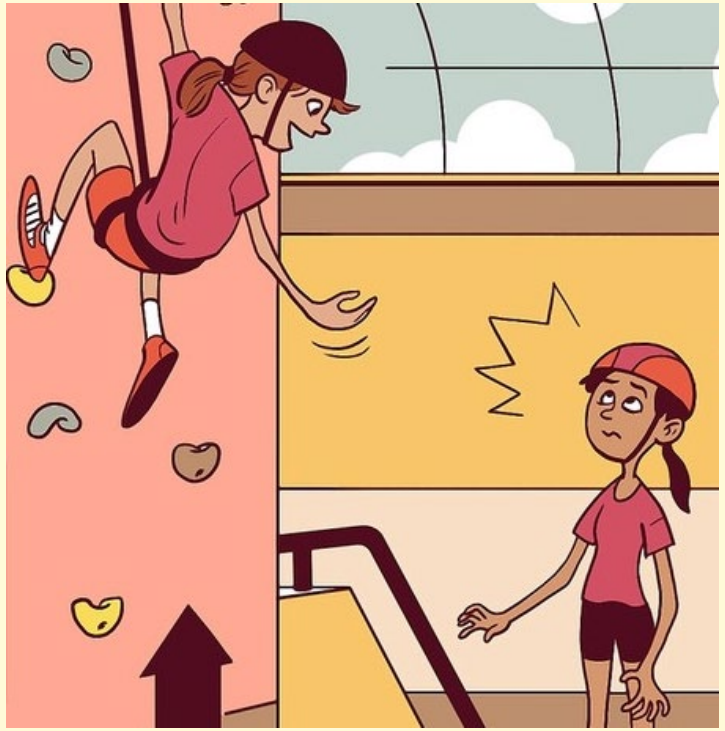
Do you listen to your neighbour?
Block leader proximity effects in energy communities



Millions of dwellings need to become more sustainable.
But many residents doubt whether to **energy retrofit.**
EU: Residential energy communities can speed up energy transition

This study: mechanisms at work in REC
Can block leaders stimulate people to retrofit?

Data: 79 Dutch residential energy communities aiming at information sharing, campaigning and collective purchase; 66K dwellings; 2K retrofits

29 March 2023 – Tije van Casteren – Ioulia Ossokina – Theo Arentze

2. Motivation & Research Question

Communities reduce barriers to adoption

- Individuals face internal and external barriers towards adoption (Cattaneo, 2009)

- Communities reduce information and verification costs through peer influence (Xiong et al., 2016)

Block Leaders

- Block leaders inform others about certain issues (Abrahamse and Steg,2013; Beltramo et al., 2015; Burger et al., 2004)

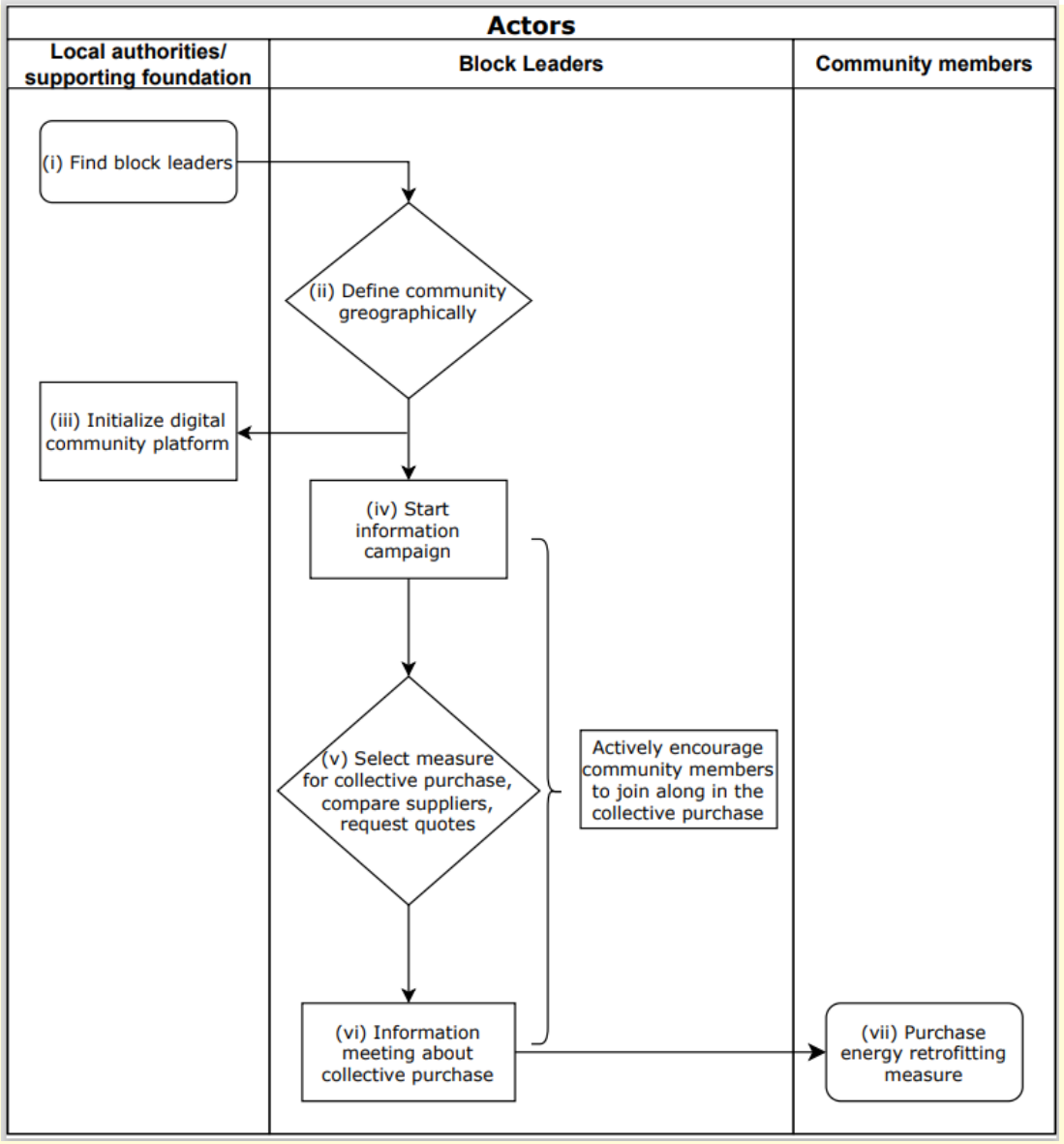
- Block leaders speed up information diffusion and increase compliance, especially when similar (Everett and Peirce, 1992; Henning and Lieberg, 1996; Mickaël, 2014)

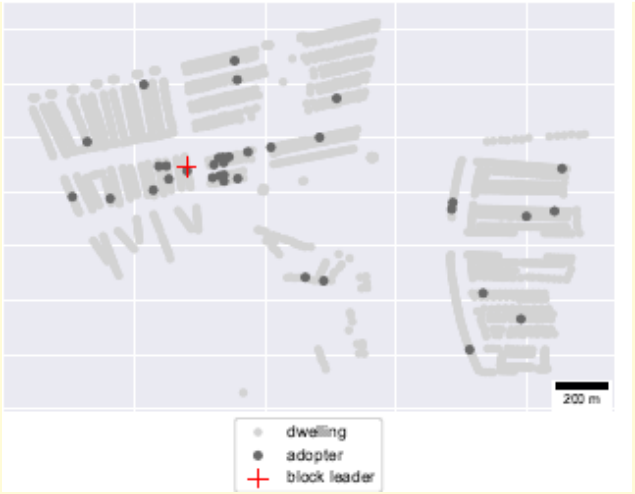
Spatial peer effects

- Peers affect your decision (visibility, and imitation Bollinger and Gillingham, 2012; Graziano and Gillingham, 2015, 2016, word-of-mouth Palm, 2017; Wolske et al, 2020)
- The effect disappears with distance

Goal: How large and far-reaching is the effect of block leaders on close neighbours? How to choose block leaders optimally?

3. First insights role block leaders: based on 79 communities





Block leaders play a crucial role.

Block leaders exert 2 externalities:

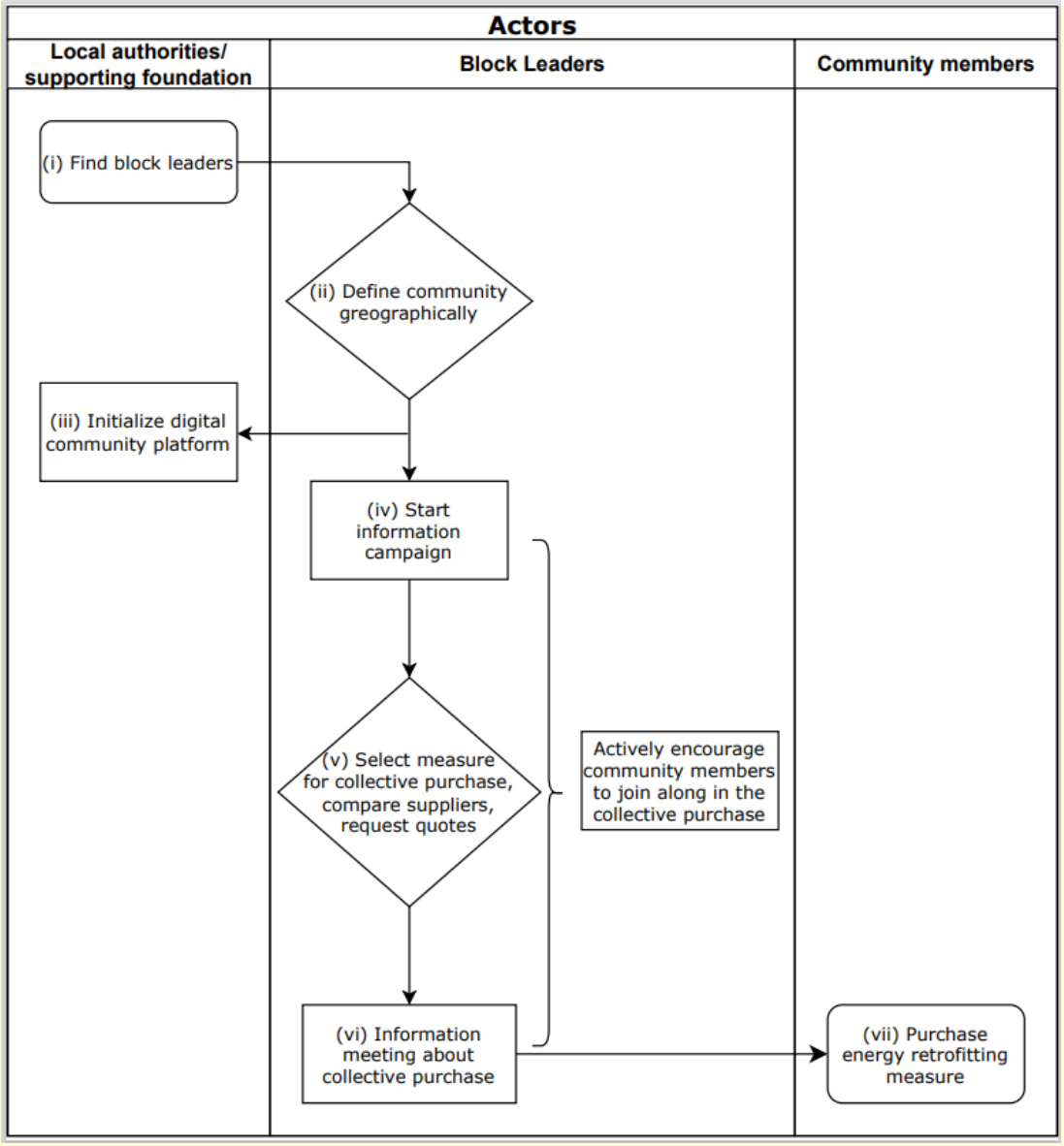
(i) Reduce information and verification costs

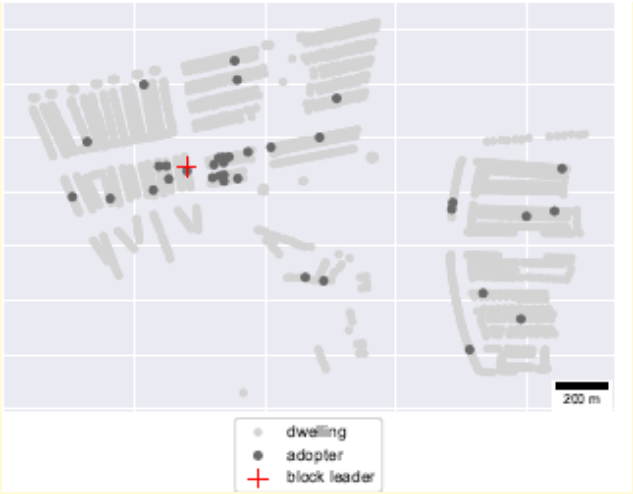
→ for whole community

(ii) Activate and persuade through word-of-mouth (cheap talk)

→ for close neighbours

3. First insights role block leaders: based on 79 communities





Block leaders play a crucial role.

Hypotheses

(i) Proximity to block leader increases the retrofit probability

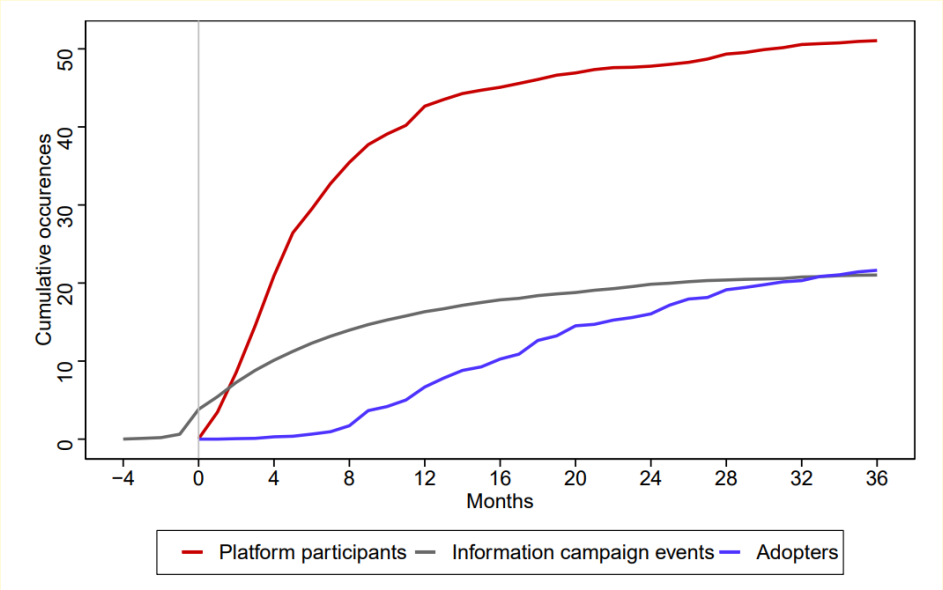
(ii) Similarity to block leader increases the retrofit probability

(iii) Proximity effect is smaller:

- When other communication channels rise in importance
- When similarity to block leader is larger

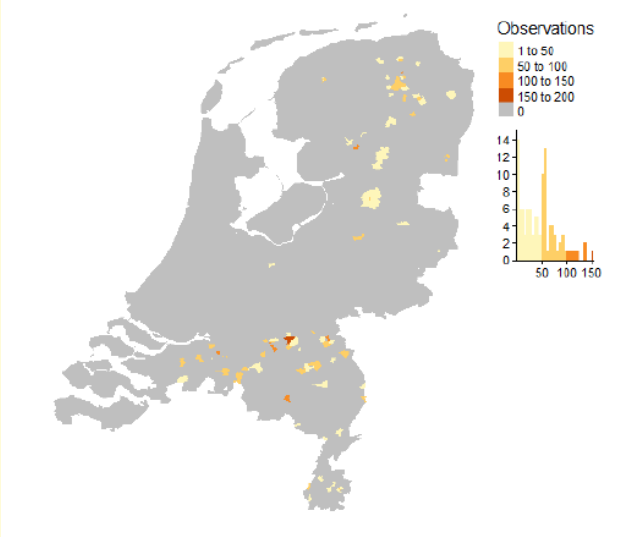
4. Data: 79 communities, 66K houses, 2K retrofit uptakes

We define start of community as the moment when its digital platform goes online.



Dropped:

- Small communities and large (<100, >4000)
- Communities without block leaders in data
- Communities with few retrofit uptakes (< 5)

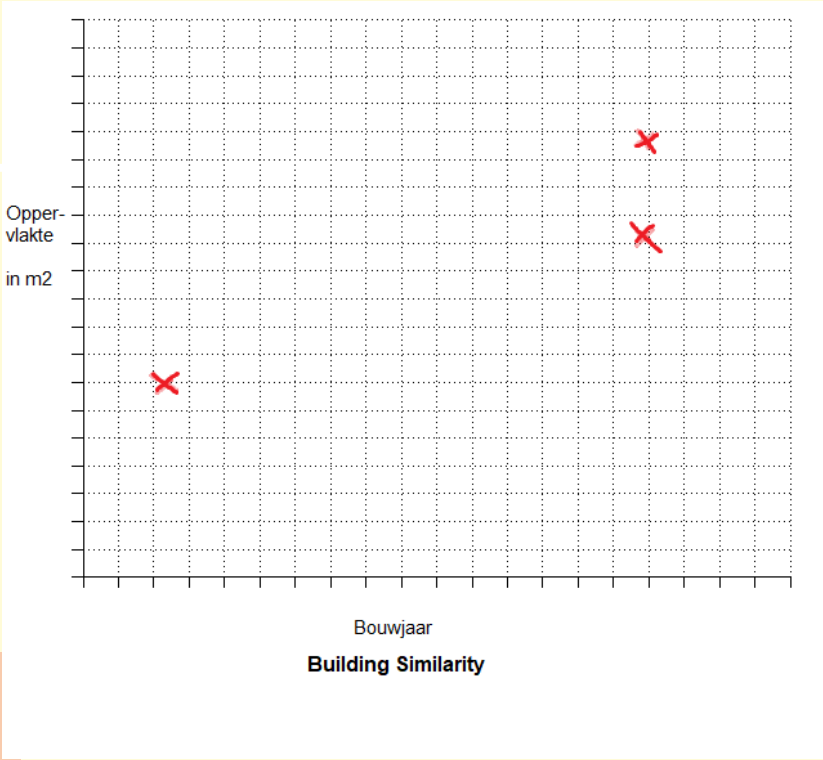


5. Method: logistic regression

i: dwelling, j: community, p: postal code

P: probability to retrofit; 1-P: probability NOT to retrofit

$$ln(\frac{P_{ijp}}{1-P_{ijp}}) = \theta_1 D_{ijp} + \theta_2 S_{ijp} + \beta_1 X_{ijp} + \phi_1 G_p + \gamma_j + \epsilon_{ijp}$$



D: **distance** to nearest block leader

S: **building similarity** between dwelling i and that of the nearest block leader

θ_1 and θ_2 indicate (i) the proximity effect of the nearest block leader on the retrofit probability and (ii) the importance of building similarity for the retrofit decision

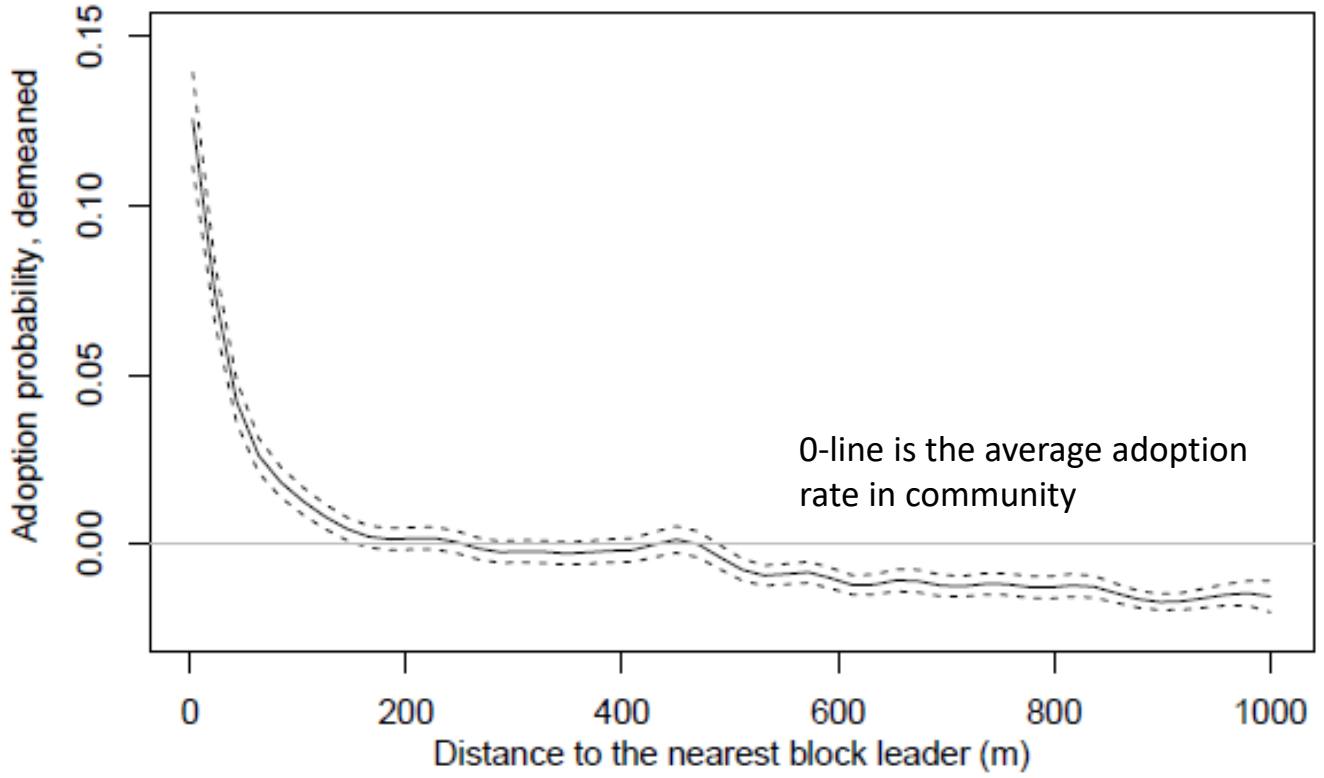
X: individual dwelling characteristics (surface area and construction year)

G: other dwelling/resident characteristics, at 6-digit postal code aggregation (e.g. average electricity and gas use)

γ_j : propensity to retrofit community j

6. Average result: main peer effect is within 200 meter

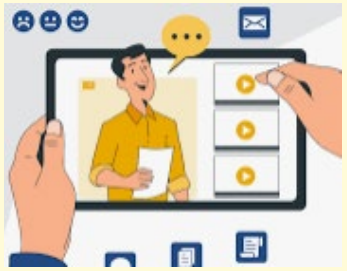
Figure 5: Non-parametric estimate of the block leader proximity effect



Notes: The line is a Nadaraya-Watson kernel regression of the community-demeaned probability to adopt a retrofit measure, as a function of the distance to the nearest block leader. A 95% confidence interval is used.

	Model 4
BL 0-50	2.352 (0.553)***
BL 51-100	1.956 (0.554)***
BL 101-200	1.688 (0.479)***
BL 201-300	1.360 (0.497)***
BL 301-400	1.152 (0.411)***
BL 401-500	1.007 (0.478)**
Same street	0.305 (0.120)**
Building sim. Q1	−0.374 (0.165)**
Building sim. Q2	−0.147 (0.111)
Building sim. Q3	0.044 (0.207)
log Floor space (m2)	1.515 (0.231)***
Built < 1946	−0.172 (0.219)
Built 46-64	0.135 (0.158)
Built 85-04	−0.530 (0.217)**
Build > 2004	−1.173 (0.344)***
log Property value	1.257 (0.418)***
log Elec. use	−0.281 (0.292)
log Gas use	−0.625 (0.494)
Num. obs.	59246

7. Heterogeneity



Hypotheses

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We find indeed smaller block leader effects:

- for ONLINE PLATFORM participants
- for communities with ACTIVE CAMPAIGN

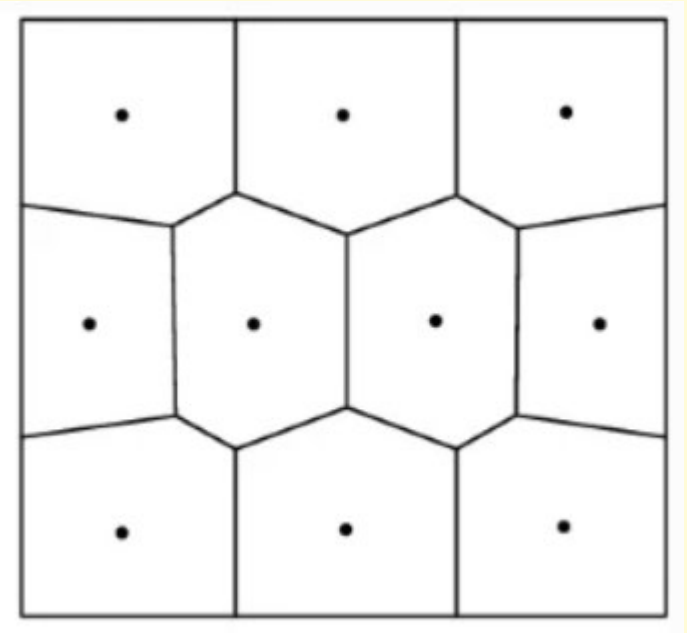
We find larger block leader effect in more dense (urban) communities

We find same block leader effects:

- For high and low similarity to block leader
- Between solar and insulation

8. Policy implications

Proximity to block leader increases the uptake probability. The effect is the largest within 200 meter (from 2.5% average to 10% uptake)



How to choose block leader to maximize this effect?

- Dispersed within community → Do not make communities too large!
- Living in representative dwellings
- In high density neighbourhoods