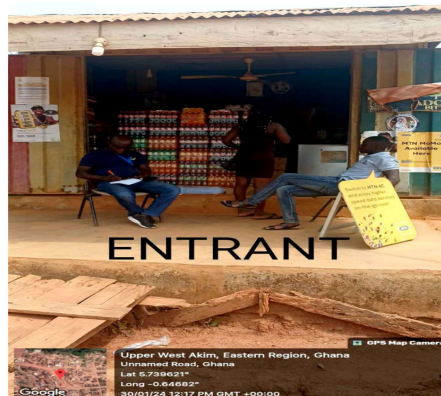


Randomized Entry: The Equilibrium Effects of Entry in Digital Financial Markets

Francis Annan
UC Berkeley and NBER

STEG-PEDL Virtual Course: Session 14 - Recent Applications



Motivation

- Enlisting nonfinancial businesses to provide retail financial services is a widespread and scalable practice globally
 - ▶ United States: Wells Fargo & Co. expand financial services via branches in supermarkets
 - ▶ Similar EGs in other countries: India, Kenya, Indonesia,...
- Such market entry approach “entry with bundling” can create a multiplier:
 - ▶ both sectors respond separately,
 - ▶ and if the services are strategic complements, can lead to additional growth in the aggregate local services industry
- **This paper** examines whether such a multiplier in services exists
 - ▶ In the context of markets for digital financial services — specifically, mobile money
 - ▶ Original data collection on both firms and consumer household outcomes
 - ▶ Market- & firm-level field experiment, randomize entry of new financial mobile money vendors

Design Overview

In partnership w MTN (largest MNO-led DFS provider) **and** GCB Ltd (largest Bank-led) in Ghana:

- **Field Experiment:** Randomize entry of new financial mobile money vendors (MOMO), who also sell nonfinancial goods/services e.g., rice, etc (MICROE)
 - ① In each locality: enlist pool of 5 existing nonfinancial firms
 - ② Assign localities in equal proportions to either of:
 - ★ Control (no-entry, +0%) vs
 - ★ Treatment 1 (+1 additional vendor each, +25% increase [low])
 - ★ Treatment 2 (+3 additional vendor each, +70% increase [high])
 - ③ In treatment localities: 'upgrade' 1 or 3 of the 5 nonfinancials as financial vendors
 - ▶ Altogether, enrolled +170/181 new financial entrant vendors
- Before the experiment, there was a ban on entry of new MOMO vendors
- I convinced service providers to experimentally change regulation on entry, to induce entry

Results Overview

- **Randomized entry:** Is +25pp more likely among nonfinancial MICROE firms at endline
- **Consumer welfare:** Meaningful impacts on price and nonprice outcomes:
 - ▶ Firm misconduct—overcharging—for MOMO financial services decreased (-46%)
 - ▶ Prices $\Delta \approx 0$ but market-level markups for MICROE nonfinancial services decreased (-32%)
 - ▶ Aggregate household expenses (+16%)
- **Producer welfare:** Broader impacts on revenues ($\Delta \text{profits} \approx 0$):
 - ▶ Within-market revenue reallocation and expansion for financial services
 - ▶ Services multiplier — revenues for nonfinancial services increased (+23%)

Entry increases local economic activity, and it does so not only by changing markets for DFS but also by transforming MICROE services

Roadmap

- 1 Setting and Baseline
- 2 Experiment: Design
- 3 Experiment: Results
- 4 Conclusion
- 5 Connections to the Literature
- 6 Appendix

Sector A - Markets for DFS/Mobile Money

- Vertical market with actors:
 - ▶ (1) providers (@upstream, n=4), MTN share=90%
 - ▶ (2) vendors (@downstream, n≈4 per locality) nonexclusive
 - ▶ (3) consumers
- Consumers onboard (i) DFS at vendor points (**major business**): open accounts, cash-in/deposits, cash-out/withdrawals, other tools + (ii) non-financial services (**minor bus**: see MICROE)
- Vendors are mobile money distribution outlets:
 - ▶ Small size enterprises (daily: sales=\$400, profit=\$2)
 - ▶ Free entry and exit
 - ▶ Initial capital + Business training + Agreement
 - ▶ Earn commissions on transactions as profit
- Transactions tariffs *ex-ante* set by providers
 - ▶ Misconduct = overcharging = double marginalization

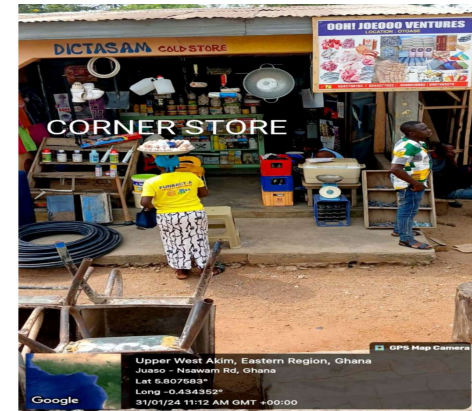
Human ATMs: Retailing MOMO



Sector B - Markets for nonDFS/Microenterprises

- Microenterprises (MICROE): existing nearby corner stores
- Consumers onboard non-financial services (**only business**): groceries (e.g., rice), building materials, clothing, pharmaceuticals, etc.
 - ▶ Small size enterprises (daily: sales=\$200, profit=\$5)
 - ▶ Free entry and exit
 - ▶ Earn sales profits
- Liquidity (ability to convert p-cash to e-money)
- Reputation for doing local business
- Existing customer base

Microenterprise Outlets Nearby



The Setting

- **Set** in eastern Ghana; low-income, 13 administrative districts
- **Sample:** lot of ground work (absent detailed industry data)
- Construct unique census of markets—for MOMO + nearby MICROE—across 136 localities btw Mar-May 2023
- Door to door, locality to locality
- \forall Market (or locality: 900-9000 pop):
 - ▶ MOMO vendors (n=all) x
 - ▶ Nearby MICROE (n= \leq 5) x
 - ▶ Consumers: customers intercepted + households visits near MOMO points (n \leq 50)
- Baseline census \equiv
 - ▶ 627 MOMO vendors (incumbents), w avg=4.5 vendors per locality
 - ▶ 575 MICROEs enlisted
 - ▶ 4,765 consumers (2,679 customers intercepted or 2,085 nearby households)
- large number of localities allows randomization at market level

Project Timeline

	DATE	ACTIVITY
Part 1	January-June 2020	Pilot work
Part 2	March 2023 April 2023 April/ May 2023	Baseline: Market census Trust games I (Baseline) Audit study I (Baseline)
Part 3	June 2023 June - Oct 2023	Intervention: Markets and entrants assignment Intervention: Entrants enrollment
Part 4	April 2024 (7 months) April 2024 April 2024 Mar/ Apr 2024+	Endline: Market surveys Trust games II (Endline) Audit study II (Endline) Administrative data: Market records from service provider
	Jan 2025 (16 months)	Phone surveys: track firm exits in the long term ($\leq 2\%$)

Descriptive Motivating Facts about Markets for Mobile Money @Baseline

- ① Providers **regulated competition** by imposing a ban on entry of new vendors
 - ▶ Moratorium & justifications:
 - ▶ (1) Inactive vendors & black-market sale of licenses
 - ▶ (2) Keep # of vendors to levels manageable by field staff
- ② **Untapped Entry Potential:** Variation in agent density across villages (min=1 to max=8 agents per 1k pop), suggesting room for additional vendors
- ③ **Low Service Quality:** High misconduct (~30%) compounded by low service quality
 - ▶ But bundled MOMO firms—incumbents—are less likely to commit misconduct
- ④ **Limited Consumer Trust:** Variation in consumer trust in vendors and notable portion of consumers express mistrust (~50%+)
- ⑤ **Entry Matters:** Market expect entry to improve quality, misconduct, trust

Facts suggest entry matters (experiment)

Intervention: Entrants Enrollment

Intervention: Enlist existing MICROEs, who sell non-financial goods/services, to offer MOMO – a widespread and scalable market entry approach for financial markets

Enrollment:

1ST: ONBOARDING - PAPERWORK

- Operations officer verifies all set entry requirements, including the BOP, and then completes vendor registration form and Agreement
- *if* needed (70% of the time), project subsidizes MICROE (w 50% or 100% of the total BOP cost of ~200 ghs, depending on how much entrant can contribute) to acquire their BOP
- entrant signs Agreement

2ND: DUE DILIGENCE AND APPROVALS

- Operations officer sends completed forms/Agreement and supporting documents to hQ for evaluation
- *if* passed, managerial approval is granted and vendor-specific SIM card w a shortcode is generated

3RD: ACTIVATION AND MINI BRANDING

- Officer re-visits entrant's outlet
- delivers SIM card, trains the entrant about operation and retailing of MOMO, and then brand the outlet with stickers/tariffs/ etc., along w customer acquisitions

-
- Required joint partnerships w two competing commercial providers: MTN vs GCB (hard + fun part!)

Financial Vendor Contract Agreement Forms

- 3.7. The Agent shall at all times maintain a float of a minimum of Two Thousand Ghana Cedis (GHS2000.00) in both electronic and physical cash.
- 3.8. The agent shall not use the account for any e-currency transactions without license from the regulator to perform such transactions.
4. **BRIBERY CORRUPTION AND FRAUD**
- 4.1. The Company has a zero tolerance for bribery, corruption and fraud. Examples of conduct that amount to bribery and corruption and fraud includes but are not limited to the following:
- 4.1.1. Charging unapproved fees for MoMo transactions.
- 4.1.2. Providing customer's transaction details and other confidential information to unauthorized third parties.
- 4.1.3. Conducting unapproved/unauthorized transactions such as withdrawals on a customer's account.
- 4.1.4. Engaging in wrongful Mobile Money Registrations such as deliberately inputting wrong or incorrect data.
- 4.1.5. Inducing and misleading customers to obtain their MobileMoney PIN numbers and other confidential information.
- 4.1.6. Forgery or Falsification of Mobile Money documents/records.
- 4.1.7. Engaging in money laundering.
- 4.2. The above list is non-exhaustive and shall be updated as and when the need arises.
- 4.3. An Agent who is found to be involved in bribery, corruption and fraud shall have their accounts terminated and shall be handed over to the Police for investigation and prosecution where necessary. The Company hereby enjoins all MobileMoney Agents to report to the Company any knowledge, awareness or suspicion of improper, unethical, fraudulent and or criminal conduct by an Agent, Customer, Staff of the Company or any other third party.
5. **MONEY LAUNDERING:**
- 5.1. The Agent shall report all suspected cases of money laundering or fraud, relating to customers or other Agents or third parties having dealings with the Company to the Partner bank, the Company's designated representatives or to the Police.
- 5.2. The Agent shall at all times comply with the rules of this Agreement and the procedures specified in the Mobile Money Agent Manual, as updated



17.0 NO ASSIGNMENT OR TRANSFER
This Agreement is personal to the Agent and no assignment of any kind whatsoever shall be permitted but in the event of individuals the obligations set out in this Agreement shall bind the personal representatives of the Agent and in case of corporate bodies it shall bind its successors and assigns

18.0 SEVERABILITY
Any provision of this Agreement held by a Court of competent jurisdiction to be contrary to any law shall be severed from this Agreement, but such severance shall not render the remaining provisions of this Agreement ineffective. The remaining provisions of this Agreement will remain in full force and effect

19.0 GOVERNING LAW
This Agreement shall be governed by and construed in accordance with the laws in force in Ghana and parties submit to the exclusive jurisdiction of Ghanaian courts.

20.0 DISPUTE RESOLUTION
The Parties shall endeavour to resolve amicably by direct informal negotiation, any dispute, controversy or claim arising out of or incidental to this Agreement or the breach, termination or invalidity thereof. However, in an event of the failure to resolve such disputes amicably, the matter shall be settled by arbitration in accordance with the Alternate Dispute Resolution Act 2010, (Act 798). The arbitral tribunal shall consist of one person who shall in the absence of agreement be appointed by the Ghana Arbitration Centre. The arbitration shall be in English and shall be held in Accra, Ghana. The cost of arbitration shall be borne by the parties in equal share.

21.0 INCORPORATION BY REFERENCE
1. The terms and conditions of the G-Money System published on the GCB BANK LIMITED website (<http://www.gcb.com.gh>) and amended from time to time is hereby incorporated by reference into this Agreement.

IN WITNESS WHEREOF THE PARTIES HAVE SET THEIR HANDS THE DAY AND YEAR FIRST WRITTEN ABOVE

SIGNED and DELIVERED by
[Signature] for and on behalf of
and in the name of GCB BANK LIMITED
in the presence of:-
Name:
Signature:
Address:

SIGNED and DELIVERED by
[Signature] for and on behalf of the [Redacted]
(Agent herein)
in the presence of:-
[Redacted]
for and on behalf of the [Redacted]
(Agent herein)
in the presence of:-
Name: [Redacted]
Signature: [Redacted]
Address: [Redacted]

Treatment Effects

- Subject i (firm, consumer hh) in locality v (market) in strata d to random treatment variable(s):

$$y_{iv} = \beta \mathbf{Treated Firm}_{iv} \times \mathbf{Treated Market}_v + \delta \mathbf{Treated Market}_v + \eta_d + \epsilon_{iv}$$

- ▶ **Treated Firm** $_{iv}$: dummy for those assigned to treatment (regardless)
- ▶ **Treated Market** $_v$: dummy for being in any treatment locality (any pos % MICROE treated)
- ▶ $\beta = \mathbf{direct}$ (holdin' fixed indirect effects)
- ▶ $\delta = \mathbf{indirect}$ (allowin' for +100% entry: neg/0/pos)
- ▶ $\beta + \delta = \mathbf{net effect}$ of entry (accounts for externalities or indirects) compared to the super-control locality
- ▶ set $\beta = \mathbf{0}$ for consumer hh outcomes throughout
- ▶ s.e. clustered at the locality level

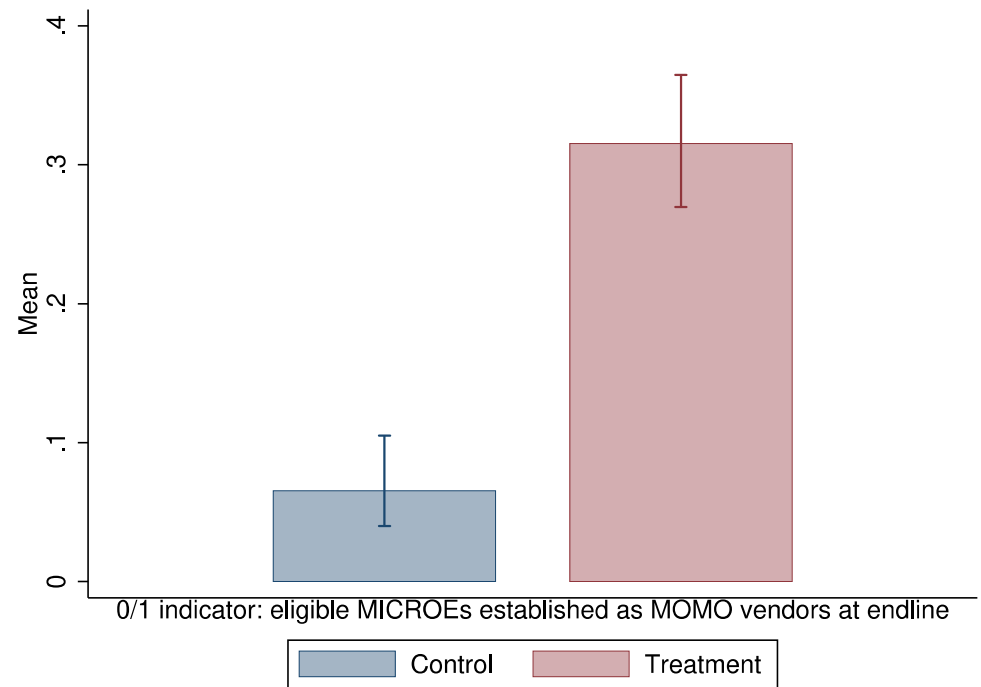
Results Roadmap

- ① First stage: randomized entry
- ② Consumer welfare
- ③ Producer welfare
- ④ Discussion – what to learn, or possibly say about randomized entry
- ⑤ Further results (Appendix):
 - ▶ (1) Beliefs and expectations about randomized entry effects
 - ▶ (2) Heterogeneity: intensity of randomized entry programs (low/high)
 - ▶ (3) Heterogeneity: store distances/geography, commonness of services, agent per-capita
 - ▶ (4) Models of Competition with Bundling
 - ▶ (5) Long-term exits and views from firms

Results – Effects of Treatment on Entry: $\triangle \uparrow$

- **Program Participation:** Entry is +25pp more likely among nonfinancial MICROE firms in treated localities, predictably:
 - ▶ [low] entry localities: +13pp
 - ▶ [high] entry localities: +35pp
- **Shock to Market:** \uparrow #agents, \downarrow HHI
- **Market Participants' Knowledge of new entrant stores**
 - ▶ non-entrant firms: +36pp
 - ▶ consumers: +23pp
- **Firm exits in treated localities:** +2.7%

Figure: EFFECTS OF TREATMENT ON ENTRY



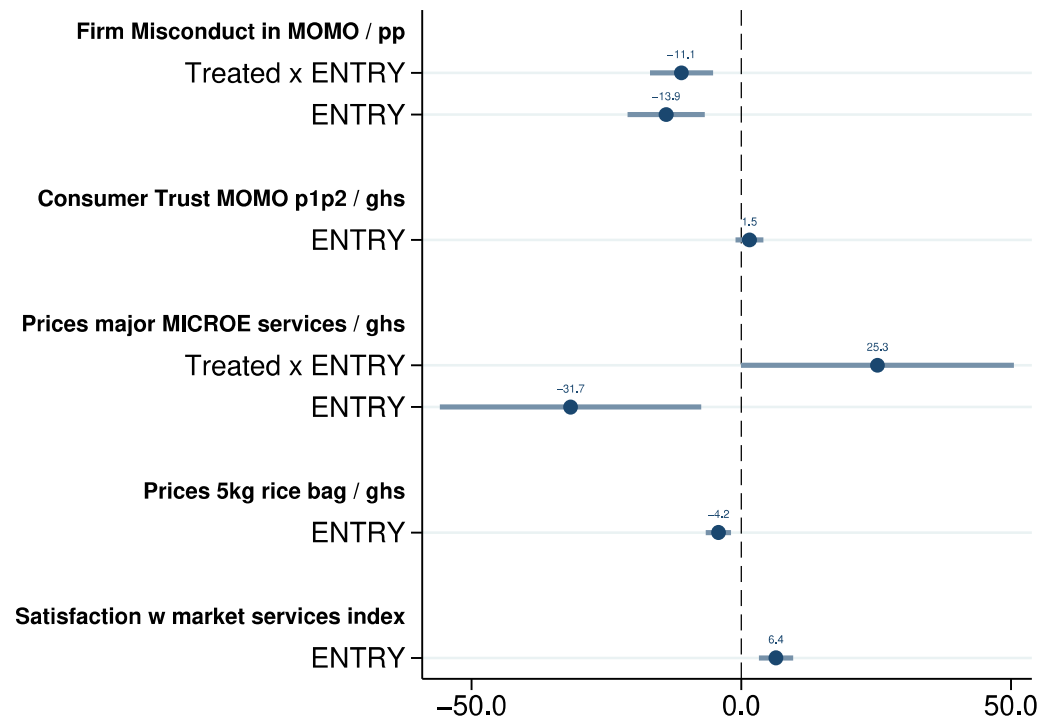
Randomization strata FEs. Clustered SEs at locality level.

In/Direct Effects on Consumer Welfare

- Key consumer outcomes @endline
 - ▶ **firm misconduct (momo) = overcharging services:** $\Delta \downarrow$
 - ▶ **consumer trust (momo):** $\Delta = 0$, ns
 - ▶ **prices (microe):** $\Delta \downarrow$ (**but complicated!**)
 - ▶ **consumer demand and satisfaction (industry: momo + microe):** $\Delta \uparrow$
 - ▶ **service quality (momo) = failed transactions, agent absence, price transparency:** $\Delta \nearrow$

In/Direct Effects on Consumer Welfare: $\triangle \uparrow$

Figure: TREATMENT EFFECTS OF ENTRY PROGRAM



Randomization strata FEs. Clustered SEs at locality level. $N \leq 1,143$

In/Direct Effects on Producer Welfare

- Key firm outcomes @endline
 - ▶ **Total revenues per wk: momo** $\Delta = 0$, ns + **microe** $\Delta \uparrow$
 - ▶ Total profits per wk (industry: momo + microe): $\Delta = 0$, ns (Appendix)
 - ▶ Profit (momo-line, administrative data) = ending balances for commissioning account (Appendix)

In/Direct Effects on Producer Welfare (1)

Table 8: Effects of randomized entry on business revenues for financial services

A. Financial Services: Mobile Money - Revenue and Profits							
	Firm-level revenue/wk (GHS)				Market-level revenue/wk (GHS) markups μ		Profit/wk (GHS)
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	
Treated Firm x Treated Market (β)	2864* (1802)			1748 (1671)			
Treated Market (δ)	4808** (2414)	-2926 (2191)	-2652 (2143)	-2931 (2180)	8753 (12115)	0.001 (0.004)	22.26 (18.13)
Net effect of randomized entry ($\beta + \delta$)	7673*** (2086)			-1182 (2796)			
Observations	176	593	769	769	136	136	769
Control mean	2,333	22,139	21,722	21,722	91,718	1.016	202.0
Analysis sample & level	T & UT entrants	Incumbents	Firms (all)	Firms (all)	Locality	Locality	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys

Note: Observations are at the firm level. Dependent variables are endline survey-based measures, winsorized at the 95th percentile level. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Revenue is sales made per week. For mobile money, this captures all cash-in/cash-out/money transfers made at financial vendor's outlet, and for microenterprise goods, it captures all non-financial goods and services at the store. Market-level revenue sums all the revenues of individual firms in a locality. Assuming constant returns to scale in production, the markup of price-cost, $\mu = 1/(1 - s_\pi)$, is estimated using profit rate $s_\pi = \text{profit}/\text{revenue}$, which is directly observed from the firms' survey data (Basu 2019) (Column 2b). Profit is income earned after paying all business expenses. Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2a and 2b, where heteroskedasticity-robust standard errors are reported.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

In/Direct Effects on Producer Welfare (2)

Table 9: Effects of randomized entry on business revenues for non-financial services

	B. Non-Financial Goods/Services - Revenue and Profits						
	(1a)	Firm-level revenue/wk (GHS)			Market-level revenue/wk (GHS) markups μ		Profit/wk (GHS)
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(3)
Treated Firm x Treated Market (β)	38.98 (383.7)			-8.600 (380.5)			
Treated Market (δ)	832.9** (401.8)	276.4* (154.0)	514.3*** (193.4)	281.5* (160.9)	5500*** (1838)	-0.080** (0.035)	37.53 (24.19)
Net effect of randomized entry ($\beta + \delta$)	871.9** (361.1)			272.9 (422.9)			
Observations	459	593	1,052	1,052	136	136	1,052
Control mean	2,696	1,860	2,222	2,222	16,198	1.245	334.5
Analysis sample & level Measurement	T & UT entrants Firm surveys	Incumbents Firm surveys	Firms (all) Firm surveys	Firms (all) Firm surveys	Locality Firm surveys	Locality Firm surveys	Firms (all) Firm surveys

Note: Observations are at the firm level. Dependent variables are endline survey-based measures, winsorized at the 95th percentile level. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Revenue is sales made per week. For mobile money, this captures all cash-in/cash-out/money transfers made at financial vendor's outlet; for microenterprise goods, it captures all non-financial goods and services at the store. Market-level revenue sums all the revenues of individual firms in a locality. Assuming constant returns to scale in production, the markup of price-cost, $\mu = 1/(1 - s_\pi)$, is estimated using profit rate $s_\pi = \text{profit}/\text{revenue}$, which is directly observed from the firms survey data (Basu 2019) (Column 2b). Profit is income earned after paying all business expenses. Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2a and 2b, where heteroskedasticity-robust standard errors are reported.

***Significant at the 1 percent level.

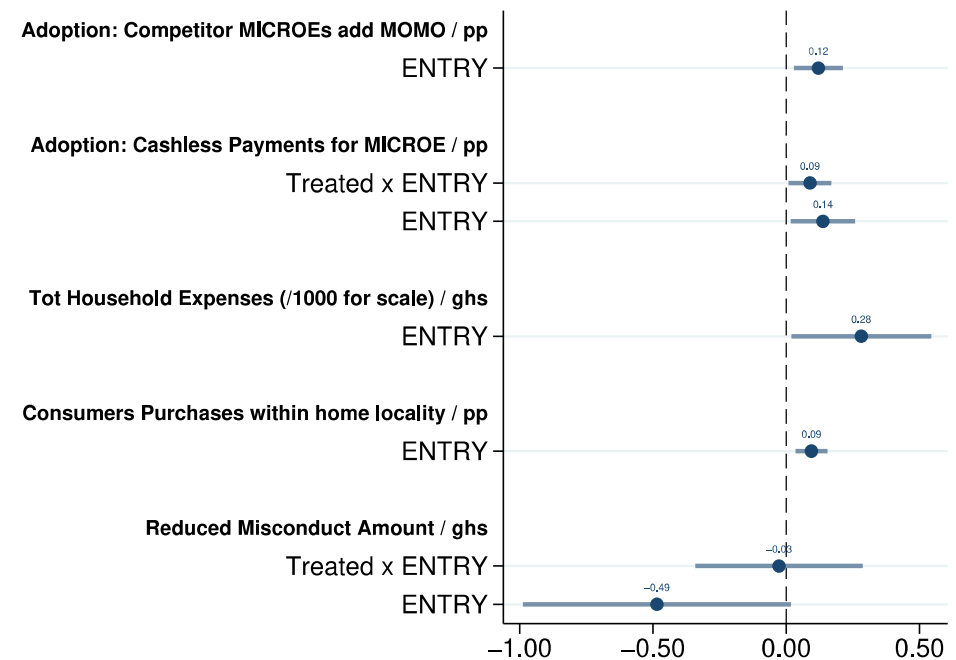
**Significant at the 5 percent level.

*Significant at the 10 percent level.

What Drives the Improvements: Quantification

- Positive story emerges:
 - ▶ Decrease in markups for nonfinancial (-32%)
 - ▶ Rise of consumer expenses (+16%)
 - ▶ Growth of firm revenues (+23%)
- ① Adoption externalities
 - ▶ Switch from cash to cashless payments +22pp
- ② Savings from lower firm misconduct
 - ▶ Reduced misconduct \approx
+25,000ghs/month/locality = -1.25ghs per
 245ghs \times 245ghs (avg value/week in ctr locality)
 \times 500 hhs in locality \times 4 weeks
- ③ Savings from lower shopping costs & prices
 - ▶ Substitution: purchases within home locality
 increases \approx **+ [93,500, 850,000]**
GHS/month/locality
 - ▶ Savings from reduced transportation costs \approx
+ [13,200, 120,000] GHS/month/locality

Figure: SOURCES OF IMPROVEMENTS



Randomization strata FEs. Clustered SEs at locality level.
 $N \leq 1,110$

Bigger Picture: Entry with Bundling—What to Learn, or to Say?

- **Do financial MOMO services unlock nonfinancial MICROE goods/services?**
 - ▶ Estimate significant positive spillover effects of DFS on nonfinancial services
 - ▶ Many wonder how DFS markets will transform service industries in rural economies
- **Did the market equilibrium had sufficient entry and if not, why?**
 - ▶ Increased industry revenues and consumer outcomes, suggest entry insufficient *pre*-experiment.
 - ▶ (1) the shape of demand?
 - ▶ (2) moratorium/ban on entry (MTN leaving money on the table?) ✓
 - ▶ (3) cost of bus formalization: 200 ghs/yr (cost) < 800 ghs revenue/wk increase (return) X
 - ▶ (4) incumbent firm misconduct or hidden behavior ✓
 - ▶ (5) Or selection X
- **Learning externality from randomized entry?**
 - ▶ Vendor misconduct might arise if firms do not understand demand curve (Annan JPE2025)
 - ▶ Incumbent vendors reduced misconduct; part 'may be' due to learning externality
 - ▶ Externality may justify short-term entry, even if it leads to losses in the short term for incumbents
- **Models of Competition with bundling?**
 - ▶ Armstrong and Vickers (2010), Zhou (2017): 'price effects' consistent
 - ▶ Bundled firms increased prices, un-bundled firms decreased
 - ▶ Incidentally, bundled firms behavior consistent with 'loss-leader pricing'

Conclusion

- Markets for DFS exhibit significant consumer protection concerns
- Entry—with bundling—matters for efficiency
 - ▶ Broader direct and indirect benefits of randomized entry
 - ▶ Financial MOMO services: ↓ vendor misconduct + ↑ service quality
 - ▶ Nonfinancial MICROE services: ↓ markups ⇔ ↑ within-market revenue expansion
- Improvements come from decreased transaction costs
- **Proof-of-concept:** Entry increases local economic activity, not only by changing markets for DFS, but also by transforming MICROE services
 - ▶ Nature of externalities from entry
 - ▶ Firm pricing strategies under bundled entry
 - ▶ Conditions under which entry may be inefficient

Connections to the Literature

- Firm entry and competition in markets

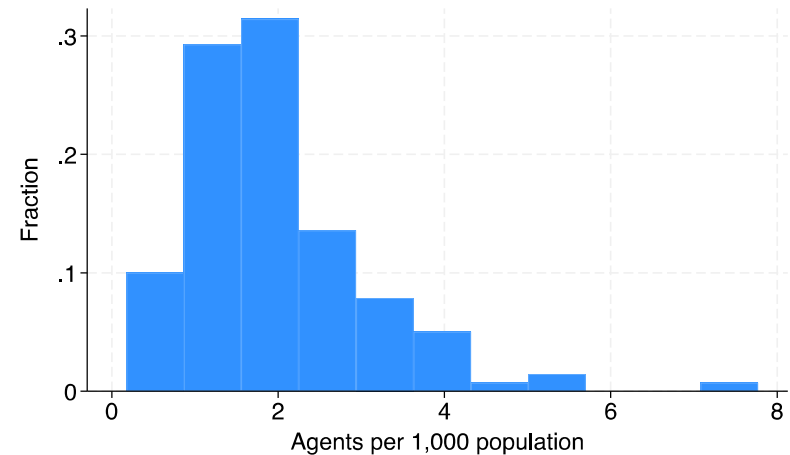
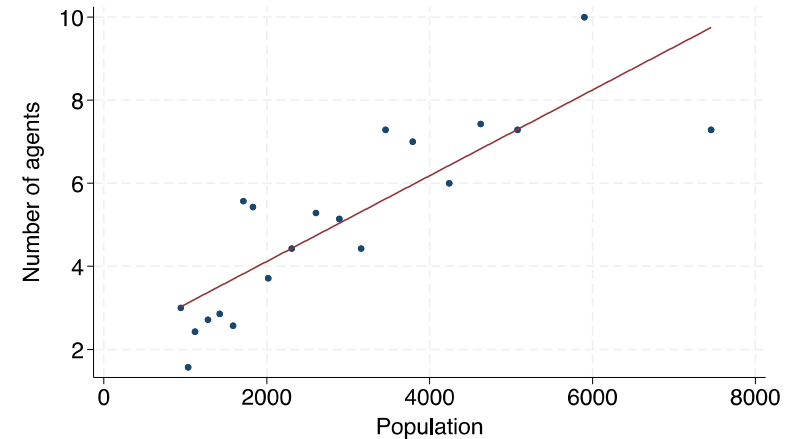
- ▶ Bresnahan-Reiss JPE1991 (cc), Syverson JPE2004 (pd), Atkin et al JPE2018 (px, w)
- ▶ Matsa QJE2011 (ql), Bennett-Yin RESTAT2019 (ql), Busso-Galiani AEJ-A2019 (px, ql), Bergquist-Dinerstein AER2020 (px)
- ▶ Exogenous entry is hard to get in decentralized markets
- ▶ Work with markets that are essentially monopolized – one only needs a single decision-maker (e.g., MTN MM Ltd) to “get it wrong” about the right level of entry

- Household finance and digital payments

- ▶ Higgins AER2024 (card adoption), Crouzet et al JPE2023 (demonetization), Annan JPEfc (vendor behavior)
- ▶ Drivers of digital payments depend on market structure, yet remains poorly understood
- ▶ Entry with bundling improves vendor conduct and quality, and generate a large services multiplier
- ▶ Market design & expansion interventions need to account for such market-wide responses

DFS Market Fact 1 - Vendor Density

- No. of agents pos correlated w pop (market size) at village level
- Still a lot of village-level variation in terms of *agent per capita*
→ Additional vendors can be efficiently added
- In a survey:
 - Majority think all can survive after new entry and that market is large enough for entry
- ***ex-ante*: There's untapped Market Potential [Extensive Margin]✓**



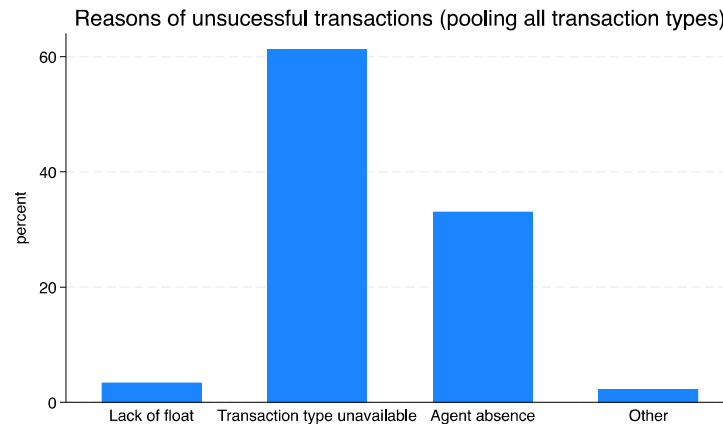
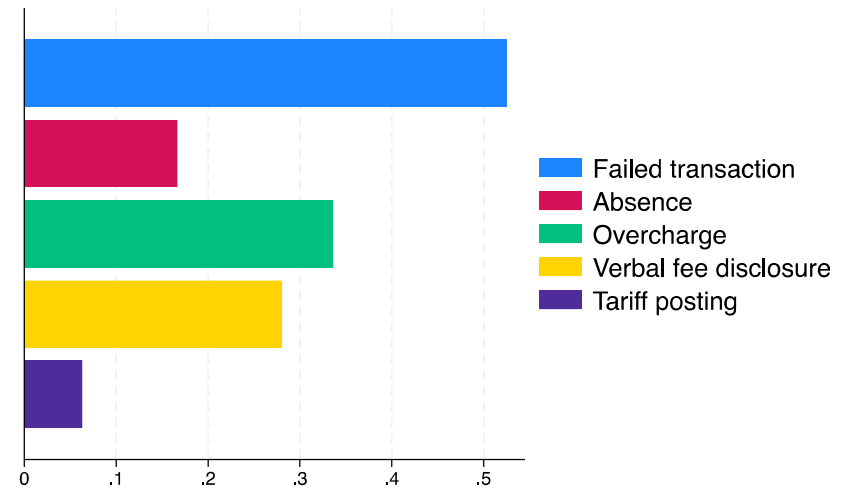
DFS Market Fact 2 - Misconduct and Service Quality

Audit study: transactions at vendor outlets:

- Failed transactions (unconditional): 52%
- Agent absence: 18%
- Overcharging (misconduct): 30%
- Limited price transparency: verbal price disclosure=27% vs physical tariff post=6%

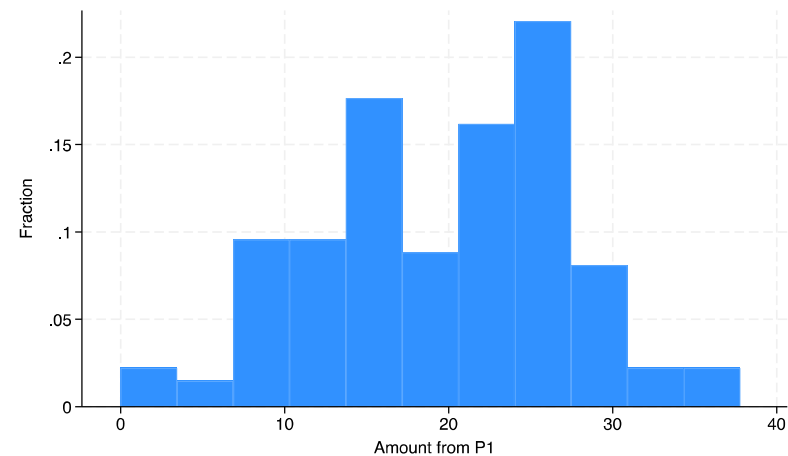
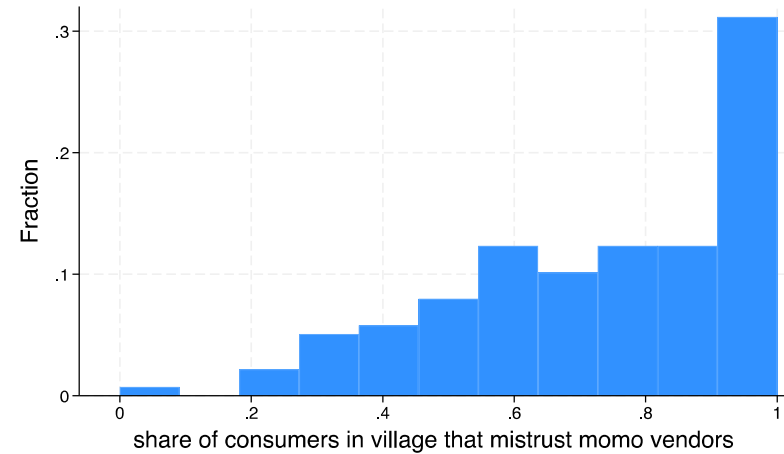
- In a survey:
- Consumer beliefs + estimates from their last vendor transaction indicate similar concerns

- **There's low service quality [Intensive Margin]** ✓



DFS Market Fact 3 - Consumer Trust

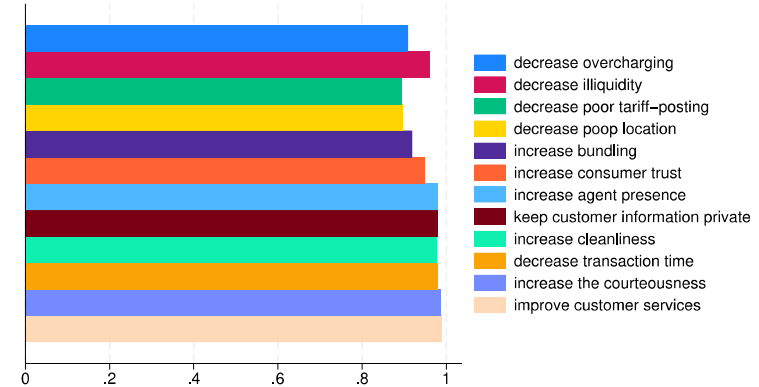
- Village level: share of consumers that disagree “consumers in village mistrust momo vendors”
 - ▶ Higher x =agree mistrust in vendors
- In a trust game: amount from consumers (max 40 ghs): $20/40=50\%$
 - ▶ Trust vary across villages
- **Limited consumer trust**✓
- Facts #2 + #3 → sig concerns [The Market for Consumer Protection]
- The value of “entry” likely higher



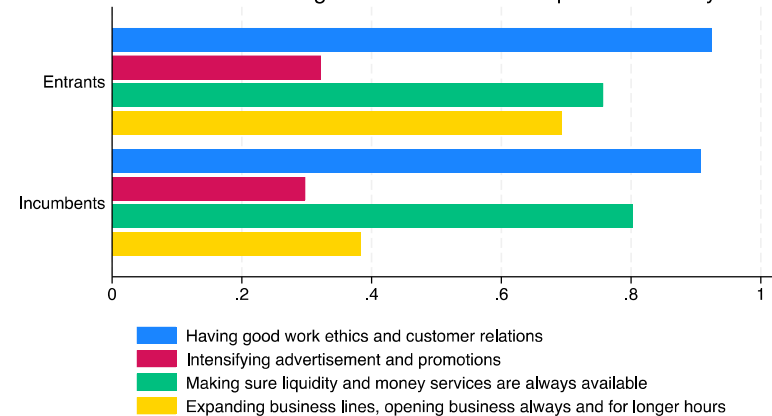
Market Fact 4 - Entry Matters

- When consumers (and incumbents!) asked **perceptions** about entry effects: misconduct, quality, trust, etc.
- Potential entrants and incumbents asked **best responses**, if entry.
- **Entry likely matters** — w possible indirect effects on non/peer businesses ✓

Consumer expectation about competition effects



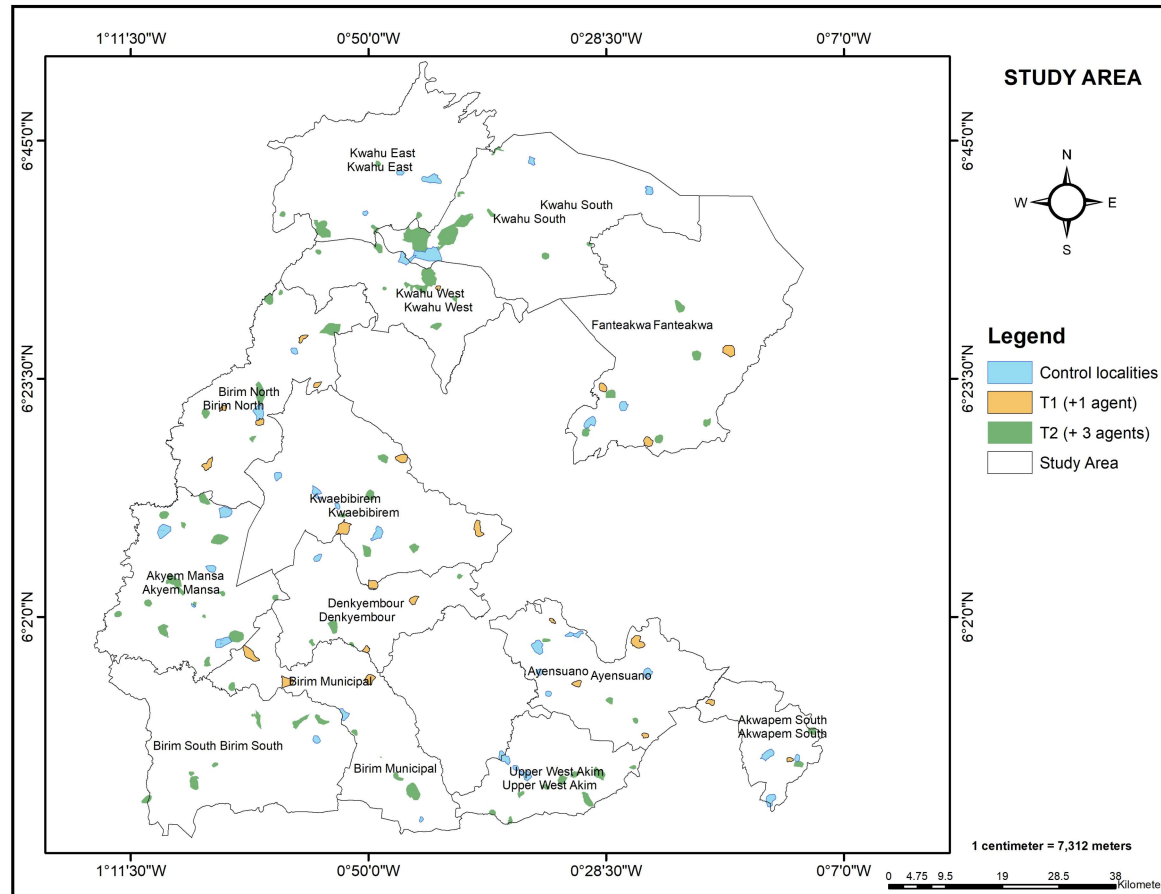
Entrant strategies and incumbent responses to entry



Intervention: Entrants Assignment

- ① \forall local market: gather ($n \leq 5$) pool of existing MICROE
 - ▶ Joint team of staff from MTN and GCB + GSS (supervise process)
 - ▶ Enterprises identified based on service providers set rules: initial capital ($>3k$ ghs) + store infrastructure + min literacy + bus operating permit (non-binding w support)
- ② Markets assigned to either of:
 - ▶ Control: $1/3^{rd}$ of localities randomly receive “no-entry” ($=+0\% \uparrow$) $n=45$ vs
 - ▶ Treatment: $2/3^{rd}$ of localities receive entry of new vendors $n=91$
 - ★ Treatment 1 [low]: Half receive +1 additional vendor each ($= +25\% \uparrow$)
 - ★ Treatment 2 [high]: Half receive +3 additional vendors each ($= +70\% \uparrow$)
- ③ \forall treated local market: randomly select either 1 or 3 (out of $n \leq 5$) eligible MICROE to be enrolled
- Three-step design creates 3 different exog variations at market- and individual-levels:
 - ▶ (i) subset of localities receive entry (compare impacts of entry vs not)
 - ▶ (ii) vary density of entry (trace out equilibrium impacts)
 - ▶ (iii) subset of eligible MICROE enrolled (compare business impacts on enrolled vs not)
- Programs stratified based on pop (dd) x vendor density (ss)

Map for Treatment Assignments – Spatially Distinct



- When asked: 95% of services within locality overall

Intervention: Entrants Enrollment

1ST: ONBOARDING - PAPERWORK

- Operations officer verifies all set entry requirements, including the BOP, and then completes vendor registration form and Agreement
- *if* needed (70% of the time), project subsidizes MICROE (w 50% or 100% of the total BOP cost of ~200 ghs, depending on how much entrant can contribute) to acquire their BOP
- entrant signs Agreement

2ND: DUE DILIGENCE AND APPROVALS

- Operations officer sends completed forms/Agreement and supporting documents to hQ for evaluation
- *if* passed, managerial approval is granted and vendor-specific SIM card w a shortcode is generated

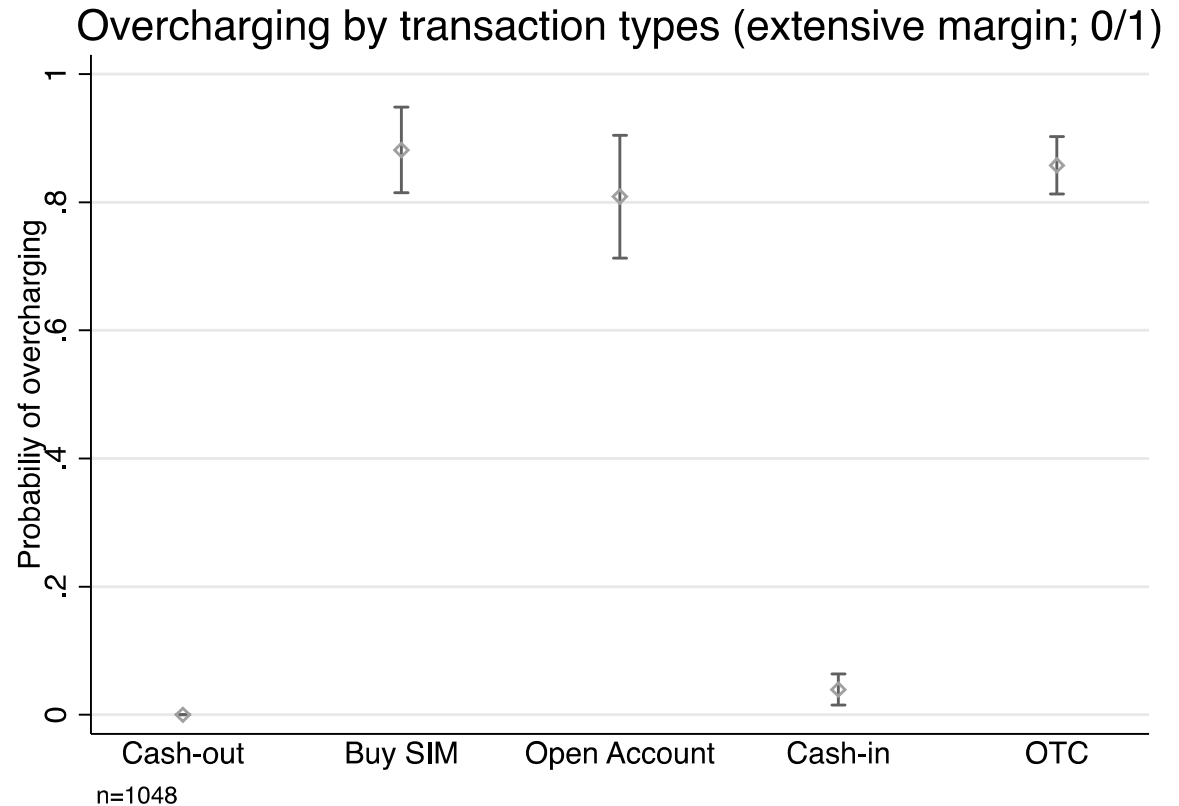
3RD: ACTIVATION AND MINI BRANDING

- Officer re-visits entrant's outlet
- delivers SIM card, trains the entrant about operation and retailing of MOMO, and then brand the outlet with stickers/tariffs/ etc., along w customer acquisitions

-
- Established entrants to offer both MTN MOMO and G-Money, akin to incumbents mix of MOMO services
 - Brings two registrations to MICROE doorstep, bus registrations with instant purpose
 - Required joint partnerships w two competing commercial providers: MTN vs GCB (hard + fun part!)

Measuring Misconduct – Objectively

- Trained customers (40) given money (p-cash+e-money) to make real transactions on Mobile Money (Annan 2023)
 - ▶ Fix, use modal transaction value=140ghs (based on consumer intercepts data)
 - ▶ Include all transaction types: CI, CO, OTC, SIM purchase, open account, airtime purchase*
 - ▶ **Misconduct:** reference *ex-ante* official rates, define misconduct as overcharged transaction (0/1, amount)
 - ▶ **Track other quality outcomes:** agent absence, failed transactions, price transparency



Intermediate Firm Outcomes

- Key firm outcomes @endline (2)

- ▶ no. of customers per wk: $\Delta \nearrow$
- ▶ business expenses per wk: $\Delta = 0$
- ▶ wagebill (last 30 days): $\Delta = 0$
- ▶ household expenses (last 30 days): $\Delta \nearrow$

- ▶ business loans (last 90 days): $\Delta = 0$
- ▶ **business capital investments (last 90 days) (\uparrow FC): $\Delta \uparrow$**
- ▶ **hrs of work per week (no. of days + no. of hrs per day) (\uparrow MC): $\Delta \uparrow$**
- ▶ moved business to another location within locality (last 90 days): $\Delta = 0$
- ▶ capital investments (momo, administrative data)* = ending balances for money account as of Mar 15, 2024 (Appendix)

Beliefs and Expectations - How Predictive is Market About Entry Effects, Ex-ante?

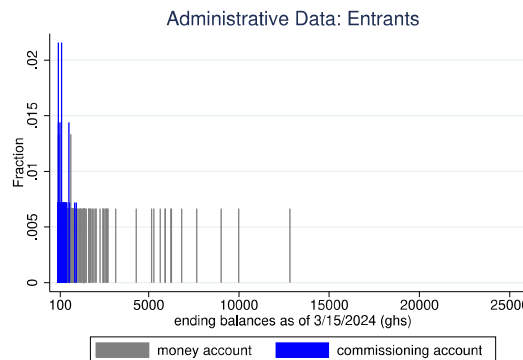
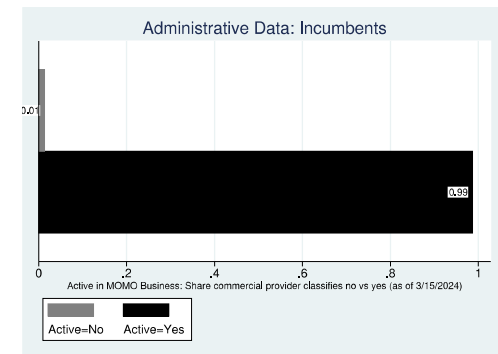
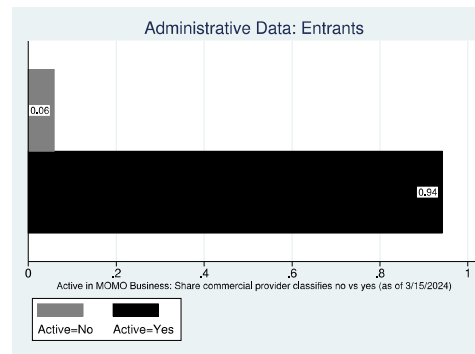
- @baseline: solicited **perceptions** of vendors and consumers about “new entry’s” likely effects
- Examine predictability of effects (à la DellaVigna and Pope 2018)
- (1) descriptively (back-of-the-envelope)
 - ▶ Δ Misconduct (mkt-level): -22% (truth) vs -74% [se=1.8] (vendors) vs -91% [se=0.7] (consumers)
 - ▶ Δ Consumer trust (mkt-level): 0% (truth) vs +86% [se=1.3] (vendors) vs +95% [se=0.6] (consumers)
- (2) regress outcomes (@endline) against ENTRY \times perceptions (@baseline): pos correlation but not sig
- Vendors perceptions less optimistic compared to consumers
- Firm misconduct: correct (sign) but incorrect (size)
- Consumer trust: systematically incorrect (sign, size)
- Treatment effects weakly correlate w baseline predictions: imperfect forecasts + limited selection on treatment (sampling from selected population, akin to a bandith problem)
- **Surprising? certainly** - even market participants

Appendix: Admin – Effects of Treatment on Entry: $\triangle \uparrow$

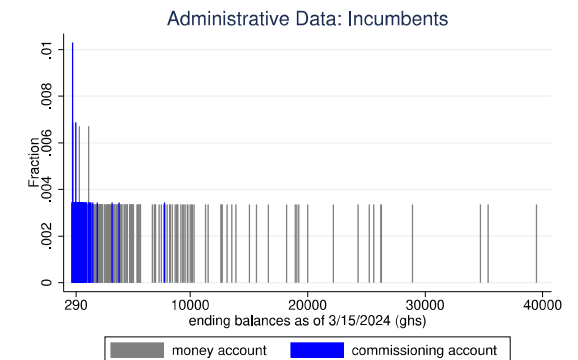
Randomized entry [Administrative data]

- Very active and promising new entrants (conditional on enrollment)
- 94% are classified as “active” in MOMO business by the commercial service provider (@upstream)
- Money account balances (capital investments): $\in [0, 25000]$ ghs
- Commissioning account balances (profits): $\in [0, 1000]$ ghs

Figure: EFFECTS OF TREATMENT ON ENTRY



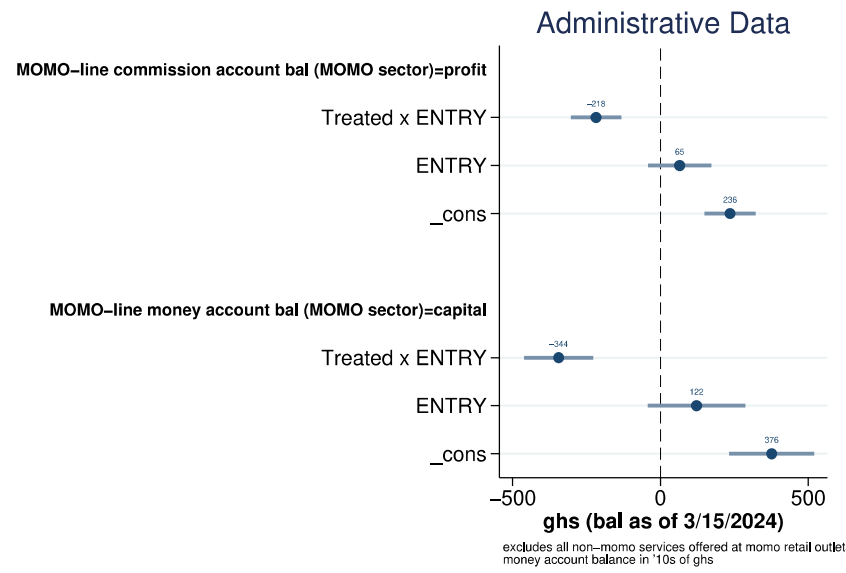
Note: 94% of the entrants classified as active in MOMO business by commercial provider, n=181



Note: 99% of the incumbents classified as active in MOMO business by commercial provider, n=627

Appendix: Admin – Effects on Producer Welfare, Commissions - MOMO: $\Delta = 0$

Figure: TREATMENT EFFECTS OF ENTRY PROGRAM

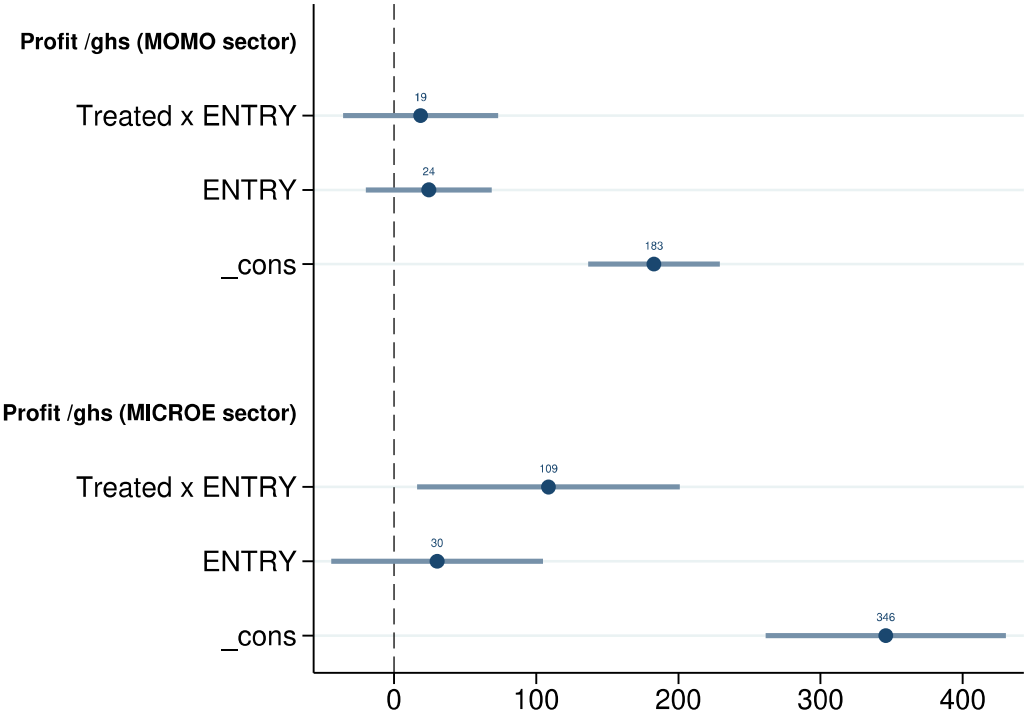


- Treatment locality incumbents are keeping larger ending balances on money account
- Evidence of within-market [reallocations + expansions]

Randomization strata FEs. Clustered SEs at locality level. N=468 (admin).

Appendix: Effects on Producer Welfare, Profit: $\Delta = 0$

Figure: TREATMENT EFFECTS OF ENTRY PROGRAM



Randomization strata FEs. Clustered SEs at locality level. N=324/352.

Appendix: Framework – Welfare and Policy

- In theory, “randomized entry” intervention could create
 - ▶ (i) Market expansion (competitive conduct) vs
 - ▶ (ii) Business stealing within and across sector/s
 - ▶ (iii) Or, a mix of (i) and (ii)
- Introduce a simple general eqbm model of services that (i) features these effects and (ii) provides microfoundations for the empirical findings, and can be used to quantify the welfare effects of randomized entry

(GE) Model of Services

- Sector 1/ Service A: MOMO (retail finance/CICO/OTC services, etc)
- Sector 2/ Service B: MICROE (provisions, tailor, drug store, building materials, etc)
- Experiment: “exogenous entry”—to sell both MOMO and MICROE
- There are many localities $m = 1, 3, \dots, M$
- In each locality m :
 - ▶ There are many firms $i = 1, 2, \dots, I$ and one representative consumer (assumes homotheticity)
 - ▶ $Q_m^A = \left(\sum_{i \in m} (q_i Q_i^A)^{(\sigma-1)/\sigma} \right)^{\sigma/(1-\sigma)}$, aggregates all purchased MOMO services in locality m
 - ▶ $Q_m^B = \left(\sum_{i \in m} (q_i Q_i^B)^{(\sigma-1)/\sigma} \right)^{\sigma/(1-\sigma)}$, aggregates all purchased MICROE services in locality m
 - ▶ q_i is firm i 's quality of service.

(1) Consumer Preferences – Optimal Allocation

- CES across services (within sector) and Cobb-Douglas across sectors

- **Max** $\{Q_m^A, Q_m^B\}$: $U = \theta \log(Q_m^A) + (1 - \theta) \log(Q_m^B)$

- ▶ subject to $\sum_{i \in m} P_{Ai}^A Q_i^A + Q_m^B \leq E_m$

- ▶ θ is MOMO expenditure share, E_m is total spending

- Assume frictionless markets so that P_i is constant across localities, we derive that

→ for each firm i (quality-adjusted price), $P_i^A q_i^{(1-\sigma)/\sigma} = \left(\frac{\theta E_m}{Q_i \sum_{i' \in m} (P_{i'}^A / q_{i'})^{(1-\sigma)}} \right)^{1/\sigma} = \left(\frac{\theta E_m}{Q_i \mathbf{P}_m^A (1-\sigma)} \right)^{1/\sigma}$

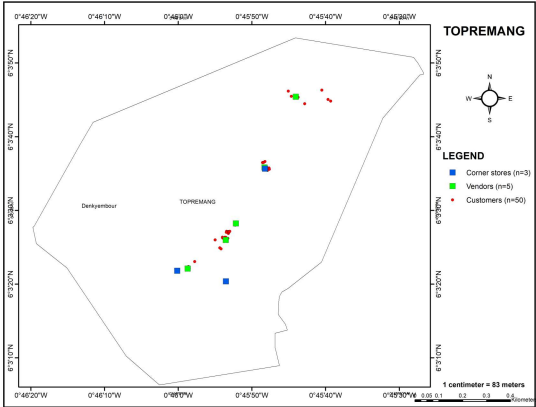
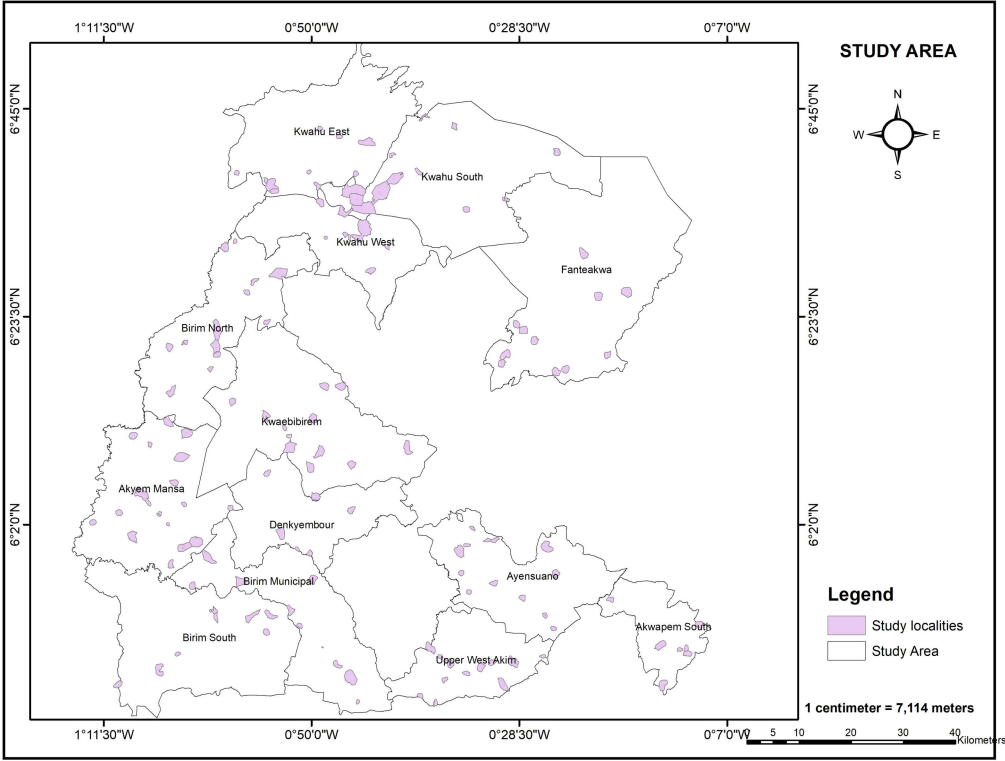
- ▶ where: $\mathbf{P}_m^A := \left(\sum_{i' \in m} (P_{i'}^A / q_{i'})^{(1-\sigma)} \right)^{1/(1-\sigma)}$ is “quality-adjusted” Dixit-Stiglitz price index (aggr market price)

- Note 1: (qlty-adjusted) price decrease in own total supply Q_i (noting that $Q_i \uparrow$ via potential improvements in η_i and q_i under ENTRY)
- Note 2: These are the demand curve/s.

(2) Firms' Price-Setting

- Firms are small, do not take into account its impact on price indices
- CRS production, produce services with capital only, take rental rates r as given
- Aggregate capital supply $K = \sum_i K_i$
- **Max:** $P_i Q_i - rK_i$ subject to demand curve/s from (1)
 - ▶ with $Q_i = \eta_i K_i$, where η_i = firm i 's productivity and so a firm i is fully described by $\{\eta_i, q_i\}$
- Assume ENTRY improves $\{\eta_i, q_i\}$, which evolve according to the following eqns:
 $\eta_i \propto \exp(\gamma_\eta)$ and $q_i \propto \exp(\gamma_q)$, $\gamma = \gamma_\eta + \gamma_q$
- SOLVE

Appendix: Map for Market Census

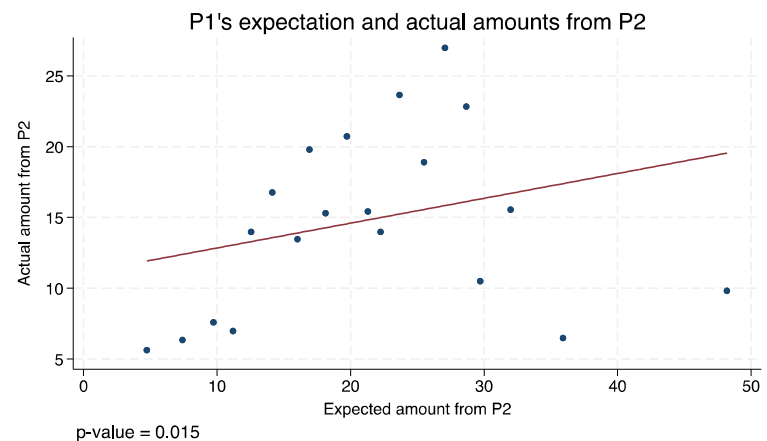
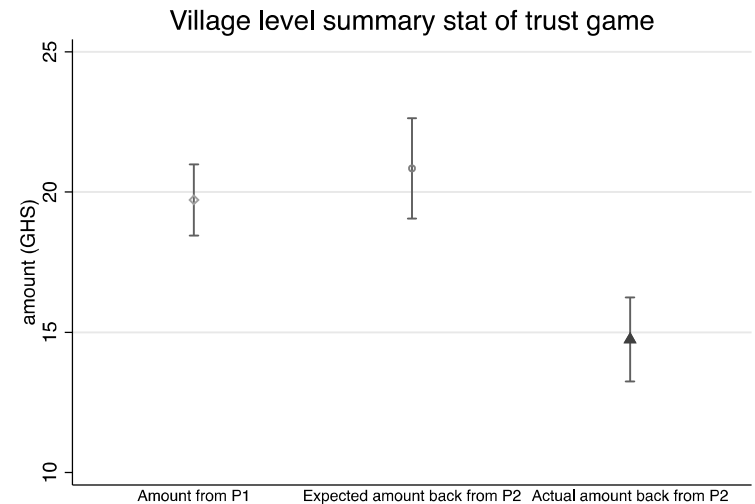


Market: Topremang

n=136 localities, 13 districts, all in the East

Appendix: Measuring Trust – Objectively

- Trained enumerators (40) implement trust games *at-scale* in the field
 - ▶ Trustor/P2: 1 representative, anonymous vendor per village (n=136)
 - ▶ Trustee/P1: ~10 customers per village (n=1044), each endowed w 40ghs
 - ▶ Basic form: P1 decides how much (s ghs) to send to P2; we triple it ($3*s$ ghs) and give it to P2; P2 then decides how much (r ghs) to send back to P1
 - ▶ All payouts depend on choices and are made directly via Mobile Money
- **Trust (or lack thereof):** as
 - ▶ (i) amount P1 sent to P2 vs
 - ▶ (ii) amount P1 expected from P2 vs
 - ▶ (iii) amount P2 sent to P1



Appendix: Trust Game in Pictures

