

Virtual Business Networks and Knowledge Diffusion: Experimental Evidence from Liberia

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Introduction

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 - ▶ Traditional training programs have been widely implemented and studied,
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 - ▶ Yet many MSMEs may lack access to business networks that enable such exchanges.
- ▶ The widespread adoption of mobile phones, social media, and messaging apps, has transformed how innovation and ideas are shared (Aghion & Howitt, 1992; Forman *et al.*, 2005; Acemoglu *et al.*, 2016).
 - ▶ Can virtual platforms be leveraged to foster peer-to-peer interactions?

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 - ▶ ~400 entrepreneurs were randomly invited to participate in the business discussions.
 - ▶ ~200 entrepreneurs participated in weekly business discussions, for six weeks.

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 - ▶ ~400 entrepreneurs were randomly invited to participate in the business discussions.
 - ▶ ~200 entrepreneurs participated in weekly business discussions, for six weeks.
- ▶ The intervention is very cost-effective.
 - ▶ Virtual platforms offer a *scalable* solution for extending business networks to micro-entrepreneurs.

Literature Review

▶ **Digital Technologies and Knowledge Diffusion**

Digital tools help overcome market barriers in developing economies.

- ▶ They reduce information frictions and transaction costs (Jensen, 2007; Jack & Suri, 2014).
- ▶ Enhance market access, reduce price dispersion, improve business practices (Aker, 2010; Hjort & Poulsen, 2019).
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▶ Learning via Peer-to-Peer Interactions

Peer interactions improve knowledge transfer and performance.

- ▶ Group-based discussions shown effective in China (Cai & Szeidl, 2018) and throughout Africa (Vega-Redondo *et al.*, 2024; Baseler *et al.*, 2025; Asiedu *et al.*, 2023).
- ▶ Mechanisms include tech adoption, information diffusion, mentoring, and collaboration opportunities (Beaman *et al.*, 2021; Hardy & McCasland, 2021; Asiedu *et al.*, 2023; Baseler *et al.*, 2025).

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▶ Contribution of This Paper

- ▶ First experimental evidence on *virtual* business group discussions for micro-entrepreneurs.

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Context: REALISE SSB Program

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- ▶ **Discussion Groups Sample:** SSB applicants, including grant recipients (grant lottery winners) and non-recipients (grant lottery losers).
 - ▶ Allows to benchmark effect of discussion groups with effect of grant.

Business Discussion Groups

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 - ▶ From the two most represented sectors:
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- ▶ **In-Person Launch:** Treatment group invited to in-person meetings held within their community.
 - ▶ Randomly assigned to groups of 5-6 participants upon arrival.
 - ▶ Transportation and lunch provided to encourage attendance.

Business Discussion Groups (cont'd)

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- ▶ **Structure:** Group composition remained fixed throughout the intervention.

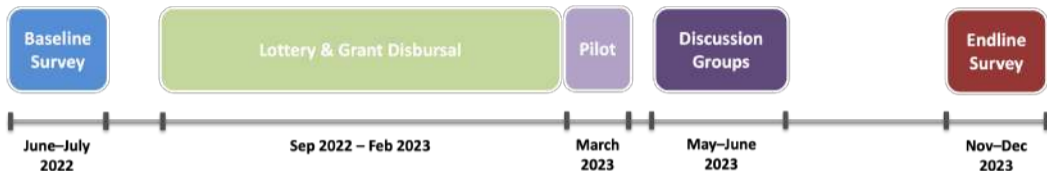
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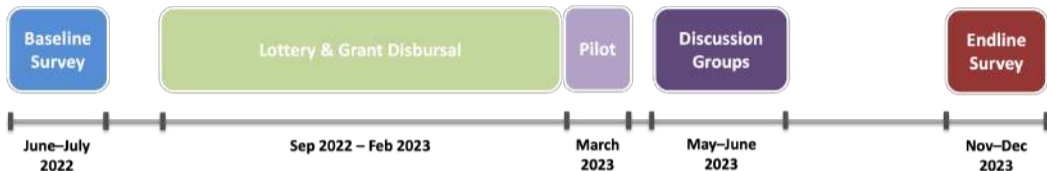
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- ▶ **Incentives:** Participants who completed all six sessions received a small reward of \$1.

Timeline



- ▶ **Survey Rounds:** Full sample surveyed both pre- and post-intervention.
- ▶ **Analysis Focus:** Short-term impacts measured approximately six months after the intervention.

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- ▶ **Survey Rounds:** Full sample surveyed both pre- and post-intervention.
- ▶ **Analysis Focus:** Short-term impacts measured approximately six months after the intervention.
- ▶ **Survey Attrition:** 1,039 entrepreneurs answered the endline out of the 1,131 (8% attrition)
 - ▶ No systematic difference between survey respondents and non-respondents.

Sample summary stats and balance

Variable	(1)		(2)		(1)-(2)	
	Control Group N	Mean/(SD)	Treatment Group N	Mean/(SD)	Pairwise t-test N	P-value
Female	696	0.807 (0.395)	435	0.795 (0.404)	1131	0.620
Age	696	36.929 (12.120)	435	37.228 (11.767)	1131	0.683
Literate	696	0.608 (0.489)	433	0.621 (0.486)	1129	0.651
Age at first employment	696	21.148 (5.816)	435	21.517 (6.002)	1131	0.305
Has an active business	696	0.888 (0.316)	433	0.880 (0.325)	1129	0.682
Total revenues	696	43.092 (50.129)	433	36.293 (40.526)	1129	0.018**
Total cost	696	27.647 (46.653)	433	24.303 (42.077)	1129	0.224
Sector: Clothing and Shoes	696	0.365 (0.482)	435	0.352 (0.478)	1131	0.653
Sector: Retail of Food and Drinks	696	0.635 (0.482)	435	0.648 (0.478)	1131	0.653

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What works?

Participation

	# of obs	Prop. of sample
Invited to participate	434	1.000
Consented to participate	280	0.645
Attended in-person meeting	209	0.482
Attended second meeting	156	0.359
Attended third meeting	159	0.366
Attended fourth meeting	155	0.357
Attended fifth meeting	155	0.357
Attended sixth meeting	162	0.373

- ▶ Conditional on attending the first meeting, high participation rate
 - ▶ Median attendance of five out of six meetings.

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- ▶ No correlation between ex-ante expressed interest and actual participation [▶ Table](#)
- ▶ High self-reported satisfaction rate. [▶ Table](#)
- ▶ Self-reported preferred topics include: finance topics (including savings), and growth and sales strategies. [▶ Table](#)

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Empirical Strategy

- ▶ We estimate the effect of discussion groups with the following specification:

$$y_{ij} = \alpha + \delta BDG_i + X_{ij}\beta + \epsilon_{ij}$$

- ▶ y_{ij} is the outcome of firm i in market j
- ▶ BDG_i is a dummy that takes the value 1 if firm i is invited to participate in business discussion groups
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 - ▶ X_{ij} is a vector of controls
- ▶ Since not all business owners who were invited to participate in the business discussion groups actually participated, we instrument participation with assignment to treatment (treatment on the treated):

$$y_{ij} = \alpha + \delta \widehat{BDG}_i + X_{ij}\beta + \epsilon_{ij}$$

- ▶ \widehat{BDG}_i is a dummy that takes the value 1 when firm i participates in the discussion groups, and is instrumented by BDG_i a dummy that take the value 1 when firm i is invited to participate.

Empirical Strategy (cont'd)

- ▶ For business outcomes that were measured both at baseline and at endline we estimate using the two survey rounds, with round fixed effects:

$$y_{ijt} = \alpha + \delta \widehat{BDG}_{it} + X_{ij0}\beta + \mu_t + \epsilon_{ijt}$$

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- ▶ BDG_{it} is a dummy that takes the value 1 if firm i is invited to participate in business discussion groups
- ▶ And we include the effect of the grant (for benchmarking):

$$y_{ijt} = \alpha + \delta \widehat{BDG}_{it} + \gamma Grant_{it} + X_{ij0}\beta + \mu_t + \epsilon_{ijt}$$

- ▶ $Grant_{it}$ is a dummy that takes the value 1 if firm i won the lottery—including if they were part of business discussion groups
- ▶ X_{ij0} includes a dummy for attending the lottery

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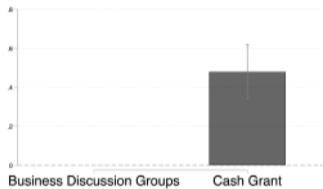
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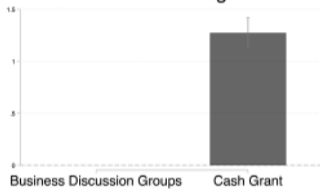


Business Strategies

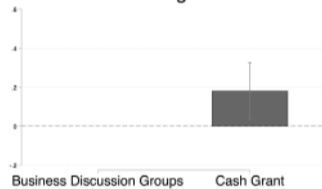
Innovation Index



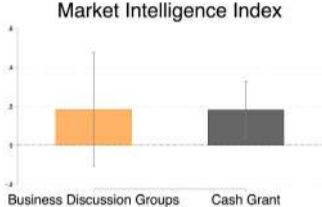
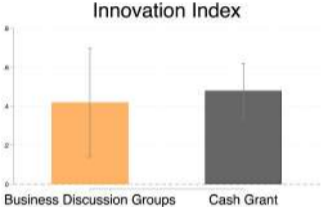
Financial Planning Index



Market Intelligence Index



Business Strategies



▶ Table

Business Strategies



- ▶ Participants in business discussion groups used more innovative strategies

▶ Table

Business Strategies: Innovation

New Suppliers (0.12)



New Products (0.73)



New Production Technology (0)



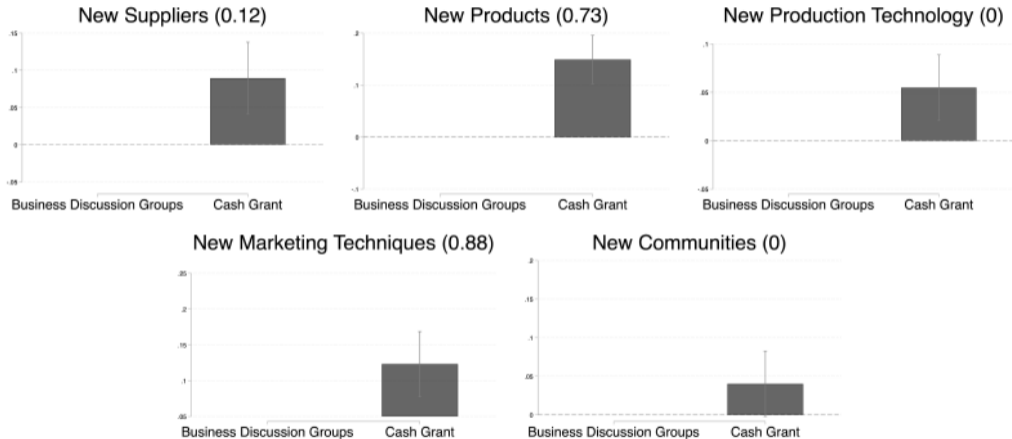
New Marketing Techniques (0.88)



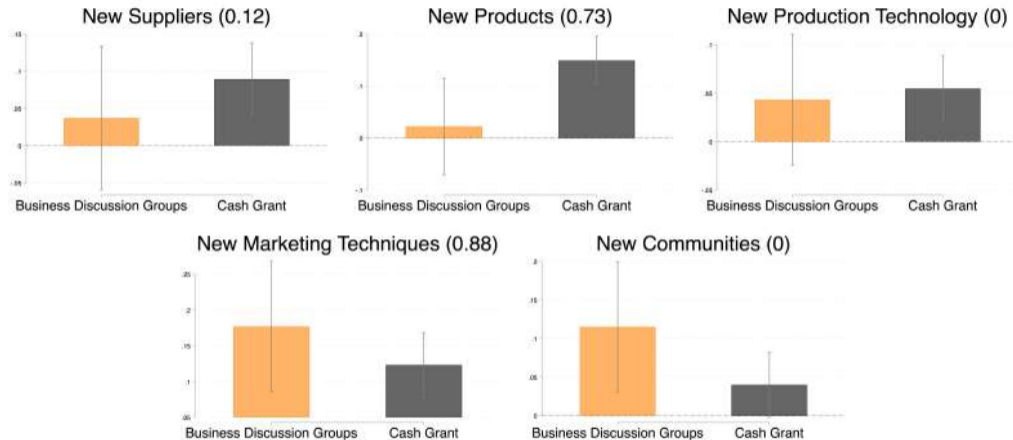
New Communities (0)



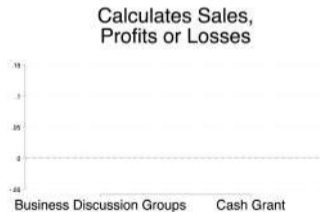
Business Strategies: Innovation



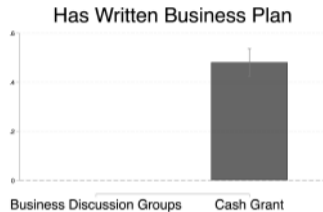
Business Strategies: Innovation



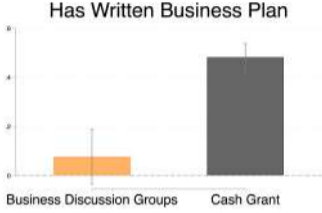
Business Strategies: Financial Planning



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Business Strategies: Market Intelligence

Visited Competitors
To See Prices



Visited Competitors
To See Products



Asked Customers
Their Preferences



Asked Former Customers
Reasons for Stopping

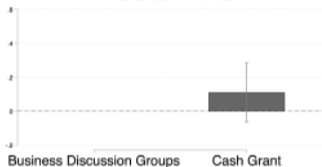


Asked Suppliers
Successful Products

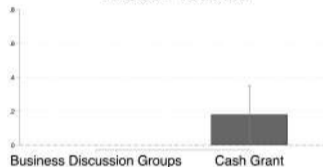


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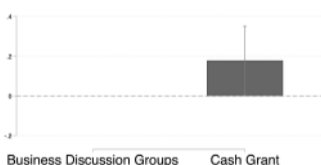
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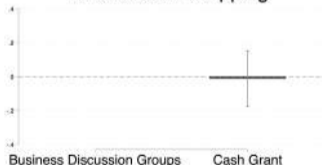
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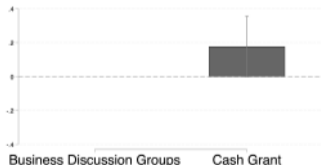
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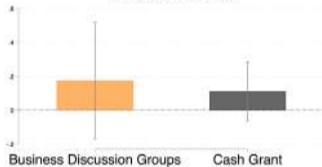


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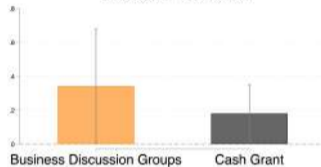


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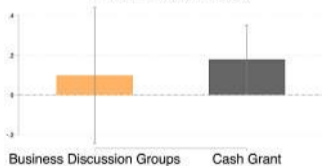
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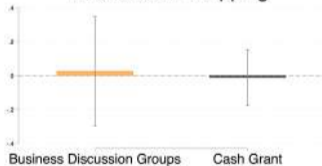
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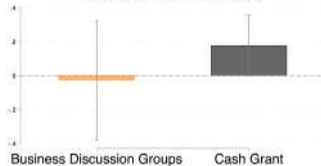
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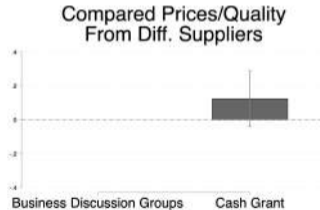
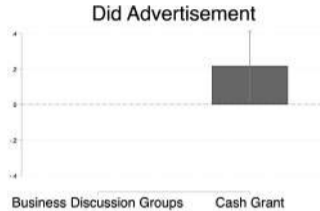
Asked Suppliers
Successful Products



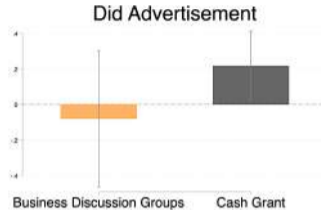
Business Strategies: Market Intelligence (cont'd)



Business Strategies: Market Intelligence (cont'd)



Business Strategies: Market Intelligence (cont'd)



Outline

Setting & Experimental Design

Effect of Discussion Groups on Business Outcomes

Participation in Discussions

Empirical Strategy

Treatment Effect on Business Strategies

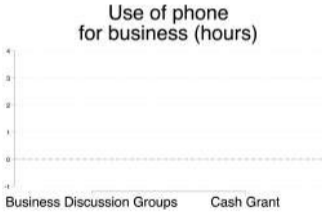
Treatment Effect on Digital Adoption

Treatment Effect on Professional Networks

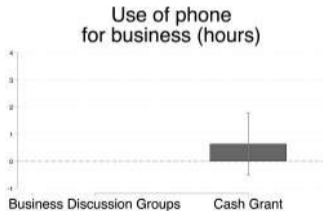
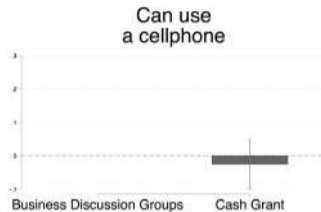
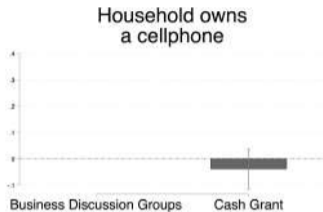
Treatment Effect on Business revenues and profits

What works?

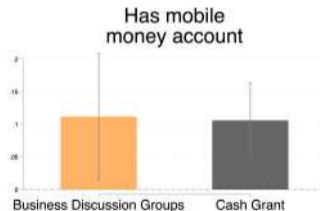
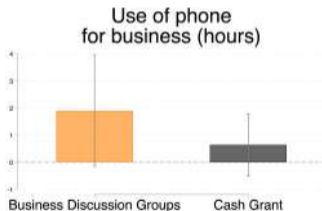
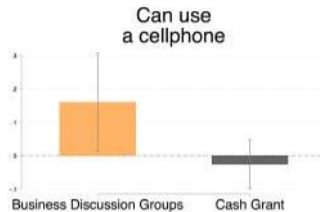
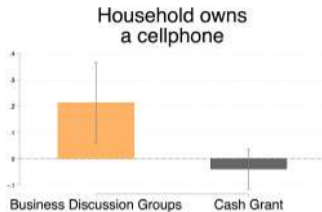
Digital Adoption: Cellphones Usage



Digital Adoption: Cellphones Usage



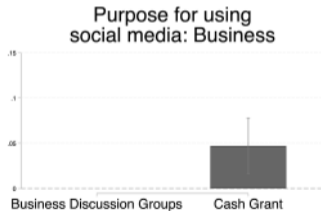
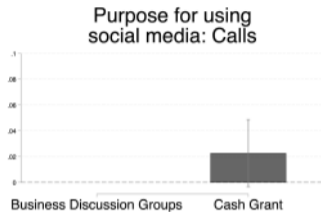
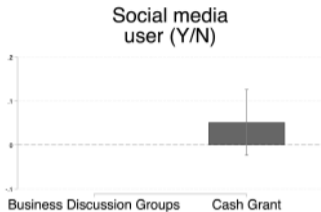
Digital Adoption: Cellphones Usage



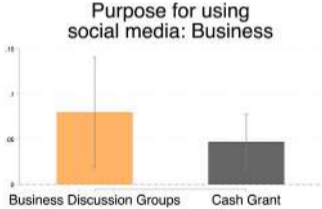
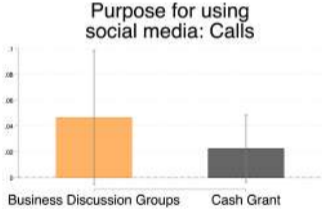
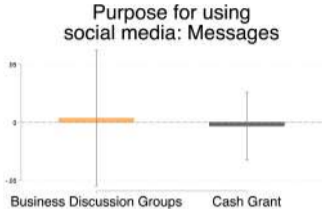
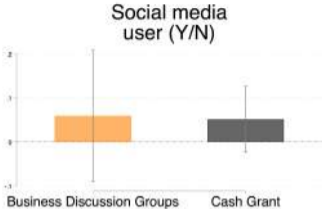
Digital Adoption: Social Media



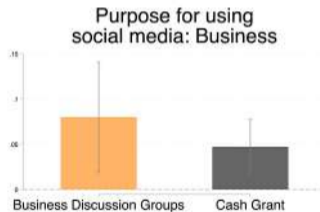
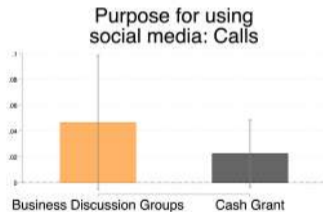
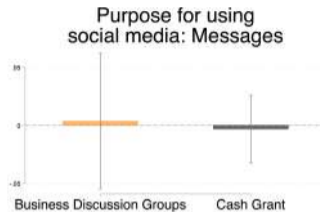
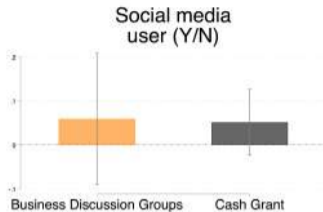
Digital Adoption: Social Media



Digital Adoption: Social Media



Digital Adoption: Social Media



► Treatment increased the use of digital technologies for business purposes.

► Table

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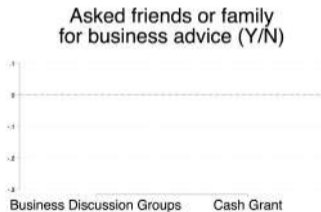
Treatment Effect on Digital Adoption

Treatment Effect on Professional Networks

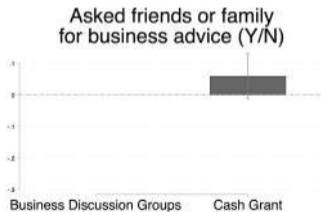
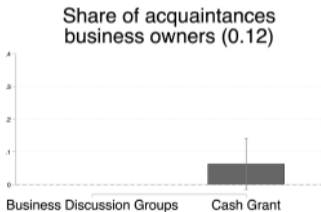
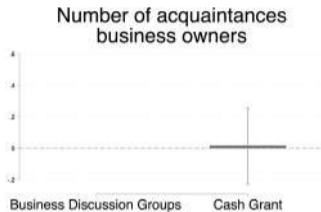
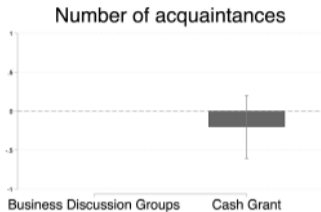
Treatment Effect on Business revenues and profits

What works?

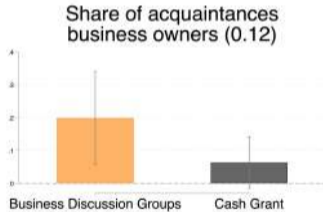
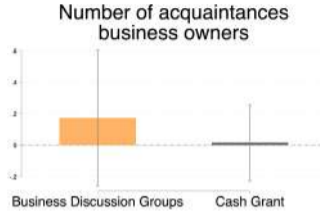
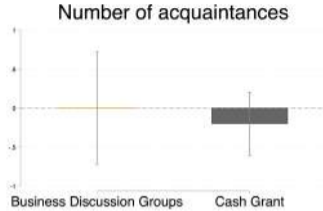
Professional Networks



Professional Networks



Professional Networks



Outline

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Empirical Strategy

Treatment Effect on Business Strategies

Treatment Effect on Digital Adoption

Treatment Effect on Professional Networks

Treatment Effect on Business revenues and profits

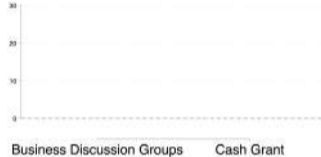
What works?

Business revenues and profits

**Business Revenues
(USD)**



**Business Costs
(USD)**



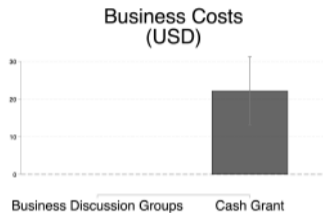
**Business Profits
(USD)**



**Personal Savings
(USD)**



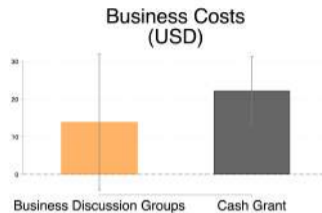
Business revenues and profits



Business revenues and profits



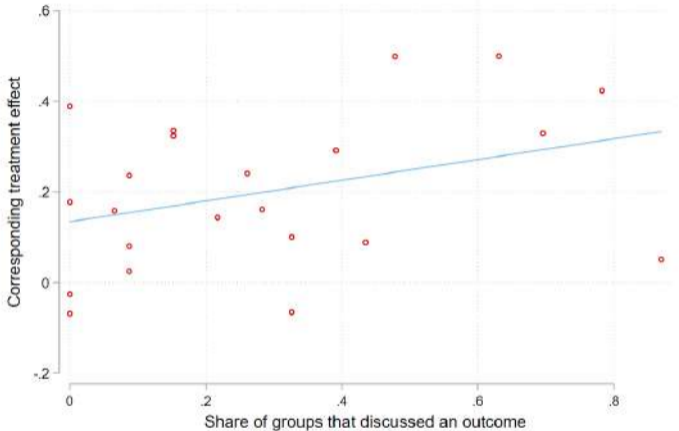
Business revenues and profits



► No effects on short-term profits

► Table

Mediation Analysis



► Correlation=0.35, P-val=0.1055

► Table

Outline

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Treatment Effect on Professional Networks

Treatment Effect on Business revenues and profits

What works?

Heterogeneity of Treatment Effect

Who gains the most from the intervention?

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- ▶ **men** → more likely to innovate, digitize their business, network, and **save**.

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- ▶ **w/ more education** → more likely to innovate, digitize their business, and network.
- ▶ **who started working early in their life** → more likely to innovate, digitize their business, network, increased their revenues, their costs, and **save** (as much as the grant does).

Heterogeneity of Treatment Effect

Which group characteristics drive stronger effects?

- ▶ **Group composition effects:**

Heterogeneity of Treatment Effect

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 - ▶ Stronger effects across all outcomes.

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 - ▶ **Peer education level** → no significant impact.
- ▶ **Younger groups:**
 - ▶ Stronger effects across all outcomes.
- ▶ **Smaller groups:**
 - ▶ Especially effective for network changes.

Conclusion

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Conclusion

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 - ▶ Is there a business opportunity? Small benefits to small firms...

Conclusion

- ▶ **Main results:** Virtual platforms can facilitate knowledge transfer and business practice adoption among micro-entrepreneurs in developing countries.
- ▶ **Policy Recommendations:** Low-cost, scalable virtual platforms can support micro-enterprise growth.
 - ▶ Is there a business opportunity? Small benefits to small firms...
- ▶ **Future Research:**
 - ▶ Explore long-term impacts of the treatment.
 - ▶ Ongoing project in Kenya: business discussion groups among high-growth entrepreneurs, varying gender-composition.
 - ▶ Spillover effects from the grant: clustered randomization allows us to measure indirect effect of grant on non-grant winners.

Thank you!

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Interest vs Participation

	Participated in Discussion Groups	
Expressed Interest in Participating	-0.047 (0.06)	-0.062 (0.06)
Controls	NO	YES
Control Mean	0.482	0.482
Observations	434	434

▶ Back

Self-reported Satisfaction

	# of obs	Mean	Min	Max	Median
Sessions attended (self-rep)	203	3.54	0	8	4
Impact on business (1 to 3)	204	2.82	1	3	3
Would recommend (0 to 10)	204	8.67	0	10	10
# of acquaintances from treatment	203	0.36	0	15	0
# of advisors from treatment	204	0.13	0	4	0

▶ Back

Preferences Over Discussion Topics

	# of obs	Prop. of treatment
Invited to participate	434	1.000
Remembers being invited	216	0.498
Remembers having participated	204	0.470
Remembers discussing challenges	115	0.564
Discussing challenges was useful	52	0.255
Remembers discussing sales	108	0.529
Discussing sales was useful	63	0.309
Remembers discussing finances	153	0.750
Discussing finances was useful	133	0.652
Remembers discussing income	51	0.250
Discussing income was useful	24	0.118
Remembers discussing partners	66	0.324
Discussing partners was useful	24	0.118
Remembers discussing growth	110	0.539
Discussing growth was useful	69	0.338

Business Strategies

	Innovation Adoption (index)		Financial Planning (index)		Market Intelligence (index)	
Participated in Discussion Groups	0.37** (0.14)	0.42*** (0.14)	0.35** (0.15)	0.38** (0.15)	0.19 (0.15)	0.18 (0.15)
Received Grant	0.48*** (0.07)	0.48*** (0.07)	1.21*** (0.07)	1.27*** (0.07)	0.17** (0.07)	0.18** (0.07)
Controls	NO	YES	NO	YES	NO	YES
Control Mean	-0.070	-0.070	-0.004	-0.004	-0.019	-0.019
Standard dev.	0.960	0.960	0.972	0.972	0.972	0.972
Observations	2167	2167	2167	2167	2167	2167

Business Strategies: Innovation Adoption

	New Suppliers		New Products		New Marketing Techniques		New Production Technology		New Communities	
Participated in Discussion Groups	0.023 (0.05)	0.037 (0.05)	0.0073 (0.05)	0.022 (0.05)	0.17*** (0.05)	0.18*** (0.05)	0.035 (0.03)	0.043 (0.03)	0.11** (0.04)	0.12*** (0.04)
Received Grant	0.083*** (0.02)	0.089*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.061*** (0.02)	0.055*** (0.02)	0.041** (0.02)	0.040* (0.02)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.113	0.113	0.094	0.094	0.084	0.084	0.038	0.038	0.073	0.073
Standard dev.	0.317	0.317	0.292	0.292	0.278	0.278	0.191	0.191	0.260	0.260
Observations	2167	2167	2167	2167	2167	2167	2167	2167	2167	2167

▶ Back

Business Strategies: Financial Planning

	Knows Business Plan		Has Written Business Plan		Keeps Accounting Books		Calculates Sales, Profits or Losses	
Participated in Discussion Groups	0.22*** (0.07)	0.22*** (0.07)	0.075 (0.06)	0.075 (0.06)	0.11 (0.07)	0.12* (0.07)	0.020 (0.05)	0.041 (0.05)
Received Grant	0.34*** (0.03)	0.36*** (0.04)	0.46*** (0.03)	0.48*** (0.03)	0.46*** (0.03)	0.48*** (0.03)	0.12*** (0.02)	0.12*** (0.02)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.419	0.419	0.159	0.159	0.324	0.324	0.892	0.892
Standard dev.	0.494	0.494	0.366	0.366	0.468	0.468	0.310	0.310
Observations	2167	2167	2167	2167	2167	2167	2167	2167

▶ Back

Business Strategies: Market Intelligence

	Visited Competitors To See Prices		Visited Competitors To See Products		Asked Customers Their Preferences		Asked Former Customers Reasons for Stopping		Asked Suppliers Successful Products	
Participated in Discussion Groups	0.18 (0.18)	0.17 (0.17)	0.35** (0.17)	0.34** (0.17)	0.093 (0.17)	0.097 (0.17)	0.033 (0.17)	0.026 (0.17)	-0.022 (0.18)	-0.028 (0.18)
Received Grant	0.11 (0.08)	0.11 (0.09)	0.16* (0.08)	0.18** (0.09)	0.18** (0.08)	0.18** (0.09)	-0.013 (0.08)	-0.013 (0.08)	0.17** (0.08)	0.18* (0.09)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	2.491	2.491	2.415	2.415	2.464	2.464	2.711	2.711	2.385	2.385
Standard dev.	1.145	1.145	1.121	1.121	1.147	1.147	1.076	1.076	1.170	1.170
Observations	2130	2130	2131	2131	2134	2134	2133	2133	2127	2127

▶ Back

Business Strategies: Market Intelligence (cont'd)

	Used Special Offer To Attract Customers		Did Advertisement		Negotiated Lower Prices With Supplier		Compared Prices/Quality From Diff. Suppliers	
Participated in Discussion Groups	0.53*** (0.17)	0.54*** (0.17)	-0.057 (0.20)	-0.081 (0.20)	0.18 (0.17)	0.17 (0.17)	-0.052 (0.16)	-0.070 (0.16)
Received Grant	0.12 (0.08)	0.12 (0.09)	0.22** (0.09)	0.22** (0.10)	0.092 (0.08)	0.11 (0.09)	0.12 (0.08)	0.12 (0.08)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	2.460	2.460	2.219	2.219	2.896	2.896	3.075	3.075
Standard dev.	1.106	1.106	1.269	1.269	1.117	1.117	1.066	1.066
Observations	2122	2122	2123	2123	2133	2133	2131	2131

- ▶ "I never used to give things out for sell pay, but I learned from this meeting from a fellow colleague that customers can be trusted depending on the relationship and I started giving goods out for sell pay which has boosted my business to another level. Now my customers wait for me to bring goods before buying as they donât wanna buy from anyone else because of the relationship we have built over the time."

Digital Adoption: Cellphones Usage

	Household owns a cellphone		Can use a cellphone		Use of phone for business (hours)		Has mobile money account	
Participated in Discussion Groups	0.21*** (0.08)	0.21*** (0.08)	0.16** (0.07)	0.16** (0.07)	1.87* (1.05)	1.90* (1.04)	0.10** (0.05)	0.11** (0.05)
Received Grant	-0.027 (0.04)	-0.039 (0.04)	-0.027 (0.03)	-0.026 (0.04)	0.79 (0.49)	0.64 (0.58)	0.12*** (0.02)	0.11*** (0.03)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.450	0.450	0.363	0.363	0.918	0.918	0.870	0.870
Standard dev.	0.498	0.498	0.481	0.481	5.654	5.654	0.336	0.336
Observations	2167	2167	2167	2167	1037	1037	733	733

▶ Back

Digital Adoption: Social Media

	Social media user (Y/N)		Purpose for using social media: Calls		Purpose for using social media: Messages		Purpose for using social media: Business	
Participated in Discussion Groups	0.069 (0.08)	0.059 (0.08)	0.049* (0.03)	0.047* (0.03)	0.0043 (0.03)	0.0036 (0.03)	0.080** (0.03)	0.080** (0.03)
Received Grant	0.029 (0.04)	0.051 (0.04)	0.023* (0.01)	0.023* (0.01)	-0.011 (0.01)	-0.0032 (0.01)	0.043*** (0.01)	0.047*** (0.02)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.446	0.446	0.026	0.026	0.036	0.036	0.032	0.032
Standard dev.	0.497	0.497	0.161	0.161	0.186	0.186	0.176	0.176
Observations	2167	2167	2167	2167	2167	2167	2167	2167

Professional Networks

	Has acquaintances		Number of acquaintances		Number of acquaintances business owners		Share of acquaintances business owners		Asked friends or family for business advice (Y/N)	
Participated in Discussion Groups	-0.042 (0.07)	-0.046 (0.07)	0.025 (0.37)	0.00015 (0.37)	0.18 (0.22)	0.17 (0.22)	0.20*** (0.07)	0.20*** (0.07)	-0.12* (0.07)	-0.12 (0.07)
Received Grant	-0.062* (0.03)	-0.078** (0.04)	-0.14 (0.17)	-0.20 (0.21)	-0.0097 (0.10)	0.013 (0.12)	0.054 (0.03)	0.063 (0.04)	0.034 (0.03)	0.059 (0.04)
Controls	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	0.726	0.726	1.891	1.891	1.126	1.126	0.630	0.630	0.675	0.675
Standard dev.	0.446	0.446	2.117	2.117	1.404	1.404	0.398	0.398	0.469	0.469
Observations	1036	1036	1036	1036	1036	1036	745	745	2167	2167

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Business revenues and profits

	Business Revenues (USD)		Business Costs (USD)		Business Profits (USD)		Personal Savings (USD)	
Participated in Discussion Groups	10.7 (9.32)	6.13 (9.07)	14.8 (9.21)	13.9 (9.18)	-4.13 (9.57)	-7.73 (9.44)	10.6 (14.52)	8.36 (14.44)
Received Grant	26.2*** (4.31)	24.9*** (4.54)	25.1*** (4.26)	22.2*** (4.59)	1.09 (4.42)	2.72 (4.72)	65.3*** (6.79)	66.3*** (7.32)
Controls	NO	YES	NO	YES	NO	YES	NO	YES
Control Mean	48.632	48.632	34.032	34.032	14.600	14.600	70.160	70.160
Standard dev.	64.709	64.709	59.215	59.215	58.488	58.488	91.829	91.829
Observations	2167	2167	2167	2167	2167	2167	2108	2108

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Outcome	# of groups that discussed it
Buying inputs from new suppliers	4
Selling new products	40
Using new marketing techniques	36
Using new production processes	10
Selling at new location	18
Writing a business plan	0
Keeping accounting books	12
Calculating sales, profits and losses	15
Visiting competitors to check prices	13
Visiting competitors to check products	7
Asking customers their preferences	20
Asking former customers why they stopped buying	4
Asking suppliers about trending products	0
Using a special offer to attract customers	29
Doing advertisement	15
Negotiating lower prices with suppliers	3
Comparing different suppliers	0
Using cellphone for business	7
Using social media for business	0
Using a mobile money for business	32
Creating contacts with other business owners	22
Who to ask for business advice	4