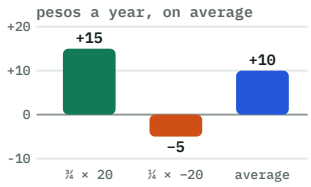
Why do farmers stay poor?

Why a sensible farmer skips fertilizer that pays back double: the average year against the bad year, no cushion and no insurance, cash gone by planting time, half the gain taken by the landowner, and what a study in Kenya found.

1 The bag

expected gain

- Amara, farmer on Palmera (money: pesos) · plot **100** pesos · bag of fertilizer **20** → harvest **140** · rain **3 years in 4**; dry year (1 in 4) → harvest 0, bag or not
- Rain year · 140 − 100 − 20 = **+20** · dry year · **−20** (the bag's cost, lost)
- **Expected gain** = each result × its chance, added up (Finance Lesson 11) · `¾ × 20 − ¼ × 20 = 15 − 5 = +10`
- Break-even · bad year **1 in 2** → `½ × 20 − ½ × 20 = 0` · practice: Neema +30 / −20 · p = chance of a dry year → `(1 − p) × 30 = p × 20` → p = **3 in 5**; at 1 in 5 → 24 − 4 = **+20**



2 No cushion

risk · missing market

- +10 on average → a farmer with savings buys every year · Amara **does not**: not foolish, a different sum
- Dry year −20 = her children's **school fees** · no savings · one bad year hurts too much → **constraint** (a limit she can't get around), not skill
- **Missing market** = a good or service worth buying that nobody in the place sells · e.g. rain **insurance** (pay a small sum each year → large sum back when something bad happens)
- Practice · rain insurance by lottery · 20% used fertilizer before · insured **45%**, control **25%** → effect **20 points** (5 came anyway) · trap lifted: **risk** (toy numbers)

3 The timing trap

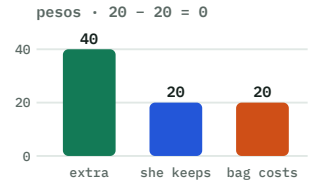
the Kenya study

- Fertilizer bought at **planting** · harvest sold months earlier → cash spent on food and fees · no safe place to save (Lesson 5)
- **Esther Duflo, Michael Kremer** (Nobel 2019, anti-poverty trials) & **Jonathan Robinson**, economists · 1,230 maize farmers, Kenya, trials **2000-04**, published **2011**
- Fertilizer paid back ≈ **70% a year** · yet only **24 in 100** used it
- Nudge (small change in how a choice is offered, nothing forced) · **free delivery** if ordered right after harvest, cash in hand → use **+14 points** (14 more farmers per 100 → ≈ 38 in 100) · same fertilizer, new **moment**
- Practice · 500 farmers × 24 in 100 = **120** · + 5 × 14 = 70 → **190** · "nobody told them" ≠ the whole story

4 Whose land?

sharecropping · incentive

- **Sharecropping** = farming land for an owner in return for a share of the harvest (here half)
- No bag 100 → keeps **50** · bag 140 → keeps **70** · keeps **20** of the extra 40 − bag 20 = `0` → no fertilizer, however good the soil
- **Alfred Marshall**, English economist, **1890** · a tenant (farms land someone else owns) who keeps only half of what extra work brings has less reason to do it
- Practice · Kofi: seed 30 adds 60 · half-share 30 − 30 = **0** · **fixed rent** (same each year) 60 − 30 = **+30**, but all the dry-year risk is his



5 Three traps, fixes

no verdict on which first

- **Risk** (a bad event could ruin her: drought, locusts, a sick cow) → **insurance** or a cushion
- **Missing market** (nobody sells it: insurance, small bags, a savings account) → someone to sell the service
- **Incentive** (she may not keep the gain: half-share, short lease = land rented year to year, a plot that can be taken) → rules that let her keep it (**land title** = legal proof the plot is hers)
- ≈ **1 in 4** workers in the world farm (26%, 2023, ILO = International Labour Organization) · more than half in many low-income countries
- Which fix first → a question for evidence; the lesson does not say

Watch out: pays on average ≠ worth the risk with no cushion · a dry-year loss is the bag's cost, not 0 · sharecropping: she pays all the cost, keeps half the gain · "farmers are stubborn" × → constraints: no cushion, no cash at planting, a share taken