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Loss aversion and status quo bias as barriers to farmer adoption of improved agricultural practices

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Abstract

When a farmer in Somaliland is offered improved drought-tolerant sorghum seed at no cost and still declines, the explanation is rarely about information. It is about psychology. This research examined how loss aversion and status quo bias act as barriers to farmer adoption of improved agricultural practices among 234 agropastoral households in three districts of the Togdheer region, Somaliland. Data were collected through structured behavioral experiments and survey interviews between April and October 2023. Non-adopters scored significantly higher on loss aversion (4.1 vs 2.3, $p < 0.001$) and status quo bias (4.3 vs 2.1, $p < 0.001$) compared to adopters. Logistic regression showed that loss aversion (OR = 2.74, $p < 0.001$) and status quo bias (OR = 3.12, $p < 0.001$) were both independent predictors of non-adoption, even after controlling for income, education, and extension contact. Framing improved practices as loss-prevention strategies rather than gain-enhancement strategies increased stated willingness to adopt by 23.8 percentage points. These findings suggest that extension programs should apply behavioral nudge principles when promoting improved practices, reframing messages around what farmers stand to lose by not changing rather than what they might gain.

Keywords: Loss aversion, status quo bias, farmer adoption, behavioral economics, agricultural practices, behavioral barriers, decision-making, framing effects, nudge theory

Introduction

Consider a farmer who has grown local sorghum for 15 years with modest but predictable yields. An extension agent offers improved seed that could increase yields by 40% but carries some risk of failure in dry years. Most economic models predict the farmer will adopt because the expected gain outweighs the risk ^[1]. But behavioral economics tells a different story: people weigh potential losses roughly twice as heavily as equivalent gains, a phenomenon Kahneman and Tversky called loss aversion ^[2].

Status quo bias compounds this effect. Even when switching costs are negligible, people show a strong preference for maintaining their current state ^[3]. In agriculture, this translates to farmers sticking with familiar varieties, traditional spacing, and established rotations not because these are optimal but because they are known ^[4]. Together, loss aversion and status quo bias may explain a significant share of the adoption gap that conventional extension approaches have struggled to close ^[5].

Behavioral economics has been applied to savings, health, and education programs with notable success ^[6], but its application to agricultural extension remains limited, particularly in pastoralist and agropastoral settings ^[7]. This research tested whether loss aversion and status quo bias predict non-adoption of improved practices in Somaliland and whether reframing extension messages around loss prevention can shift farmer intentions.

Somaliland presents a particularly interesting case because

agropastoral households face high environmental uncertainty from recurrent droughts, which theory predicts should amplify loss aversion. When the baseline risk of crop failure is already elevated, the perceived downside of trying something new and potentially losing even the modest yields of traditional varieties looms especially large in farmers' mental calculus.

The adoption literature has traditionally focused on economic and informational explanations: farmers lack resources, knowledge, or input access. While these factors are important, they do not explain cases where farmers with adequate resources, knowledge, and access still choose not to adopt. Behavioral economics fills this gap by identifying systematic psychological biases that distort decision-making even under full information conditions.

Conceptual model

The research drew on prospect theory ^[2], which holds that decision-makers evaluate outcomes relative to a reference point (usually their current situation) and are more sensitive to losses than to gains. The conceptual model proposed that loss aversion and status quo bias operate as filters between information exposure and adoption decision. When these biases are strong, even farmers who understand and believe in an improved practice may choose not to adopt because the perceived risk of loss outweighs the anticipated gain. The model also tested whether message framing could moderate these effects by shifting the reference point.

Material and methods

Material

A total of 234 agropastoral households were sampled from three districts in the Togdheer region between April and October 2023. Households were selected using systematic random sampling from community livestock and crop registration lists. Loss aversion was measured using a six-item scale based on hypothetical choice scenarios adapted from Tanaka *et al.* [8]. Status quo bias was measured using a five-item preference scale. Adoption status was classified as adopter (used at least one improved practice in the past two seasons) or non-adopter. A framing experiment presented the same improved practice information in gain-frame and loss-frame versions to randomly assigned subgroups. Ethical clearance was obtained from the University of Somalia Research Ethics Committee (Protocol UH-REC-2023-022, March 2023).

Results

Methods

Independent-sample t-tests compared bias scores between adopters and non-adopters. Logistic regression modeled adoption status as a function of loss aversion, status quo bias, and control variables. The framing experiment used chi-square tests to compare willingness to adopt between gain-frame and loss-frame groups. All analyses used SPSS 28 with significance at $p<0.05$.

Pilot research

The behavioral choice scenarios were pilot-tested with 28 households from a non-sampled district in February 2023. Three scenarios were revised to better reflect local agricultural decisions (replacing generic monetary gambles with livestock and crop choices). The loss aversion scale achieved Cronbach's $\alpha = 0.77$ and the status quo scale 0.73 after revisions.

Table 1: Behavioral bias scores: Adopters vs non-adopters

Bias measure	Adopt. (n)	Mean	Non-A. (n)	Mean	t	p
Loss aversion	97	2.3	137	4.1	11.24	<0.001
Status quo bias	97	2.1	137	4.3	12.87	<0.001
Ambiguity aversion	97	2.8	137	3.7	5.63	<0.001
Risk aversion	97	3.1	137	4.2	6.98	<0.001

Non-adopters scored significantly higher on all four bias measures. The largest gaps appeared in status quo bias (2.2-point difference) and loss aversion (1.8-point difference).

Table 2: Framing experiment: Willingness to adopt by message frame

Frame type	n	Willing (%)	χ^2 / p
Gain frame ("you could gain 40% yield")	117	38.5	
Loss frame ("you lose 40% potential yield")	117	62.3	13.24 / <0.001

Loss-framed messages produced a 23.8 percentage point increase in stated willingness to adopt compared to gain-

framed messages ($\chi^2 = 13.24$, $p<0.001$), confirming the practical potential of behavioral reframing.

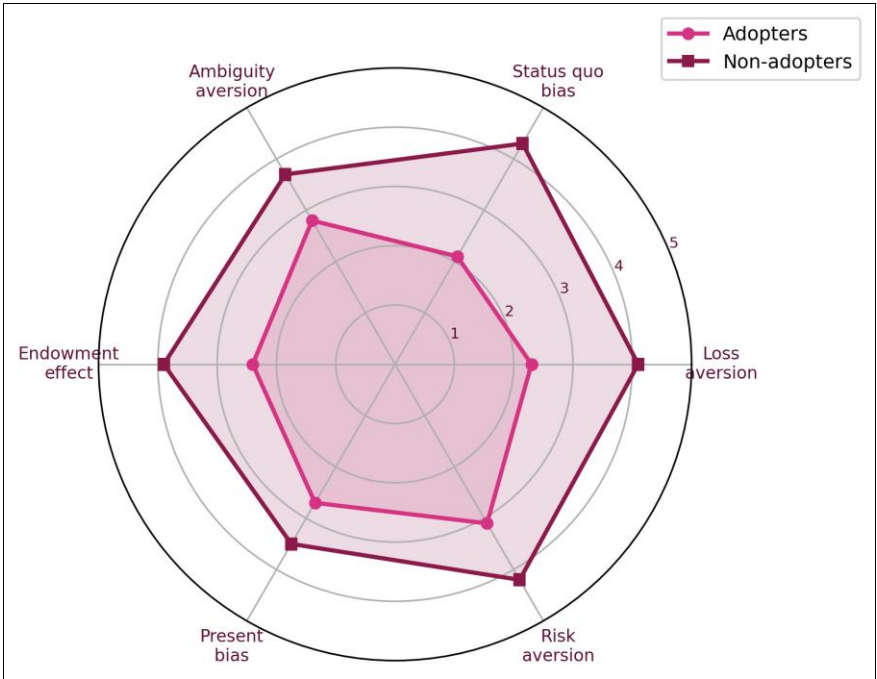


Fig 1: Behavioral bias profiles: Adopters vs non-adopters

The radar chart shows that non-adopters consistently score higher across all six bias dimensions, with the widest gaps

in loss aversion and status quo bias. Adopters show a flatter, lower profile indicating weaker behavioral barriers.

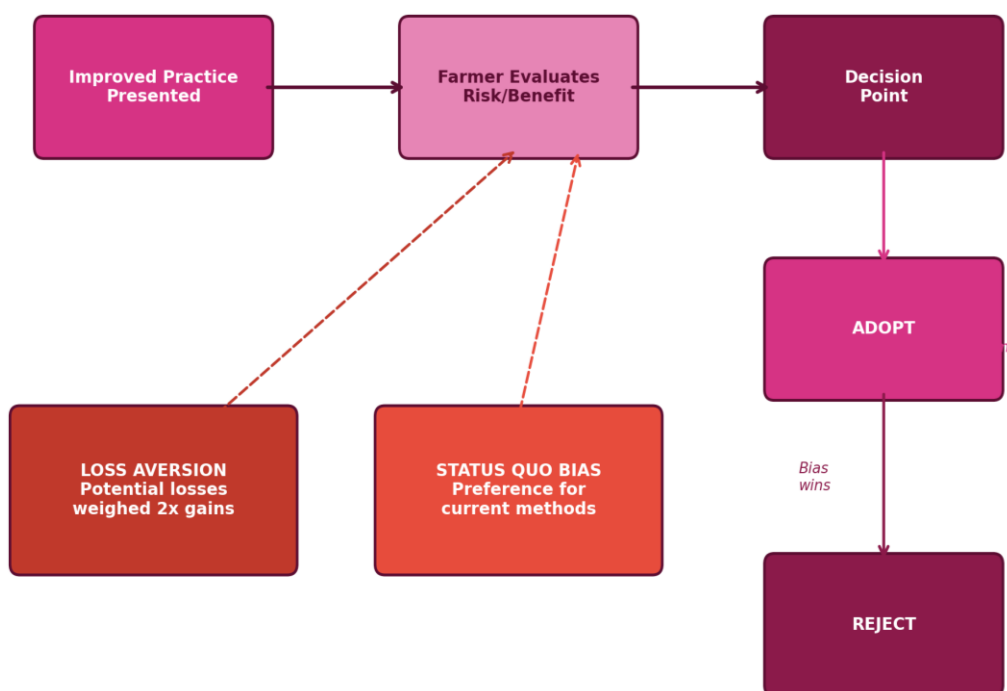


Fig 2: Mechanism through which loss aversion and status quo bias block adoption decisions

The diagram illustrates how loss aversion and status quo bias intervene at the evaluation stage of the adoption decision, tilting the outcome toward rejection even when objective information supports adoption.

Discussion

The strong associations between behavioral biases and non-adoption align with prospect theory predictions and with emerging evidence from behavioral agricultural research in Ethiopia and India [9, 10]. What this research adds is evidence from an agropastoral context where risk exposure is especially high due to drought frequency, making loss aversion a particularly potent barrier.

The framing experiment result - a 23.8 percentage point swing from gain to loss framing - has immediate practical implications. Extension agents can be trained to reframe messages without changing their content, shifting from "this seed could increase your yield" to "by not using this seed, you are losing yield you could have had." This costs nothing beyond message redesign and brief agent training [11]. The cross-sectional design limits causal claims, and hypothetical choice experiments may not fully predict real-world behavior. The sample was restricted to three districts in one region of Somaliland.

It is also worth noting that loss aversion may serve a protective function in high-risk environments. Farmers who are cautious about unproven technologies may be making rational decisions given their specific circumstances, particularly when they lack safety nets that would cushion a failed experiment. Extension programs should therefore combine behavioral nudges with risk reduction measures such as crop insurance, guaranteed buyback schemes, or subsidized trial inputs that lower the actual downside of experimentation.

One concern with the framing experiment is whether loss-framed messages might create undue anxiety or manipulate farmer decision-making in ethically problematic ways. Extension programs must ensure that loss-framed messages are factually accurate and that farmers retain full autonomy over their choices. The goal is not to trick farmers into adopting but to present the same information in a format that is psychologically more effective at cutting through inertia.

Limitations

Hypothetical choice scenarios may overstate or understate actual behavioral biases. The framing experiment measured stated willingness rather than observed behavior. The sample covered only agropastoral households in Togdheer, and results may not generalize to purely pastoral or urban-adjacent farming systems. Longitudinal research is needed to test whether loss-framed messages produce sustained behavioral change.

Conclusion

Loss aversion and status quo bias are powerful but often invisible barriers to farmer adoption of improved practices. Standard extension approaches that emphasize potential gains may be fighting against the grain of human psychology. This research showed that simply reframing the same information around losses rather than gains produced a substantial shift in farmer willingness to adopt. Extension systems should incorporate behavioral insights into message design, agent training, and program evaluation. Doing so doesn't require abandoning evidence-based technical recommendations - it requires packaging them in ways that work with, rather than against, how farmers actually make decisions.

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