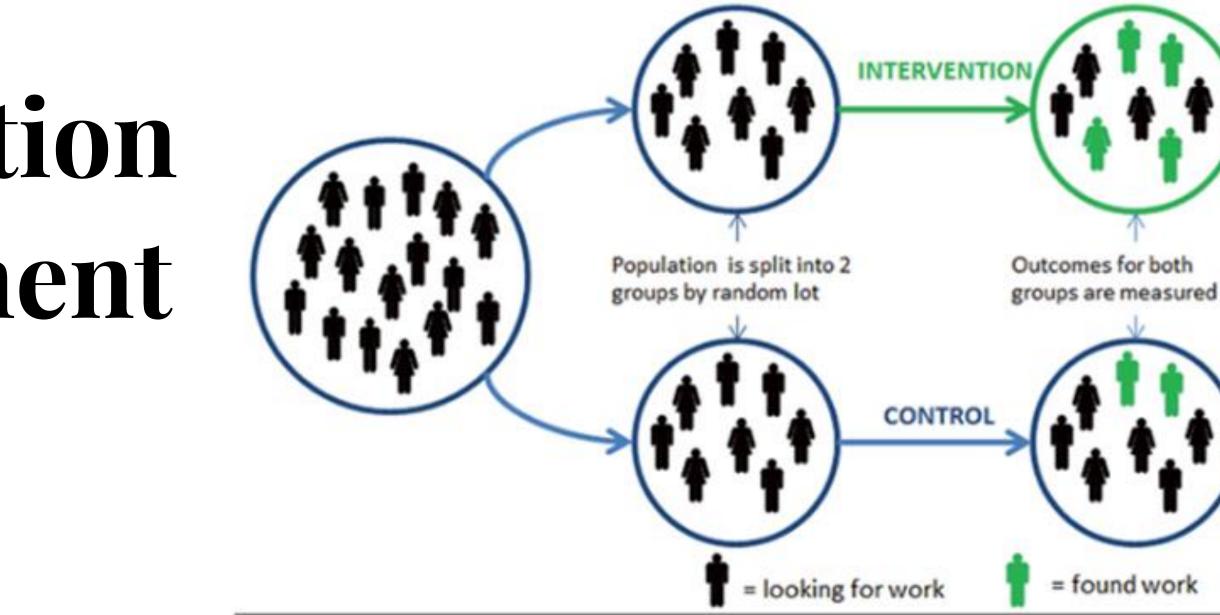
DEVELOPMENT ECONOMICS I | LECTURE 3

Topic 3: Impact evaluation in Economic Development









Plan for this 1h25

0. Brief recap from the previous lecture – 5'

1. Introducing impact evaluation – 30'

2. An RCT in practice: idea, design, intervention, evaluation, scaling-up/policy and follow-up – 45'



Recap and main points from lecture 2

- 1. Poverty traps probably exist.
- 2. Foreign aid could in principle solve them.

3. Rich country interests, corruption in recipient countries... aid debate: Sachs, Easterly, Collier, and Moyo.

4. Not much to show for aid effectiveness at the macro level.

5. Way out: **micro policy effectiveness**?





EKONOMIPRISET 2019 THE PRIZE IN ECONOMIC SCIENCES 2019



Abhijit Banerjee



Esther Duflo



Michael Kremer

"för deras experimentella ansats för att mildra global fattigdom" "for their experimental approach to alleviating global poverty"



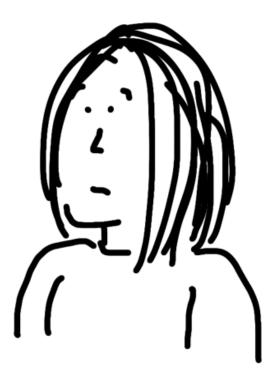
Topic 3.1. Introducing impact evaluation

WHAT DOES ACADEMIC RESEARCH HAVE TO SAY ABOUT AID EFFECTIVENESS?



Do you know about any RCTs that provide evidence that we should use RCTs?





freshspectrum.com

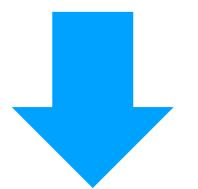
Causality and endogeneity – correlation vs causation

A METHODOLOGICAL REVISION

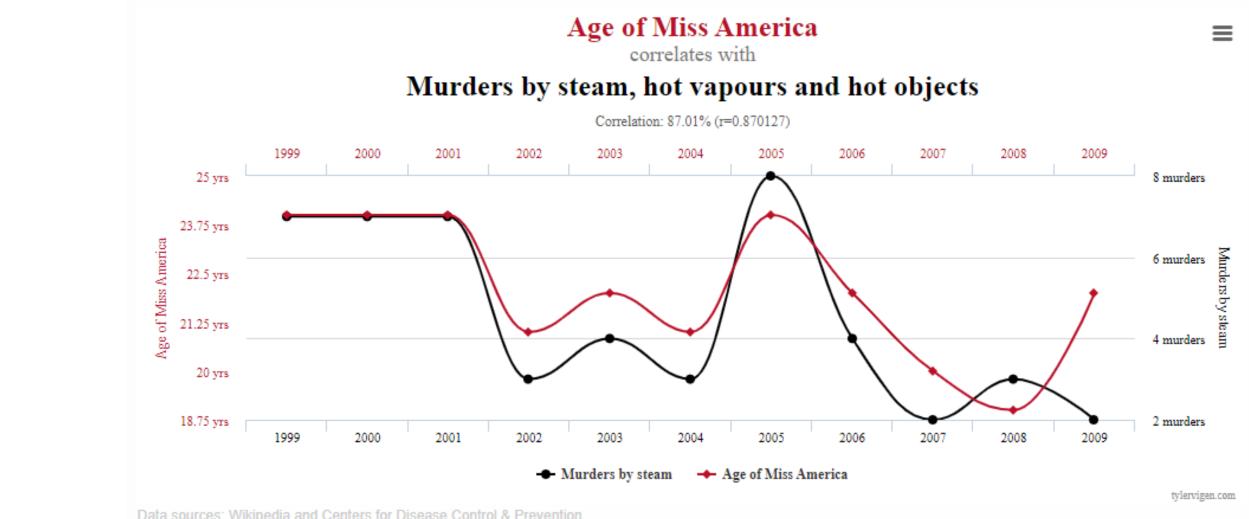
Having more sex makes you earn more money?

The headline "More Buck For Your Bang: People Who Have More Sex Make The Most Money". The author Max Rivlin-Nadler writes: "Scientists... found that people who have sex more than four times a week receive a 3.2 percent higher paycheck than those who have sex only once a week. God forbid you don't have sex at all."

Based on a study by Nick Drydakis which does not claim causality, but is called <u>The **Effect** of Sexual Activity on Wages</u>.





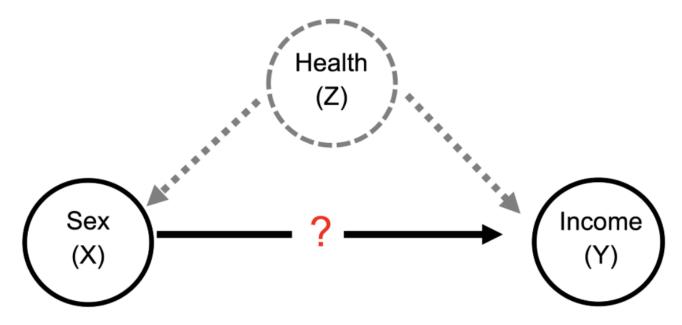


Picture from <u>spurious correlations</u>

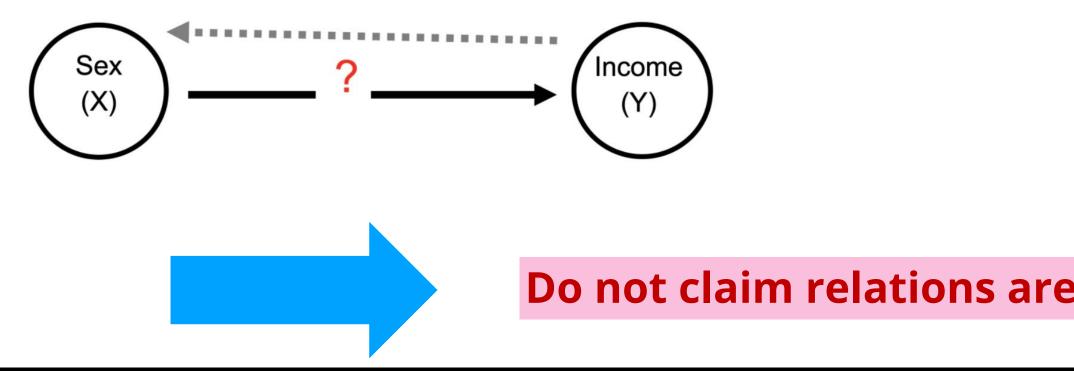
4 reasons why correlation might not imply causation

TAKEN FROM TOWARDS DATA SCIENCE, HERE, FROM AN ARTICLE (NOT SCIENTIFIC) THAT CLAIMS THAT MORE SEX CAUSES HIGHER INCOME

1. We are missing an important factor – **Omitted variable bias**



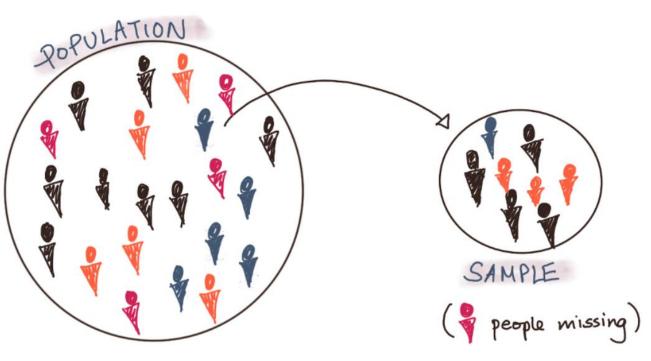
2. We got things the other way around – **Reverse causality**







3. You are looking at unusual people – **Sample selection bias**



4. It's difficult to measure things – **Measurement error**

A particularly important concern when you ask people to report:

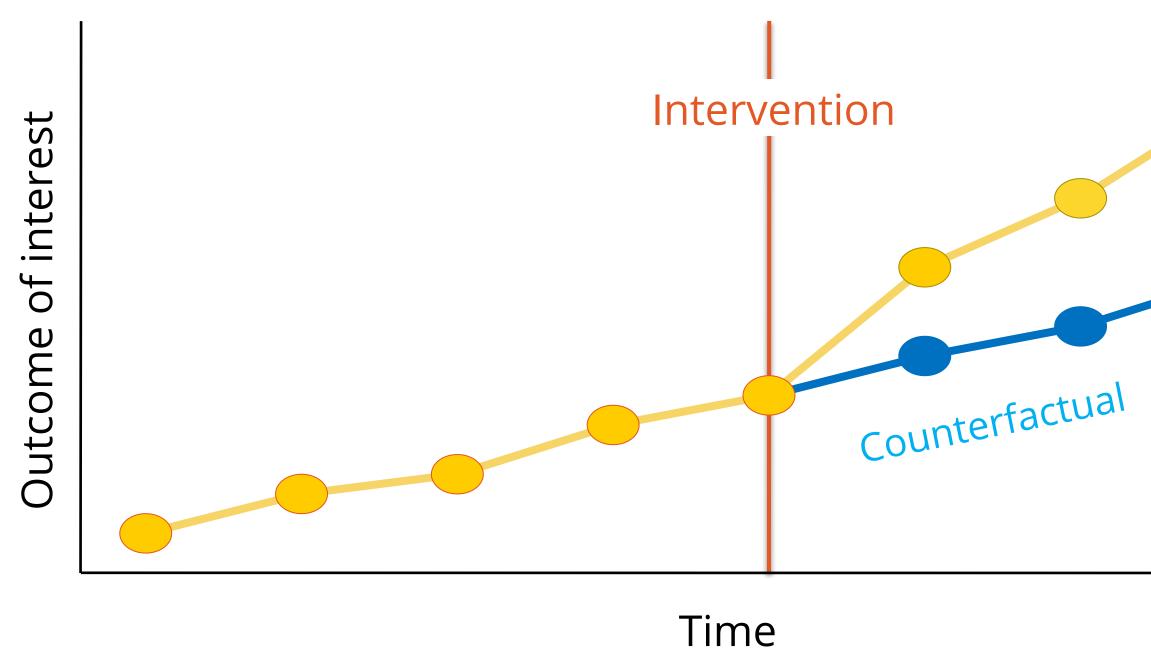
About controversial or sensitive topics: who they vote for or attitudes towards various contentious issues. Experimenter demand effect.

Do not claim relations are causal unless you are using causal inference methodologies





Causal inference





Impact

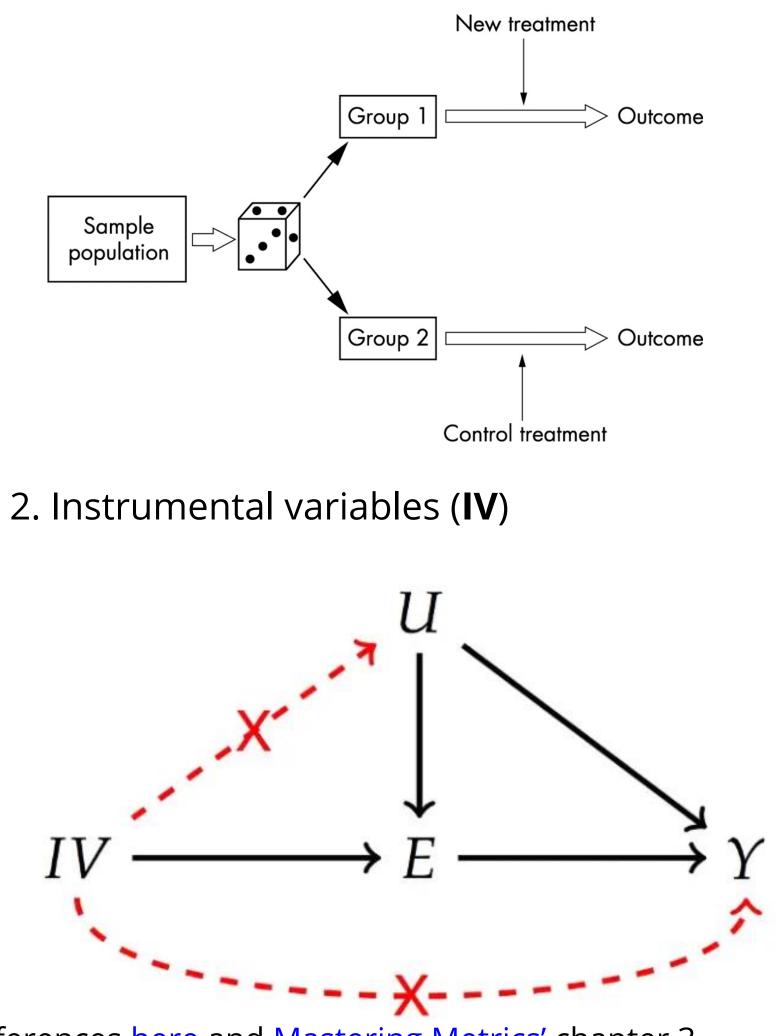
JOSHUA D. ANGRIST & JÖRN-STEFFEN PISCHKE

THE PATH FROM CAUSE TO EFFECT



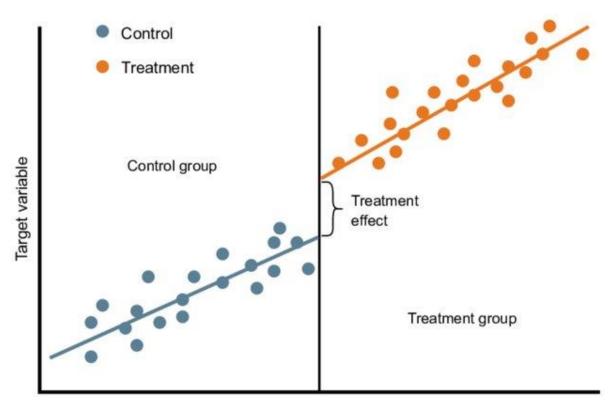
Methodologies for causal inference

1. Experiments – Lab and Field (RCTs): the gold standard



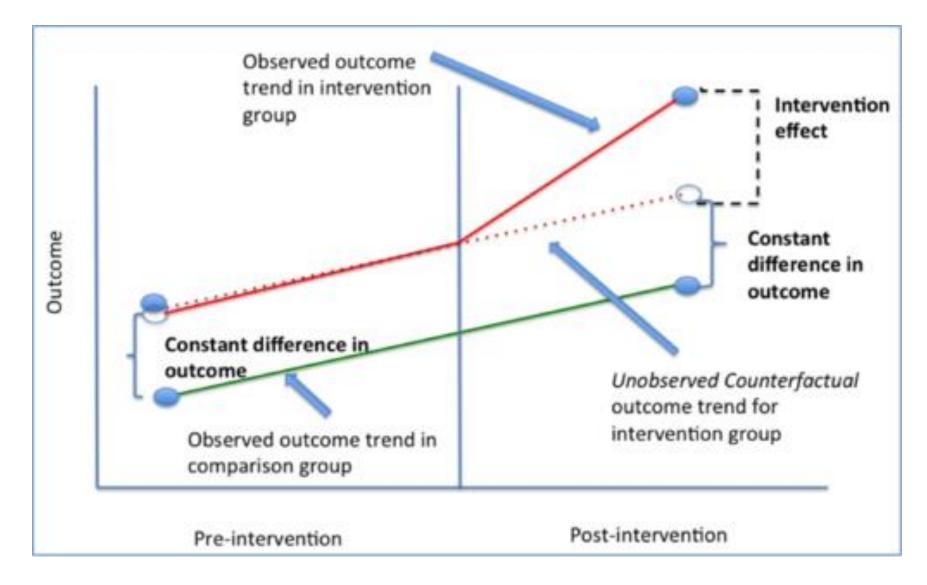
References <u>here</u> and <u>Mastering Metrics'</u> chapter 3

3. Regression discontinuity designs (**RDD**)



Assignment variable

4. Differences-in-differences (**DiD**)



RCTs – examples of topics studied in Development Economics

- Cash transfers
- Microfinance
- Mobile money electronic money
- Education
- Health
- Agricultural development
- Access to energy
- Social protection...



GiveDirectly

Send money directly to the extreme poor.



RCTs – the gold standard in causal inference 80

Figure 2: What empirical methods do recent development economics papers used?

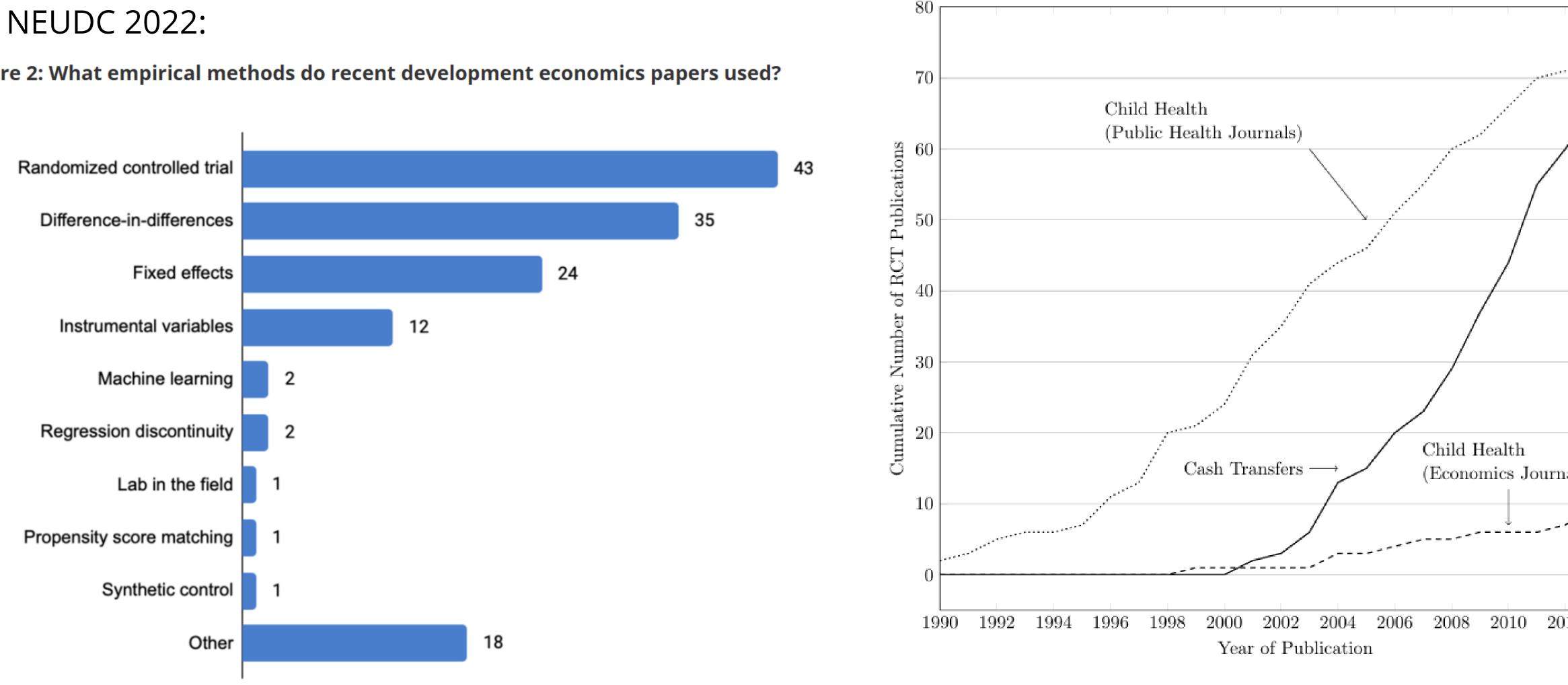


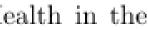


Figure 2: Cumulative Number of RCT Publications in Cash Transfer and Child Health in the AidGrade Database (http://www.aidgrade.org)

Bouguen et al 2018

World Bank Blog

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Randomization in the real world – Randomists





Funded and headed by Esther Duflo and Abhijit Banerjee - MIT



Development Impact Evaluation Department World Bank







Funded by Dean Karlan – Northwestern University









Advantages – in Development Economics

- Causality identified in a clean way.
- Simple and powerful methodology, also time intensive: •
 - It allows to develop capacity in many different tasks and levels.
 - Relatively easy to communicate to a non-technical audience and policymakers who are not specialists.
- - Choosing more effective and efficient policies.
 - Improve elements of implemented policies.

Together with evaluating the impact of interventions, it allows for piloting larger projects, facilitating:

Critics and criticisms.

- Angus Deaton: Problems of external validity and generalization •
- Lant Pritchett: Limited applicability to complex policies •
- Dani Rodrik: Lack of attention to context and mechanisms •
- Martin Ravallion: Publication bias and ethical issues •
- James Heckman: Limitations in understanding long-term processes •
- Nancy Cartwright: Lack of a solid theoretical foundation •
- David McKenzie: High costs and long execution times

A realidade práctica da avaliación de impacto – orientación de políticas públicas



Topic 3.2. An RCT in practice

IDEA, DESIGN, SETTING UP THE PROJECT, INTERVENTION, EVALUATION, DATA CLEANING AND ANALYSIS, WRITING, DISSEMINATION, SCALING-UP/POLICY AND FOLLOW-UP

	Idea
	Design
	Interve
	Interve
	Evaluat
	Writing
	Dissem
I	
	Scaling

Follow-up



Policy context - Scientific literature

Research team - Research design

Partnerships - Grant(s) application

Development of materials - Training - Implementation

Training of enumerators - Survey pilots - Baseline survey - Endline surve

Research paper - Policy briefs

Workshops - Conferences - Publication

Scaling-up/Policy Implementation

Follow-up

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Idea – the problem

- prices.
 - lower revenue.



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Real world problem – knowledge of the local context: cashew nut producers getting low prices for their cashew nuts, with those with more years of education getting higher

Scientific literature - problem: isolated market participants in remote areas might have poor access to market information, resulting in suboptimal marketing decisions and

Motivation

Primary commodity **prices fluctuate** substantially over time.

Market information can reduce price uncertainty: \rightarrow increasing producers' bargaining power and prices.

Of cashews and cash

But farmers are being squeezed

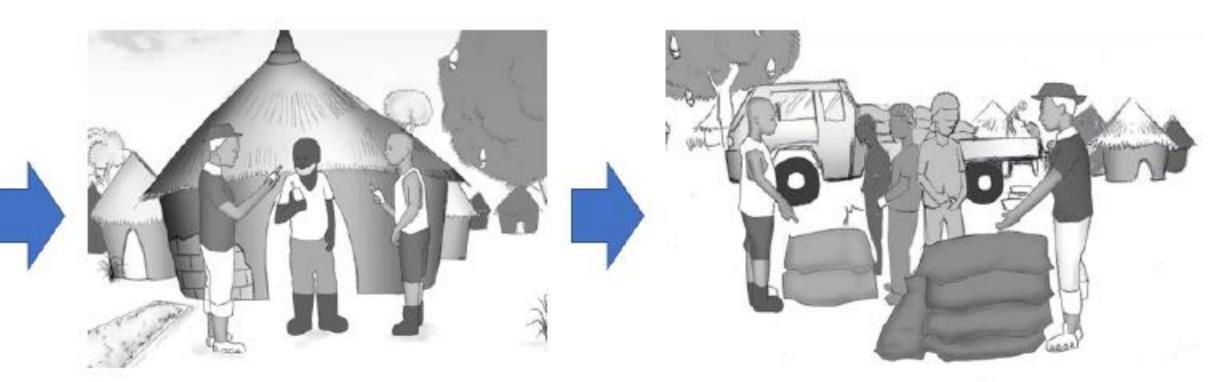
nt edition | Middle East and Africa Sep 12th 2019 | NAMPULA

- Fluctuations impact many African economies, whose exports mostly depend on.
- In the case of Guinea-Bissau, cashew nuts alone make up 90% of total exports.
- Often **producers are less informed** than buyers about market conditions.
 - But competition could erode margins for information alone to change prices.
 - Nut factories have made a cracking comeback

The Bissau-Guinean Raw Cashew Nut Supply Chain



Cashews grow in trees after three years, between March and June





The raw cashew nuts are slowly exported to India and Vietnam

... To sell them to 30-60 large intermediaries or exporters

70,000 - 100,000 families of cashew producers pick them from the ground

Producers sell them in their village to 5,000 - 10,000 intermediaries



Intermediaries transport them through low-quality roads

The National Raw Cashew Nut Market

25 percent of GDP. More than 80 percent of production goes into "raw" exports.

With a population of 2M and around 200,000 families, **about half of the families in the** country own cashew plantations.

Cashew is the main source of income for 80 percent of these families.

Raw cashew nuts account for 90 percent of Guinea-Bissau's export revenue and about

Many barriers prevent accurate information from reaching producers

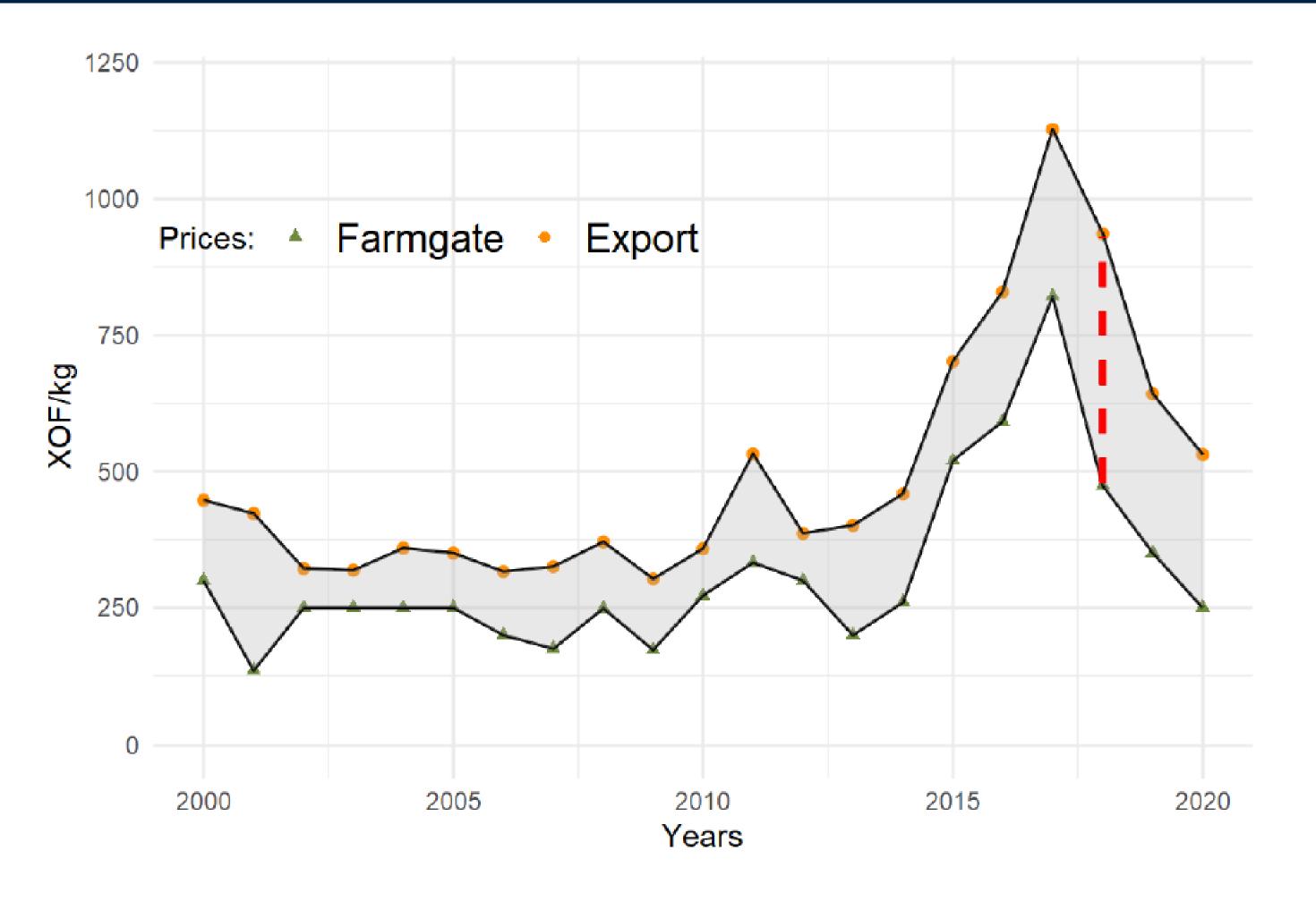
At the producer level:

- 70 percent can't read.
- 98 percent sell their cashew nuts in the village.
- They typically sell their cashew nuts in one unique sale per season.

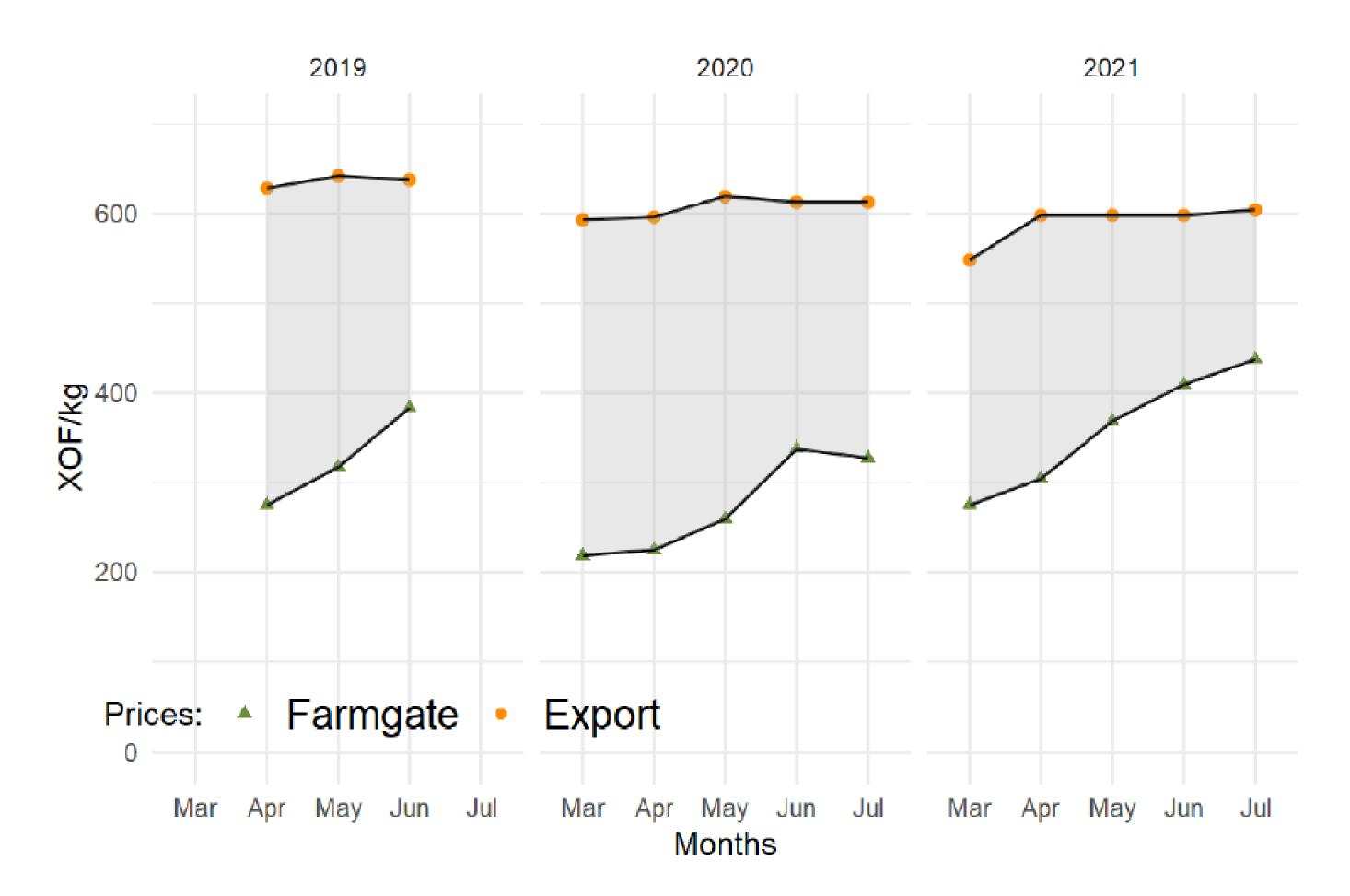
At the aggregate level:

- Guinea-Bissau is a price-taker in the world market of raw cashew nuts.
- There are strong economic and political interests in the sector.
- High price volatility across and within-seasons.

Price variation across seasons



Price variation *within* **seasons**





Idea – potential solution

Scientific literature – possible solution and gap: introducing a Market Information System – promising in remote contexts where producers have few market interactions.



Preliminary Design

- **Research team:** putting together a team of researchers with the necessary skills and background combination of technical ability and knowledge of the context.
- - International researchers based in Guinea-Bissau.
- National researchers based at ministries and universities.
- Preliminary research design: first definition of treatment arms, power calculations, sample, stratification...



Setting up the project

 Partnerships: implementing agencies, the National Cashew Agency, MTN (telecom), Nitidae (NGO specialized in Cashew Nuts), Ministry of Finance.

• **Grant Applications**: PEP, PEDL.

- Updated research design.
- Work plan timeline.
- Budget.







Impact Evaluation Mentoring

for Governments in East & West Africa

Impact Evaluation Mentoring for Governments in East and West Africa Proposal

Disseminating market information via mobile phones to cashew

producers: an impact evaluation in Guinea-Bissau

Presented to

Partnership for Economic Policy (PEP)

By

Jeremias Pereira Adewusi Mendonça Debucada Sanca Djanira Cabral Avelino Nadia Ndafa Francisco Pereira Mamadu Serra Dayvikson Laval Tavares Tatiana Martinez Zavala Camila Franco Restrepo Brais Álvarez Pereira Sebastian Schäber &

General Directorate for Forecasting and Economic Studies, Ministry of Economy and Finance Cashew Regulatory Agency of Guinea-Bissau Statistics Directorate, Ministry of Agriculture and Rural Development

> Guinea-Bissau July 29th, 2019

Mandatory template to submit Intervention Design

Setting up the project

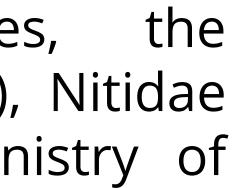
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Grant Applications: PEP, PEDL. •

- Updated research design.
- Updated intervention.
- Work plan timeline.
- Budget.

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Intervention

Co-coordinating the **planning, development and supply of the services or products to be provided** to the relevant sample: weekly voice messages to simple phones.

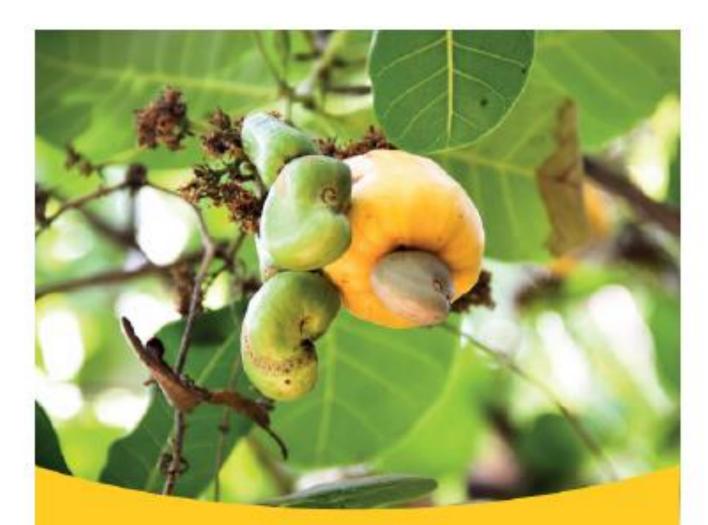


A new Market Information System: n'kalô

We partnered with the NGO Nitidæ, world-expert on cashew markets, the National Cashew Agency and the mobile operator MTN to provide a **voice-based version of the N'kalô service**.

N'kalô is a MIS providing information on agricultural markets in 13 countries.

One of the **best sources of information on the cashew market worldwide**.



Kunsi preço di kucu di cadju liga 255 pa tené nobas

N'kalo, líder internacional di informasons sobri prês de Kuku di caju.





The weekly messages



Analysis of the internal market



Nitidae Analysis of the international market and definition of the weekly message

We communicate producers one message per week, with:

- Synthesised and simplified news about the national cashew market.
- A range of the latest region-specific farm-gate prices.



News about the international cashew market and advice on whether it is a good time to sell, based on a simple message describing the likely direction of prices.

Face-to-face training after baseline with treated producers





Kal países ku tene hortas mas garandis di cadju? Costa de Marfim - 600.000 India - 700.000



Cucu di caju di India (200.000) e cucu di caju di Guiné-bissau (200.000)



Eindi ku cumpra Material pa sina djintis sobre nogos di cadju. Modulo 3



Cunsada di campanha di cucu di cadju







Message content

Example of voice message:

This is André from n'kalô to give you the last news of the cashew market. The demand for cashew is increasing all over the country as factories in India and Vietnam have re-opened. Prices at farm-gate are between 300 and 375 FCFA/kg around Biombo and Bissora, between 250 and 325 FCFA/kg in Bafata and Gabu and reach 300 to 400 FCFA/kg in Bonco close to the border with Senegal. As demand is growing prices are expected to go up, so we advise not to sell before the price reaches 375 FCFA/kg. N'kalô wishes you a very good week.

Evaluation

Pre-registration •



- **Pre-analysis plan**
- Ethics certificate IRB. ٠



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Analysis

7.1 Treatment effects

We will estimate models of the form:

 $y_{iv} = treatment_{iv} \cdot \beta + spillover_{iv} \cdot \delta + y_{0iv} \cdot \gamma + \alpha_v + \epsilon_{iv}$

where:

- i and v index individuals, and villages, respectively,
- y_{iv} denotes the outcome of interest measured in the follow-up,
- y_{0iv} denotes the outcome of interest measured in the baseline,
- treatment_{iv} denotes individual-level assignment to the treatment group,
- spillover_{iv} denotes individual-level assignment to the spillover group in treated villages,
- α_v denotes the randomisation triplet fixed effect (as described in section 5.1),
- *ε*_{iv} is the unobserved variation in the outcome

We will cluster standard errors at the village level.

Our coefficient of interest is β , the intent to treat (ITT) effect. The Stata code for our ITT specification (2) will be

```
reghdfe y treatment spillover y_0 , absorb(triplet_id) cluster(v_id)
```

To measure take-up of the intervention, we define a dummy variable equal to one if the respondent confirmed either reading or listening to the messages that were sent to them between April and May, denoted as $takeup_{iv}$, defined in section 6.3. To estimate the Local Average Treatment Effect (LATE), we will estimate a variant of (2), where we replace $treatment_{iv}$ with $takeup_{iv}$ instrumented by treatmentiv.

The Stata code for our LATE specification will be:

ivreghdfe y (takeup = treatment) spillover y_0 , absorb(triplet_id) cluster(v_id)

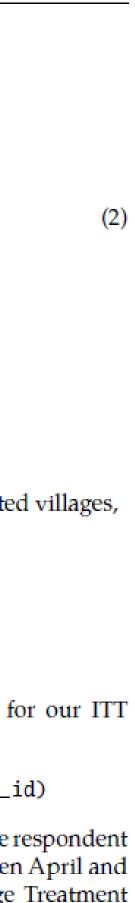
7.2 Inference and multiple-hypothesis testing adjustments

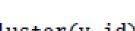
For each outcome listed in section 6, we will test the following hypothesis:

(i). $H_0: \beta = 0$: The intervention had no effect;

(ii). $H_0: \delta = 0$: The intervention had no spillover effect;

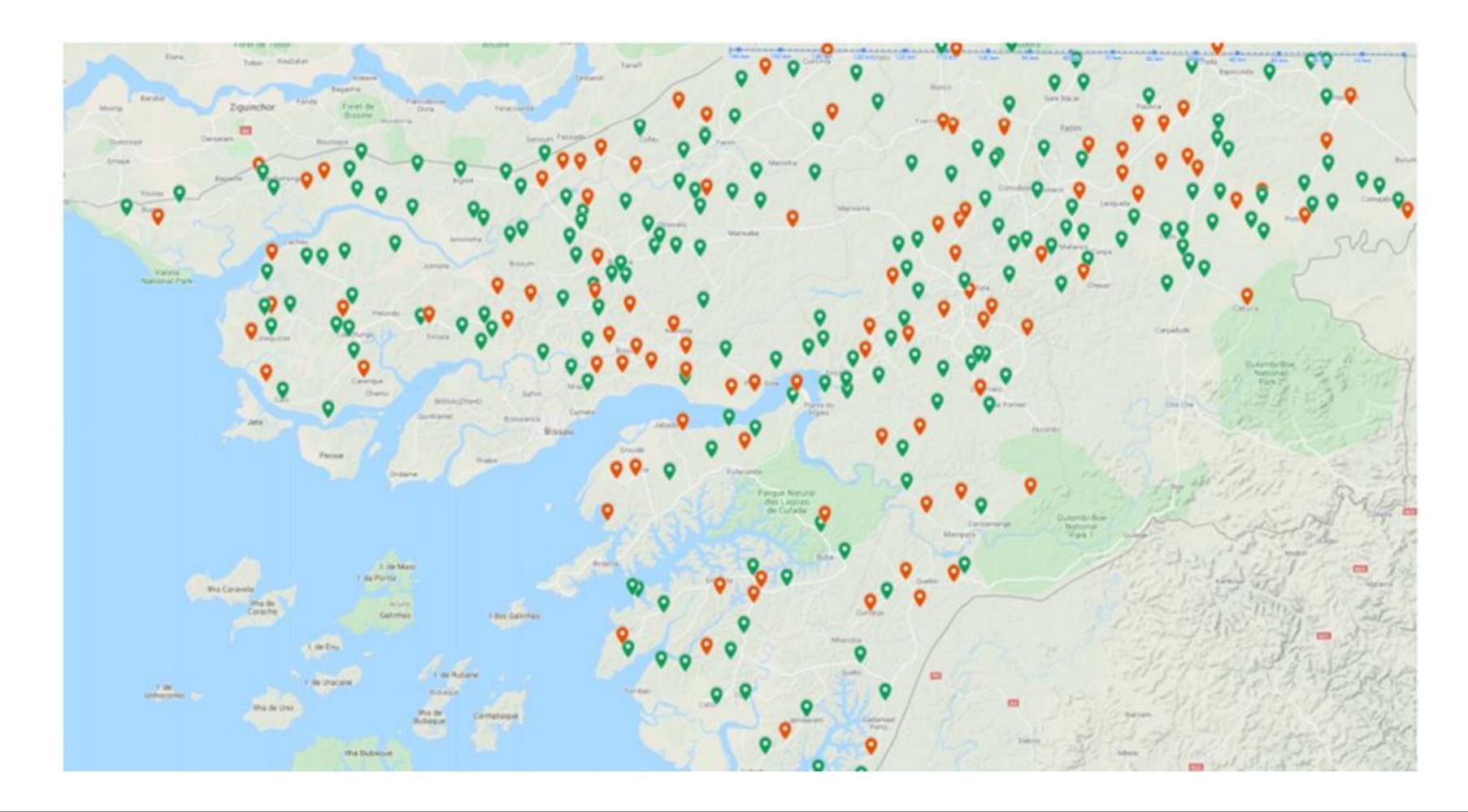
For each of these hypothesis tests, we will report two values:







Evaluation – the sample





Survey Solutions

Evaluation – the survey questionnaires

I KoBoToolbox

Survey CTO



Final - KRIOL ENDLINE DO MOBILE-MIS GUINÉ-BISSAU 2021 (413Q, 64S, 3R) COMPILE TEST

• 0 Módulo 3: Vendas e receitas de Caju A que horas comecou este modulo? M3_start 12 Midline: No ano 2020, durante a campanha passada, quantas vezes vendeu A S^{M3_6_2020} 12 No ano 2020, durante a campanha passada, quantas vezes vendeu A SUA CASTAM3_6 • 🔚 Ler: agora vamos fazer perguntas sobre cada uma das distintas vendas de castanha de ca M3R2 – Roster: VENDAS - %ROSTERTITLE% 8: Em que mês do ano 2020 realizou esta venda? M3_7 ● M3_11a 🌑 **8** Onde realizou esta venda? AB Qual foi esse outro lugar no que vendeu a sua castanha? M3_11a_other O **8** Quem foi o comprador nesta venda? M3_11b 🌑 AB Especifique quem foi o outro comprador nesta venda M3_11_out O M3_8 🔵 **12** Qual foi a quantidade da castanha que vendeu nesta venda? **8** Unidade de medida nesta venda %rostertitle% em %M3 7% ? M3_9 O ● 😥 quantitade_venda_kg quantidade_kg m3_10_kg 🔿 **12** Lembra quantos quilogramos foram no total? **12** Qual foi o preço por quilo que acordou nesta venda (em FCFA)? M3_10c ● 12 Voce lembra também qual foi o pagamento total que recebeu nesta venda (er M3_10b • preco_kg_lo (fx) preco kg venda lowerbound 😥 preco kg venda preco_kg (m) preco_kg_venda_higherbound preco_kg_hi

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/ariable label	(?)				
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2	Na minha tabanka, lonje da minha casa	ĺ			
3	Em outra tabanka vezinha				
4	No mercado do setor ou região				
5	Em Bissau				
6	Numa tabanka mais perto da fronteira				
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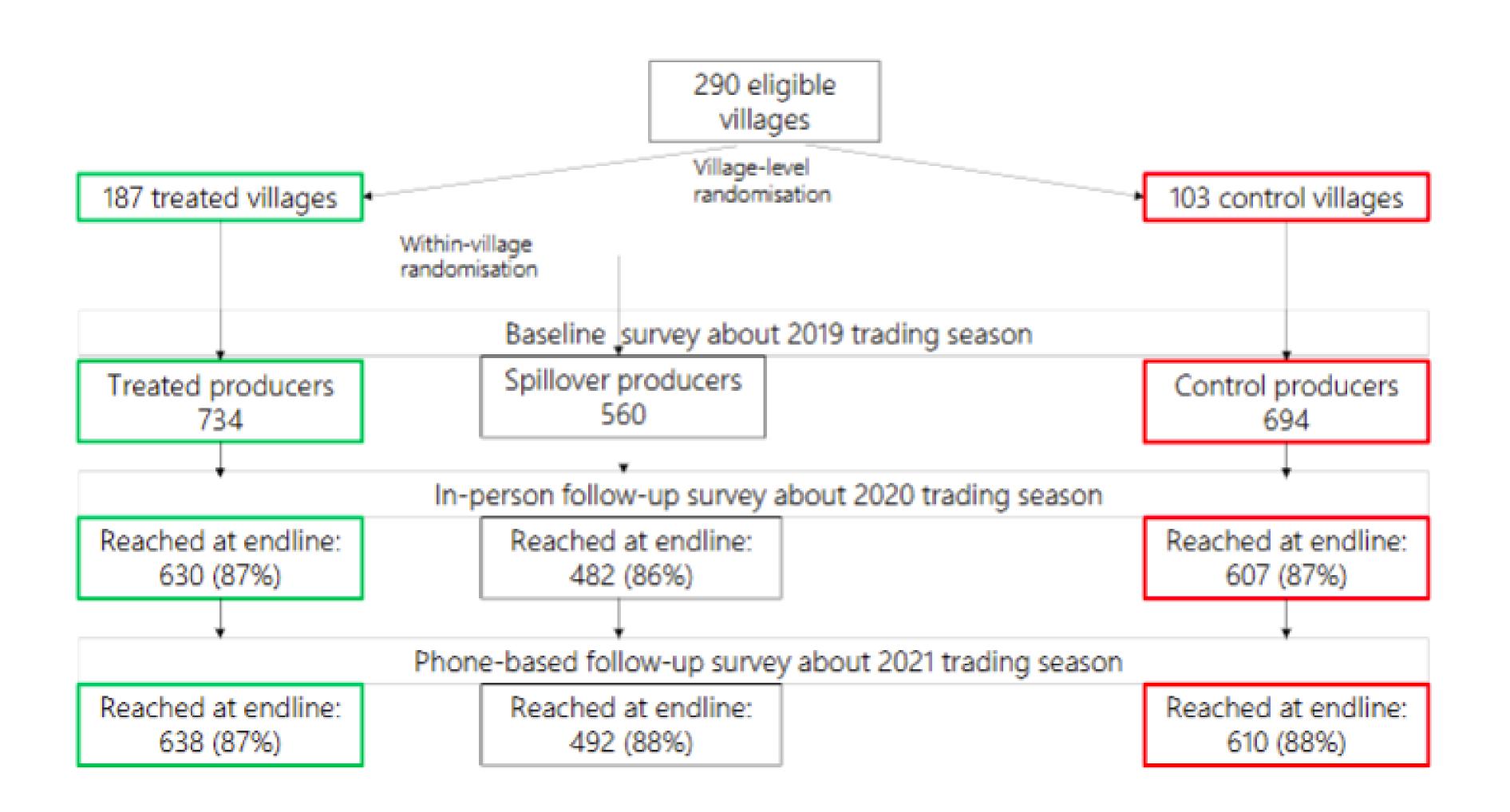




Selecting and training **field teams** – coordinators and enumerators

Piloting the intervention and the survey

Study design and sample



N OVA

Rolling out and monitoring the intervention

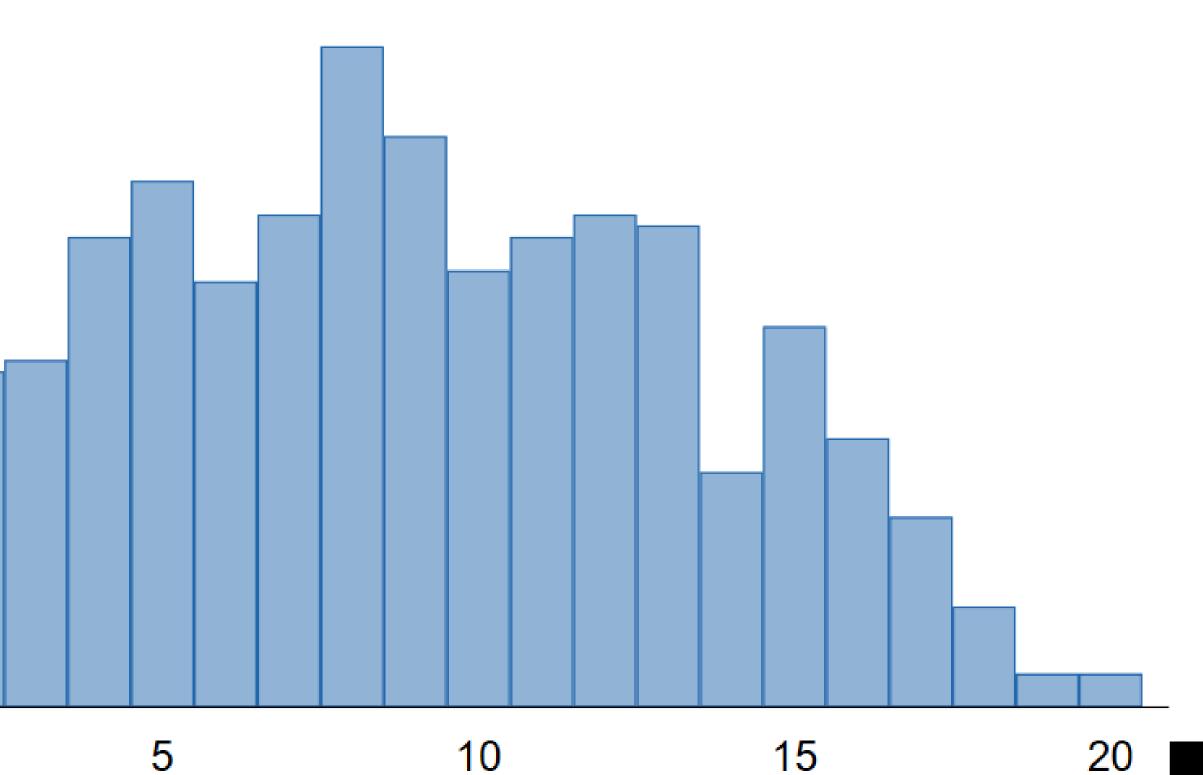
80 60 Number of producers 40 20

0

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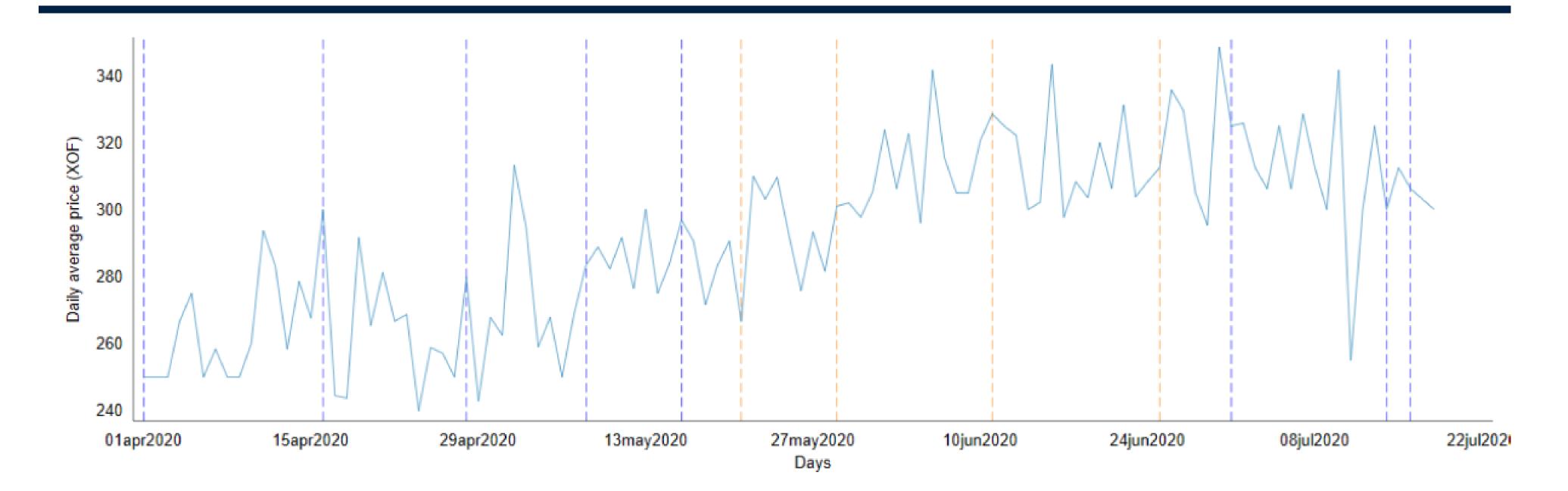
728 treated producers

0



Number of robocalls and SMS received between April and October 2020

How reliable were the messages?



- Bearish message, advising to wait before selling
- Bullish message, advising to sell



Data cleaning and analysis

Past commands appear here	Results are displayed here			Variable list appears here		
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History T # × Filter commands here Image: Command structure # Command _rc 1 log using demonstration _rc 2 cmdlog using demonstration.do _rc 3 sysuse auto rc 4 summarize rc 5 generous gp100m = 100/mpg 199 6 generate gp100m = 100/mpg 199 7 regress gp100m weight 8 8 predict yhat predict yhat	length turn displacement gear_ratio foreign . generous gp command gener r(199);	74 74 74 74 74 74 74 74 74 74 74 74 74 7	nized	4.39935 91.8372 .456287	54 31 22 79 71 2.19	233 51 425 3.89 1
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Filter variables here
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  mpg
                                                               generate double `R' = ln(`t')-`t1'
  rep78
               Repair record 1978
                Headroom (in.)
  headroom
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  trunk
                Trunk space (cu. ft.)
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                Gearratio
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  gear_ratio
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Estimation

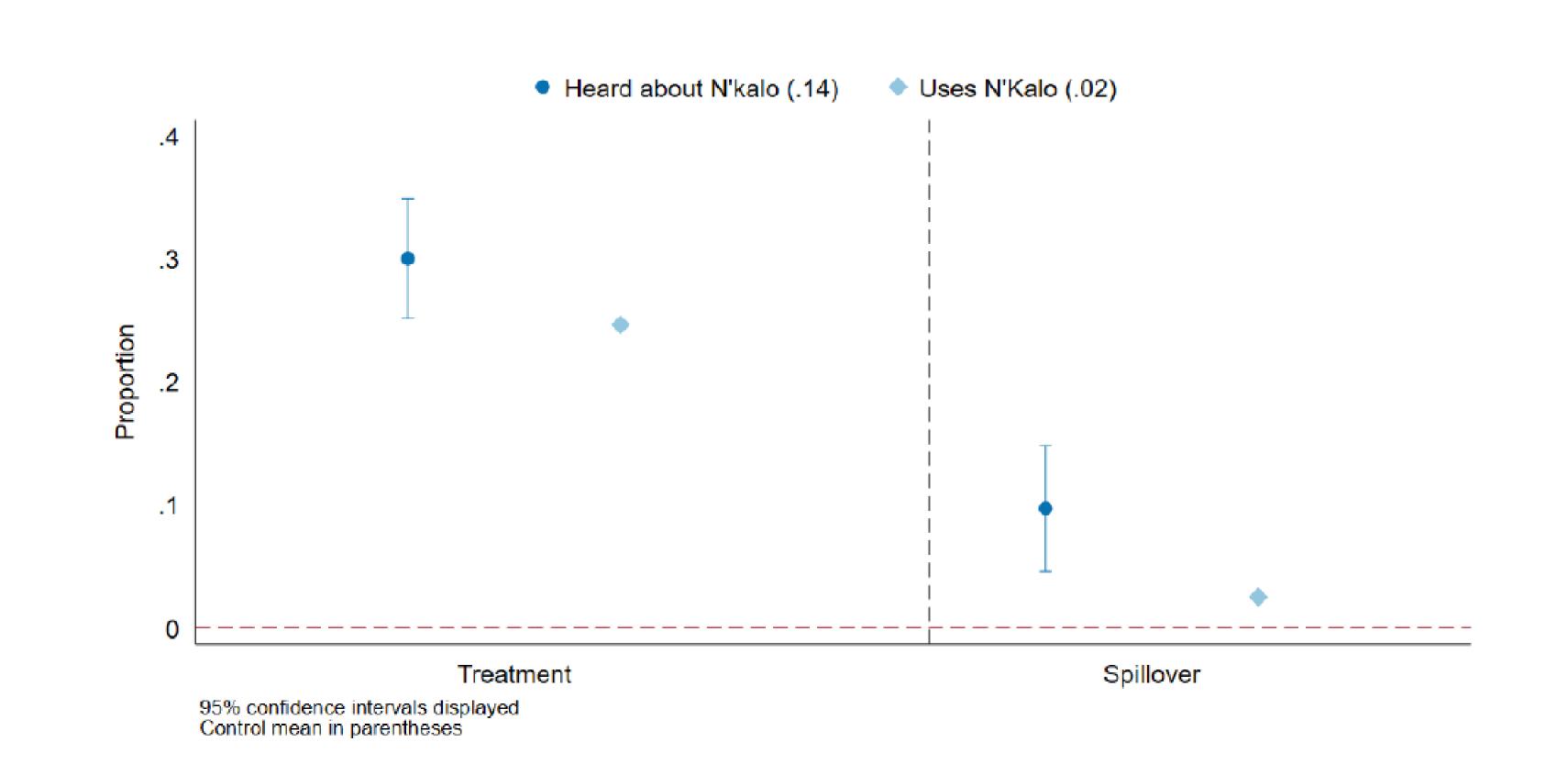
- i and v index individuals, and villages, respectively,
- \triangleright y_{iv} denotes the outcome of interest measured in the follow-up,
- yoiv denotes the outcome of interest measured in the baseline,
- treatment_{iv} denotes individual-level assignment to the treatment group,
- spillover_{iv} denotes individual-level assignment to the spillover group in treated villages,
- $\triangleright \alpha_v$ denotes the randomisation triplet fixed effect,
- ϵ_{iv} is the unobserved variation in the outcome. Errors are clustered at the village-level, the unit of the first randomisation.

https://www.socialscienceregistry.org/trials/4740

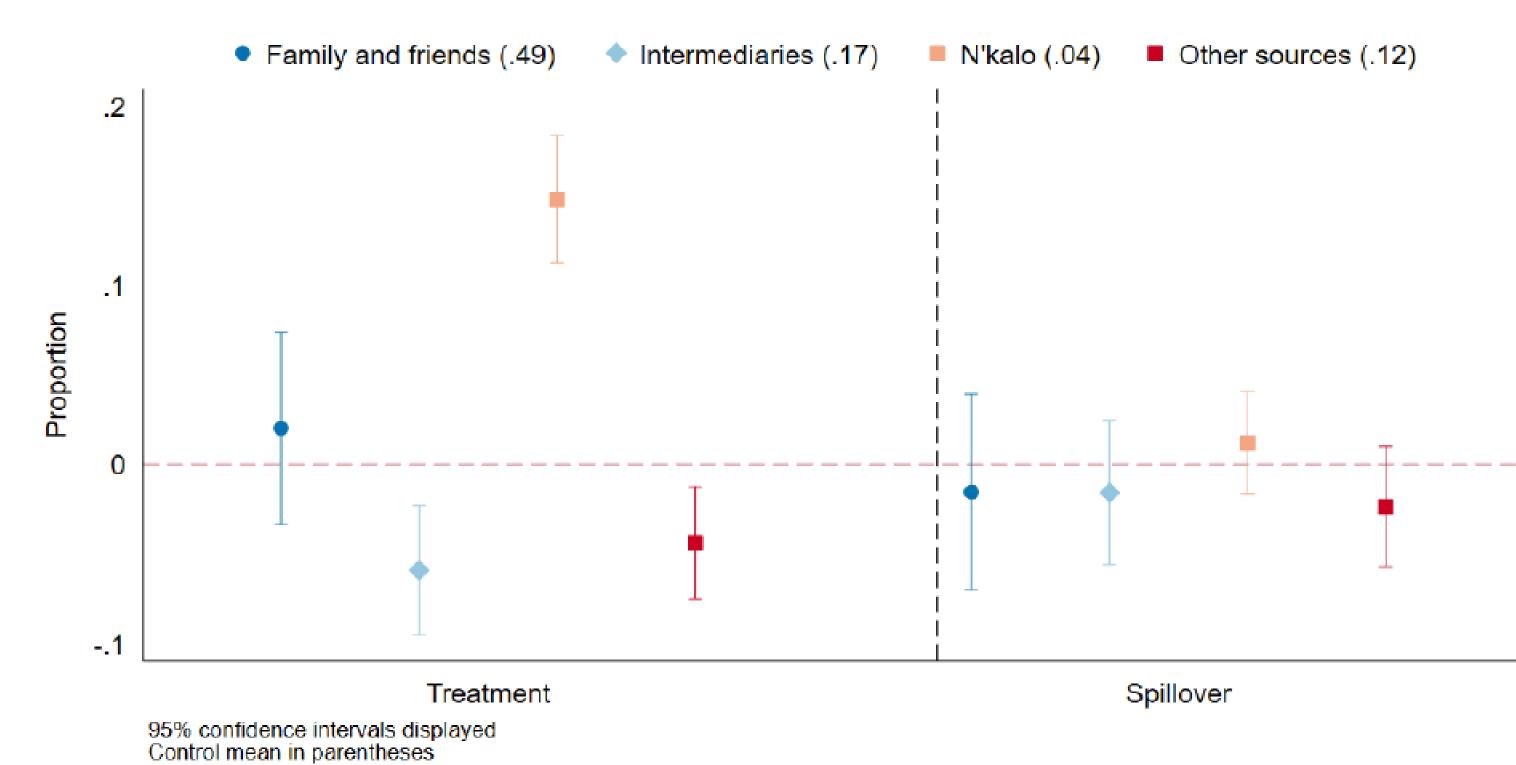
(1) $y_{iv} = treatment_{iv} \cdot \beta + spillover_{iv} \cdot \delta + y_{oiv} \cdot \gamma + \alpha_v + \epsilon_{iv}$

Results – preliminary (not published yet)

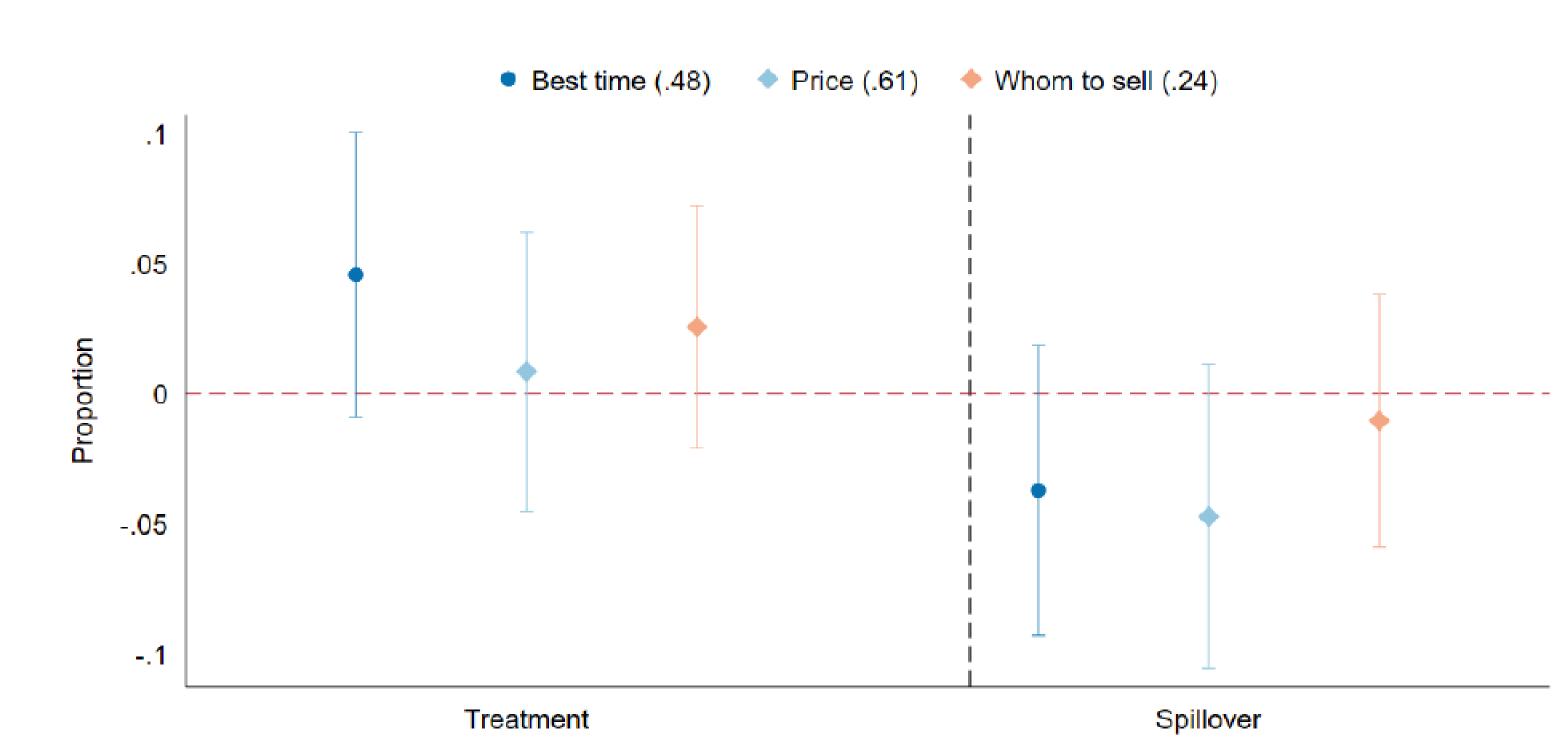
Treated producers engage more with the service



Treated producers follow less the advice of intermediaries or other agents

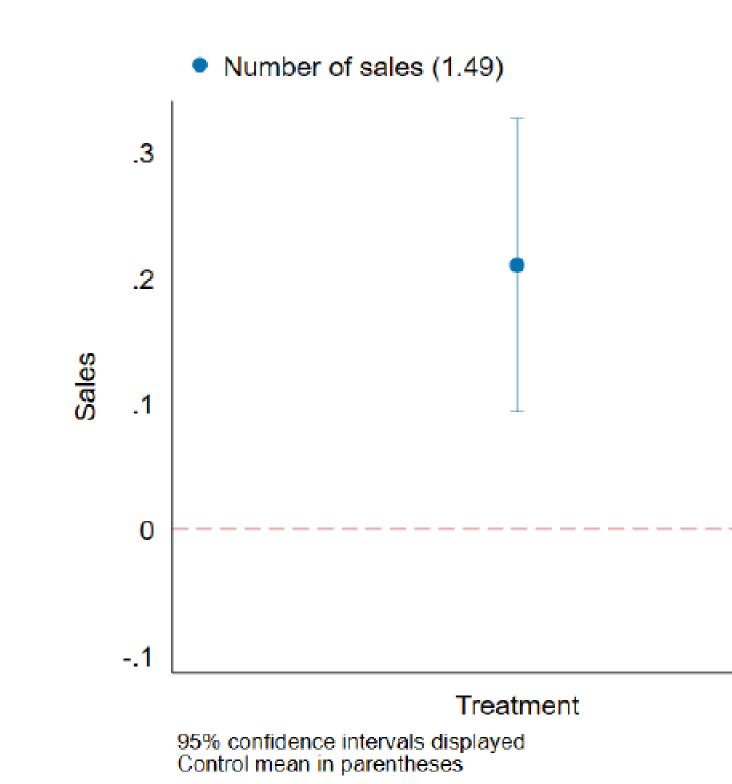


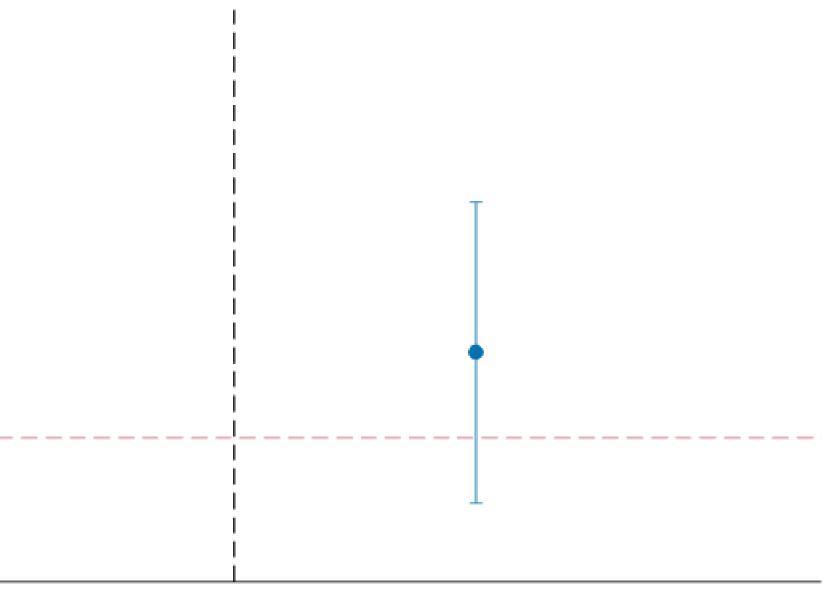
Treated producers seek advice on the best time to sell



95% confidence intervals displayed Control mean in parentheses

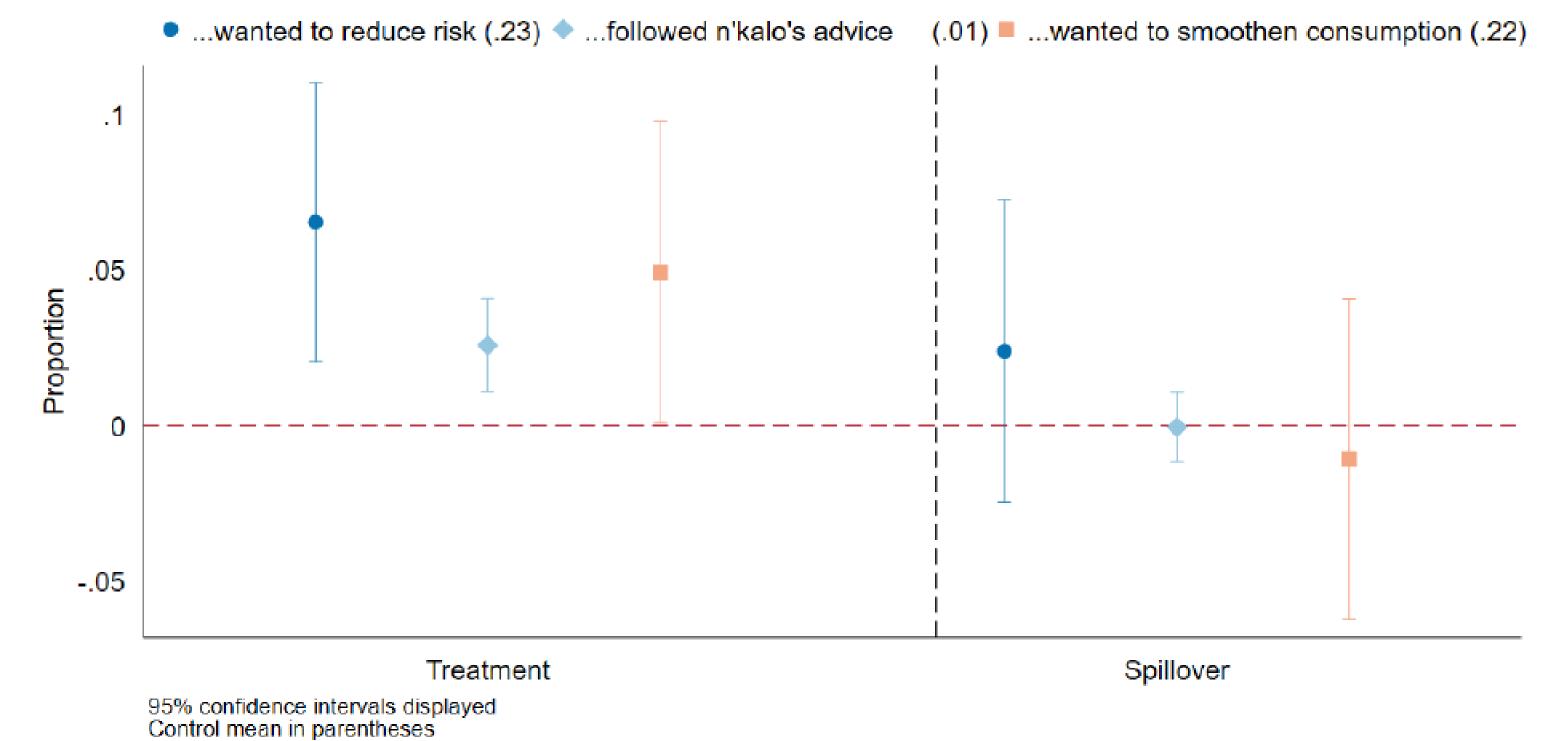
Treated producers sell more frequently



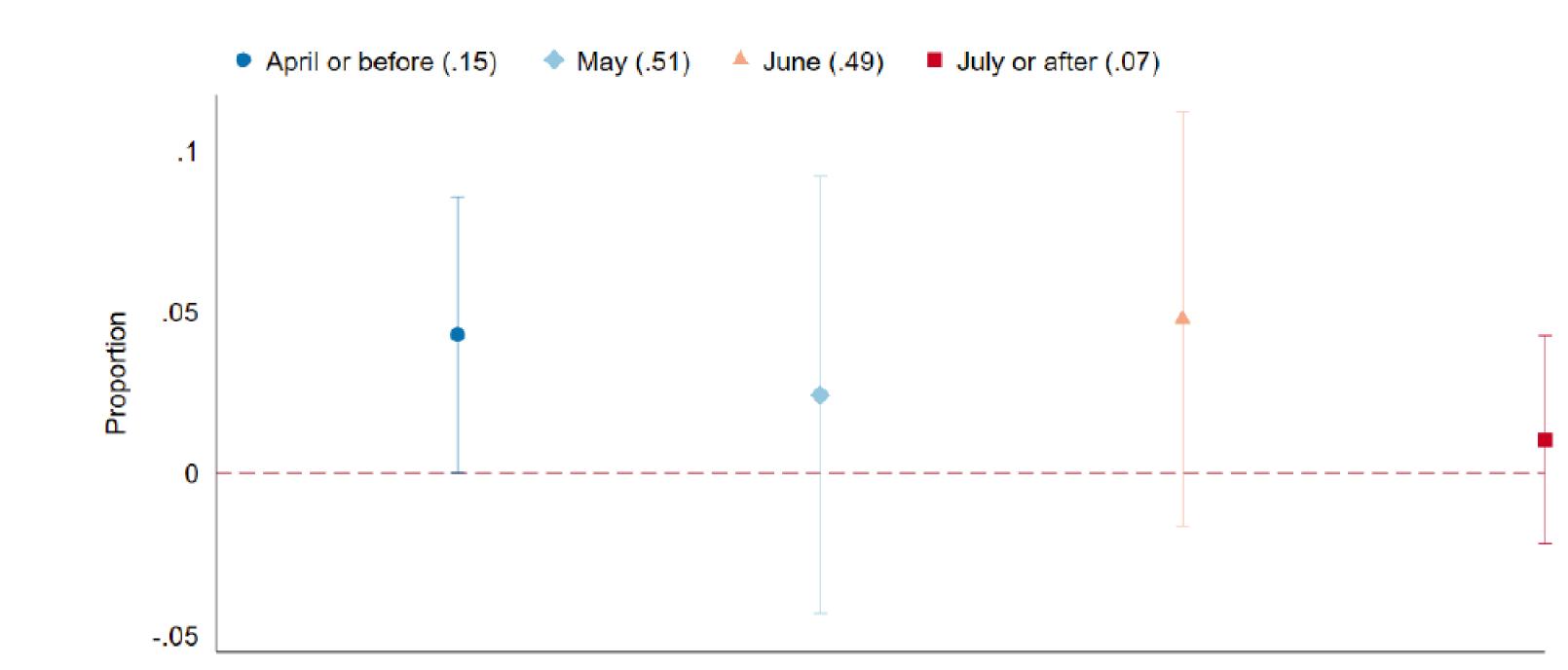


Spillover

Producers sold more than once because they...



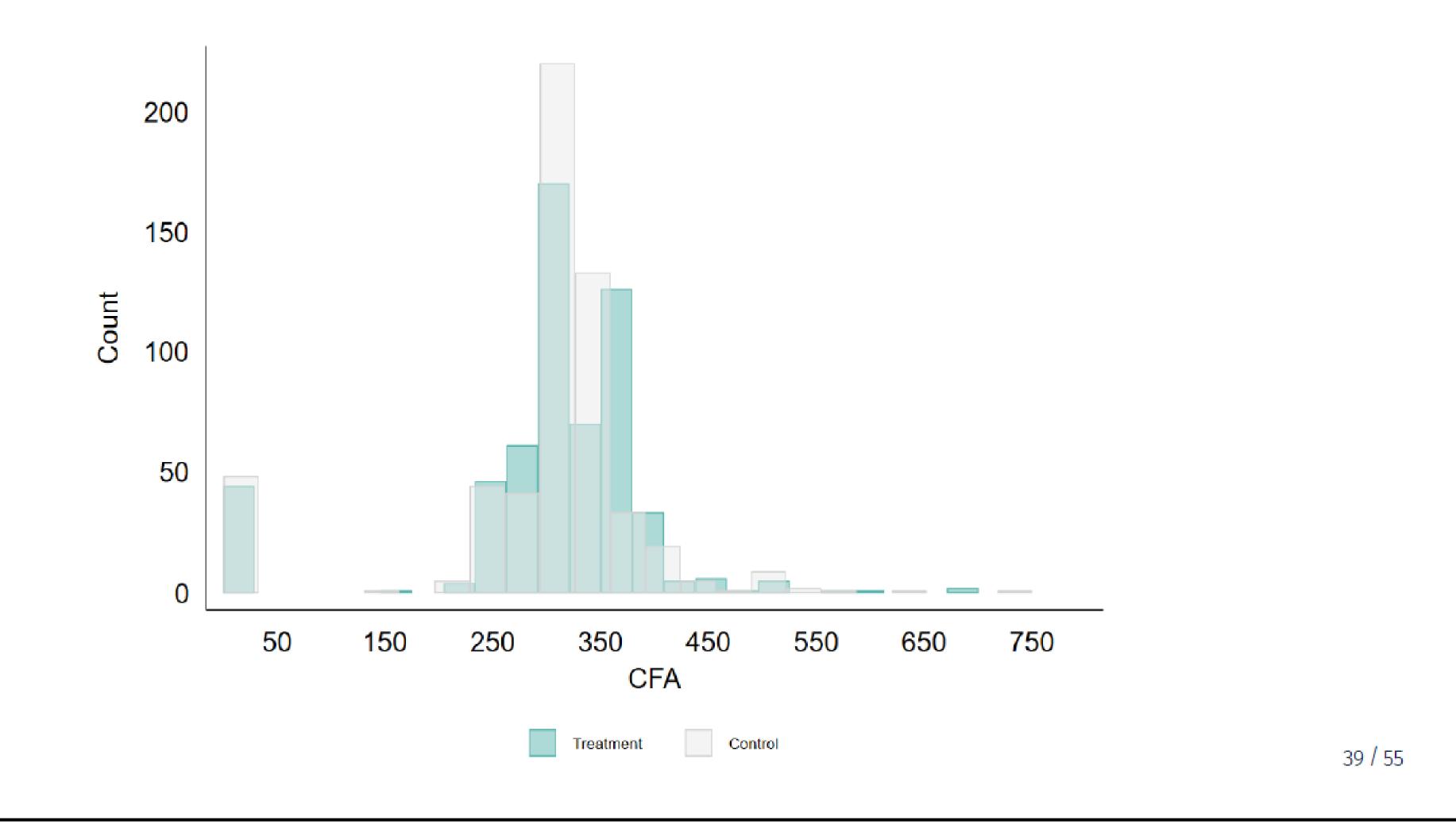
Treated producers start selling earlier



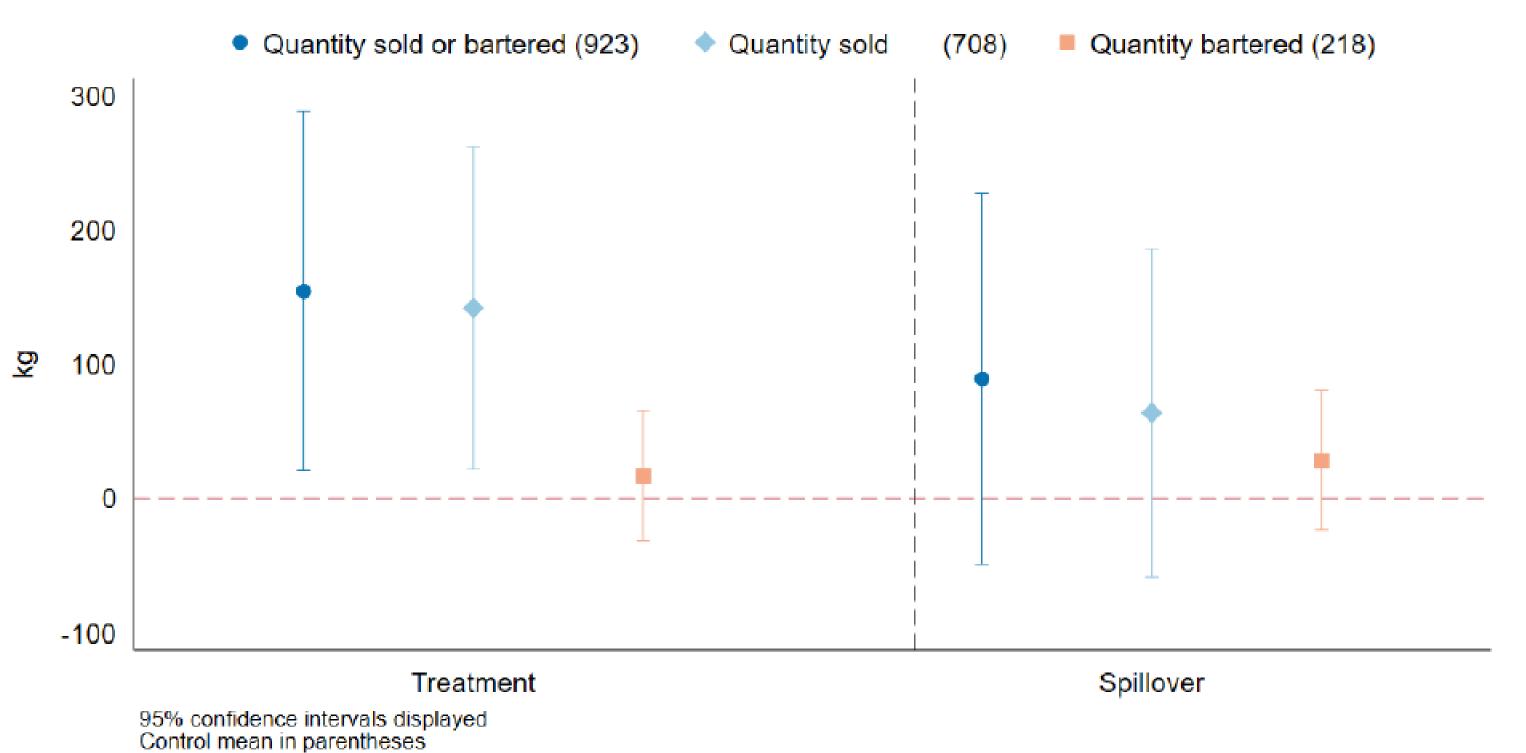
95% confidence intervals displayed Control mean in parentheses

Treatment

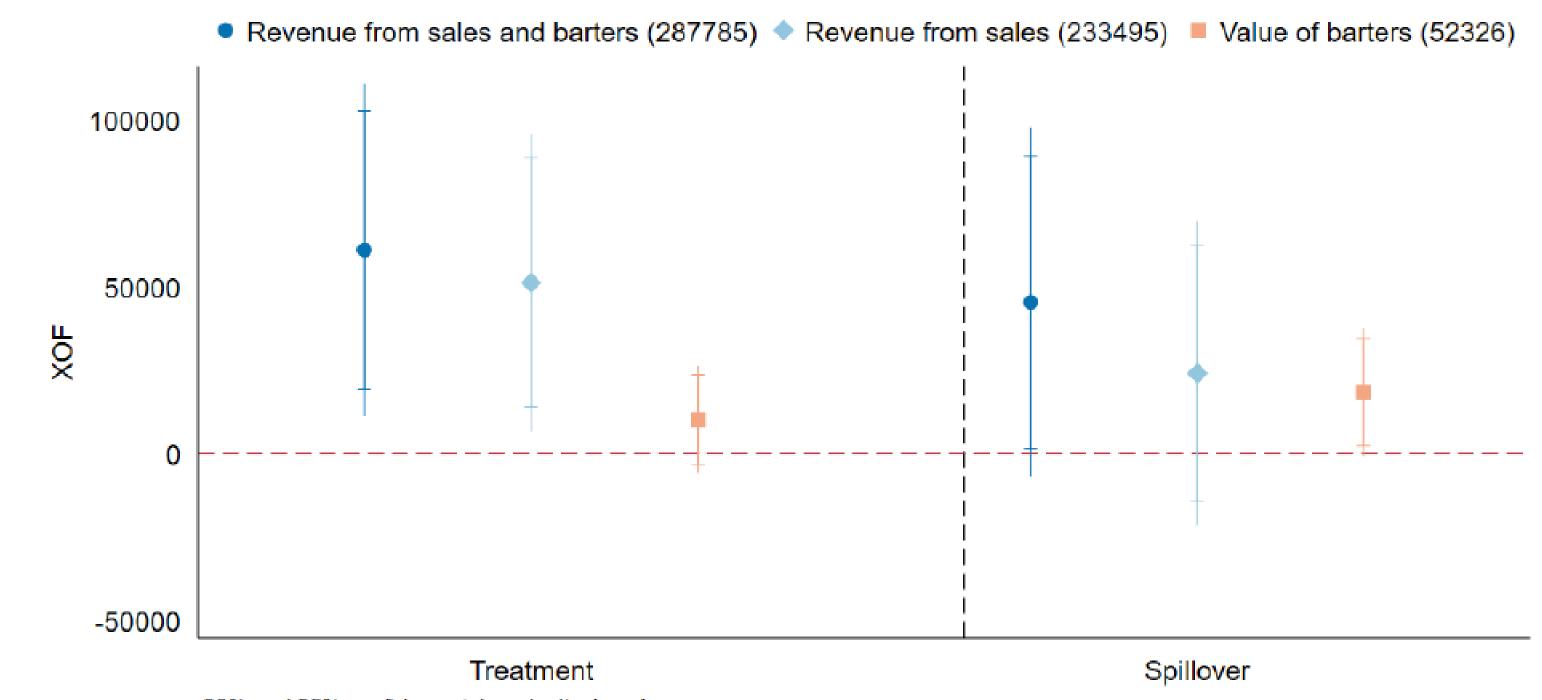
However, prices are not significantly higher for treated producers



But by selling more...



..treated producers make

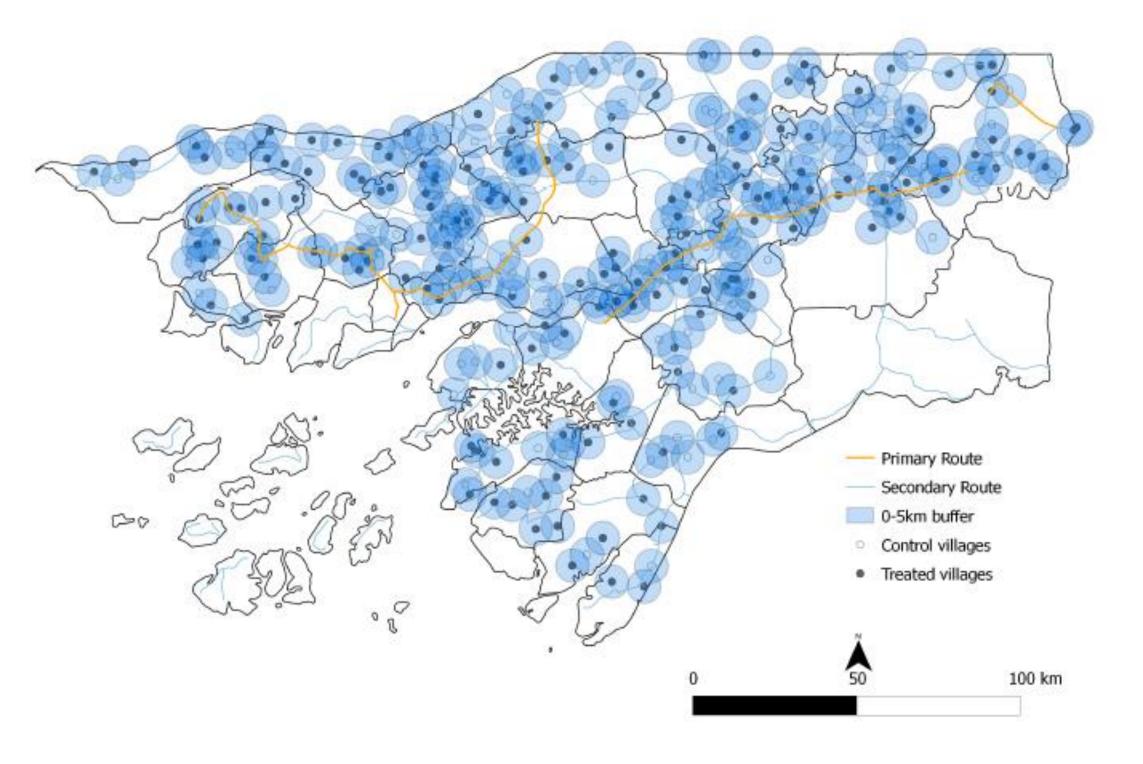


90% and 95% confidence intervals displayed Control mean in parentheses

more revenue (+21%)

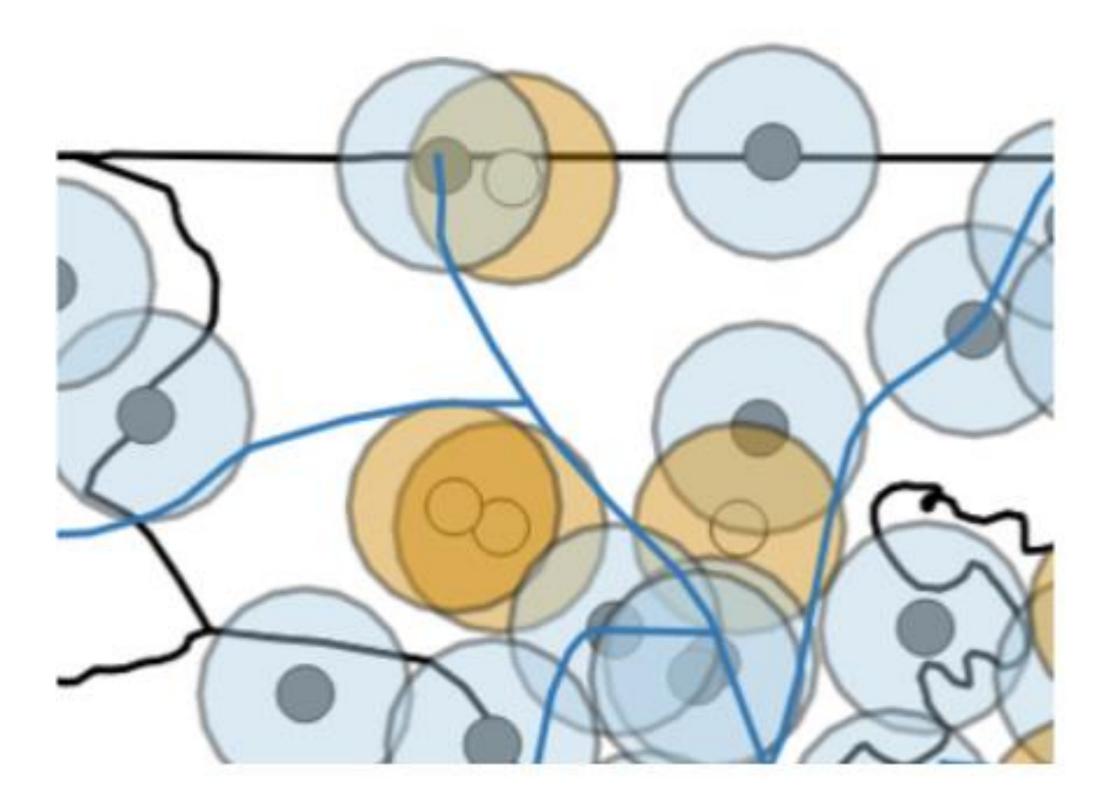
Identifying spillovers across villages

We identify between-village spillovers in the style of Miguel and Kremer (2004) and Egger et al. (forthcoming).



Quasi-random exposure to exogenous treatment

Control village (orange) center-left has no treated villages (blue) within 5km.





Between-village spillovers: prices and quantity sold

Treatment

Spillover

Treated producers within o-5km

Villages within o-5km

Treatment*Treated producers with

Spillover*Treated producers within

Obs.
P-value: Treat = Spillover
P-value (Interaction): Treat = Spillo
Control group mean
Control group st. dev.

Notes: OLS estimates of between-village effects, controlling for exogenous spatial treatment intensity. Each column represents a separate regression. The first three rows represent coefficients on household-level indicators for treatment assignment. The fourth row reports estimates of the effect of every additional treated producer within a radius of o-5km of the observation. The radius of o-5km was selected after running a series of nested models as in Egger et al. (forthcoming), selecting the model that minimised the Bayesian Information Criterion across all models. Outcome variables are listed across columns. The unit of observation is the producer. Regressions control for randomisation tripled fixed effects and baseline value of the outcomes. Conley (1999) standard errors are in parentheses, accounting for spatial correlation within a 5km radius. Stars on the coefficient estimates reflect unadjusted p-values. * denotes significance at 10 pct., ** at 5 pct., and *** at 1 pct. level. Bottom rows displays the mean, standard deviation for the control group, and total number of observations.

	(1)	(2)	(3)	(4)
	Price	Price	Quantity sold	Quantity sold
	2.16	7.09*	140.62**	94.17
	(3.37)	(4.08)	(61.25)	(69.35)
	2.49	6.92*	62.28	51.32
	(3.27)	(4.01)	(61.29)	(75.81)
	2.03*	3.96***	-4.21	-17.45
	(1.20)	(1.41)	(16.17)	(27.88)
	-6.22	-6.11	25.32	24.86
	(4.72)	(4.62)	(55.92)	(55.50)
nin o-5km		-2.90**		27.39
		(1.36)		(28.32)
n o-5km		-2.59*		6.93
		(1.42)		(29.63)
	1587	1587	1622	1622
	.918	.966	.143	-534
over		.742		.41
	295.71	295.71	708.21	708.21
	104.26	104.26	855.14	855.14

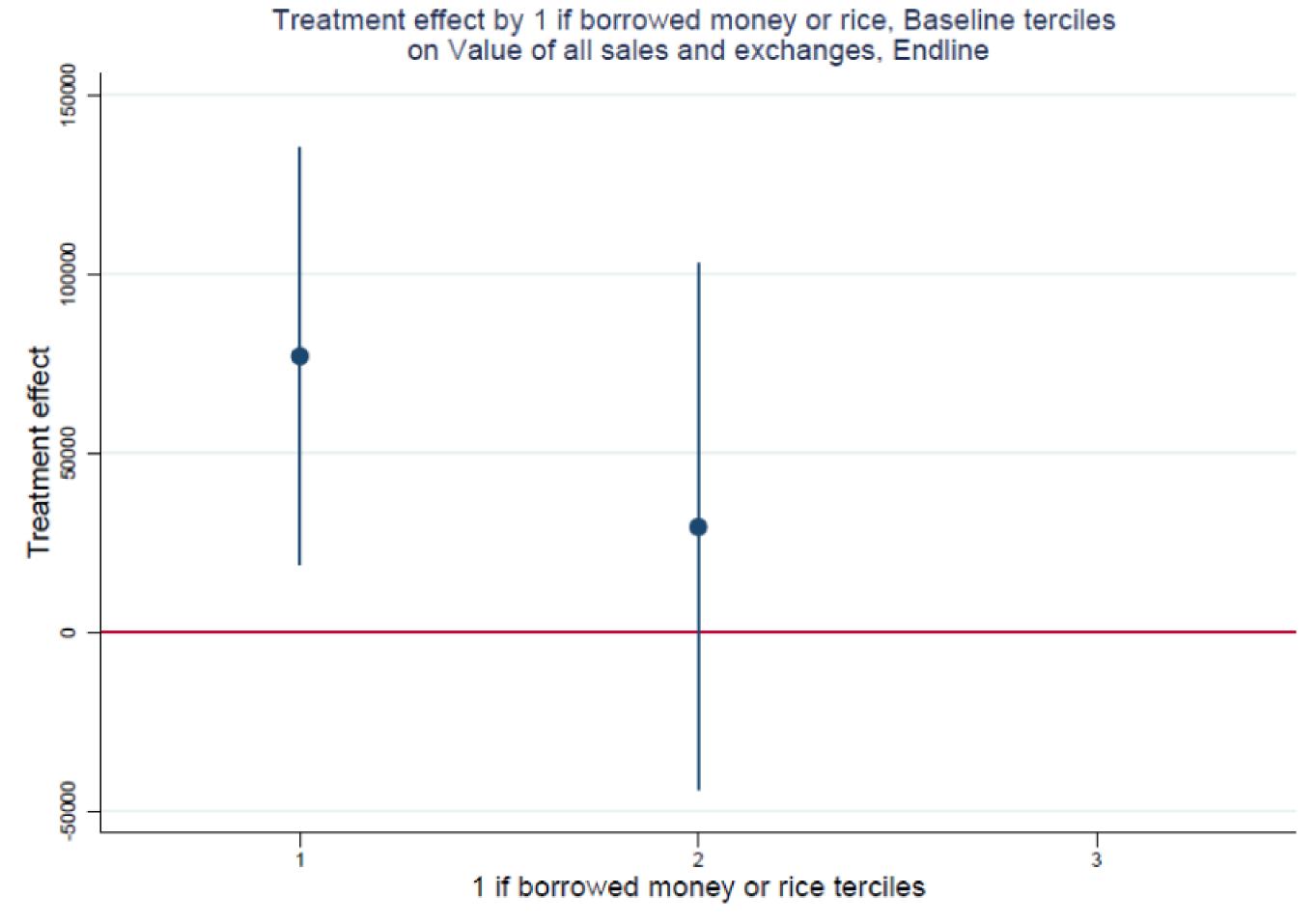
Heterogeneous effects and total revenue

significant for those producers who:

- Live close to a regional capital, or to a main road.
- Have no storage limitations.
- Had not borrowed money or rice before the cashew season.

The impact of the service on **total revenue** (and quantity sold) is large and

Increase in total revenue without credit frictions



Summary of results

Producers that are given access to market information change the timing and **frequency of sales**, as they sell when they prefer to, potentially smoothing consumption and the risk of price volatility.

No direct effect on average farmgate prices.

increased average prices.

Treated producers sold a larger amount and obtained a higher revenue.

less-constrained producers.

We identify between-villages spillovers across-villages, which show that the service

The service resulted in a clear increase in quantity sold and total revenue for those

Scaling-up and resulting policy

- the treated group continued to have access to it for free.
- The average increase in revenue for treated producers in 2021 was even larger.
- A follow-up project was financed by PEP, consisting of:

- An improve version of the service, with a team of market analysts based in the country, talking weekly on the phone to an information agent per village, who worked as an intermediary between the analysts and the community.

- An initiative to institutionalize impact evaluation within the government, setting up a unit and a team dedicated to evaluating projects



• During the 2021 season the service was made available to everyone in the country for about 0.3 euros per month, while

• The service was operational over four cashew seasons, reaching a peak of 3.000 subscribers – without any marketing.







Thanks for your attention and contributions!

