamma X_{it} + \epsilon_{cit}$$

- This is a diff-in-diff with continuous treatment and two-way fixed effects (country-year, and grid cell)
  - Approaches like Callaway and Sant'Anna (2021) are likely to be useful

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- Parallel trends assumption
  - Core challenge is that low suitability areas are likely to have pretty flat fire rates

Solutions and placebo tests

- Parallel trends in the control areas
    - Country-level controls could be very useful: need to interact them with suitability (e.g. GDP X high suitability)
    - Narrow the control group (similar to current appendix approach): control could be land with high suitability for domestic crops; treatment-exposed is land with high suitability for export crops

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- Placebo tests
  - Natural (and hopefully easy) placebos to try in this setup
  - For example: exports of manufactured goods, electricity, etc. could be especially convincing

Triple differences

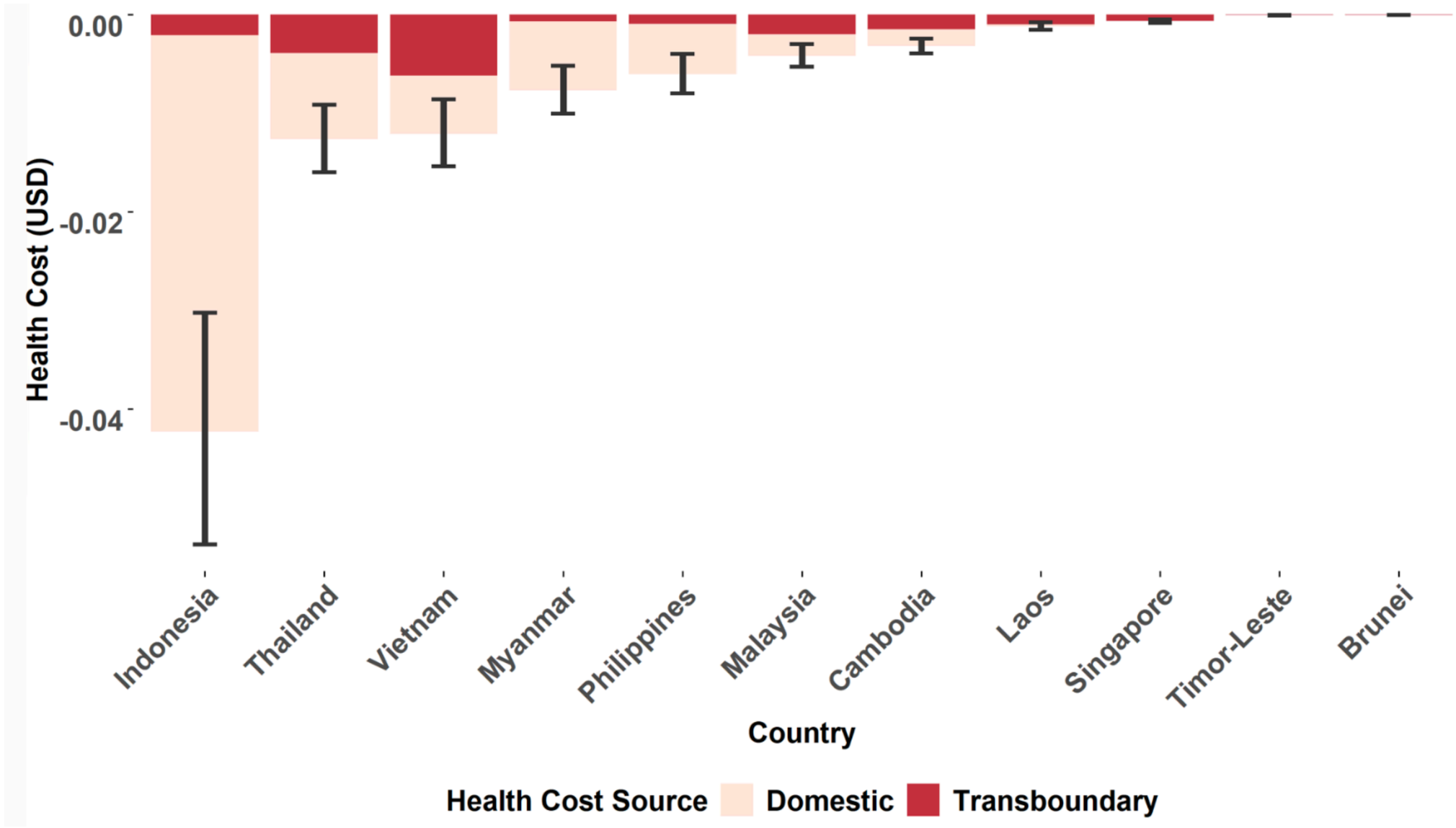
- Can be compelling, but usually the third difference addresses particular pieces of the puzzle
- One very nice triple-diff is already included: interaction with the timing of land-clearing season

- This very strongly shows that the fires are caused by agriculture, and not wildfire or something else in the data
- But, the question of why agriculture is expanding is a separate piece

Trade model and big picture

- 2.32% of gains to trade seems like it could be under-stating your results
  - Is this a simple average by country?
- It may be possible to connect to other papers in the trade literature on third-countries (mostly looking at trade agreements)
  - Could then consider relative scale of pollution spillover value

Counterfactuals



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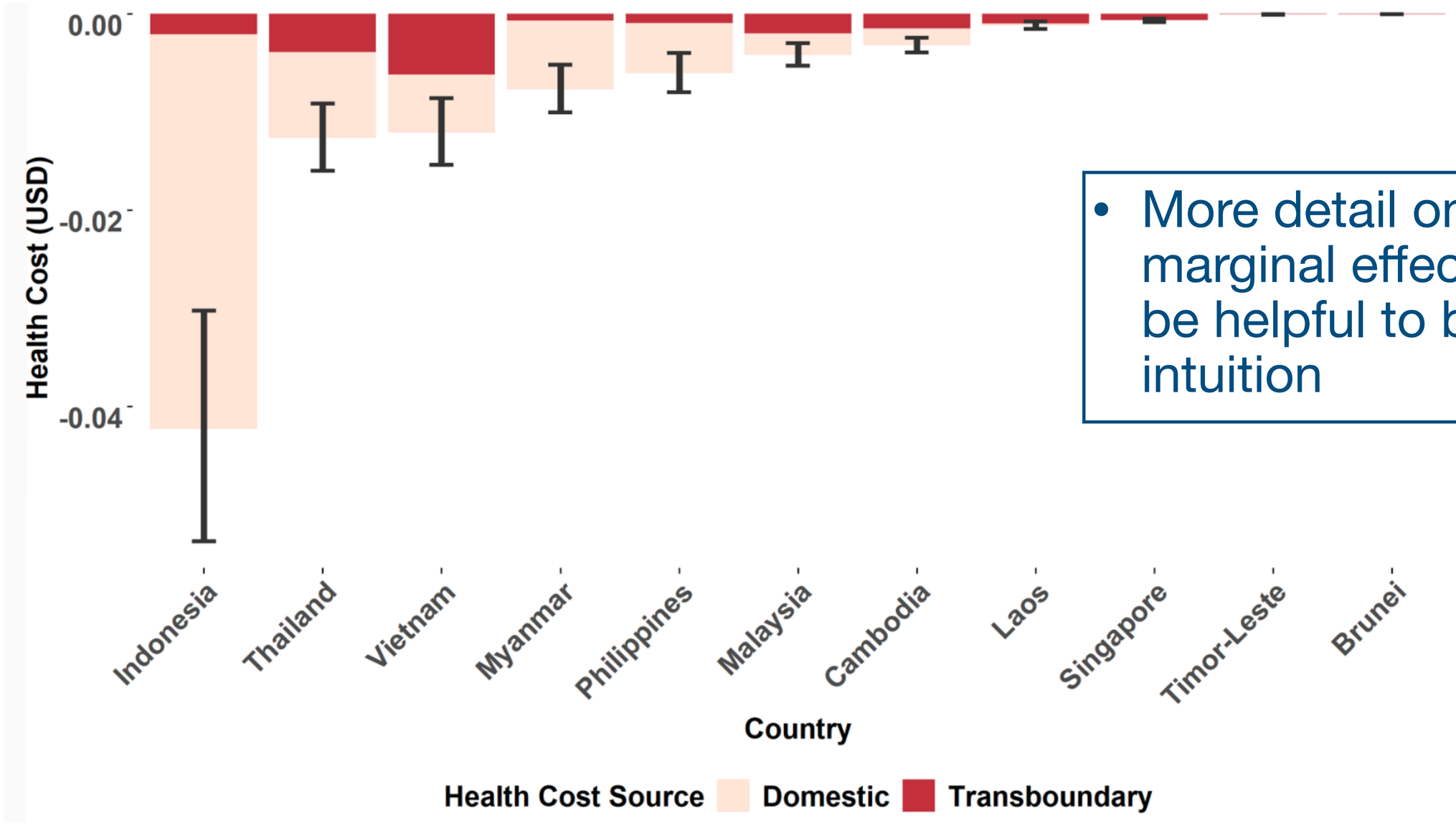

- More detail on marginal effects may be helpful to build intuition

Counterfactuals

- Consider $1 of agricultural exports for a few key countries
- Can then plot total PM 2.5 damage (per $1 in a country) decomposed by:
    1. Self
    2. Other SEA
    3. China
    4. Rest-of-world
- A potentially interesting bounding case: assign all fires on agricultural land to agriculture and divide, contrast those damages (per dollar of output) with the ones estimated inside the model

Other big picture things

- Domestic institutions and regulation
  - The paper implicitly treats damages to self (estimated at 80%) as internal, but in practice weak institutions may be preventing transfers or regulation. May be interesting to look at exporting grid cells versus other cities and provinces?

- It may be interesting to consider scenarios with a flat VSL (within SEA, and also across all countries) as this could move the damage estimates a fair amount

Other big picture things

- PM 2.5 (and some of the other modeling decisions) makes this a minimal lower bound - the paper does a good job acknowledging this
  - If we add in other things (2-3kg CO_2, critical habitat loss, river runoff, etc.) overall environmental damage could well be in excess of $1
- Would this amplify equilibrium/offsetting effects? How should we think about counterfactuals in this setting?

Miscellaneous/sensitivity cases

- Did you encounter any differences with quick-burning residue fires vs. slow land-clearing/forest fires?
    - Might be interesting if you can pick up any dynamics (e.g. land-clearing fires as a function of export change with residue fires as a function of levels)

- Ranges would be helpful on the main effects where possible: i.e. pass standard errors through and consider sensitivity to alternative trade elasticities and mortality effects of PM 2.5