



Evidence in Agriculture: Credit

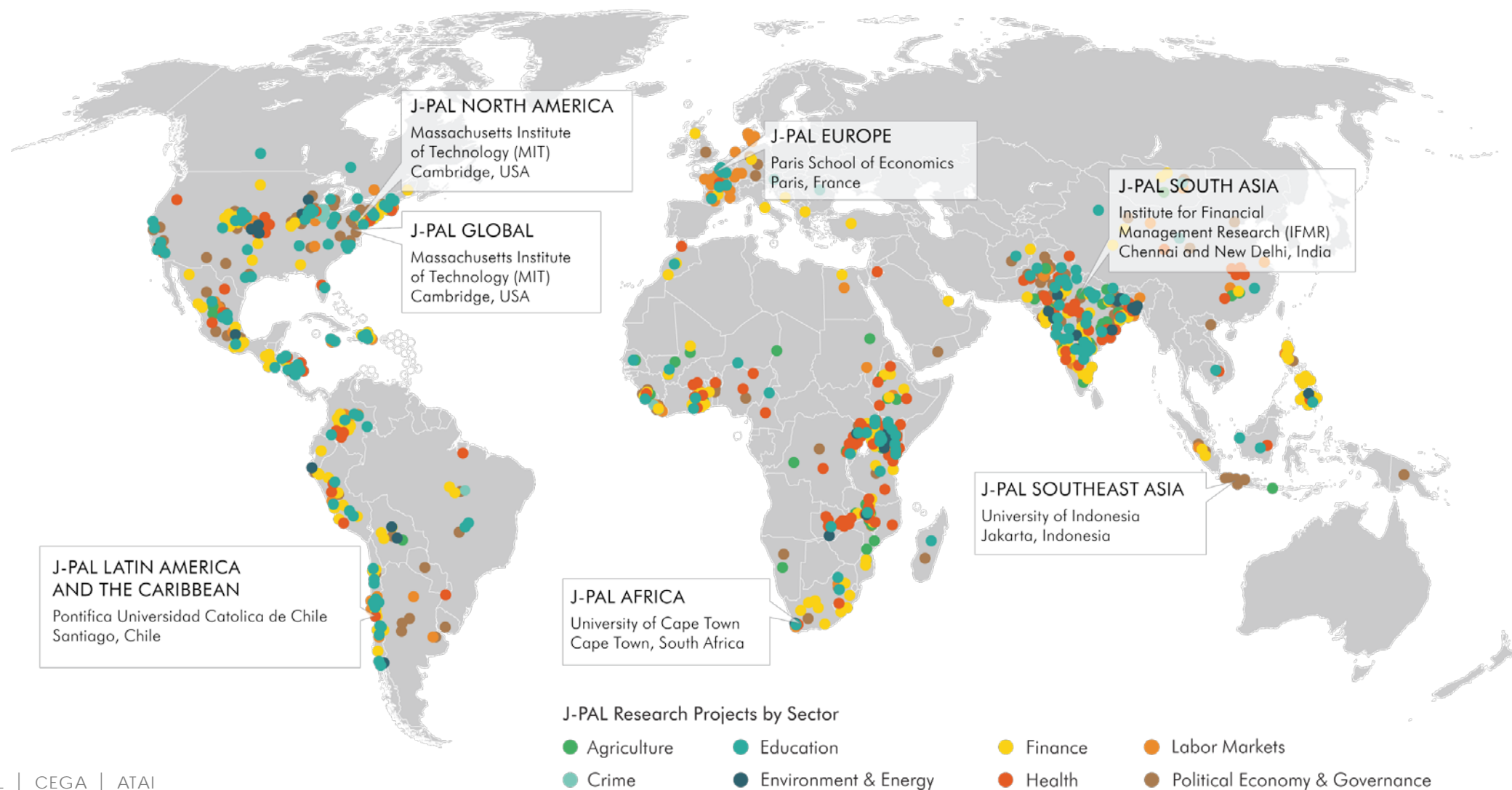
Becca Toole and Kyle Murphy
August 2016



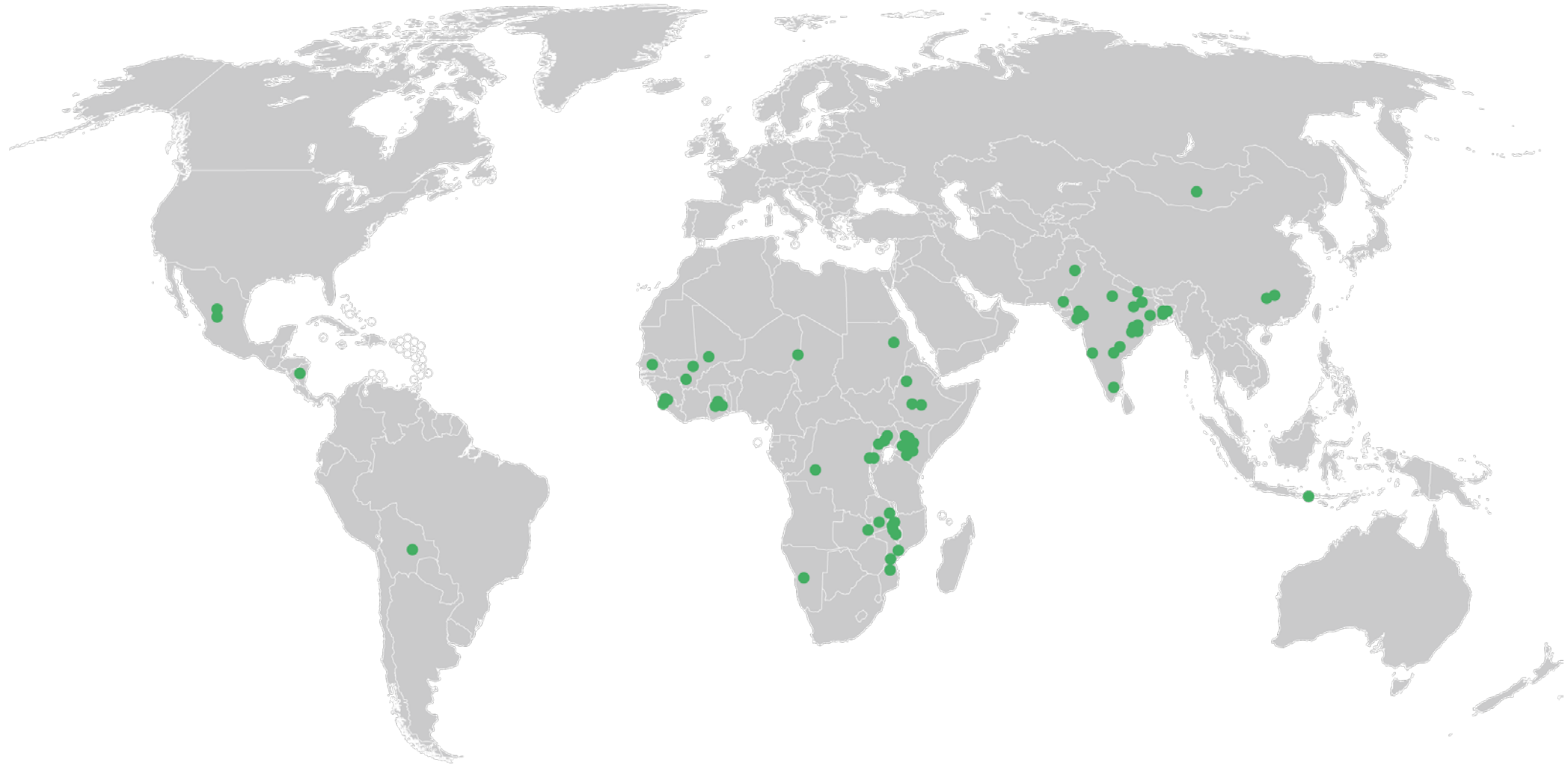
Overview

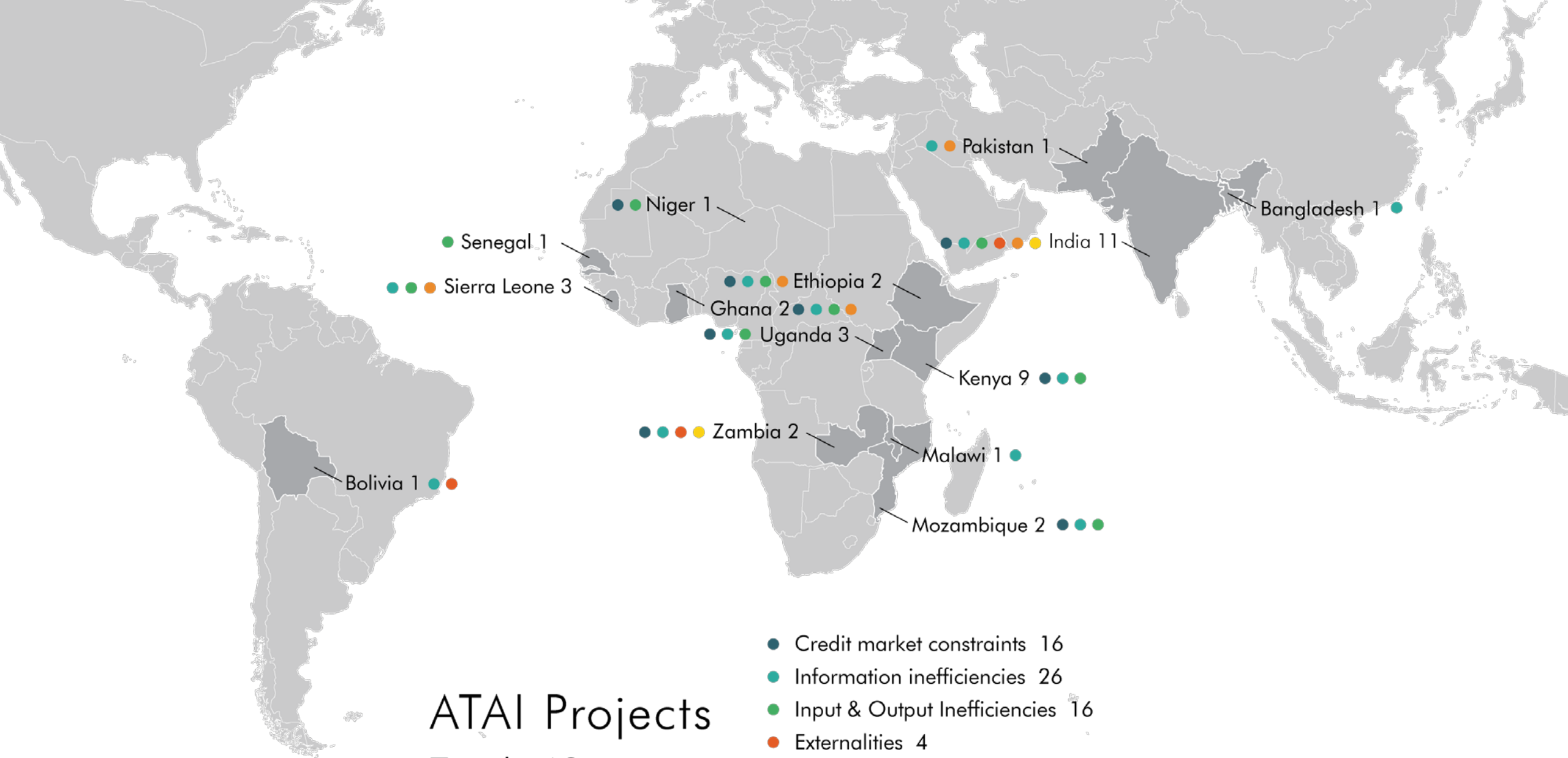
- Introduction to ATAI/J-PAL
- Credit constraints on agricultural technology adoption
- Adapting the microfinance model
- Digital financial services
- Emerging insights

J-PAL project map



Agriculture project map

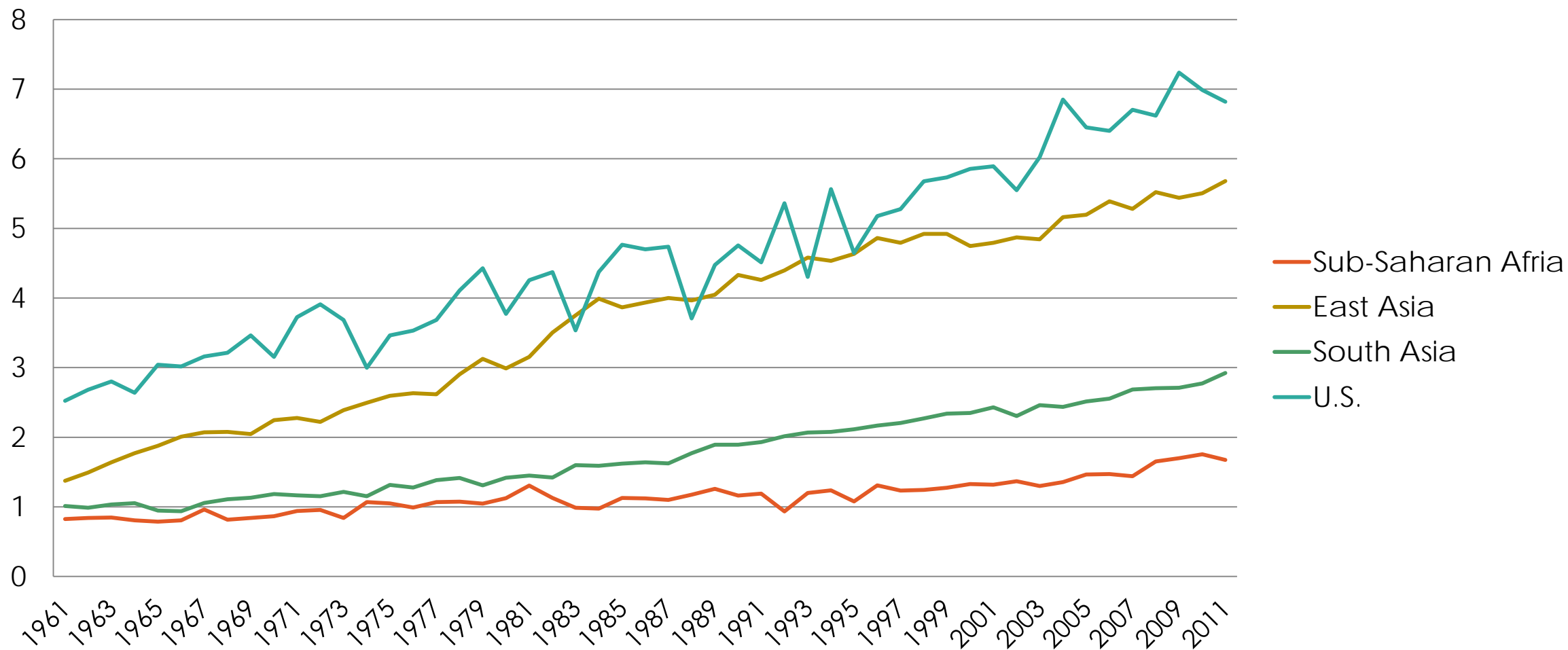




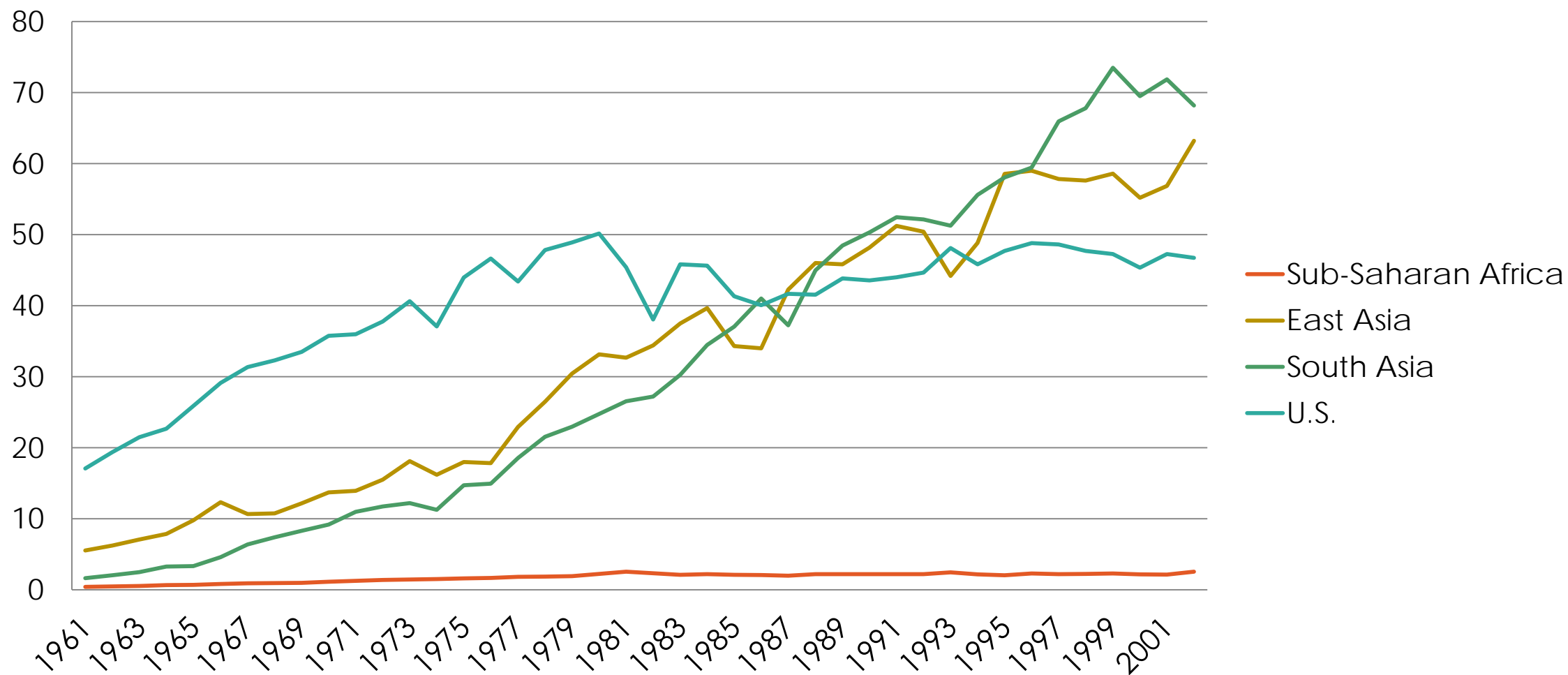
ATAI Projects
Total: 40

- Credit market constraints 16
- Information inefficiencies 26
- Input & Output Inefficiencies 16
- Externalities 4
- Risk market inefficiencies 9
- Labor inefficiencies 4
- Land inefficiencies 0

Cereal yields (metric tons/hectare)



Fertilizer use (kg/hectare)



What is hampering
technology adoption?



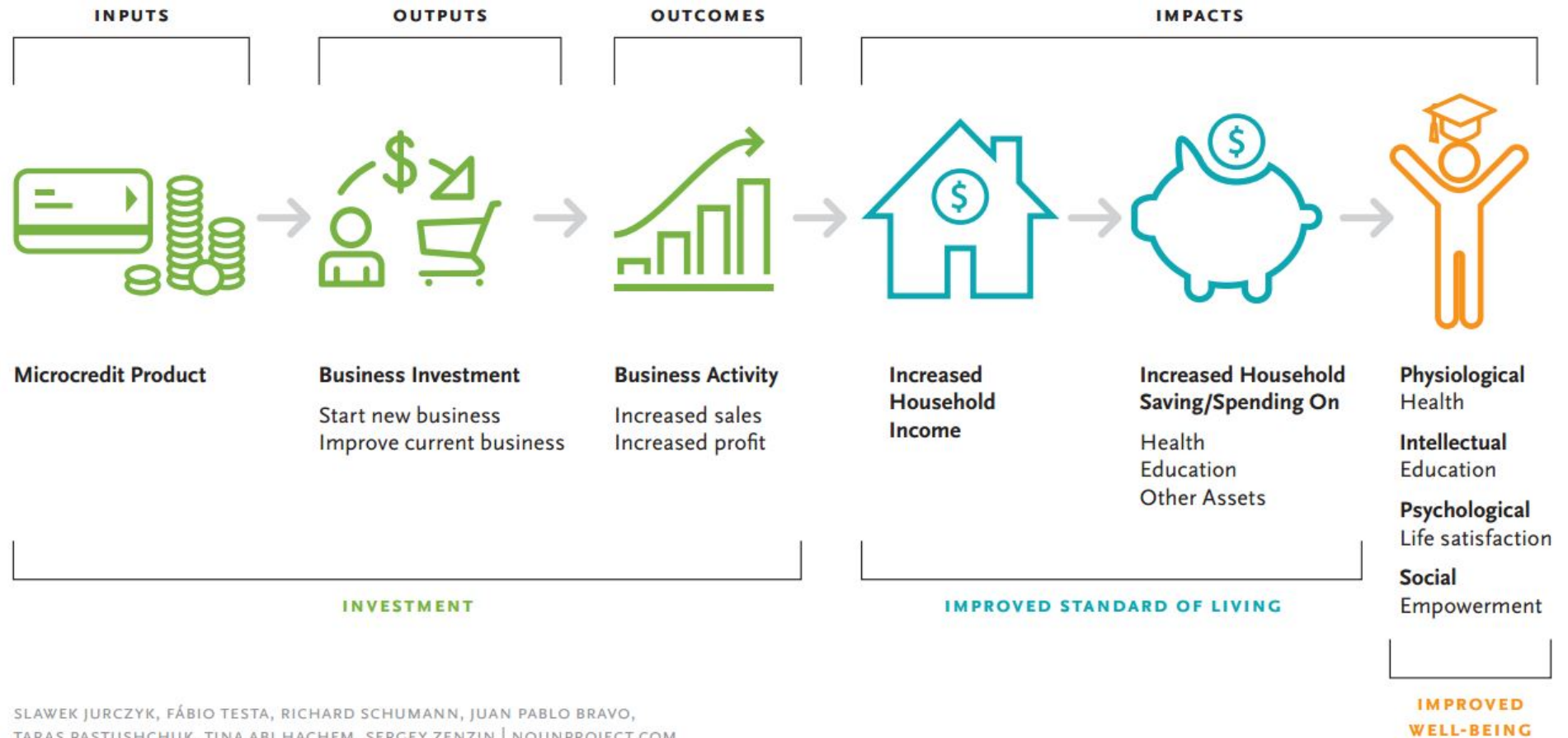
Inefficiencies constraining tech adoption

1. Credit markets
2. Risk markets
3. Information
4. Externalities
5. Input and output markets
6. Labor markets
7. Land markets

Microcredit, broadly speaking

- Traditional model
 - Immediate repayment
 - Group liability
 - Mostly women
 - Mostly urban poor





Key findings on microcredit

- From 7 RCTs, researchers found
 - Modest demand
 - Increase businesses activity
 - No impact on income, social well-being
- Despite **limited social impact**, there are vibrant, self-sustaining markets for urban microcredit

Agricultural credit is different

- Few self-sustaining agricultural credit markets have emerged
 - Traditional microfinance model is inappropriate
 - Few agriculture-specific products
 - Low demand from farmers

Yet, it is hard to push financing to agriculture

- Supply side: Lenders dislike agricultural loans because
 - Risks are high because of correlated weather shocks
 - Costs of servicing clients are high, particularly for smallholders
 - Smallholder farmers have no credit histories; hard to get started
 - Land as collateral challenging in smallholder/informal environments

Yet, it is hard to push financing to agriculture

- Demand side: Borrowers appear to have low demand for ag loans also
 - Profits in farming are low absent complementary investments
 - Risks of unavoidable default are high
 - Timing of standard ag loans poorly timed to price fluctuations
 - Farmers often operate in shallow markets

Agricultural credit is different

- Theory suggests significant gains from increasing farmers' access to credit
 - Credit constraints form barrier to technology adoption

Policy lesson preview: credit

- Farmers' credit needs are different from urban microcredit customers
- Take-up of traditional credit products is often low
- Successful credit interventions
 - Reduce risk for lenders
 - Account for seasonal variation in income (and prices)
- Credit constraints exist, but may not be the primary barrier to increasing profitability

Credit constraints in action



There is **no credit** available



Farmers **struggle to save income** from one harvest to the next



Farmers don't have **collateral** to back a loan

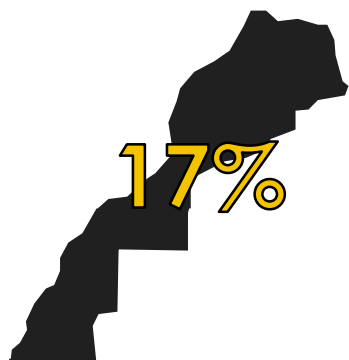


Farmers lack **financial literacy**

Three factors affecting credit needs

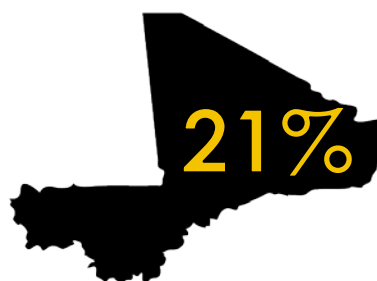
- Seasonal cycles to production and prices
- Negative correlation of production and prices
- Aggregate (not idiosyncratic) risks

Take-up is low



Morocco: 17%, with no other lenders in the area

Sierra Leone: 25%, 50% lower than break-even rate



Mali: 21%, compared to full take-up of cash grants

[Beaman et al. 2014](#), [Casaburi et al 2014](#), [Crepon et al 2015](#)

So how can we make credit work?

- Supply side
 - Reduce risk for lenders
- Demand side
 - Provide products that account for seasonality in production cycle

Reducing risk for lenders

- Supply side: Provide improved information about borrowers
 - Credit bureaus
 - Biometric identification (e.g. fingerprinting)
- Demand side: Offer flexible collateral arrangements
 - Asset collateralization
 - Crop held in storage
 - Account for seasonal distribution of income



Successful credit interventions often provide improved information about borrowers

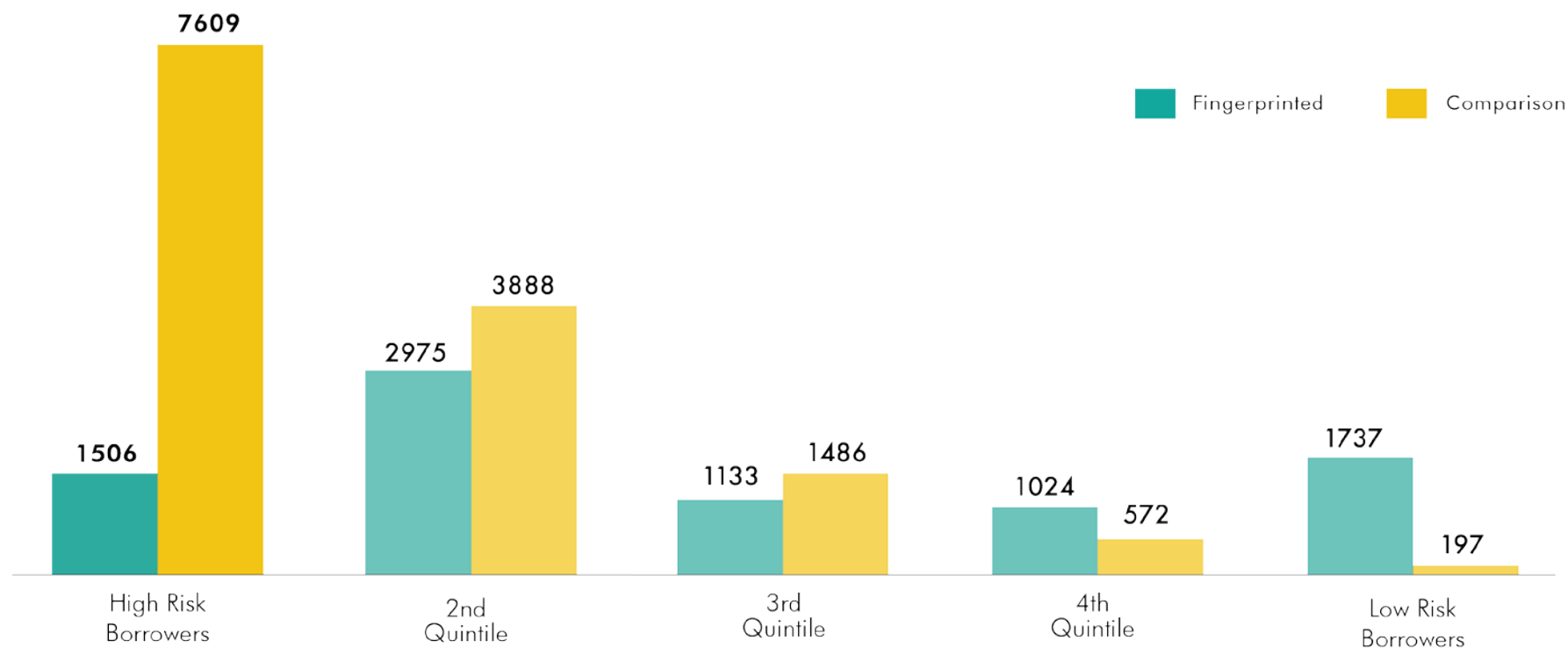
Fingerprinting borrowers in Malawi

- Lack of information makes banks unwilling to lend
 - Cannot credibly threaten to cut off future credit
- Treatment group fingerprinted during application process
 - Biometric identification cannot be lost, forgotten, stolen



[Gine et al. 2011](#)

Particularly effective for high risk borrowers



*Borrowers are divided into quintiles according to initial their predicted risk of default

[Gine et al. 2011](#)

Successful credit interventions often account for farmers' collateral constraints



Flexible collateral

- Land may be an unacceptable form of collateral in smallholder agriculture
 - Banks: titles unclear, seizure under default costly & difficult
 - Farmers: Loss averse
- However, many large ag investments can be self-collateralizing (leasing)
- Warehoused grain as collateral

Pender 2008, Basu and Wong 2012; Burke 2014; Casaburi et al. 2014

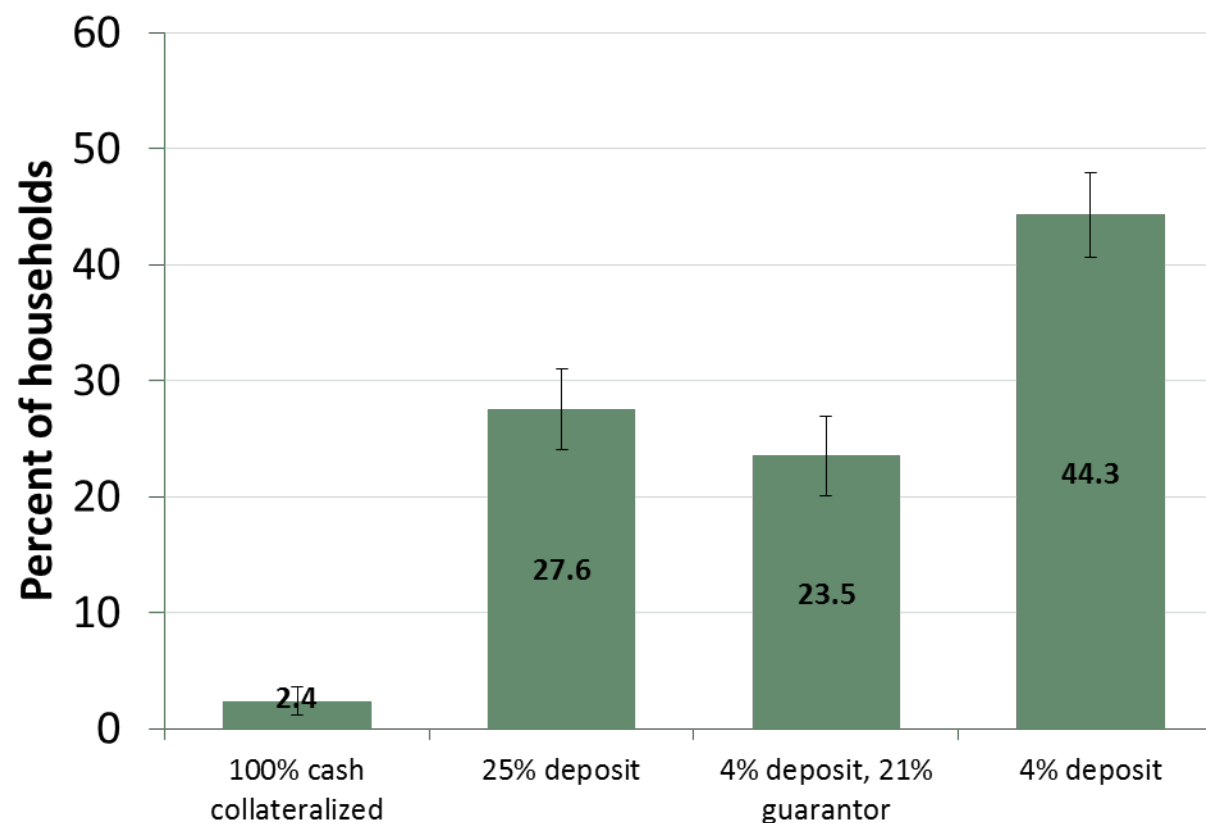
Rainwater harvesting tanks in Kenya

- Tanks for dairy farmers to collect water for cattle
- Variations in loan offers
 - Standard: 100% secured
 - 25% deposit, tank as collateral
 - 4% deposit, 21% pledge from guarantor, tank as collateral
 - 4% deposit, tank as collateral



De Laat et al. 2015

Increased take-up with no losses for lender



De Laat et al. 2015

Rainwater harvesting tanks in Kenya

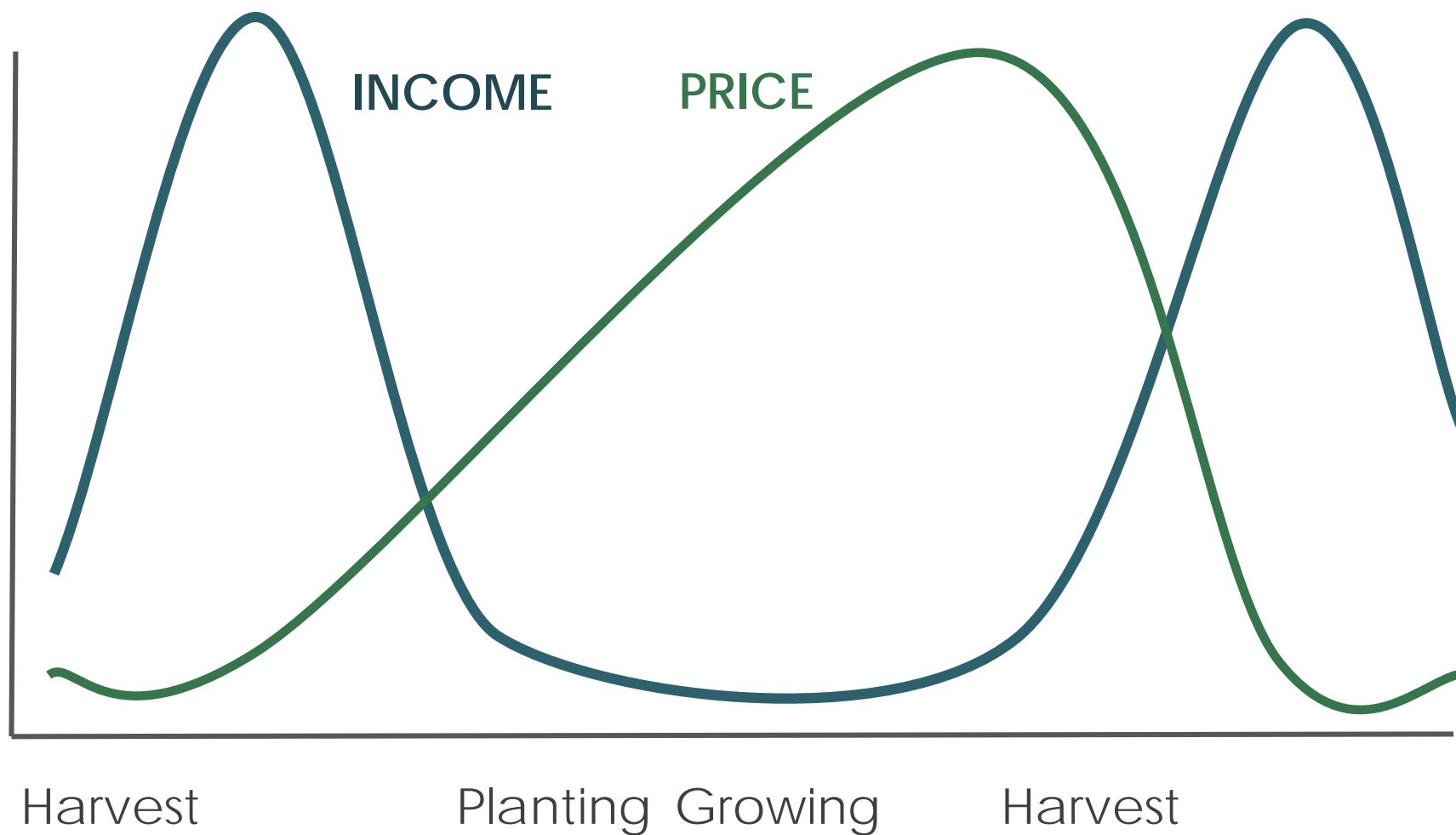
- Changes in time use
 - Girls spent less time fetching water
 - Boys spent less time tending livestock
 - Girls' **school enrollment** increased by 4% from base of 95%
- Testing concept in Rwanda
- Scoping expansion in Kenya

De Laat et al. 2015

Successful credit interventions often account for seasonal distribution of farmer income



Seasonal cycles to production and prices



Designing products for seasonality

- Delaying repayment of loan until after harvest
- Loans for consumption during “hungry season”
- Storage loans to allow farmers to take advantage of price fluctuations
- Savings products to save from harvest until planting time

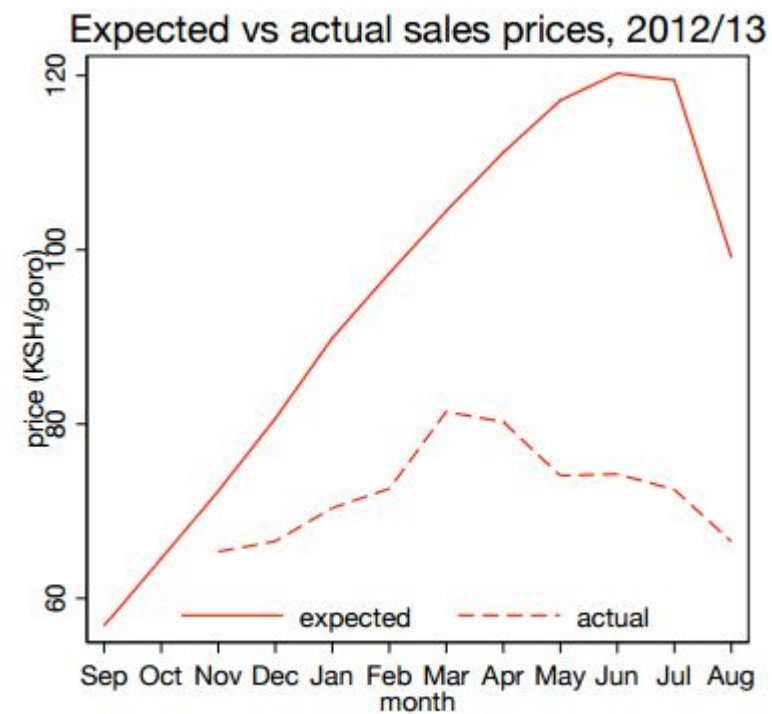
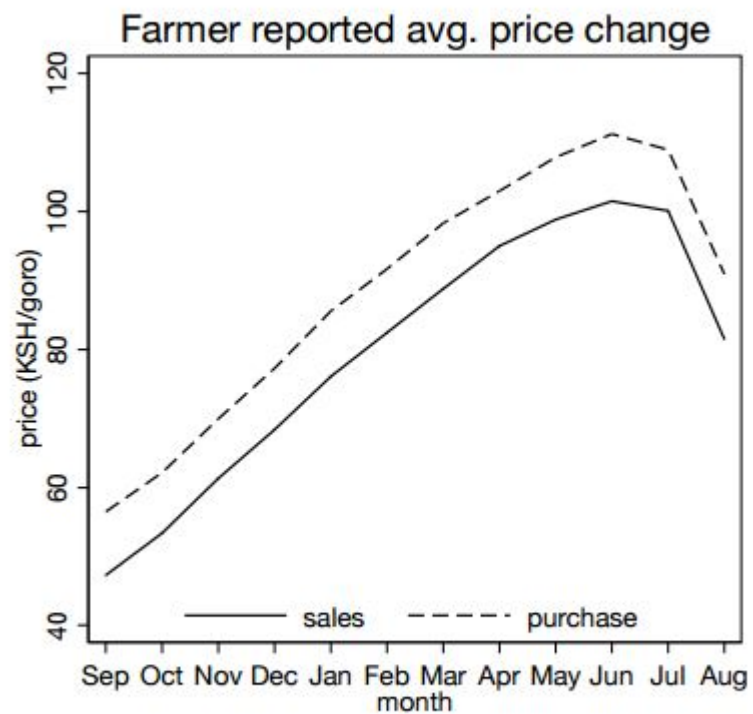
Harvest-time loans in Kenya

- Loans allowed farmers to:
 - Buy/keep maize at low prices
 - Store while prices rose
 - Sell later at higher prices
- Temporal arbitrage increased profits
 - Concentrated in areas where fewer farmers offered loans



[Burke 2014](#)

Price changes



[Burke 2014](#)

Inventory credit in Sierra Leone

- Palm oil prices rise 50%
- Two storage interventions
 - Storage assistance
 - Inventory credit
- Low take-up
 - 25% for loan
- No impact on storage, profits



[Casaburi et al 2014](#)

Digital financial services may help connect farmers to markets and lending institutions



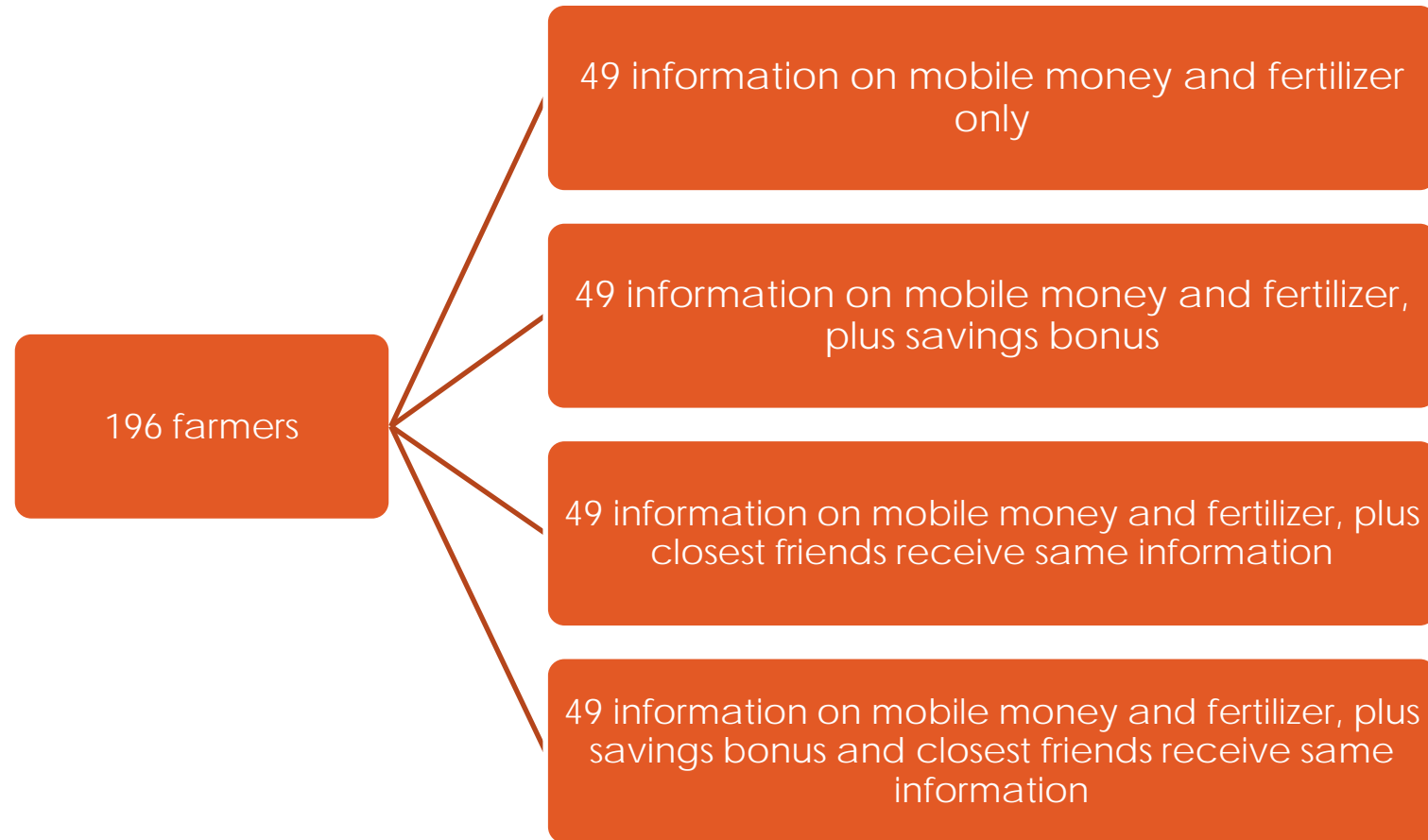
Digital financial services

- DFS has the potential to address some barriers to credit
- Lender needs:
 - Facilitates credit scoring based on previous transactions
 - Reduces travel costs of reaching farmers
- Farmer needs:
 - Affordable credit for investment
 - Cost-effective, safe, and convenient method for savings

Digital financial services

- E-warehousing in Kenya
 - Ongoing evaluation since 2013 with maize farmers
 - Farmers given:
 - cell phone,
 - access to harvest storage loans,
 - access to an electronic warehouse to bulk grain
 - GPS checks on location of grain
 - Village-level joint-liability on collateralized grain
 - Simultaneously addresses farmer liquidity, lender risk, and seasonal price variation
 - Results pending: initial indicators good

Mobile Money in Mozambique



Batista et al. 2015 (preliminary)

Mobile Money in Mozambique

- Effects of savings bonus
 - Increased use of mobile money, including deposits
 - Increased non-frequent expenditures
 - Increased probability of fertilizer use
 - Decreased social pressure to share resources
- Effects of social network
 - Increased use of mobile money
 - Decreased social pressure to share resources

Batista et al. 2015 (preliminary)

Digital financial services

- Challenges
 - Lack of penetration of mobile services/money
 - Best suited for places where DFS is already common
- Little evidence on impact to date
 - Being tested around the world

Credit can affect agricultural activity...

- Mali
 - Households offered loans **spent more** on fertilizer, insecticides
- Morocco
 - Loans used to **invest** in agriculture and husbandry (purchase cattle or sheep)
- Kenya
 - Farmers switched to **higher-value** export crops
- Malawi
 - Farmers allocated **more land** to paprika, a cash crop

[Ashraf et al 2009](#); [Beaman et al 2015](#); [Crepon et al 2015](#); [Yang et al 2012](#)

...but inconclusive evidence on profits

- Mali
 - Cash grants **increased** farm profits; loans increased value of output but not profits
- Morocco
 - Agricultural income increased, other sources decreased
- Kenya
 - Temporal arbitrage **increased profits**
- Sierra Leone
 - Storage loans had **no effect** on profits

[Beaman et al 2015](#); [Burke 2014](#); [Casaburi et al 2014](#); [Crepon et al 2015](#)

Maybe credit is not the binding constraint

- Compared cash grants, weather index insurance, or combination
 - Northern Ghana
- Investment and activity increased about equally in groups given cash and groups given insurance
 - When risk constraint relieved, farmers were able to find credit from other sources
- Hence, credit not binding!



Karlan et al 2013

Summary: Credit

- Farmers' credit needs are different
- Take-up is often low
- Promising interventions
 - Reduce risk for lenders
 - Account for seasonal distribution of income
- Access to credit affects farm activities, but mixed evidence on profit suggests
 - Other constraints may be binding
- Risk is a dominant issue for credit
 - insurance and credit likely to need to be grown hand-in-hand



Thank you!

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