Sample Size Isn't Everything

How Uncertainty About Heterogeneity Impacts Learning About New Technologies

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Motivation

Social Learning Is Oddly Influential

Peers have limited experience

Authorities test recommendations extensively

Yet, both induce adoption at equal rates:

- Krishnan and Patnam (2013)
- Takahashi, Mano, and Otsuka (2019)

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Implies social learning is more influential *per data point*

What's the mechanism?

Natural questions:

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- Why?

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- **Is social learning special?**

What's the mechanism?

Natural questions:

- Why?
- Is social learning special?
- **How can authorities improve?**

My Proposal: Context Uncertainty

Peer information comes with rich context

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Information from authorities can come with little context





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When weighing signals, we place weight on total uncertainty

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When weighing signals, we place weight on total uncertainty

Total Uncertainty = Context Uncertainty + Sampling Error

Preview of Results

Farmers reduce adoption when context uncertainty increases in the lab

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Over 40% of farmers cite heterogeneity as the reason peers are more influential than their extension agent

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Related Literature

- **Decision makers as statisticians**
  - Steiner and Stewart (2008), Olea et al. (2021), Salant and Cherry (2020), etc...
- **Social learning theory**
  - Sethi and Yildiz (2016), Dasaratha et al (2022), Bala and Goyal (1998), etc. . .

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- **Role of heterogeneity in agriculture**
  - Giné et al. (2018), Suri (2011), Munshi (2004), etc. . .
- **Agricultural extension design**
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- **Decentralization of public goods**
  - Oates (1972) and Oates (1993)

Theory

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Experimental Design

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- Participants must decide how intensively to adopt a hypothetical technology
- Pay based on crop yield from decision

High vs Low Context Uncertainty

Vary context uncertainty by varying % of gray tiles

High vs Low Context Uncertainty

Vary context uncertainty by varying % of gray tiles

(a) Low Context Uncertainty Round

(b) High Context Uncertainty Round

High vs Low Signal Error

Vary signal error by changing emoji variance

High vs Low Signal Error

Vary signal error by changing emoji variance

(a) Low Context Uncertainty Round - Low SE

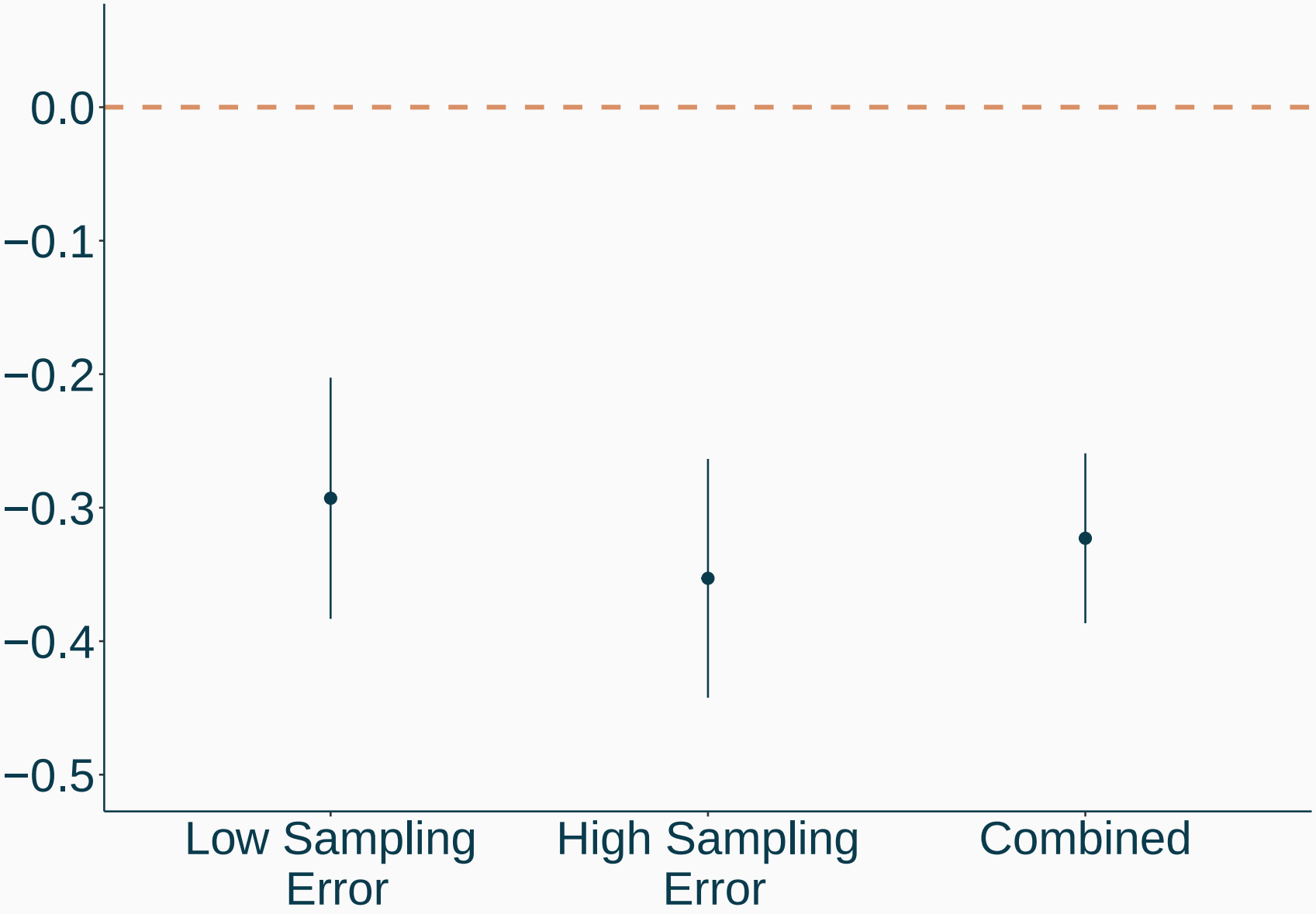
(b) High Context Uncertainty Round - Low SE

(a) Low Context Uncertainty Round - High SE

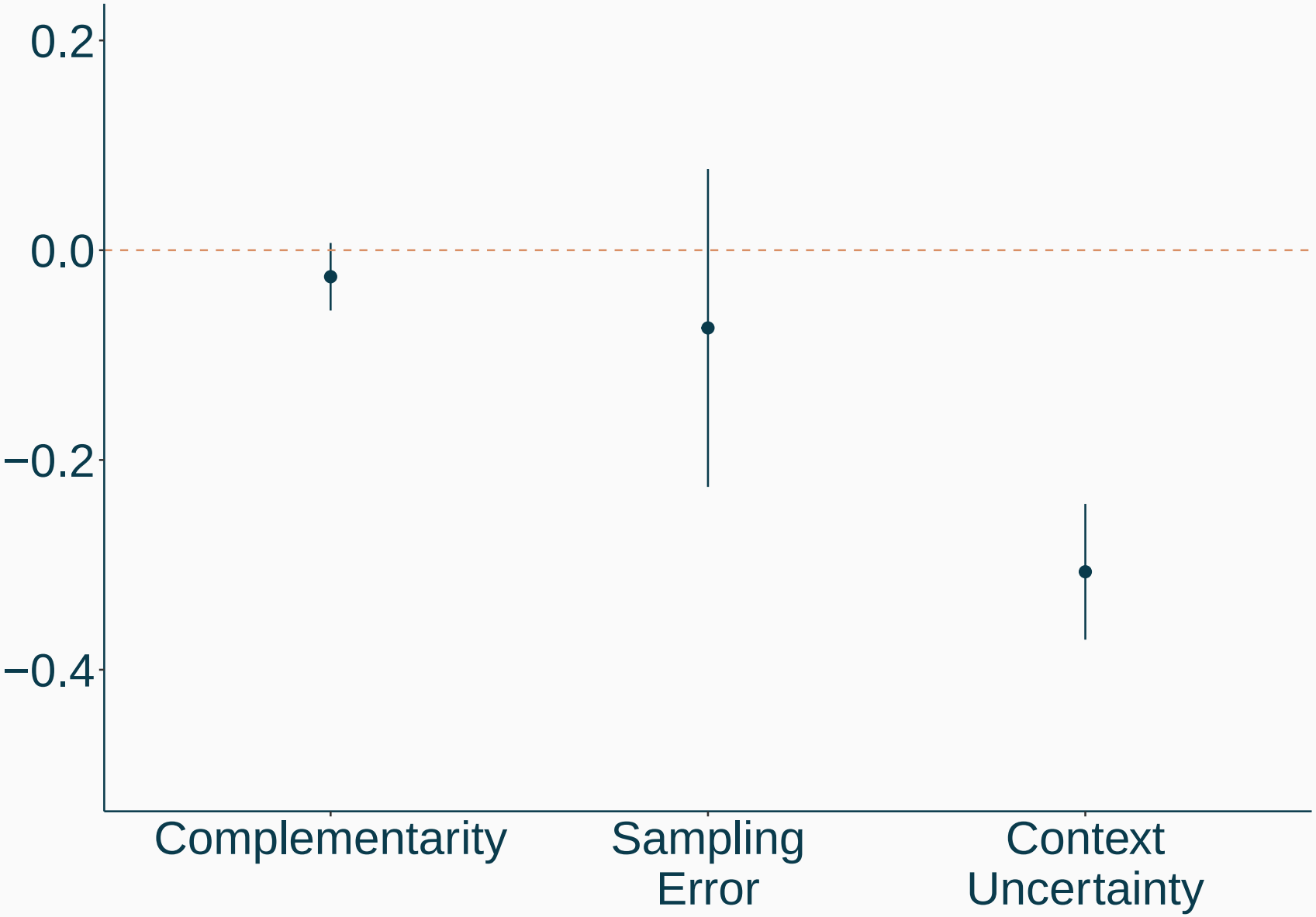
(b) High Context Uncertainty Round - High SE

Results

Farmers Prefer More Context

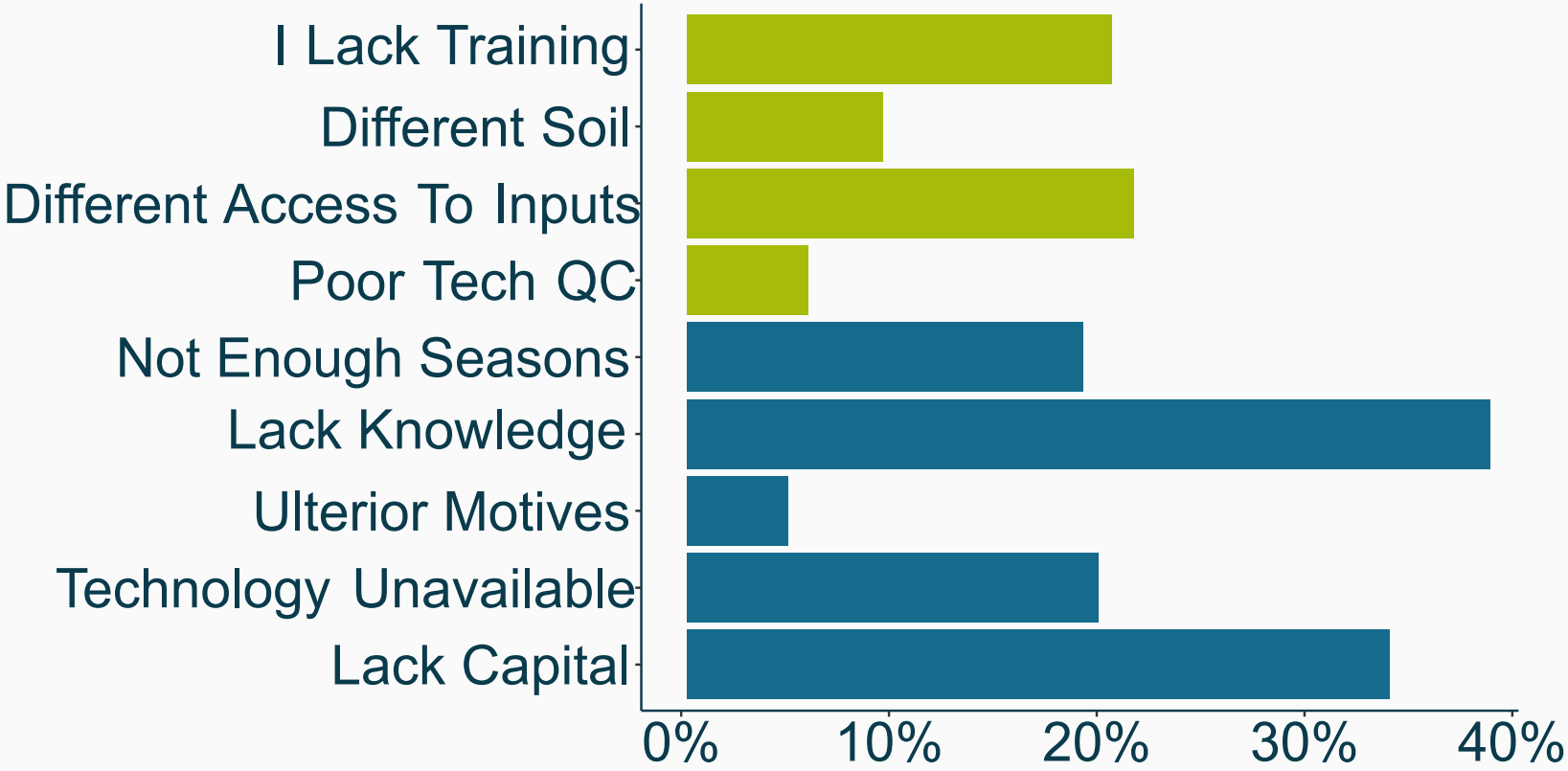


Uncertainties May Be Complementary



External Validity

Farmers Worry About Heterogeneity



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- Information campaigns should disaggregate returns
- Distributed, local experimentation could increase influence
- Insurance with low basis-risk, when tied to experimentation, can have high positive externalities
- Future work looks into how much full personalization (i.e. ML) is needed