

ADANSONIA:
PEER NETWORKS & ENTREPRENEURSHIP
IN ECONOMIC DEVELOPMENT

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- Peer networks are thought to be important for innovation and hence entrepreneurship

If so, what does it hinge upon: trust, cohesion, diversity? What are the key dimensions?

Our aim is to

test the hypotheses
implement approach effectively

in a large scale

for statistical power
for policy relevance

This “journey” started a while ago ...

- In 2015, with a small experiment in rural South-East Ghana
- In 2016, continued with a large pilot in Ghana, Kenya, and Uganda
- In 2017, Adansonia,* the *full-scale RCT* conducted at the whole continental level

*“*Wisdom is like a baobab tree; no one individual can embrace it.*” (Ghanaian proverb)



ON THEORY AND EMPIRICAL EVIDENCE:
A METHODOLOGICAL DIGRESSION

Ideally, we would have liked to proceed from theory to empirical testing
Sometimes, things do not proceed in this way -- mainly if the phenomenon is complex & multisided

These features (complex & multisidedness) indeed apply to *peer innovation networks* –
many components involved:

- Diffusion (with learning)
- Matching (complementarities)
- Cooperation (trust)
- Competition (innovation rents)

These dimensions are in rich interplay, which is neither well understood nor documented

Our program collects exhaustive *individual* and *dated* (panel) information on:

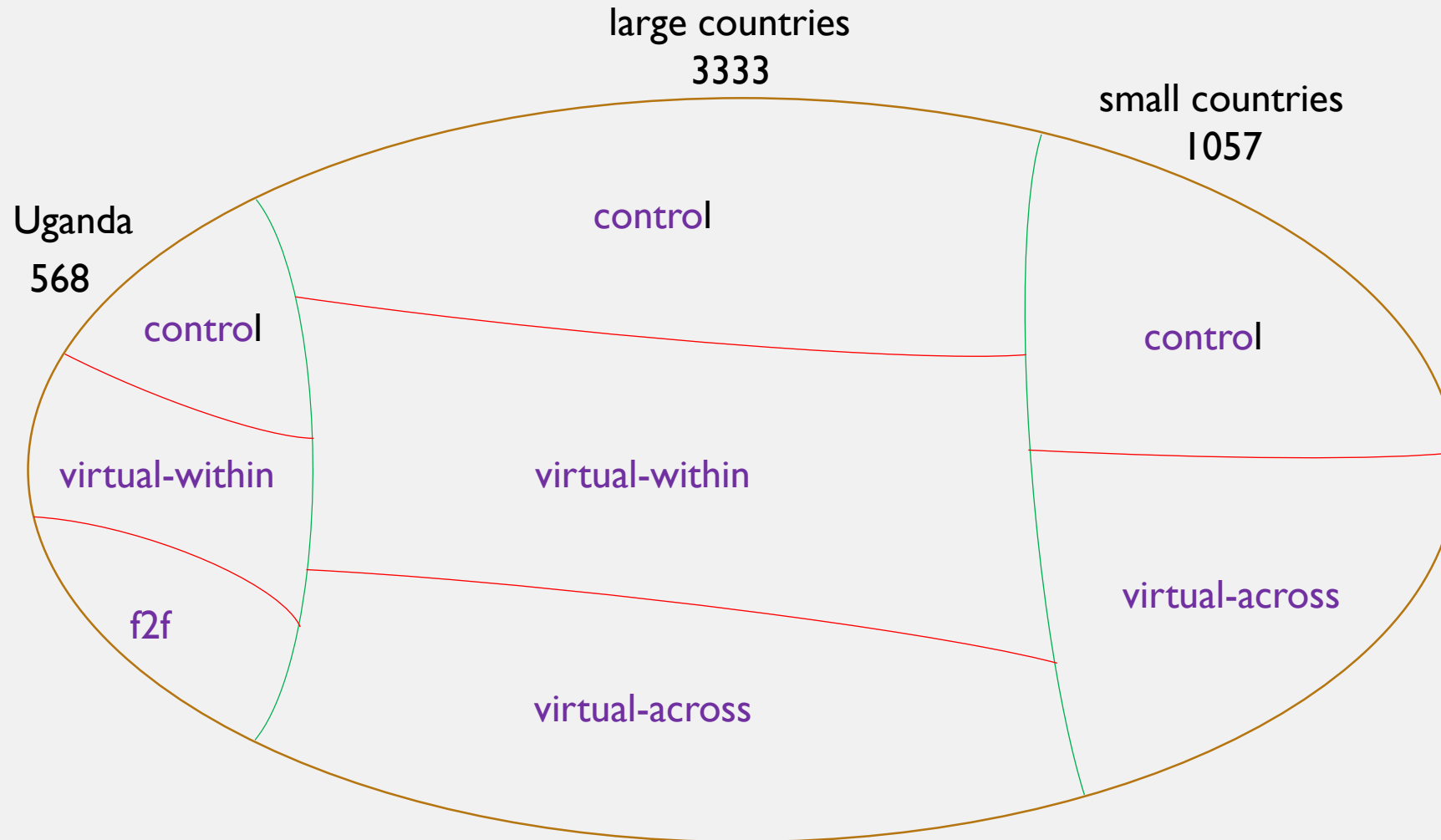
behavior, networking, communication, as well as eventual performance

which should shed much light on the problem and be valuable input for (well-informed) theory

EXPERIMENTAL SETUP

5000 entrepreneurs recruited from almost 50 African countries.

Treatment involves peer interaction in 60-individual instances: virtually (-within, -across) & f2f




TIMELINE

- **Interaction** (three treatment arms) & **online business course** (all) for 2.5 months
- **Outcome:** business proposals, which have undergone a two-stage evaluation:
 1. A 15-member panel consisting of African professionals
 2. 40 investors (VCs, angel investors, institutional ones, entrepreneurship hubs)

MULTILEVEL ANALYSIS

The analysis is carried out at three different levels

- **Econometric analysis of the treatment effect** for three different arms:
 - f2f -- virtual interaction within countries -- virtual interaction across countries
- **Co-evolving networking dynamics:** 

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graph LR; network <--> messages; network --> proposals[business proposals]; messages --> proposals;
```
- **Co-evolving communication:**

PLAN FOR THE REST OF THE TALK

- Preliminary econometric analysis -- effect of treatment/networking on
 - submission
 - the extensive margin (submission *and* project quality, combined)
 - the intensive margin (project quality, contingent on submission)
- Outline of the network analysis
 - How different treatments (e.g. virtual *vs* f2f) affect networking
 - What is effect of different patterns of networking on communication and eventual outcome
- Outline of the semantic analysis
 - What “sentiment” (cooperative/competitive, disperse/focused, formal/informal, etc.) prevails in different treatments
 - How is such sentiment associated to networking patterns and eventual performance

BUSINESS PROPOSAL SUBMISSION

Summary:

- f2f interaction (Uganda sample) promotes submission
- Virtual interaction within countries promotes submission
(positive effect in large countries, positive but not significant in Uganda)
- Virtual interaction across countries no-effect/discourages submission
(statistically insignificant in large countries, negative effect in small countries)

OLS regressions submission

(strata dummies, evaluator fixed effects
clustered errors at the group level)

	Submitted proposal
Panel A: Uganda sample	
face to face	0,126
	(0.038)***
virtual-within	0,022
	(0,03)
Panel B: large-country sample	
virtual-across	0,014
	(0,02)
virtual-within	0,036
	(0.015)**
Panel C: small-country sample	
virtual-across	-0,057
	(0.024)**

EXTENSIVE-MARGIN ANALYSIS

Outcome: submission + quality business proposal

Grades: 0 to 5 (no submission = 0)

Summary:

- f2f interaction (Uganda sample) promotes submission
- Virtual interaction within countries promotes submission
(positive effect in large countries, positive but not significant in Uganda)
- Virtual interaction across countries no-effect/discourages submission
(statistically insignificant in large countries/negative effect in small countries)

Same pattern as for submission!

This raises important question: Is there an intensive treatment effect (among those who submit)?

OLS regressions

extensive margin

(strata dummies, evaluator fixed effects
clustered errors at the group level)

	Evaluation
Panel A: Uganda sample	
face to face	0,411
	(0.106)**
virtual-i-within	0.165
	(0,12)
Panel B: large-country sample	
Virtual-within	0,128
	(0,047)***
virtual-across	0,047
	(0,06)
Panel C: small-country sample	
virtual-i-across	-0,135
	(0.073)**

INTENSIVE-MARGIN ANALYSIS

Outcome: quality business proposal (1-5 scale, conditional on submission)

Key concern: selection bias, since submission is endogenous!

(we partly tackle it by relying on additional exogenous information on “motivation”)

Summary:

- Virtual interaction *within* countries *promotes* quality of business projects
(positive significant effect in large countries and Uganda)
- Virtual interaction *across* countries & *f2f* has *no* effect on project quality
(both in small and large countries, statistical insignificant)

OLS regressions

intensive margin

(strata dummies, evaluator fixed effects
clustered errors at the group level)

	Evaluation
Panel A: Uganda sample	
face to face	0,057 (0.23)
virtual-within	0.427 (0,205)**
Panel B: large-country sample	
virtual-within	0,139 (0,068)**
virtual-across	-0,008 (0,08)
Panel C: small-country sample	
virtual-across	0,074 (0.12)

NETWORK ANALYSIS

Definition of the network (most basic, other more sophisticated considered):

individual $i \longrightarrow j$ if i writes in a channel (private or public) at some t and j visits it at $t' > t$

Advancing two **simple regularities**:

- (a) **Project quality** correlated with the **centrality** of entrepreneurs but *not* with their degree
- (b) Individuals in **v-across** display higher degree -- **communicate more** -- than those in v-*within*.

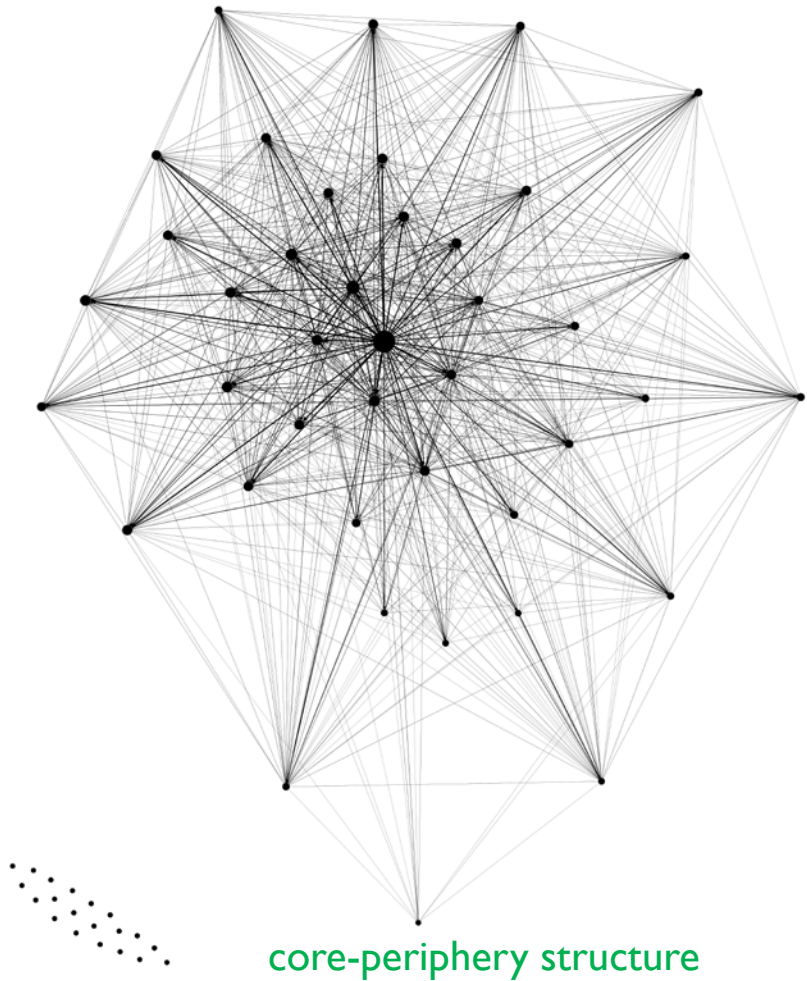
In view of our econometric analysis, (a)-(b) appears somewhat surprising/interesting:

Intensity of communication per se “is not it,” a more global feature is more important

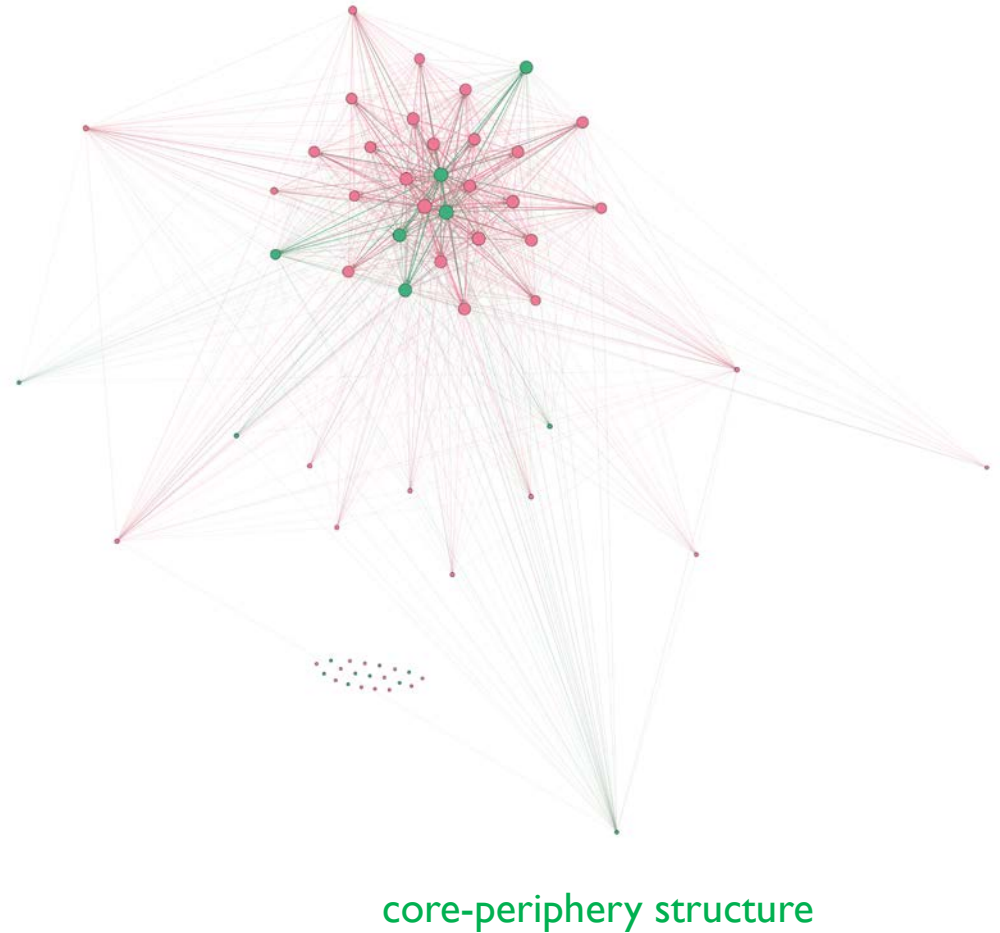
Is it that too much diversity breeds more communication, but a less fruitful one?

Or is it that the national/geographical dimension of diversity is a red herring, counterproductive?

To shed light on this, complementary **semantic analysis** of the communication/messages (~100K)



Group under **virtual interaction within**
(all individuals from *Nigeria*)



Group under **virtual interaction across:**

- **Green nodes:** individuals from small countries
- **Red nodes:** individuals from large countries

SEMANTIC (NLP) ANALYSIS

(W/ DIRK HORVY, BOCCONI)

Preliminary step: use machine-learning techniques to extract information on

- the **content** (meaning, sentiment) of *messages*
- the **attitudes** (expectations, aspirations) of the *individuals* who send those messages
- the **social norms** (rules) according to which individuals interact within their *group*

Two aims:

1. Use this to shed light on key issues that call for semantic understanding of communication, e.g. why v-across yields more messages but worse performance (less substance? less structure?)
2. Contribute *categorical/qualitative* variables and *continuous/numerical* ones to econometric analysis, e.g. identify how the *sentiment, amount* of communication, its *novelty* contribute to innovation

SUMMARY & PLAN AHEAD

SUMMARY: RCT to identify/measure peer effects (virtual and face-to-face) on innovation and entrepreneurship

- *Positive* effect of *v-within* a country *both* in the *extensive* and *intensive* margin
- *Positive* effect for *f2f* in the *extensive*, *not* *intensive* – thus operates *through submission*
- *Negative* effect for *v-across* in the *extensive*, *not* *intensive* – thus operates *through submission*
- *Network and semantic analysis* of full-fledged panel data to shed light on results & improve econometric analysis

PLAN AHEAD:

- Identify what sources/dimensions of inter-agent diversity conducive or detrimental to fruitful interaction
- Major improvement/integration of incentive scheme, interaction platform, and funding mechanism
- Test external validity of the insights obtained for our African context in other environments