

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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Natural questions:

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

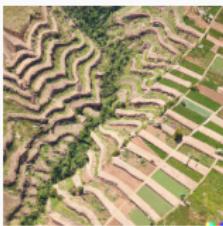
My Proposal: Context Uncertainty

Peer information comes with rich context

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When weighing signals, we place weight on total uncertainty

$$\text{Total Uncertainty} = \text{Context Uncertainty} + \text{Sampling Error}$$

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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Mechanism is consistent with a wide range of past RCTs

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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- **Information provision experiments**
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- **Role of heterogeneity in agriculture**
 - Giné et al. (2018), Suri (2011), Munshi (2004), etc...
- **Agricultural extension design**
 - Dar et al. (2020), Kondylis et al. (2020), Cole and Fernando (2021), etc...

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- **Decentralization of public goods**
 - Oates (1972) and Oates (1993)

Theory

Model Highlights

- Heterogeneity can cause uncertainty about context

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Experimental Design

Experiment Overview

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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

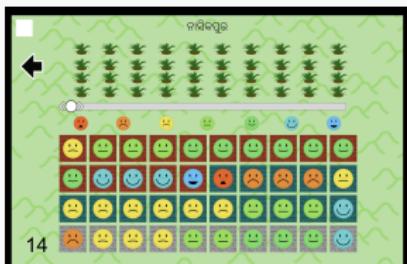
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(a) Low Context Uncertainty
Round - Low SE



(b) High Context Uncertainty
Round - Low SE



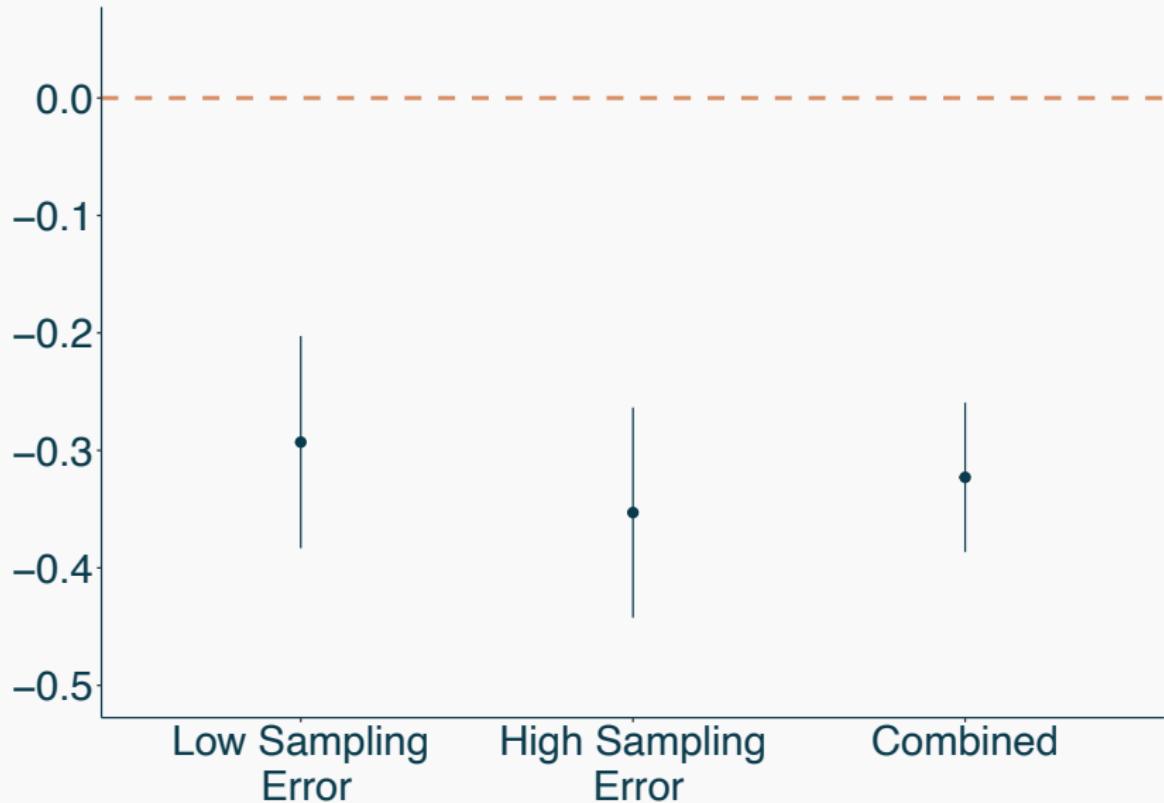
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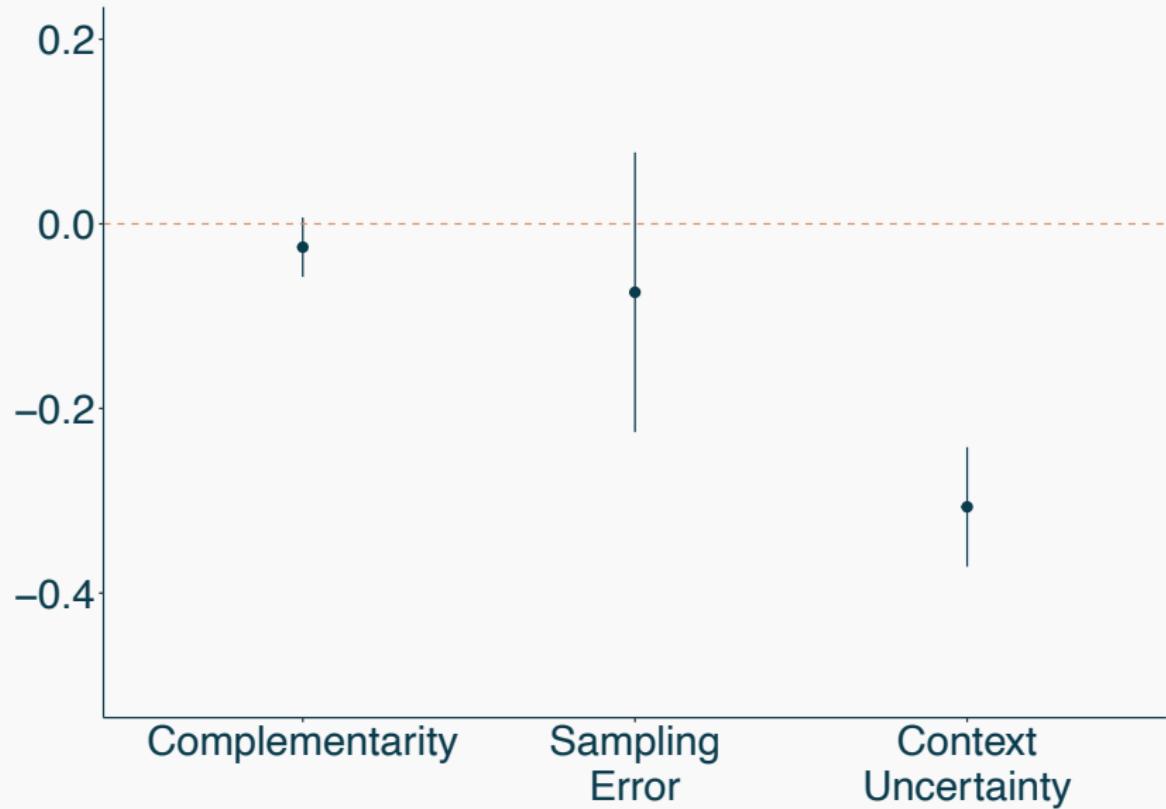
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Results

Farmers Prefer More Context

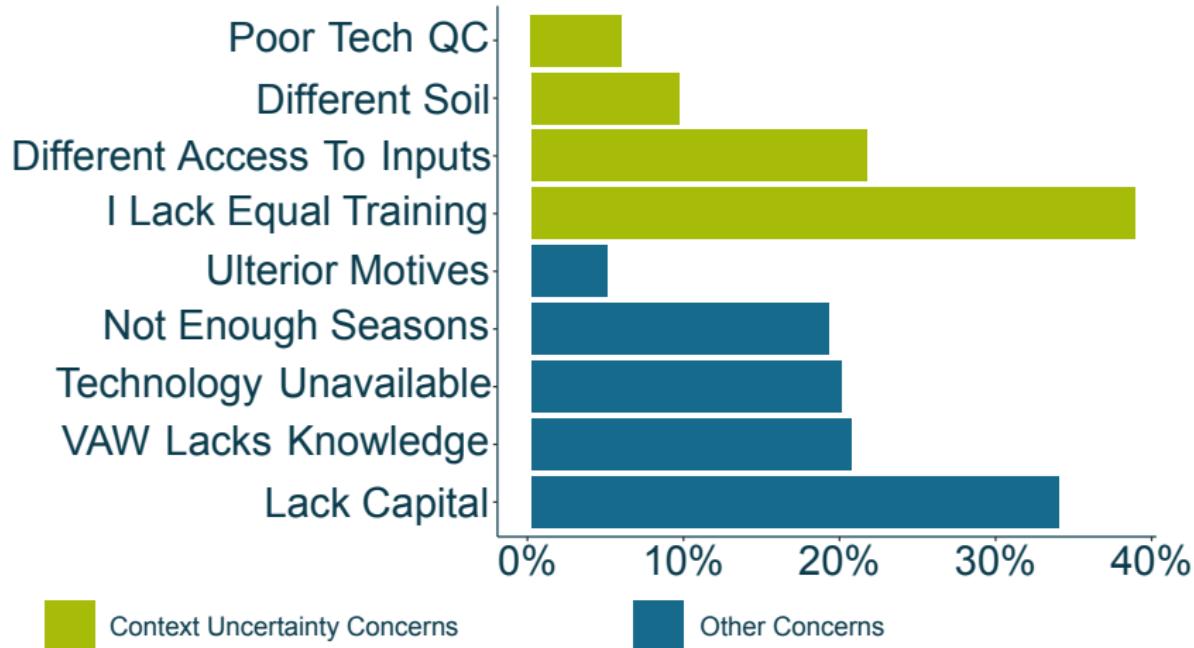


Uncertainties May Be Complementary



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