Business Training and Spatial Competition in Urban Uganda

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- **What are the indirect effects of business training?**
  - ▶ Key for policy questions regarding aggregate impact in many market contexts

This paper

- We experimentally evaluate direct <u>and</u> indirect effects of business training

- Intervention: classroom training and individual coaching and mentoring for women-owned SMEs in central Uganda

- Design aimed at power for capturing indirect effects
  - ▶ Saturation design with 134 urban neighborhood clusters and $\sim$1,300 firms
  - ▶ 9 rounds of detailed follow-up surveys over 4 years

- Our approach: combine tools from spatial literature with experimental variation to understand geographic exposure in an urban setting

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    - ▶ Little diffusion of business practices
    - ▶ Positive demand agglomeration
    - ▶ Negative competitive pressures

- Exposure depends on distance and demand elasticity
    - ▶ Indirect effects appear to be localized in this setting

Related literature

- Firm training, mentoring, & consulting, reviewed in McKenzie et al. (2021)
  - ▶ Our direct effect sizes are consistent with the literature

- Indirect effects of interventions with firms
  - ▶ Through firm networks: Cai & Szeidl (2018) and Hardy & McCasland (2021)
  - ▶ Within sector effects of firm subsidies (Rotemberg, 2019)
  - ▶ Market-level effects of credit (Cai & Szeidl, 2022) and business training (McKenzie & Puerto, 2021)
  - ▶ This paper: spatial dimension in urban setting without segregated markets

- Bring experimental variation to classic IO and geography literatures on agglomeration vs. competition forces driving firm location

Intervention and Experimental Design

# Women Mean Business program implementation

- Women Mean Business (WMB) program run by Technoserve
  - ▶ Open to established women-owned SMEs of any type in central Uganda

  - ▶ Program had classroom (finances, customer care, marketing) and personalized components (business plan development, mentoring) over 16 month period

  - ▶ Medium intensity program targeting mid-size firms relative to literature

- Broad-based recruiting for scale-up and high frequency data
  - ▶ Started with SME census in commercial areas of four cities

  - ▶ Recruitment visits to $\sim$ 5k likely eligible businesses plus blast advertising

  - ▶ Baseline survey with experimental sample of 1,297 eligible applicants and 9 follow-ups surveys over 4 years

Sample firms are SMEs in consumer-facing retail and services
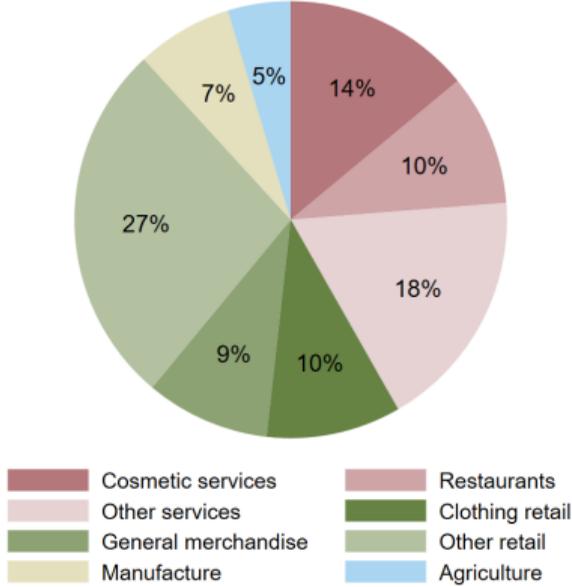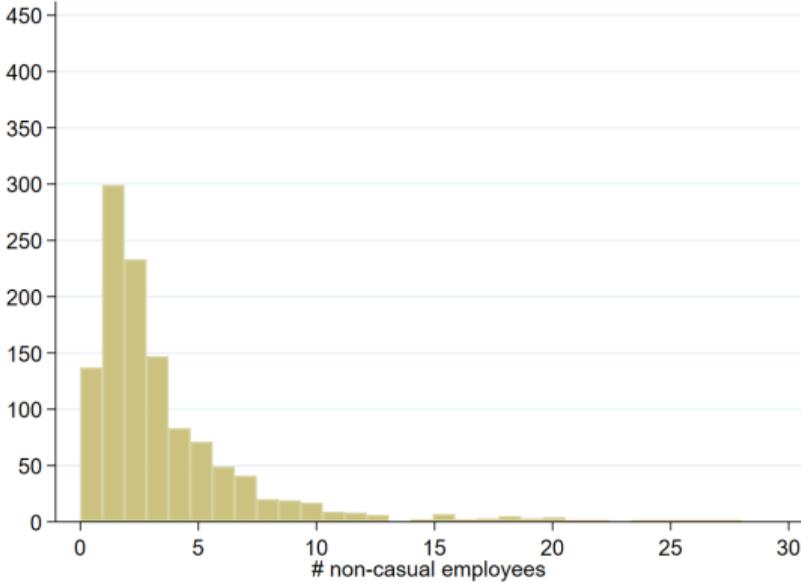
SUMMARY STATS AND BALANCE

Experimental design
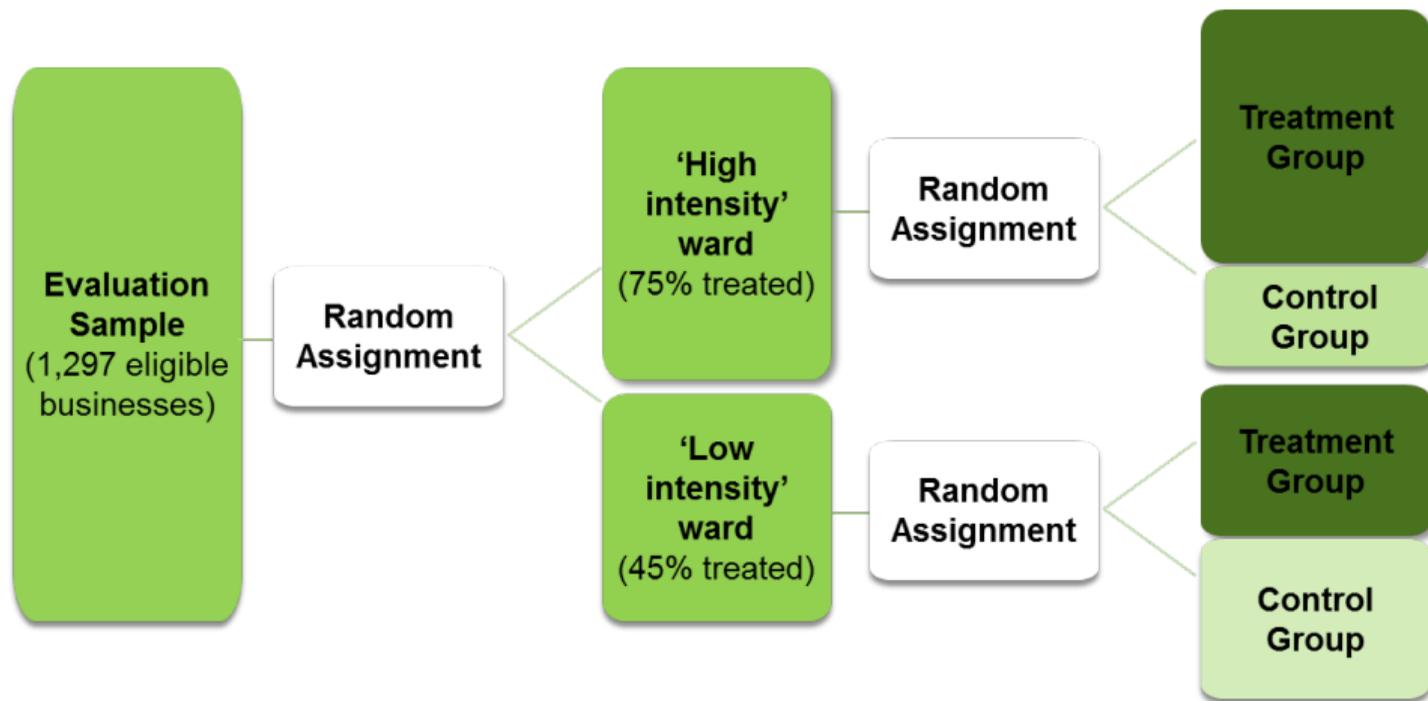
Takeup & participation

- Take-up moderately high, in line with literature ($\sim \frac{2}{3}$ of invited businesses)
  - ▶ Conditional on attending, participation was high on the intensive margin

- No evidence of selection by ward-level intensity of treatment

- Some positive selection in take-up
  - ▶ Participants more likely to be highly educated, speak English, etc

TABLE

Empirical Strategy and Results

Use spatial variation to get firm-level exposure measures

- Expect demand-side forces to be main source of indirect effects, which depend on:
  - ▶ Firm locations
  - ▶ Consumers' cost of distance to get between firms
  - ▶ Perceived substitutability of firms

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- Expect demand-side forces to be main source of indirect effects, which depend on:
  - ▶ Firm locations
  - ▶ Consumers' cost of distance to get between firms
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- Exploit firm location data to create a continuous, distance-weighted measure of individual exposure:

$$E_i = \sum_j \frac{T_j}{d_{ij}^{\sigma}}$$

- Captures idea that improvements in closer neighbors matter more
  - ▶ How much more? Parameterized by σ

Control for non-random components of spatial exposure

- Treatment is randomly assigned, but distance weighting is not $\rightarrow$ depends on business location and neighborhood density

- Use Borusyak & Hull (2021) method to control for "expected exposure" μ_i

- Identification comes from differences between expected and realized random exposure to treated businesses HISTOGRAMS
  - ▶ Saturation design leads to greater deviations from μ_i than under individual-level randomization

Specification captures spatial aspect of indirect effects

$$y_{it} = \alpha + \beta_1 T_i + \beta_2 E_i + \beta_3 \mu_i + \gamma_1 y_{i0} + \textit{pair}_i + \textit{survey}_t + \epsilon_{it}$$

- y_{it} is outcome at time t (y_{i0} at baseline), T_i is individual treatment, $\textit{pair}_i$ are ward randomization pair FE and $\textit{survey}_t$ are survey round FE

- β_1 is direct effect and β_2 indirect effect of business training

- Choice about distance elasticity σ
  - ▶ First show one value as an example, then explore range

WMB exposure effects: Business practices

Exposure calculated with elasticity σ = 2.5

	(1) Business practices: std index (cols 2-9)	(2) Record keeping: std index	(3) Business planning: std index	(4) Use of financial services: std index	(5) Supply management: std index	(6) Monthly advert. expenses (PPP USD)	(7) Customer care: std index	(8) HR training: # new methods	(9) Formality: std index
Treatment	0.51***	0.21***	1.06***	0.04	0.17***	0.76*	0.20***	0.01	0.10
	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.41)	(0.05)	(0.03)	(0.07)
		[0.001]	[0.001]	[0.420]	[0.002]	[0.134]	[0.001]	[0.781]	[0.258]
Exposure to treated businesses	0.00	0.02***	-0.03	0.04**	-0.03	-0.39**	0.01	-0.04	-0.00
	(0.02)	(0.01)	(0.03)	(0.02)	(0.03)	(0.17)	(0.04)	(0.04)	(0.02)
		[0.013]	[0.381]	[0.089]	[0.420]	[0.062]	[0.807]	[0.465]	[0.807]
Expected exposure	-0.01	-0.00	-0.01	0.00	0.00	0.03	-0.01	0.02	-0.01
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.05)	(0.03)	(0.03)	(0.01)
Observations	9,575	9,575	7,435	5,312	6,354	6,326	9,574	3,075	1,042
Unique businesses	1,157	1,157	1,157	1,146	1,141	1,149	1,157	1,074	1,042
Follow-up mean (C-LI)	0.00	-0.22	-0.03	0.36	0.13	4.50	0.40	0.47	-0.35
Follow-up SD (C-LI)	1.27	0.96	1.11	1.12	1.53	12.70	1.47	0.64	0.98

WMB exposure effects: Financial outcomes

Exposure calculated with elasticity σ = 2.5

	(1) Financial outcomes: std index (cols 2-7)	(2) Business in operation (=1)	(3) Monthly revenue (PPP USD)	(4) Monthly profit (PPP USD)	(5) Monthly take home (PPP USD)	(6) Business grew since 2013 (=1)	(7) Business more profitable since 2013 (=1)
Treatment	0.10**	0.01	812.21**	114.63*	35.48*	0.07**	0.08**
	(0.04)	(0.01)	(405.73)	(62.05)	(18.37)	(0.03)	(0.03)
		[0.255]	[0.134]	[0.135]	[0.134]	[0.134]	[0.127]
Exposure to treated businesses	0.02**	0.00	281.80**	16.01	1.16	-0.01*	-0.01
	(0.01)	(0.00)	(120.59)	(20.45)	(7.11)	(0.01)	(0.01)
		[0.436]	[0.127]	[0.475]	[0.872]	[0.170]	[0.273]
Expected exposure	0.01	0.00**	37.51	4.60	-1.19	0.04***	0.04***
	(0.01)	(0.00)	(140.74)	(18.97)	(5.94)	(0.01)	(0.01)
Observations	17,012	5,307	16,583	16,260	14,110	1,044	1,044
Unique businesses	1,155	1,123	1,151	1,151	1,149	1,044	1,044
Follow-up mean (C-LI)	-0.15	0.94	4,713.94	916.61	395.78	0.57	0.54
Follow-up SD (C-LI)	0.89	0.24	7,412.51	1,345.34	394.93	0.50	0.50

WMB exposure effects: Production inputs

Exposure calculated with elasticity σ = 2.5

	(1) **Total expenses last month (PPP USD; cols 2-5)**	(2) Stock expenses last month (PPP USD)	(3) Employee expenses last month (PPP USD)	(4) Equipment expenses last month (PPP USD)	(5) Other expenses last month (PPP USD)	(6) # non-casual employees	(7) Property replacement value (PPP USD)
Treatment	507.22**	311.29	33.24	2.22	129.48***	0.40**	5,168.83*
	(254.56)	(216.25)	(21.92)	(2.28)	(42.33)	(0.20)	(2,982.70)
		[0.262]	[0.262]	[0.442]	[0.033]	[0.195]	[0.206]
Exposure to treated businesses	59.82	72.81**	-2.22	-0.95*	-1.34	-0.11	997.34
	(49.89)	(33.80)	(9.89)	(0.51)	(14.16)	(0.10)	(2,764.75)
		[0.195]	[0.898]	[0.196]	[0.925]	[0.394]	[0.863]
Expected exposure	46.31	24.39	10.20	-0.67	16.17	0.21**	1,072.81
	(45.86)	(30.21)	(8.46)	(0.54)	(19.08)	(0.10)	(1,669.74)
Observations	9,420	9,420	9,420	9,420	9,420	8,528	991
Unique businesses	1,239	1,239	1,239	1,239	1,239	1,155	991
Follow-up mean (C-LI)	2,708.45	1,681.01	369.68	19.38	638.38	2.84	23,103.30
Follow-up SD (C-LI)	4,391.64	3,671.40	663.55	118.03	910.23	4.62	43,467.59

WMB exposure effects: Business operations

Exposure calculated with elasticity σ = 2.5

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	# daily customers	Weighted price index (log)	Weighted avg markup (log)	Weighted unit cost index (log)	Total units sold (log)	Introduced product in last 3m (=1)	Stopped offering product in last 3m (=1)
Treatment	2.45	0.03	0.01	0.02	0.11	0.00	0.00
	(1.60)	(0.05)	(0.02)	(0.06)	(0.08)	(0.01)	(0.01)
	[0.300]	[0.770]	[0.770]	[0.892]	[0.331]	[0.958]	[0.892]
Exposure to treated businesses	0.54*	-0.04*	-0.02***	-0.04***	0.08***	-0.01	0.00
	(0.30)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.00)
	[0.208]	[0.208]	[0.022]	[0.022]	[0.001]	[0.712]	[0.958]
Expected exposure	0.00	-0.02	0.02	-0.00	0.02	0.01	-0.00
	(0.16)	(0.03)	(0.01)	(0.02)	(0.02)	(0.01)	(0.00)
Observations	9,520	7,998	7,986	7,985	7,998	9,574	9,574
Unique businesses	1,155	1,143	1,143	1,143	1,143	1,157	1,157
Follow-up mean (C-LI)	16.56	9.59	0.63	8.99	5.84	0.28	0.08
Follow-up SD (C-LI)	33.23	1.85	0.55	1.83	1.90	0.45	0.28

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  - ▶ Little evidence of transmission of practices/knowledge
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  - ▶ Competitive pressures: lower prices and markups, some evidence of cost cutting

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- Using only ward-level randomized saturation as measure of indirect exposure fails to capture these patterns RESULTS

How local are indirect effects?

- Choice of σ matters for both level and precision of estimates
  - ▶ A higher distance elasticity assigns greater weights to very local exposure
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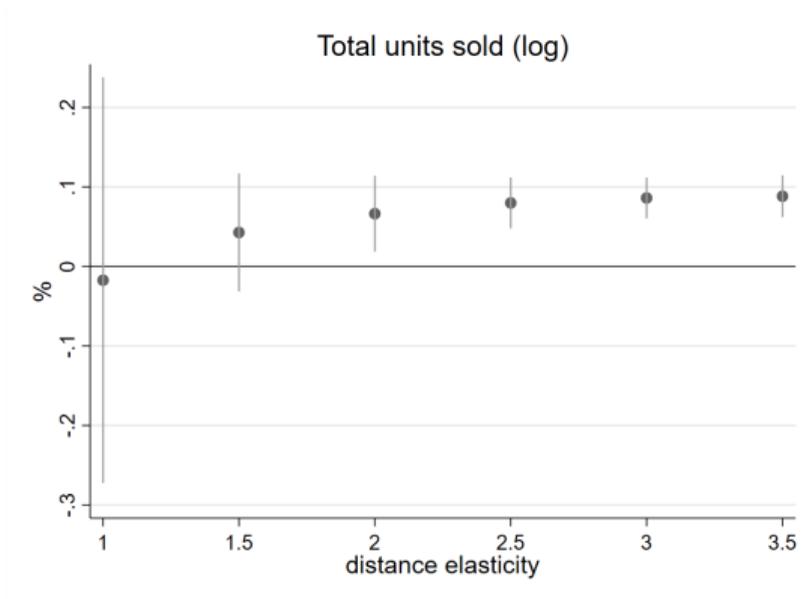- (In progress: plugging experiment into a framework that lets us interpret σ and estimate an internally consistent value)
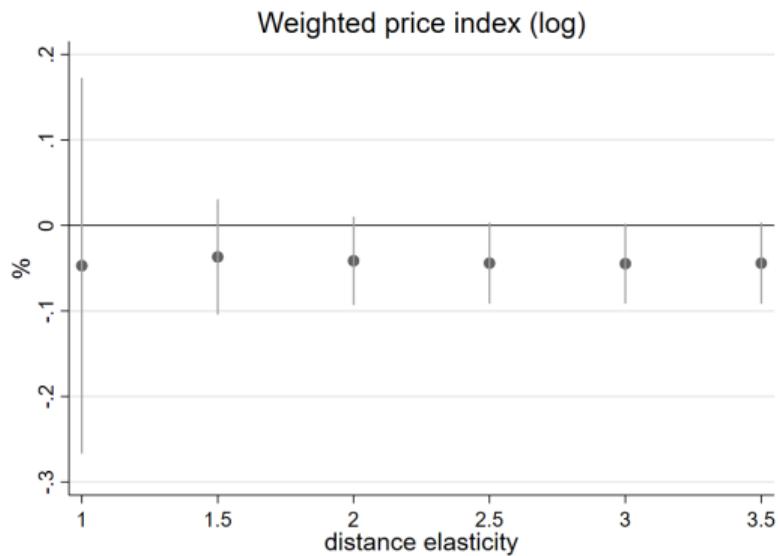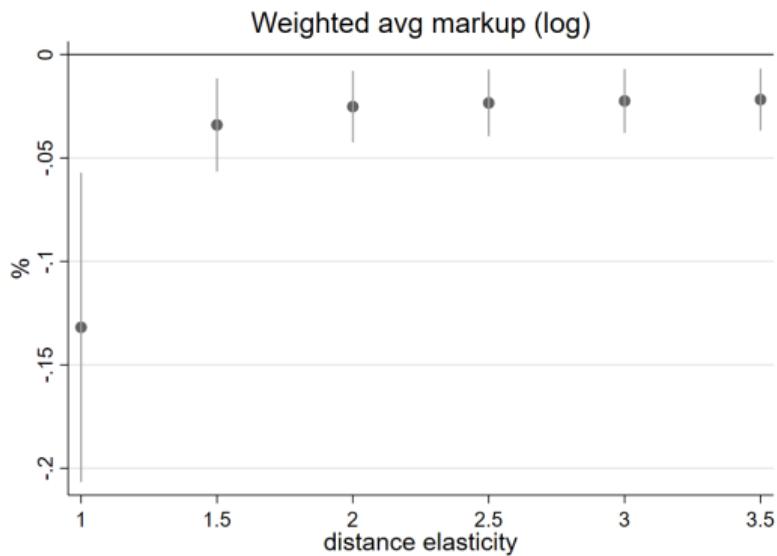
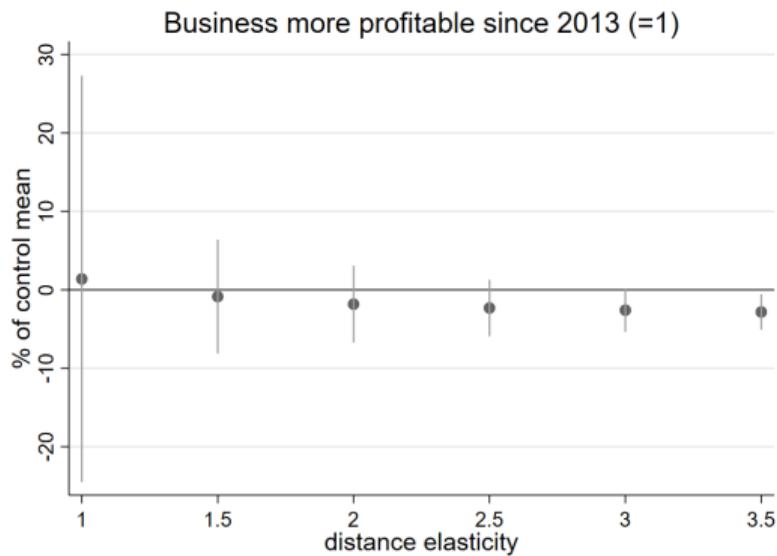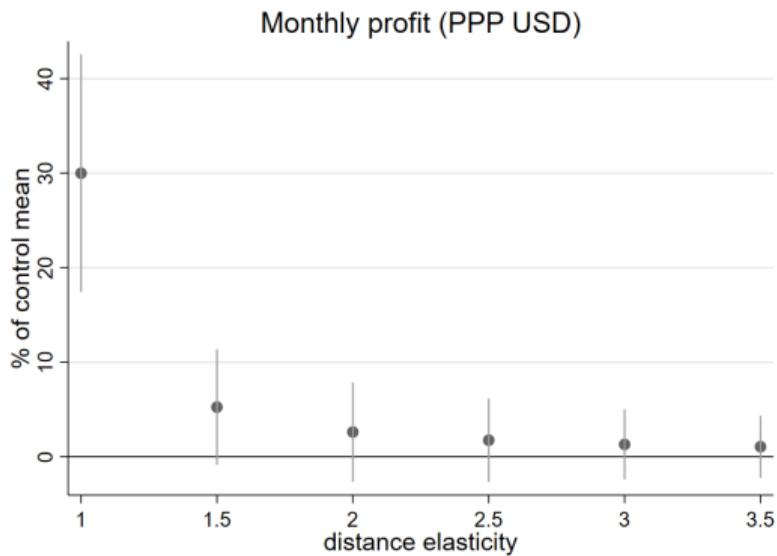# Exposure to treatment generates positive demand spillovers…
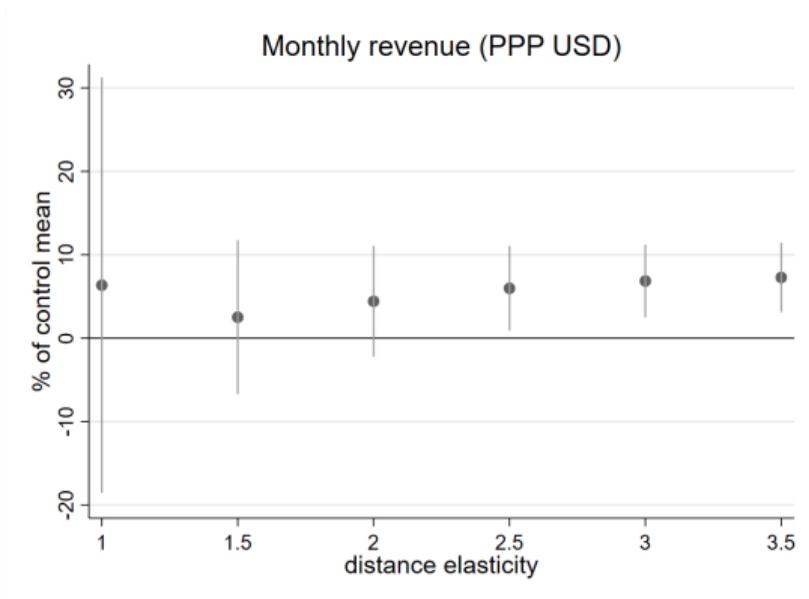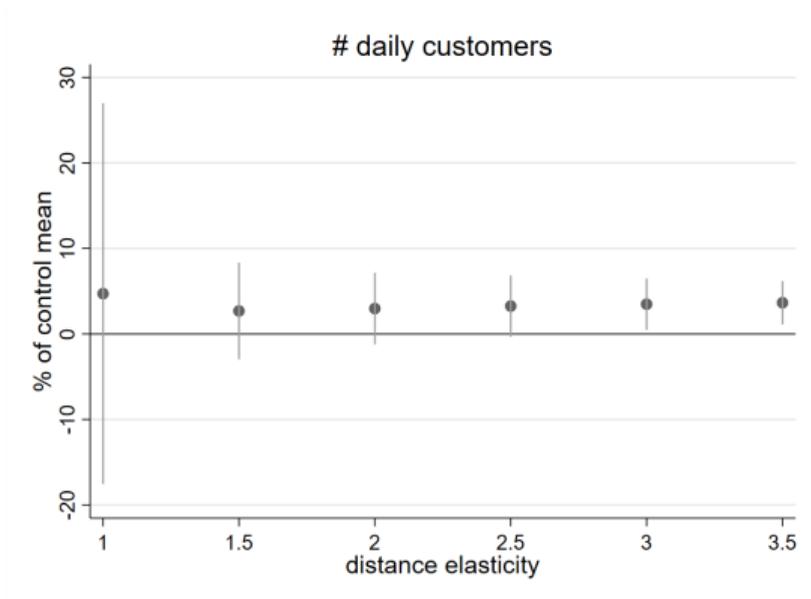
Exposure to treatment generates positive demand spillovers...

Total units sold (log)

Stock expenses last month (PPP USD)
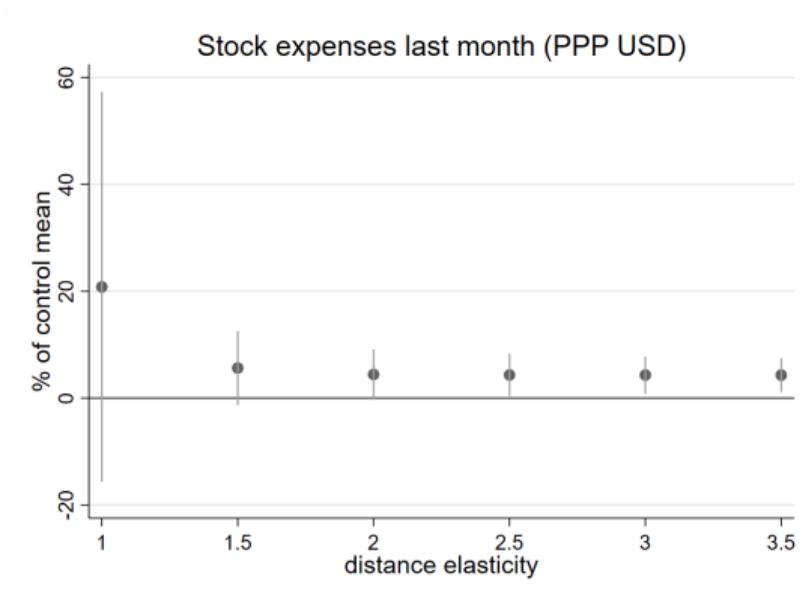
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Conclusion

Conclusion and next steps

- Training was good for participating SMEs, but policy makers need to know what that does to the whole market

- We bring experimental variation to old questions about spatial agglomeration and competition, in a setting with complex geography

- Evidence of both agglomeration and competition in the effects on indirectly exposed firms
  - ▶ Both forces appear to be very localized in this urban retail setting

- Next: plug into simple modeling framework to:
  1. Estimate and interpret internally consistent distance elasticity
  2. Bound aggregate implications from policymaker perspective

Thank you!!

Summary statistics and balance

	(1) Business treatment status	(2)	(3) Ward-level intensity	(4)
	Control	Treat - Control	Low	High - Low
Completed higher education (=1)	0.47	0.00 (0.02)	0.49	-0.03 (0.05)
Household assets (std index)	-0.00	0.00 (0.06)	0.02	-0.06 (0.06)
Business age in 2012 (years)	7.30	0.56* (0.33)	7.14	1.07*** (0.26)
Monthly revenue (PPP USD)	5,773.30	560.98 (445.94)	6,007.74	61.92 (497.72)
Monthly profit (PPP USD)	1,117.99	74.84 (110.21)	1,167.28	-26.79 (68.03)
# bus. branches	1.16	0.01 (0.04)	1.18	-0.04* (0.02)
# non-casual employees	4.27	-0.62 (0.70)	4.26	-0.57 (0.46)
Keeps records (=1)	0.83	-0.03 (0.02)	0.81	-0.00 (0.02)
Applied for a loan in last year (=1)	0.29	0.02 (0.03)	0.26	0.07*** (0.02)
Observations	482	779	619	642
p-value: multivariate orthogonality test		0.357		0.000

Takeup & participation

	(1) All treated	(2) High intensity ward	(3)	(4) Higher education	(5)
		No	Yes	No	Yes
Participated in ≥ 1 activity (=1)	0.66	0.67	0.66	0.60	0.81***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
Attended ≥ 1 class (=1)	0.63	0.63	0.64	0.58	0.78***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
# of classes attended (cond.)	4.98	4.82	5.07	4.74	5.23**
	(0.09)	(0.16)	(0.12)	(0.15)	(0.12)
Ever met with coach (=1)	0.62	0.63	0.61	0.54	0.71***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)
# of times that met with coach (cond.)	4.93	4.80	5.00	4.77	5.11
	(0.11)	(0.19)	(0.14)	(0.17)	(0.16)
Received business plan from coach (=1; cond.)	0.88	0.85	0.89	0.86	0.90
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
Ever met with mentor (=1)	0.51	0.50	0.51	0.45	0.59***
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
# of times that met with mentor (cond.)	4.05	3.91	4.13	3.85	4.24
	(0.14)	(0.26)	(0.16)	(0.17)	(0.21)
Observations	810	288	522	384	358

BACK

Ward saturation is an imprecise exposure measure

- Design intended to vary geographic exposure, but ward-level saturation is a very imprecise measure in our setting
  - ▶ Within ward, variation due to individual random assignment
  - ▶ Across ward, variation due to urban setting – no segregated markets MAP
  - ▶ Wards are heterogeneous in terms of size and business density MAP

Firms may be close to firms in other wards

BACK

Sample spread through central Uganda
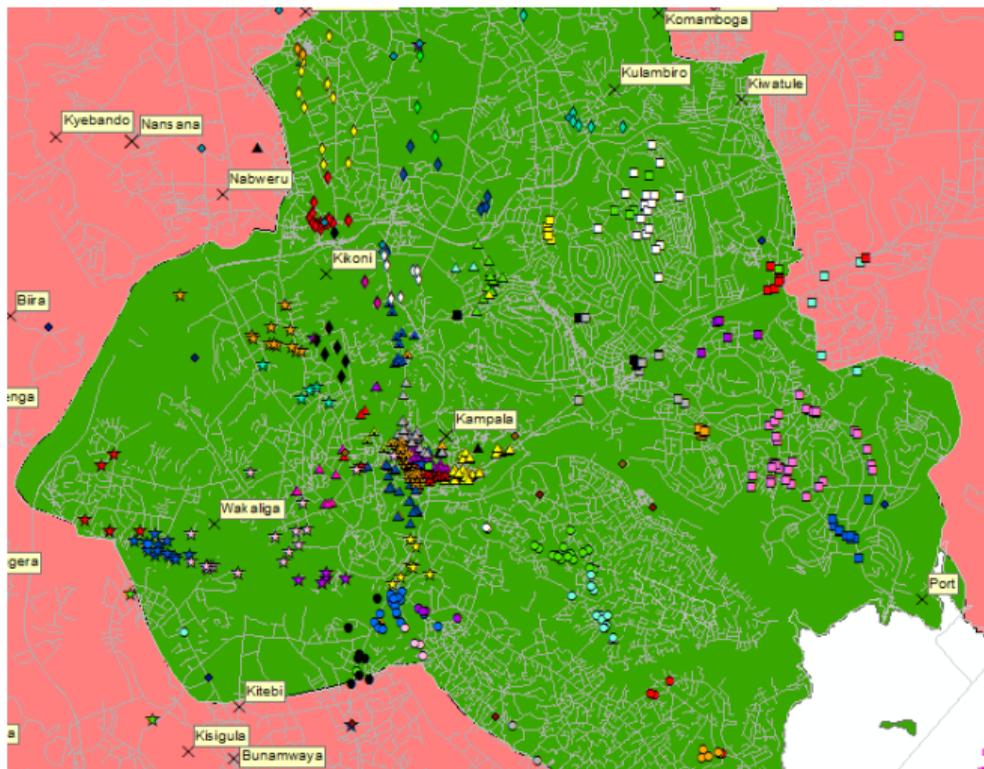
Identification from expected vs. realized random exposure

WMB effects: Business practices

	(1) **Business practices: std index**	(2) Record keeping: std index	(3) Business planning: std index	(4) Use of financial services: std index	(5) Supply management: std index	(6) Monthly advert. expenses (PPP USD)	(7) Customer care: std index	(8) HR training: # new methods	(9) Formality: std index
Treat (T)	0.52*** (0.03) [0.001]	0.21*** (0.03) [0.001]	1.07*** (0.05) [0.001]	0.00 (0.04) [0.978]	0.19*** (0.05) [0.001]	1.34*** (0.35) [0.001]	0.21*** (0.05) [0.001]	0.01 (0.04) [0.855]	0.09 (0.07) [0.338]
High Intensity (HI)	-0.00 (0.05)	0.02 (0.03) [0.551]	-0.03 (0.07) [0.777]	0.13** (0.06) [0.079]	-0.05 (0.04) [0.457]	-1.57** (0.75) [0.088]	-0.03 (0.05) [0.719]	-0.00 (0.04) [0.978]	0.03 (0.04) [0.630]
Observations	9,731	9,731	7,558	5,401	6,456	6,431	9,730	3,117	1,059
Unique businesses	1,180	1,180	1,180	1,169	1,163	1,171	1,180	1,090	1,059
Follow-up mean (C-LI)	-0.01	-0.23	-0.03	0.34	0.12	4.41	0.39	0.47	-0.36
Follow-up SD (C-LI)	1.26	0.96	1.11	1.12	1.52	12.58	1.47	0.64	0.97

WMB effects: Financial outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Financial outcomes: std index	Business in operation (=1)	Monthly revenue (PPP USD)	Monthly profit (PPP USD)	Monthly take home (PPP USD)	Business grew since 2013 (=1)	Business more profitable since 2013 (=1)
Treat (T)	0.10**	0.01	731.05*	113.32*	48.30**	0.05	0.06*
	(0.04)	(0.01)	(416.47)	(61.18)	(19.39)	(0.04)	(0.04)
	[0.306]	[0.202]	[0.202]	[0.169]	[0.306]	[0.202]
High Intensity (HI)	0.01	-0.00	346.13	23.60	-27.12*	0.02	0.01
	(0.03)	(0.01)	(270.80)	(36.56)	(15.10)	(0.02)	(0.02)
	[0.903]	[0.306]	[0.568]	[0.202]	[0.330]	[0.568]
Observations	17,289	5,390	16,857	16,530	14,333	1,061	1,061
Unique businesses	1,178	1,143	1,174	1,174	1,172	1,061	1,061
Follow-up mean (C-LI)	-0.16	0.93	4,636.37	903.46	391.59	0.57	0.54
Follow-up SD (C-LI)	0.89	0.25	7,353.36	1,334.33	392.60	0.50	0.50

WMB effects: Production inputs

	(1) **Total expenses last month (PPP USD)**	(2) Stock expenses last month (PPP USD)	(3) Employee expenses last month (PPP USD)	(4) Equipment expenses last month (PPP USD)	(5) Other expenses last month (PPP USD)	(6) # non-casual employees	(7) Property replace-ment value (PPP USD)
Treat (T)	463.80*	245.44	36.30	2.58	145.92***	0.39*	4,096.89
	(250.12)	(206.72)	(22.88)	(2.46)	(43.90)	(0.21)	(2,984.55)
		[0.356]	[0.277]	[0.388]	[0.014]	[0.223]	[0.296]
High Intensity (HI)	208.02	267.05*	-15.19	-0.29	-35.83	-0.03	3,431.29*
	(146.78)	(148.35)	(15.32)	(2.87)	(25.79)	(0.18)	(1,896.14)
		[0.223]	[0.388]	[0.920]	[0.296]	[0.920]	[0.223]
Observations	9,814	9,814	9,814	9,814	9,814	8,667	1,008
Unique businesses	1,293	1,293	1,293	1,293	1,293	1,178	1,008
Follow-up mean (C-LI)	2,569.45	1,594.35	350.95	18.34	605.81	2.81	22,796.22
Follow-up SD (C-LI)	4,307.16	3,586.10	649.89	114.78	895.07	4.58	43,071.41

WMB effects: Business operations

	(1) ＃ daily customers	(2) Weighted price index (log)	(3) Weighted avg markup (log)	(4) Weighted unit cost index (log)	(5) Total units sold (log)	(6) Introduced product in last 3m (=1)	(7) Stopped offering product in last 3m (=1)
Treat (T)	1.86	0.05	0.02	0.03	0.12	0.00	0.00
	(1.75)	(0.06)	(0.02)	(0.06)	(0.09)	(0.01)	(0.01)
	[0.964]	[0.964]	[0.964]	[0.964]	[0.964]	[0.964]	[0.964]
High Intensity (HI)	2.40*	0.01	-0.02	0.03	-0.03	-0.00	-0.00
	(1.26)	(0.07)	(0.03)	(0.07)	(0.05)	(0.02)	(0.01)
	[0.836]	[0.964]	[0.964]	[0.964]	[0.964]	[0.964]	[0.964]
Observations	9,674	8,132	8,120	8,119	8,132	9,730	9,730
Unique businesses	1,178	1,166	1,166	1,166	1,166	1,180	1,180
Follow-up mean (C-LI)	16.37	9.58	0.63	8.98	5.82	0.28	0.08
Follow-up SD (C-LI)	32.94	1.85	0.55	1.84	1.90	0.45	0.28

Indexes of business practices

Outcome	Components
Record keeping	Keeps records Showed records to surveyor How often records sales and purchases (1-3; higher = more often) Separates personal and business expenses
Financial services	*Binary indicators for use of financial services*: bill payment, insurance, loans, mobile money, money transfer, saving services
Supply mgmt	Uses/sells imported materials/inputs Negotiated with supplier in last three months How often out of product when requested (1-5; higher = less often) Compared alternative supplier in last three months
Business planning	Has written business plan Has written budget for business
Marketing	Amount spent on advertisement (trimmed)

Indexes of business practices (cont.)

Outcome	Components
Customer care	Ask customers for feedback Has made changes based on customer feedback *Binary indicators for customer care strategies*: after sale services, customer relations, discounts/gifts, low prices, new products, good quality, special terms, updates
Human resources	*Binary indicators for methods for employee training*: formal training, external professional, other employee, respondent, similar business *Binary indicators for methods for finding applicants*: advertise at business, hire family/friends, advertise at radio/newspapers, advertise at other businesses, recruit from other businesses, referrals, walk-in applicants
Formality	Has trading license Has other sector-specific licenses Has Tax ID Registered in Registry of Companies