WHAT *would make this farmer plant* THE HEDGE?

How policy can support farmers in restoring habitat connectivity - Simulations on policies for hedge plantings.

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3b. Decision

benefit   cost

Depending on pay-off, farmers decide on whether to plant a hedge

$$U_t = B_t - C_t$$
$$B_t = S_i$$
$$C_t = C_i + C_{opt}$$
$$U = \sum_{t=1}^{n=20a} U_t [1-r]^{t-1}$$

U_t, B_t, C_t ...   utility, benefit, cost of a hedge per area in year t $\left[\frac{\text{€}}{\text{m}^2}\right]$

S_i, C_i...   height of investment subsidy and cost, exclusively in year $t = 1$

with $C_i \approx \left\{ 5\frac{\text{€}}{\text{m}^2} ; ... ; 15\frac{\text{€}}{\text{m}^2} \right\}$

$$S_i = 80\% \, C_i$$

C_{opt} ...   opportunity cost (here: income forgone) of a hedge per area in year t $\left[\frac{\text{€}}{\text{m}^2}\right]$

with $C_{opt} \approx \left\{ 480\frac{\text{€}}{\text{ha}} ; ... ; 980\frac{\text{€}}{\text{ha}} \right\}$

r ...   Time discounting factor with $r = 5\%$

n ...   Time horizon with $n = 20$ a

1. Background

- Over 50% of Germany's surface area is agriculturally managed land
- Wildlife declines drastically in species numbers and population sizes & decline is stronger in farmlands than in other habitats
- Planting hedges in agricultural landscapes could mitigate species decline
- Most hedges in Germany must not be removed due to Nature Protection Laws
- Subsidies to plant hedges: e.g. NALAP in Thuringia, Landscape Preservation Directive (*"Landespflegerichtlinie"*) in Baden-Württemberg, funds from National Action Plan on Natural Climate Protection (*"Aktionsplan Natürlicher Klimaschutz"*)

2. Questions

What is the effect of <u>subsidies for hedge planting</u> on the <u>connectivity of hedges</u> in agricultural landscapes?
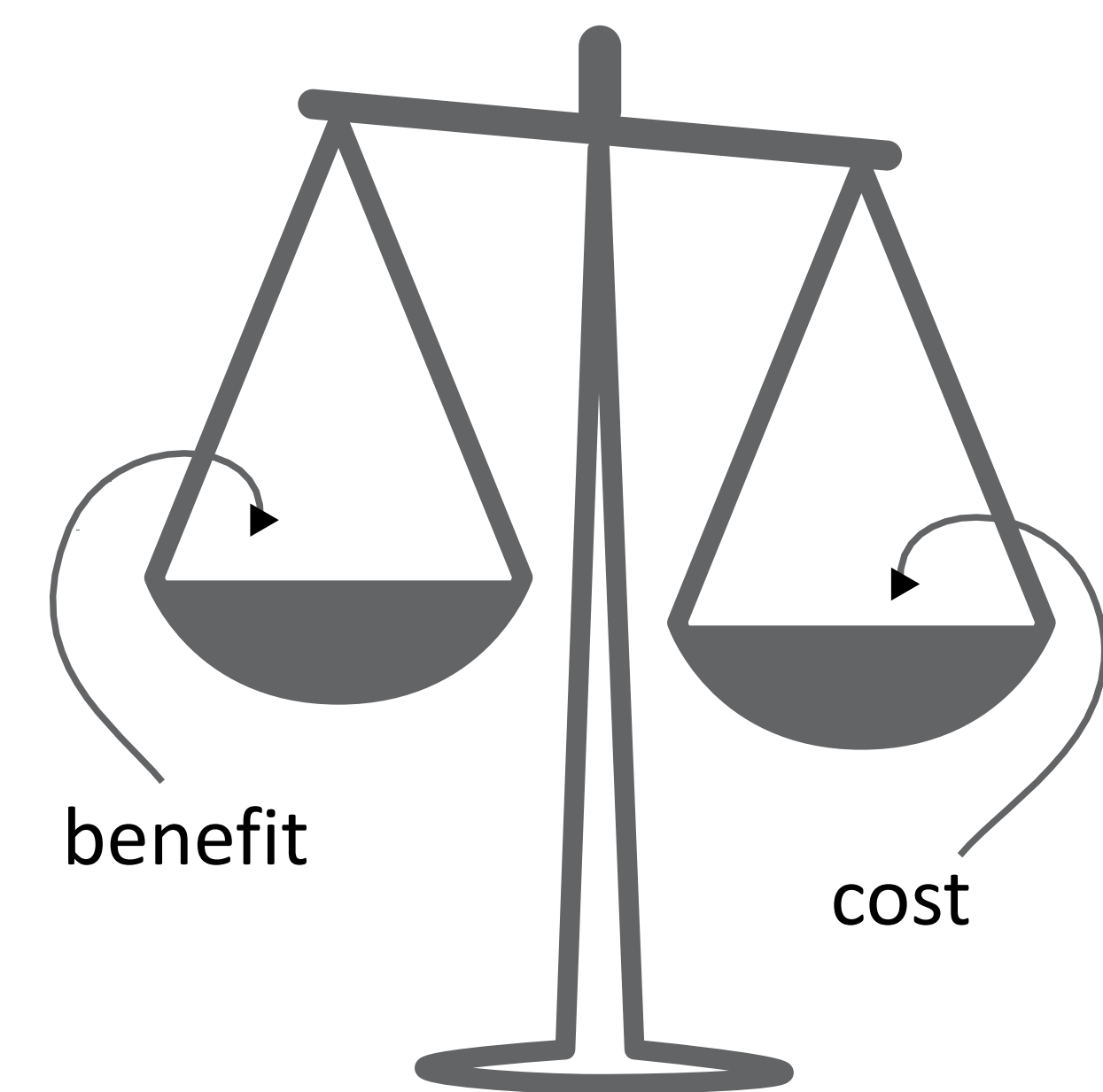
Hypothesis I: Paying <u>subsidies</u> incentivises <u>farmers</u> to plant hedges.

Hypothesis II: Introducing <u>hedges</u> in agricultural landscapes <u>increases habitat connectivity</u>.

3a. gen. Methods

- Agent-based model
- In NetLogo *(soon: Julia)*
- Extent in first version: one county, Unstrut-Hainich-Kreis, Thuringia
- Geodata from openly accessible LPIS (Land Parcel Identification System)

4. Scenarios

- Impact of land tenure and ownership on hedge planting
- Include behavioural factors

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