Leibniz Institute of Agricultural Development in Transition Economies

From theory to field:

Measuring farmers' risk and time preferences

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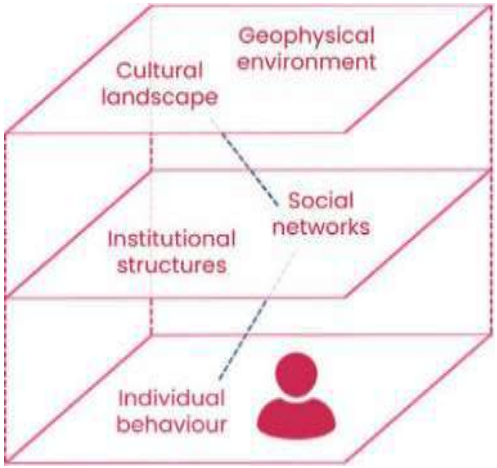
Outline

- Why behavioral insights matter for policy design
- Environment and economic preferences
- Experiments in eliciting farmers' risk and time preferences
- Brief intro to prospect theory and time preferences

Behavioral agricultural economics

- What influences farmer's behavior?
  - Beyond traditional economic assumptions
  - Cognitive biases, emotions, heuristics, social context and framing effects
- Why farmers don't comply
  - -> improving policy outcomes
- How changing contextual factors changes behavior?
  - -> enabling better decisions in agriculture without restricting freedom of choice



Source: OECD Behavioral insights (2023)

BI importance in Central Asian context

- Bridge the gap between policy intent and individual behavior:
  - BI reveal why individuals may not respond as expected
- Ensure relevance to local contexts:
  - Cultural norms, historical experience with state planning, and informal institutions
- Address heterogeneity in decision-making:
  - individuals differ in risk attitudes, time preferences, and social motivations not simply in their wealth, education, age levels
- Design more effective incentives :
  - tailored interventions without depleting public budget or restraining decision-making freedom

Economic preferences

- Emerging consensus: Preferences are endogenous and context-dependent (Holden & Tilahun, 2024)
- Good examples of economic preferences relate to how individuals decide across risky and delayed choices:
  - Risk and Time preferences
- Individual-level variation: Age, gender, education, cognitive ability (Falk et al., 2018; von Gaudecker et al., 2011)
- Contextual factors: Socio-cultural norms and environmental exposure (Bchir et al., 2024; Garcia et al., 2024)

A common research question

Risk & Time Preferences of Farmers

Risk & Time preferences: Conventional approaches

How well do the following statements describe you as a person?

- How strongly are you **willing to take risks**?
- How willing are you to **give up something good today** to **get something even better in the future**?

Do you agree with these statements?

- I am more **concerned about potential losses** in my farming business **than about potential gains**

Which one from the following two situations would you prefer for your farming business?

- Situation 1: You will 100% receive a profit of $5,000
- Situation 2: You have a 50% chance of gaining $10,000 profit, but at the same time a 50% chance of earning nothing

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Risk and Time Preferences: Linking Experimental and Household Survey Data from Vietnam

Tomomi Tanaka

Colin F. Camerer

Quang Nguyen

AMERICAN ECONOMIC REVIEW
VOL. 100, NO. 1, MARCH 2010
(pp. 557–71)

Tanaka, T., Camerer, C., Nguyen, Q. (2010) Risk and time preferences: Linking experimental and household survey data from Vietnam. *American Economic Review* 100(1), 557–571. https://doi.org/10.1257/aer.100.1.557

Prospect Theory

Losses are felt more intensely than equivalent gains

According to Tversky & Kahneman (1992), a utility can be defined as the expected value of prospects

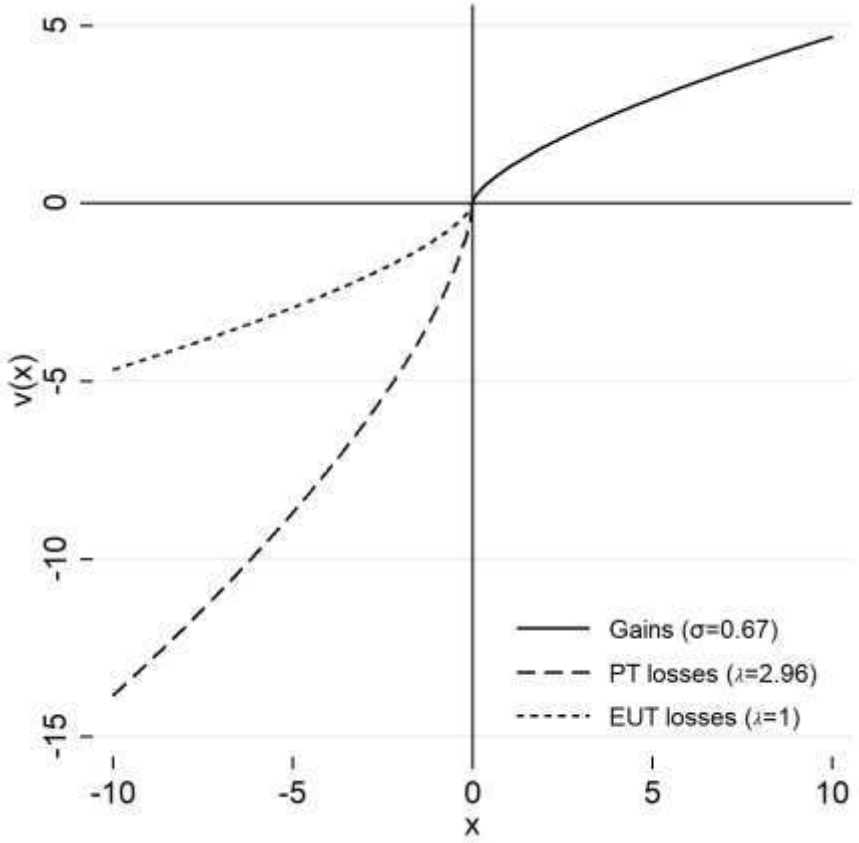
The value function $v(x)$ consist of a gain function when $x > 0$ and a losses function if $x<0$:

$$v(x) = \begin{cases} x^{\sigma}; x \geq 0 \\ -\lambda(-x)^{\sigma}; x < 0 \end{cases}$$

where

σ = concavity (a proxy for risk aversion)

λ = loss aversion (sensitivity to losses)



Source: Tynaliev (2025) based on Villacis et al. (2021).

Probability weighting

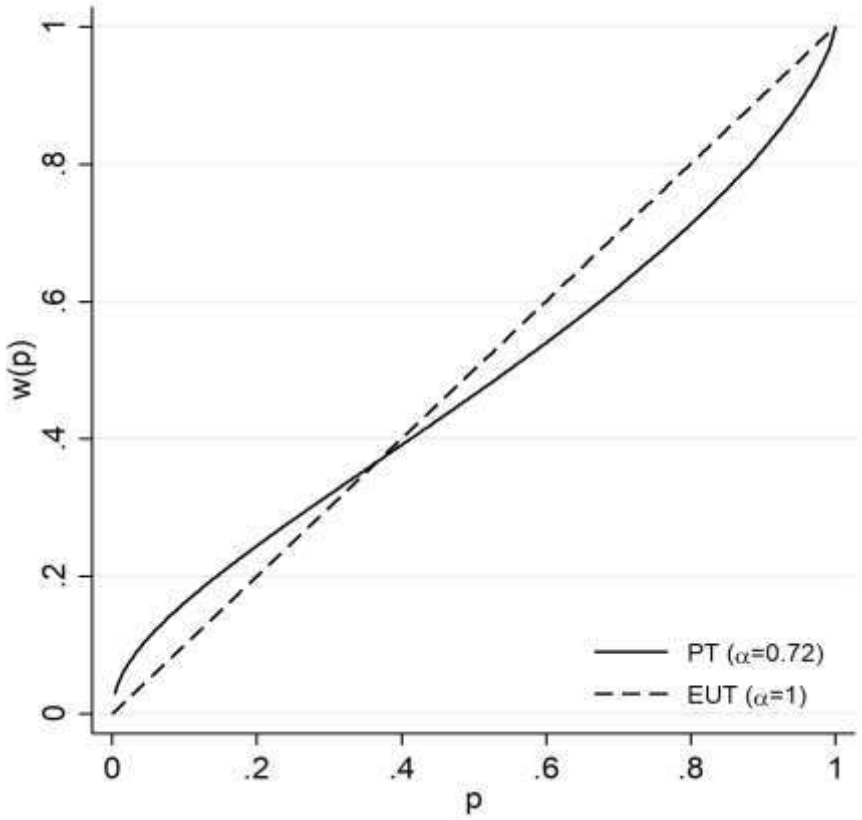
Small probabilities are overweight & moderate-large probabilities are underweight

$w(p)$ is probability weighting function, according to which individuals assess probabilities of events differently (Prelec, 1998):

$$w(p) = \frac{1}{[exp(\,ln(1/p))]^{\alpha}}$$

where

α = the degree of distortion



Source: Tynaliev (2025) based on Villacis et al. (2021).

Summary of Prospect Theory parameters

Parameter		Main properties
Risk aversion	σ	Risk-neutral: σ=1 Risk-averse: σ<1 Risk-seeking: σ>1
Loss aversion	λ	No loss aversion: λ=1 Loss aversion: λ>1 Loss seeking: λ<1
Probability weighting	α	Linear weighting: α=1 Distorted weighting: α<1 (more weights on small chance events) α>1 (more weights on high chance events)

Quasi-hyperbolic time discounting

Individuals value immediate rewards disproportionately more than delayed ones

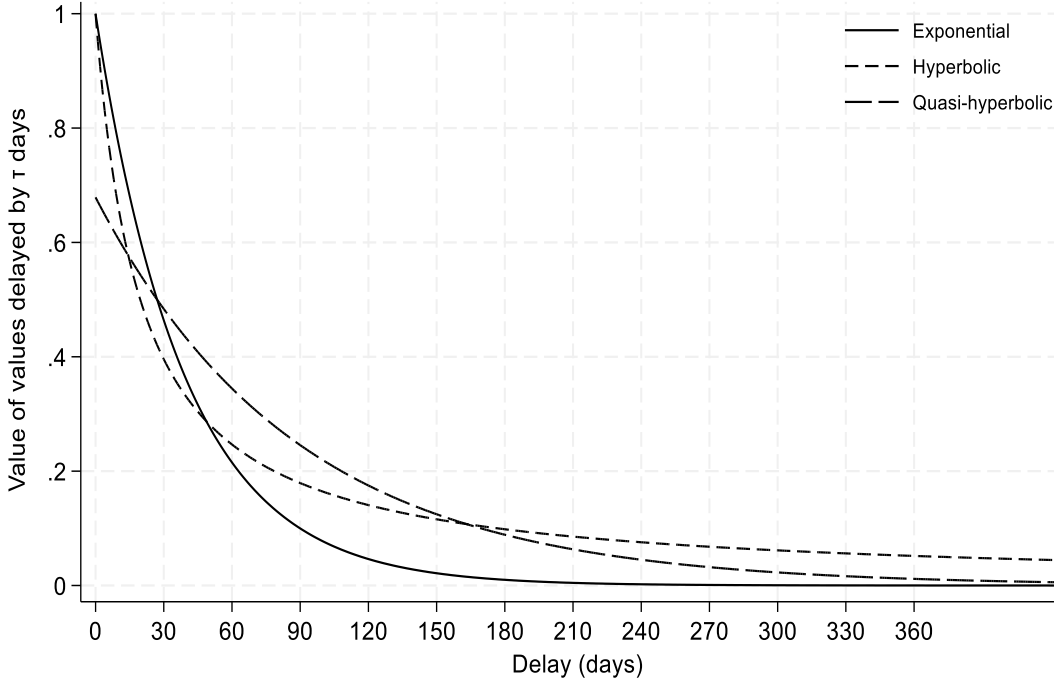
Quasi-hyperbolic discounting model extends the exponential discounting by incorporating shifts in how people prioritize rewards over time (Benhabib et al., 2010)

$$D(\beta, r, t) = \begin{cases} 1; if\ t = 0 \\ \beta exp(-rt); if t > 0 \end{cases}$$

where

r = a parameter for time preference

β = a parameter of present bias



Source: Tynaliev (2025) based Cohen et al. (2020).

Summary of hyperbolic time discounting parameters

Parameter		Main properties
Impatience (Discount rate)	r	No discounting: r=0 Discounting of present gains (saving now) r<0 Discounting of future gains (spending now): r>0
Present bias	β	No present bias: β=1 Extra discounting of future gains: β<1 Extra discounting of present gains: β>1

Method for elicitation of risk and time preferences

Multiple Price List (MPL): most commonly used method in the **lottery experiment** to elicit risk/time preferences

It consists of pairs of lotteries, each with two options (**A** & **B**)

1. Individuals are asked to choose between various combinations of **risky** and **certain outcomes** to elicit **risk preferences**

2. For **time preferences**, participants decide between immediate and **delayed rewards**, and their **discount rates** are calculated from these choices

Source: Tynaliev (2025)

Example: Risk preference experiment (Choice N = 35)

Round 1: total number of choices - 14

№	«A» OPTION 30 %	«B» OPTION 70 %
1	2 000 KGS	500 KGS
2	2 000 KGS	500 KGS
3	2 000 KGS	500 KGS
4	2 000 KGS	500 KGS
5	2 000 KGS	500 KGS
6	2 000 KGS	500 KGS
7	2 000 KGS	500 KGS
8	2 000 KGS	500 KGS
9	2 000 KGS	500 KGS
10	2 000 KGS	500 KGS
11	2 000 KGS	500 KGS
12	2 000 KGS	500 KGS
13	2 000 KGS	500 KGS
14	2 000 KGS	500 KGS

№	«B» OPTION 10 %	«A» OPTION 90 %
1	3 400 KGS	250 KGS
2	3 750 KGS	250 KGS
3	4 150 KGS	250 KGS
4	4 650 KGS	250 KGS
5	5 300 KGS	250 KGS
6	6 250 KGS	250 KGS
7	7 500 KGS	250 KGS
8	9 250 KGS	250 KGS
9	11 000 KGS	250 KGS
10	15 000 KGS	250 KGS
11	20 000 KGS	250 KGS
12	30 000 KGS	250 KGS
13	50 000 KGS	250 KGS
14	85 000 KGS	250 KGS

Round 2: total number of choices - 14

№	«A» OPTION 90 %	«B» OPTION 10 %
15	2 000 KGS	1 500 KGS
16	2 000 KGS	1 500 KGS
17	2 000 KGS	1 500 KGS
18	2 000 KGS	1 500 KGS
19	2 000 KGS	1 500 KGS
20	2 000 KGS	1 500 KGS
21	2 000 KGS	1 500 KGS
22	2 000 KGS	1 500 KGS
23	2 000 KGS	1 500 KGS
24	2 000 KGS	1 500 KGS
25	2 000 KGS	1 500 KGS
26	2 000 KGS	1 500 KGS
27	2 000 KGS	1 500 KGS
28	2 000 KGS	1 500 KGS

№	«B» OPTION 70 %	«A» OPTION 30 %
15	2 700 KGS	250 KGS
16	2 800 KGS	250 KGS
17	2 900 KGS	250 KGS
18	3 000 KGS	250 KGS
19	3 100 KGS	250 KGS
20	3 250 KGS	250 KGS
21	3 400 KGS	250 KGS
22	3 600 KGS	250 KGS
23	3 850 KGS	250 KGS
24	4 150 KGS	250 KGS
25	4 500 KGS	250 KGS
26	5 000 KGS	250 KGS
27	5 500 KGS	250 KGS
28	6 500 KGS	250 KGS

Round 3: total number of choices - 7

№	«A» OPTION 50 %	«B» OPTION 50 %
29	1 250 KGS	-200 KGS
30	200 KGS	-200 KGS
31	50 KGS	-200 KGS
32	50 KGS	-200 KGS
33	50 KGS	-400 KGS
34	50 KGS	-400 KGS
35	50 KGS	-400 KGS

№	«B» OPTION 50 %	«A» OPTION 50 %
29	1 500 KGS	-1 050 KGS
30	1 500 KGS	-1 050 KGS
31	1 500 KGS	-1 050 KGS
32	1 500 KGS	-800 KGS
33	1 500 KGS	-800 KGS
34	1 500 KGS	-700 KGS
35	1 500 KGS	-550 KGS

Source: Tynaliev (2025) based on Tanaka et al. (2010).

Example: Time preference experiment (Choice N = 75)

№	«A» – OPTION	№	«B» – OPTION
1	6 000 KGS receive in one week	1	1 000 KGS receive today
2	6 000 KGS receive in one week	2	2 000 KGS receive today
3	6 000 KGS receive in one week	3	3 000 KGS receive today
4	6 000 KGS receive in one week	4	4 000 KGS receive today
5	6 000 KGS receive in one week	5	5 000 KGS receive today
6	6 000 KGS receive in one month	6	1 000 KGS receive today
7	6 000 KGS receive in one month	7	2 000 KGS receive today
8	6 000 KGS receive in one month	8	3 000 KGS receive today
9	6 000 KGS receive in one month	9	4 000 KGS receive today
10	6 000 KGS receive in one month	10	5 000 KGS receive today

Source: Tynaliev (2025) based on Tanaka et al. (2010).

Lab-in-the-field experiment

- Ethical clearance by IAMO Ethics Committee
- Pre-registration at AsPredicted.org
- 425 smallholder farmers from two water availability zones in JalalAbad
- 307 farm managers of cotton/wheat and horticulture farms in Samarkand
- Small gap between experiments: Oct/Nov & Nov/Dec 2024

Study 1 by Marlen Tynaliev
Kyrgyzstan: Water resource environment & farmers' risk and time preferences

Study 2 by Abdusame Tadjiev
Uzbekistan: Stringent institutional framework & farmers' risk and time preferences

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Thank you for your attention!

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