Fight fire with finance: an experiment to curtail land-clearing fire in Indonesia

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Motivation

Indonesia's 2015–16 fire season $\Rightarrow >$ \$16 bn economic costs, 100,000 premature deaths, on several days more emissions than US economy

$\Rightarrow$ mostly all human-lit, an increasingly prominent way to clear land

Payments for ecosystem services and conditional cash transfers are popular and often effective approaches to spur behavior change.

$\Rightarrow$ key question is whether environmental fiscal incentives can still be effective amidst limited property rights, land use flux, underdevelopment

$\Rightarrow$ credible counterfactual needed to discern additionality and to avoid or at least minimize paying for the status quo "anyway" activities

This paper $\Rightarrow$ RCT deep in the Bornean jungle, covering around 90,000 households, testing whether community-level conditional cash transfers can reduce the use of harmful land-clearing fire, as monitored from space

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Program design

Three-part payment-by-results pilot program in 75 rural villages

1. Village information and instruction on fire prevention
2. Up-front Rp 10 million (750 USD) capital grant to ease liquidity constraints and help with fire prevention
3. Ex-post conditional payment of Rp 150 million (around 15% of village budget) if successful in eliminating fire over the 2018 fire season (July–December)

Other salient features:

- Focus on village collective action, PNPM CDD facilitation approach
- Over 30,000 HH treated; plot-level monitoring infeasible, too costly
- Designed within existing fiscal architecture to be scaled, as a mechanism to operationalize external climate finance on ground
- Realistically implemented with TNP2K, Sampan, and governments

Data and experimental design

Performance monitoring and data

$\Rightarrow$ MODIS Active Fire Product MCD14ML, hotspot detections

$\Rightarrow$ lower-**cost**, higher **quality**, genuinely **blind** control

Strongly erred on the side of paying unsuccessful villages rather than not paying successes (i.e., removing detections (a) under 50 confidence, (b) within 500m of boundary, and (c) that matched pre-registered swidden fire) and manually inspected photos for villages with three or less.

Other data: baseline census, village surveys, extensive qualitative info.

Sample and randomization

$\Rightarrow$ Kubu Raya, Sanggau, Sintang, Ketapang districts, in W. Kalimantan

$\Rightarrow$ restrict sample to the 8 most fire-prone sub-districts /district, and villages with fire 2/3 of the last 3 years using historical fire data

$\Rightarrow$ block-randomize 75/275 villages to program (i.e., within districts)

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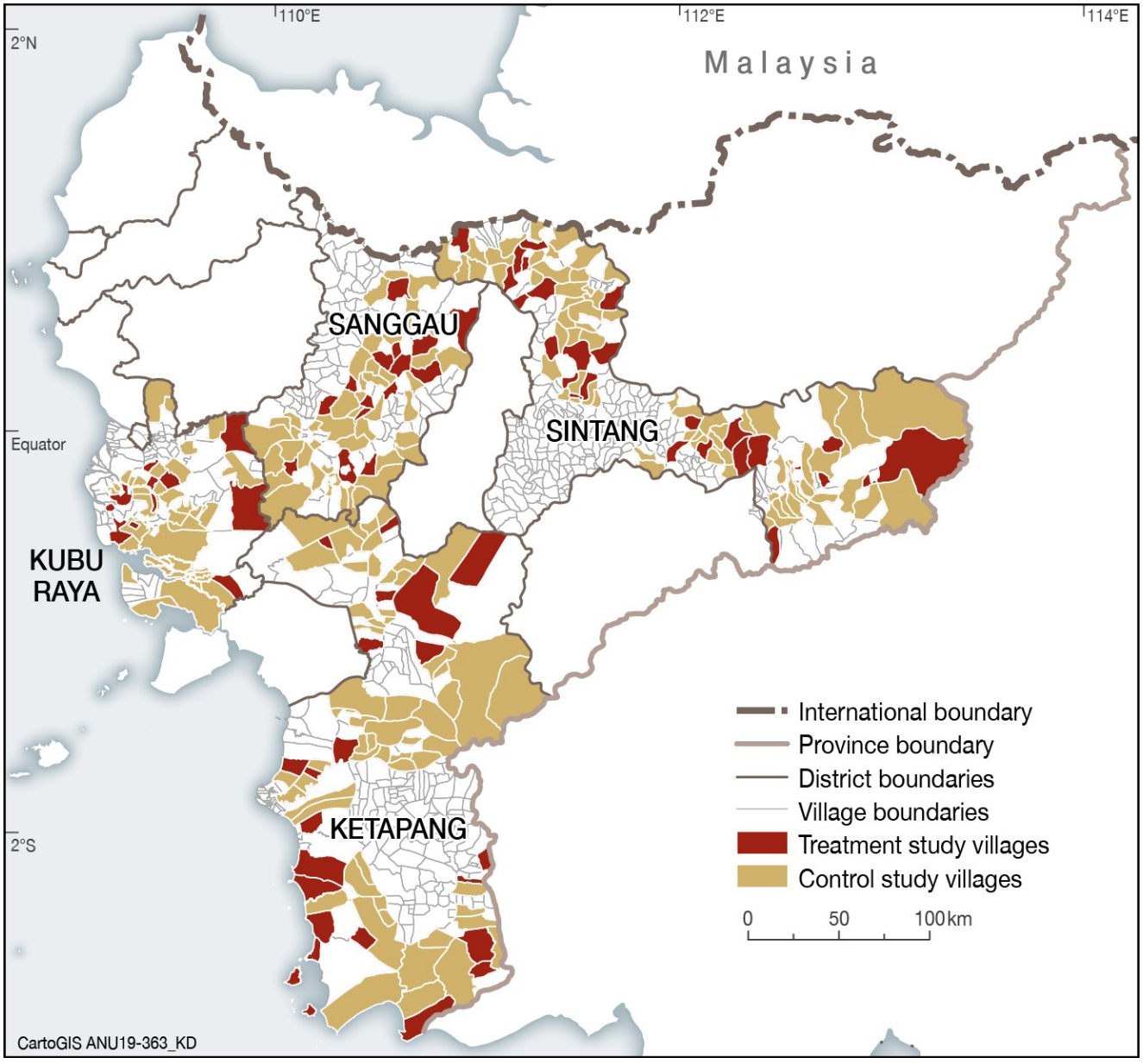
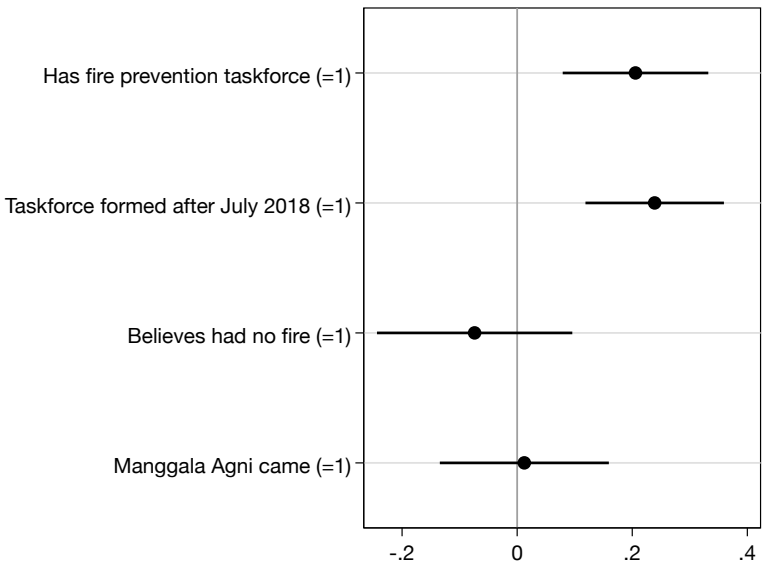
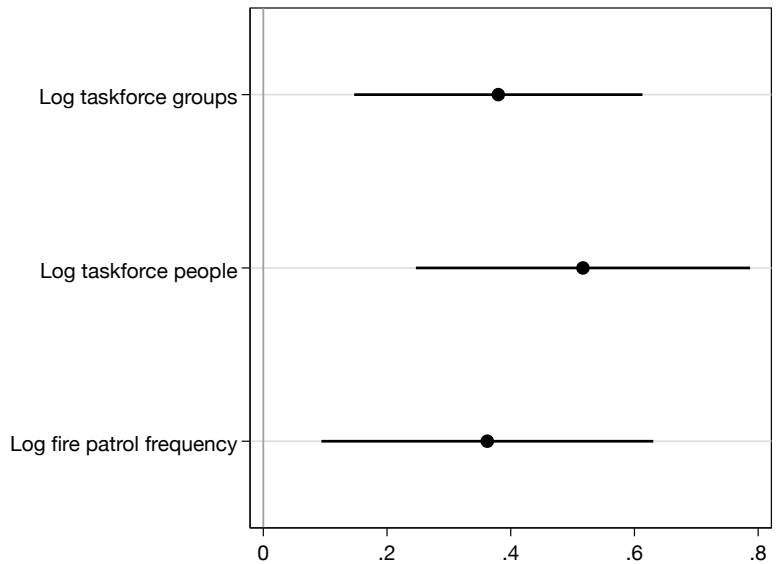
Treatment assignment



Results—program "outputs"

Treatment villages increased fire-related practices and behaviors





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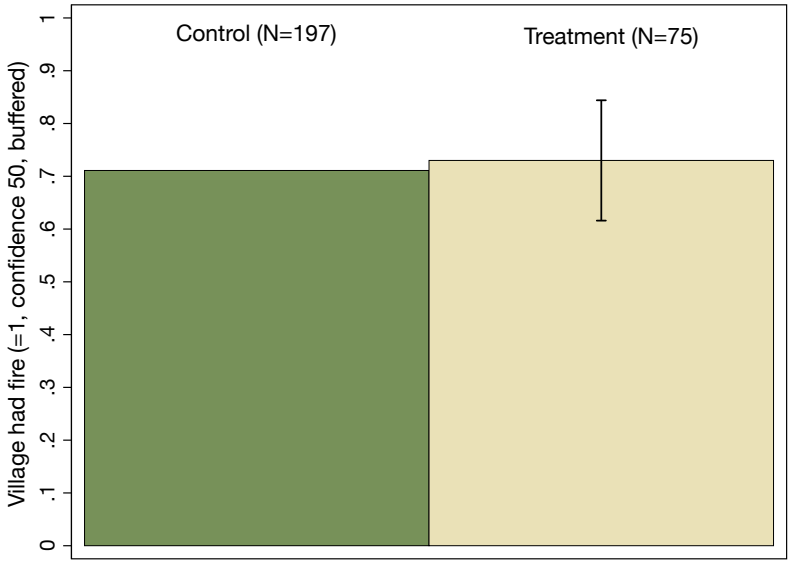

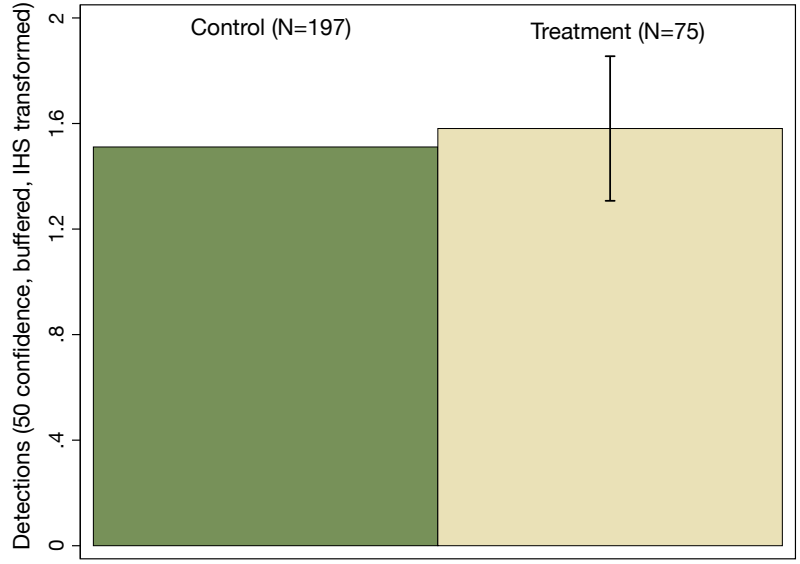

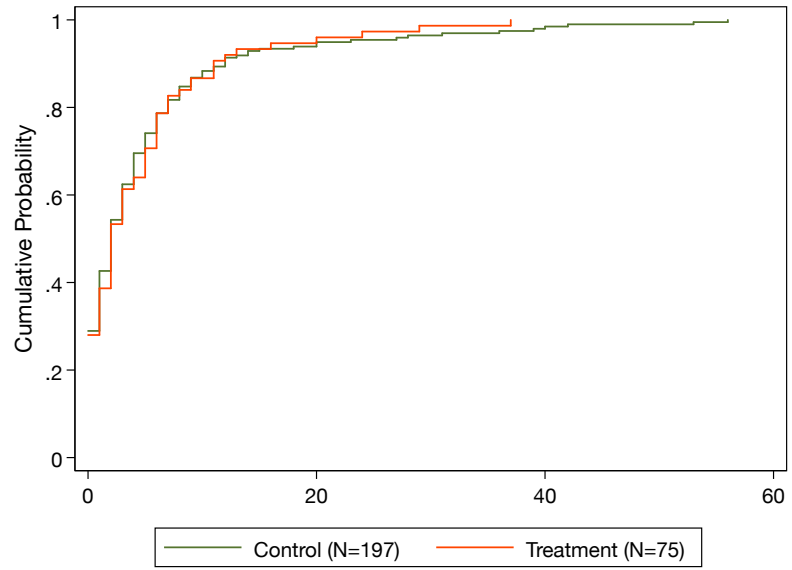

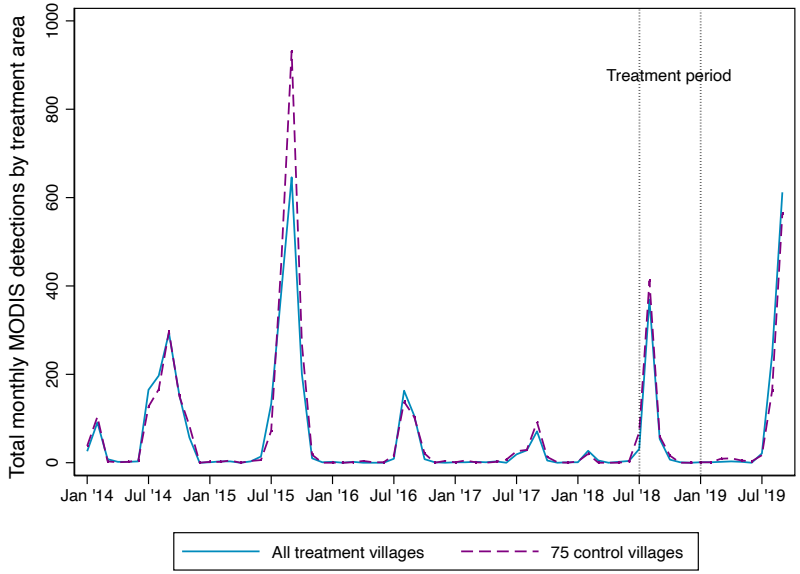

Interpretation of the null result

- Adoption of fire prevention practicies was insufficient to deliver the fire free outcomes desired, as was explicitly paying for them
- Ex-post disbursement saved 8,100 million IDR, and the 3,150 million disbursed unlikely reduced fire more than no payments at all
- Can't rule out small potentially policy-relevant effects ($<$16pp)
- Impacts need to be large to justify expanding pilot or scaling up

Our leading explanations for the disappointing result:

1. Six months was not long enough; temporary program
2. Payments were not large enough
3. Collective action failure (only need one defector/320 HH village)
4. Potentially unrealistic focus on the extensive margin

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