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 & multisdedness) 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:

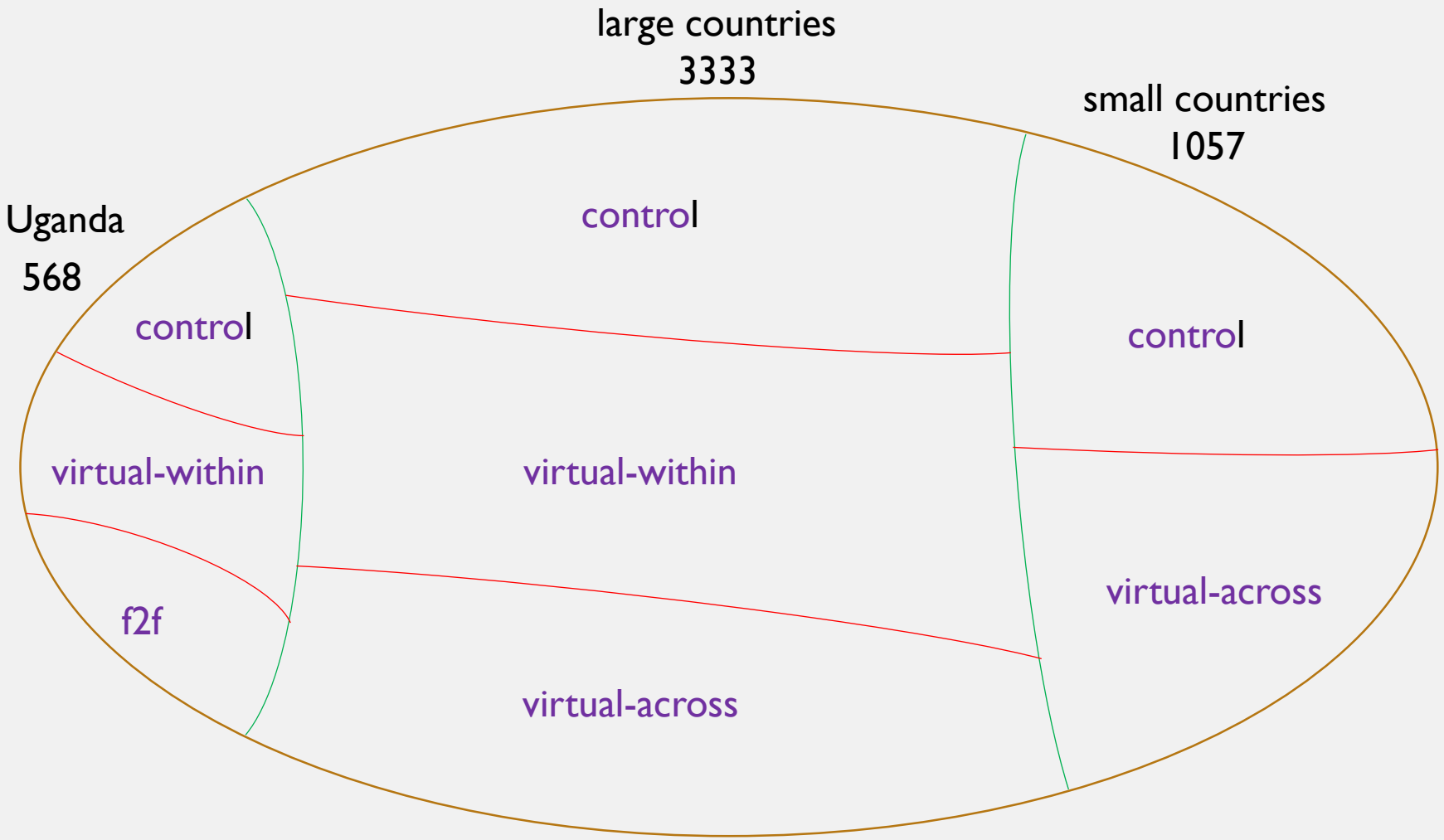
behavior, networking, communication, as well as eventual ***performance***

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: network ↔ messages → business 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***.

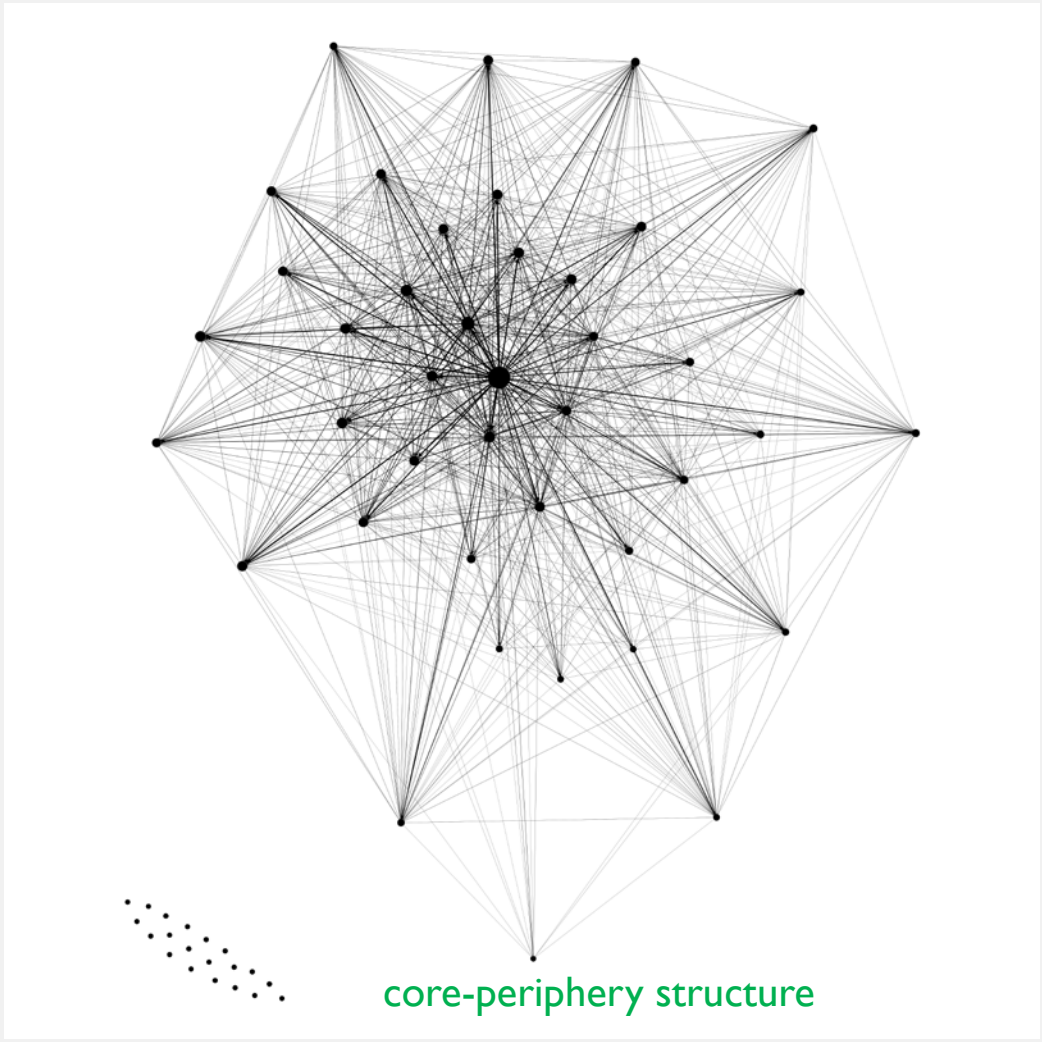
In view of our econometric analysis, (a)-(b) appears somewhat surprising/interesting:

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?

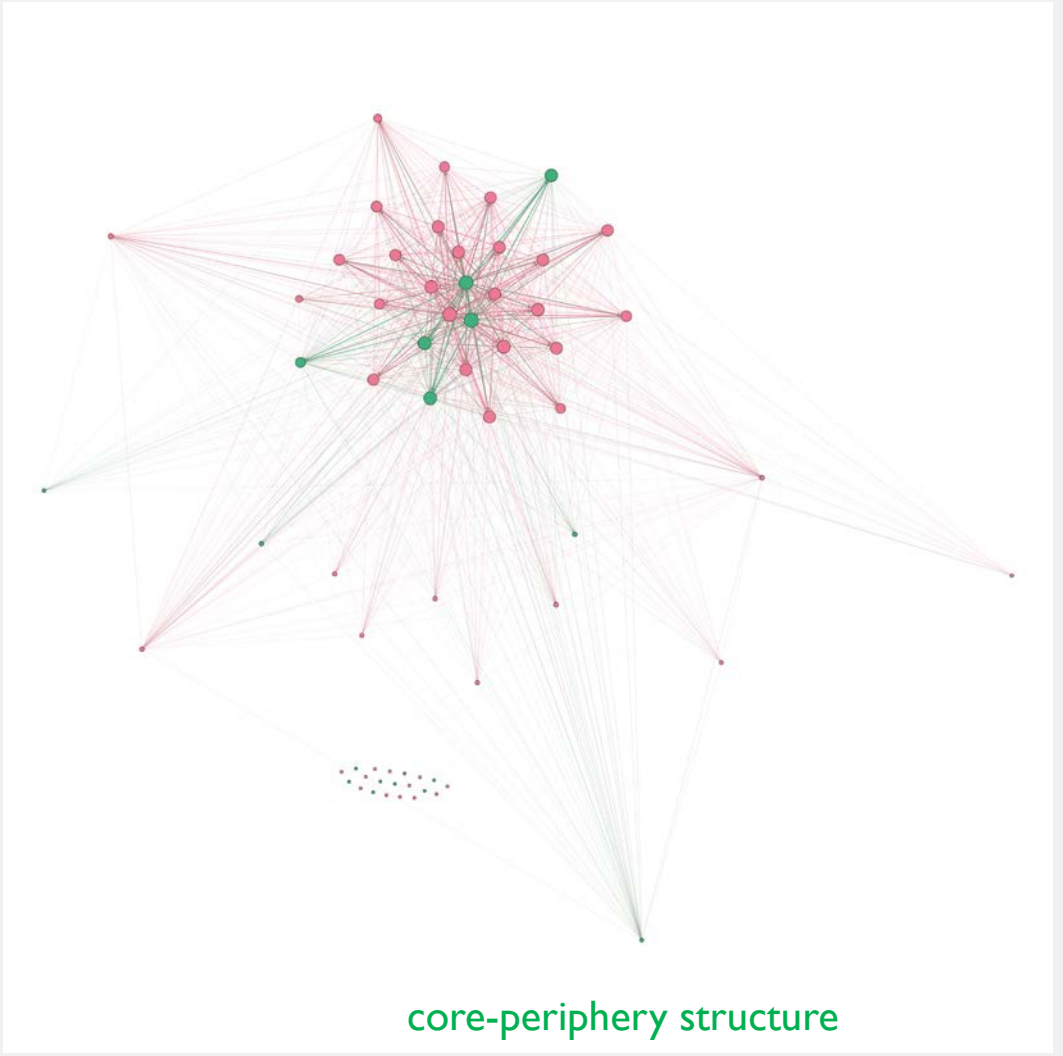
Or is it that the national/geographical dimension of diversity is a red herring, counterproductive?

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



core-periphery structure

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



core-periphery structure

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 mechanim
- Test external validity of the insights obtained for our African context in other environments