Competition for Transparency: Pre-analysis plan

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1 Introduction

1.1 Summary

A large body of economics research has examined the role of price transparency, evaluating a range of policies implemented across different countries and markets. Evidence suggests that more transparent markets can benefit both customers and agents by disciplining firms' behavior, increasing trust among counterparties, and generally improving market efficiency.

This raises a natural question: if transparency can benefit consumers, and to some extent firms, why don't market forces alone lead agents to be more transparent? Several policy tools have been proposed to address this gap — including audits (Naritomi 2019), disrupting collusive norms (Banerjee, Frischer, Karlan, Lowe, and Roth 2023), promoting competition (Bergquist and Dirnstein 2020), and increasing reputational costs for opaque behavior (Annan 2024) — with the goal of shifting the market from a low-transparency equilibrium to a more transparent one. Lack of transparency is especially relevant, if not the defining feature, in the market for digital financial services (DFS) in developing countries. In these

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markets, consumers often face hidden fees and complex pricing. Mobile money, in particular, is marked by shrouded attributes, opaque pricing, and low financial literacy, making it an ideal setting to study transparency-enhancing interventions.

This study seeks to understand how to incentivize mobile money agents to share information with customers through displaying official MTN mobile money tariffs. We test whether financial incentives, competition, or reputational motivations increase agents' willingness to engage in transparent practices, using a randomized controlled trial (RCT) across 175 rural communities across Ghana. The project includes three treatments designed to foster competition for transparency among mobile money agents in eastern Ghana. Agents in the treatment arms receive tariff posters that accurately display transaction fees. Among those offered the posters, we test three types of incentives to actually display them: (1) financial rewards, (2) competitive pressure from neighboring agents, and (3) reputational incentives from customer feedback.

1.2 Intervention

The intervention aims to incentivize tariff posting at mobile money agent locations through offering entrance into a lottery worth 200 GHS (17 USD). Prominently displaying official mobile money tariffs at agent locations alerts customers to the correct amount they should be charging, creating a more transparent market.

The PI team will conduct a two-stage randomization. In stage one, we assign markets to one of 5 treatment arms. Treatment assignment is clustered at the market level, meaning all agents and customers in the same market receive the same treatment. In stage two, which only applies to treatment arm 1, we randomly select a "representative" agent who will automatically win the lottery if he/she posts tariffs.

Stage 1

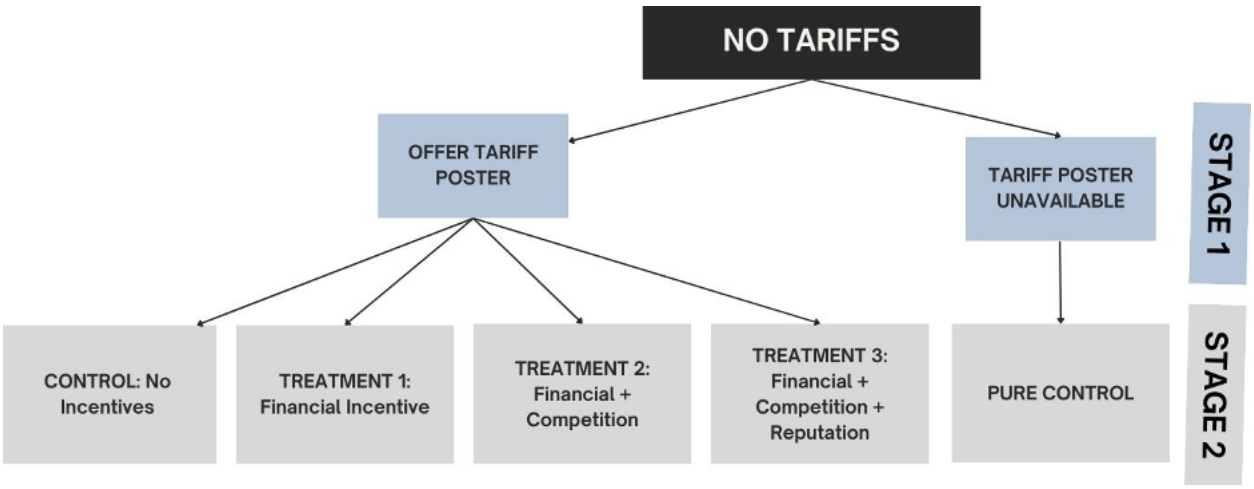

Figure 1: Two Stage Treatment Implementation

The first stage focuses purely on transparency, so the team will offer two treatments:

- **Treatment 1:** The team will work with MTN to make tariff posters available to agents in select locations. MTN will notify these agents that they can pick up tariff posters at designated locations, likely near where agents collect e-float.
- **Pure control:** The study will maintain a pure control group where agents are not offered the tariff poster.

Stage 2

Stage two includes incentivizing agents to post tariffs and includes three treatment arms: financial reward for posting tariffs, competition with other agents who post tariffs, and customers who monitor agents' tariff posting.

Among the agents offered the tariff poster in stage one, we will offer incentives to mobile money agents and mobile money customers. Agents are entered into the lottery if they post information about official mobile money tariffs. Customers are entered into the lottery if they report on agents who fail to post information about official mobile money tariffs. The intervention includes three treatment arms:

- **Treatment 1:** Treatment one invites 1 agent to participate in a lottery for 5 months. We select the agent randomly after the census of all agents in the market. For the 1 agent included in the lottery, auditors confirm that the agent is eligible for the lottery. If the agent posts tariffs he/she automatically wins the lottery. We select 1 lottery winner per market per month. The selected agent knows they are the only one in their area being treated and that they are guaranteed to win if compliant.

- **Treatment 2:** Treatment two invites all agents to participate in a lottery for 5 months. Auditors confirm that agents are eligible for the lottery through random mystery shopping visits over the course of the study. We select 1 winner per market per month from the pool of eligible agents. We select 1 lottery winner per market per month. Agents know that other agents in the community are also eligible, and that only one will be selected per month.

- **Treatment 3:** Treatment three invites both agents and customers to participate in a lottery for 5 months. Auditors confirm that agents are eligible for the lottery through random mystery shopping visits over the course of the study. Customers can enter the survey by sharing photos of mobile money agent locations and mobile money transaction receipts (if available). We select 1 winner per market per month from the pool of eligible agents and customers. We select 1 agent winner per market per month and 1 customer winner per market per month. Agents know that other agents in the community are also eligible, and that only one will be selected per month. The customer contest was described to agents as part of the intervention, meaning agents know that customers would also be monitoring them.

- **Tariff Control:** This group will have been offered the tariff poster but will not be offered any incentives for posting.

1.3 Randomization

Randomization Method

We will randomize the markets into five treatment arms: pure control, tariff control, treatment 1, treatment 2, and treatment 3. The randomization will be stratified by the following market-level characteristics to improve baseline balance across treatment arms:

- Population size (above or below the sample median)
- Number of agents (above or below the sample median)
- Percentage of agents posting tariffs

Within each stratum, we randomly assign markets into the five treatment arms. The primary purpose of stratification is to ensure comparability across arms on these key characteristics at baseline, rather than to define subgroups for the main analysis. Stratification and randomization are implemented in Stata.

2 Data

2.1 Analysis and data examined to date

The primary data sources include agent records, customer reports, and MTN administrative data. To date, we have examined data collected through the market census, and mystery shopping audits. These sources provide information on agent characteristics, tariff posting, and transaction behavior during the intervention.

2.2 Agent data

Agent-level data are drawn from multiple sources. The market census establishes the study sample of mobile money agents, capturing information such as location, provider affiliation, and tariff posting at baseline. In addition, mystery shopping audits provide repeated measures of agent behavior throughout the study, including visibility of tariff posters, transaction

success, and the presence of illicit fees. Endline surveys complement these sources by collecting data on agents' business outcomes, perceptions of tariff posting, and expected future practices.

2.3 Customer data

Customer data come from two sources. First, the baseline census captures a sample of mobile money customers from each market using convenience sampling (i.e. intercepting customers during normal business hours) at agent locations. Second, customer reports are submitted during the intervention as part of the lottery mechanism, providing evidence on tariff visibility, transaction receipts, and consumer perceptions. An endline survey follows a representative sample of customers to measure transparency perceptions and customer experience after the intervention.

3 Outcomes of interest

This section describes the outcomes that will be measured as part of the study. The indices will be captured in the body of the paper, and other outcomes will largely be reported in the appendix.

3.1 Primary outcome

3.1.1 Tariff disclosure behavior

Tariff disclosure index (standardized z-index): Summary index combining physical tariff posting (audit survey) and verbal tariff disclosure (audit survey), constructed as described below.

Tariff consistency index (standardized z-index): Summary index combining Consistency of physical tariff posting (audit survey) and Consistency of verbal tariff disclosure (audit

survey), constructed as described below.

Audits (collected monthly but aggregated cumulatively):

1. Physical tariff disclosure: Indicator for whether the agent posts tariffs at any point during the study period (based on any audit round).
2. Verbal tariff disclosure: Indicator for whether the agent verbally communicates the tariff unprompted during the audit.
3. Any tariff disclosure: Indicator for whether the agent discloses tariffs either via an official poster or verbal communication.
4. Non-tariff transparency: Indicator for whether Momo advertising is posted at the agent's outlet (this measure is not expected to change).
5. Consistency of physical tariff disclosure: Count of audit rounds in which a tariff poster is observed at the agent location.
6. Consistency of verbal tariff posting: Count of audit rounds in which agent verbally communicates the tariff unprompted during the audit.
7. Tariff visibility: Ordinal variable of how visible the tariff poster is.
8. Tariff placement:Categorical variable indicating the location of tariff poster
9. Provider tariffs: Categorical variable of providers for whom agent posts tariffs.
10. Frequency of tariff updates: Categorical variable capturing how often the agent updates their posted mobile money tariff list.

Endline Agent Surveys:

11. Self-reported physical tariff disclosure: Indicator for whether the agent posts tariffs
12. Self-reported verbal tariff disclosure: Indicator for whether the agent verbally communicates the tariff values to customers
13. Self-reported consistency of physical tariff disclosure: Count of months out of the past six months that the agent reports posting tariffs.

Endline Customer Surveys:

14. Customer-reported tariff posting: Indicator for whether the agent posts tariffs
15. Customer-reported verbal tariff disclosure: Indicator for whether the agent verbally communicates the tariff values to customers
16. Customer-reported Non-tariff transparency: Indicator for whether customer reports Momo advertising at the agent's outlet.

3.2 Secondary outcomes

3.2.1 Business outcomes

These outcomes capture whether the intervention led to improved operational and financial performance of mobile money agents. Unless otherwise noted, all measures are self-reported for the past 7 days.

Mobile money labor outcomes index (standardized z-index): Summary index combining Employees (agent survey) and Mobile money hours constructed as described below.

Mobile money transactions index (standardized z-index): Summary index combining Mobile money customers (agent survey), Mobile money transactions, Mobile money income, and Stock (agent survey) constructed as described below.

Non-Mobile money transactions index (standardized z-index): Summary index combining Non-Mobile money customers and Non-Mobile money income constructed as described below.

Endline agent survey:

1. Employees: Number of paid workers employed (excluding the owner).
2. Mobile money hours: Weekly hours worked by the owner in the mobile money business.
3. Mobile money customers: Weekly number of mobile money customers served.
4. Mobile money transactions: Weekly total number of mobile money transactions.

5. Mobile money transaction value: Weekly total value of mobile money transactions (revenue).
6. Mobile money expenses: Weekly total mobile money–related expenses.
7. Mobile money income: Weekly mobile money business income (profits).
8. Mobile money income monthly: Monthly mobile money business income (profits).
9. Stock: Total value of inventory and raw materials.
10. Non-mobile money business: Indicator that agent operates a non-mobile money business.
11. Non-mobile money business customers: Weekly number of non-mobile money customers served.
12. Non-mobile money business transaction value: Weekly total value of non-mobile money transactions (revenue).
13. Non-mobile money business expenses: Weekly total non-mobile money–related expenses.
14. Non-mobile money income: Weekly non-mobile money business income (profits).
15. Non-mobile money income (weekly): Monthly non-mobile money business income (profits).
16. Mobile money acceptance: Indicator if agent accepts mobile money as payment for goods/services.
17. Change in customers: Ordinal measure of change in customer base over past 6 months (growth or loss).
18. Change in business: Ordinal measure of change in overall business performance over past 6 months.
19. Change in mobile money market: Ordinal measure of perceived market volatility over past 6 months.

Audit measures (collected monthly but aggregated cumulatively):

20. Customers: Number of customers observed by auditor.

21. Stock: Ordinal estimate of number of items visibly stocked in the shop during the audit visit.
22. Stock value: Estimated value of shop
23. Stock items: Estimated count of different item types stocked at the shop
24. Employees: Estimated number of employees, excluding agent.

3.2.2 Customer experience

These outcomes assess whether the intervention improved the quality, transparency, and fairness of the mobile money transaction experience from the customer's perspective.

Pecuniary and non-pecuniary costs index (standardized z-index): Summary index combining Transaction success rate, Incidence of overcharging, and Value of overcharging constructed as described below.

This index will be constructed for all transaction values and types combined as well as for each transaction type (cash in, cash out and over-the-counter) separately. The index will also be constructed for audits and customer surveys separately.

Audits (collected monthly but aggregated cumulatively)

1. Transaction success rate: Share of attempted transactions completed successfully.
2. Transaction failure reason: Categorical variable for reason for failed transaction
3. Incidence of overcharging (OTC): Share of over-the-counter transactions overcharged
4. Value of overcharging (OTC): Rate of overcharging for over-the-counter transactions.
5. Incidence of overcharging (OTC, low value): Share of 150 GHS over-the-counter transactions overcharged
6. Value of overcharging (OTC, low value): Rate of overcharging for 150 GHS over-the-counter transactions.
7. Incidence of overcharging (OTC, high value): Share of 450 GHS over-the-counter trans-

actions overcharged

8. Value of overcharging (OTC, high value): Rate of overcharging for 450 GHS over-the-counter transactions.
9. Incidence of overcharging (cash-in): Share of cash-in transactions overcharged
10. Value of overcharging (cash-in): Rate of overcharging for cash-in transactions.
11. Incidence of overcharging (cash-in, low value): Share of 150 GHS cash-in transactions overcharged
12. Value of overcharging (cash-in, low value): Rate of overcharging for 150 GHS cash-in transactions.
13. Incidence of overcharging (cash-in, high value): Share of 450 GHS cash-in transactions overcharged
14. Value of overcharging (cash-in, high value): Rate of overcharging for 450 GHS cash-in transactions.
15. Incidence of overcharging (cash-out): Share of cash-out transactions overcharged
16. Value of overcharging (cash-out): Rate of overcharging for cash-out transactions.
17. Incidence of overcharging (cash-out, low value): Share of 150 GHS cash-out transactions overcharged
18. Value of overcharging (cash-out, low value): Rate of overcharging for 150 GHS cash-out transactions.
19. Incidence of overcharging (cash-out, high value): Share of 450 GHS cash-out transactions overcharged
20. Value of overcharging (cash-out, high value): Rate of overcharging for 450 GHS cash-out transactions.

Endline customer survey

21. Transaction success rate: Share of attempted transactions completed successfully.
22. Transaction failure reason: Categorical variable for reason for failed transaction
23. Transaction value: Value of the transaction

24. Total fee paid: Total fee paid for the transaction
25. Total fee paid from account to provider: Total fee deducted from customer's account to the provider
26. Total fee paid from account to agent: Total fee deducted from customer's account to the provider
27. Total fee paid in cash: Total fee deducted from customer's account to the provider
28. Value of overcharging: Rate of overcharging.
29. Incidence of overcharging: Share of transactions overcharged

3.3 Ancillary Outcomes

3.3.1 Tariff accuracy (agent and customer surveys)

These outcomes test agent and customer knowledge of tariff values. This is measured using the following indicators, which (for consistency) are collected from both the agent and customer surveys unless otherwise noted.

Tariff awareness index (agents) (standardized z-index): Summary index combining cash-in, cash-out, over-the-counter, MTN Cash-in, MTN Cash-out, MTN Over-the-counter, Other agents cash-in, Other agents cash-out, and Other agents over-the-counter constructed as described below.

Tariff awareness index (customers) (standardized z-index): Summary index combining cash-in, cash-out, over-the-counter, MTN Cash-in, MTN Cash-out, and MTN Over-the-counter constructed as described below.

Tariff accuracy index (agents/customers) (standardized z-index): Summary index for correctly identifying fees for MTN Cash-in, MTN Cash-out, and MTN Over-the-counter constructed as described below.

1. Estimated fees (for 100 GHS transaction):
   (a) Cash-in fees
   (b) Cash-out fees
   (c) Over-the-counter fees
2. Estimated official MTN fees for the same transactions:
   (a) MTN Cash-in
   (b) MTN Cash-out
   (c) MTN Over-the-counter
3. Estimated fees charged by other agents in the same market for the same transactions (agent survey only):
   (a) Other agents cash-in
   (b) Other agents Cash-out
   (c) Other agents Over-the-counter

3.3.2 Treatment Mechanisms

These outcomes measure the mechanisms tested by each of the treatment arms: financial incentives (treatment 1), competition incentives (treatment 2) and reputational incentives (treatment 3) and operational requirements (tariff control). These mechanisms may mediate effects on transparency (primary outcome), business practices, or customer experience (secondary outcomes).

Financial incentive index (standardized z-index): Summary index combining Financial rationale for tariff posting, Tariff posting rationale (when agent answers I was compensated for posting tariffs), and Perceived benefits of posting tariffs (when agent answers My sales and revenue increase) constructed as described below.

Competition incentive index (standardized z-index): Summary index combining Change in relationship to other agents, Tariff posting rationale (when agent answers Other agents in my locality started posting tariffs), and Perceived benefits of posting tariffs (when agent answers My business is more valuable than agents' who do not post) constructed as described below.

Reputational incentive index (standardized z-index): Summary index combining Change in relationship to customers (agent and customer surveys) and Reputational rationale for tariff posting, Tariff posting rationale (when agent answers Consumers asked about the tariff poster), and Perceived benefits of posting tariffs (when agent answers My customer base increases or My customer base increases) constructed as described below.

Operational requirement index (standardized z-index): Summary index combining Change in relationship to MTN and MTN requirement rationale for tariff posting, and Tariff posting rationale (when agent answers MTN gave me the tariff poster or it became easier to access) constructed as described below.

Endline agent survey:

1. Change in relationship to other agents: Ordinal measure of change in relationship with other agents
2. Change in relationship to customers: Ordinal measure of change in relationship with between agent and customers
3. Change in relationship to MTN: Ordinal measure of change in relationship with MTN supervisors
4. Competition rationale for tariff posting: Perceived share of other agents in market posting tariffs
5. Financial rationale for tariff posting: Indicator of if revenue will increase from posting

tariffs

6. Reputational rationale for tariff posting: Perceived share of customers (out of 10) who prefer agents who post tariffs
7. MTN requirement rationale for tariff posting: Indicator of perception that MTN requires tariff posting
8. Non-tariff posting rationale: Categorical variable capturing agent-reported reasons for not posting tariffs.
9. Tariff posting rationale: Categorical variable capturing agent-reported reasons for posting tariffs
10. Value of tariff posting: Indicator for whether the agent perceives posting mobile money tariffs as valuable for their business
11. Perceived benefits of posting tariffs: Categorical variable capturing the specific benefits the agent associates with posting mobile money tariffs
12. Barriers to posting tariffs: Categorical variable identifying obstacles the agent faces in posting mobile money tariffs

Endline customer survey:

13. Change in relationship to customers: Ordinal measure of change in relationship between agent and customers
14. Reason for Change in relationship to customers: Categorical variable of how the relationship between agent and customer changed

3.3.3 Customer Satisfaction

Customer satisfaction index (standardized z-index): Summary index combining Verbal advertisement (from audit, agent and customer surveys), Customer service rating (audit and customer surveys), Satisfaction with agent (audit and customer surveys), Satisfaction with shop (audit and customer surveys), Satisfaction with MoMo services (customer surveys), and Trust in agent (customer surveys) constructed as described below.

Audits (collected monthly but aggregated cumulatively)

1. Verbal advertisement: Indicator for whether the agent verbally advertised or promoted their services during the visit.
2. Customer service rating: Ordinal rating of the agent's customer service during the audit interaction.
3. Satisfaction with agent: Ordinal rating of overall satisfaction with the agent.
4. Satisfaction with shop: Ordinal rating of overall satisfaction with the shop/agent in general.

Endline agent survey

5. Verbal advertisement: Indicator for whether the agent verbally advertised or promoted their services during the visit.

Endline customer survey:

6. Customer service rating: Ordinal rating of the agent's customer service.
7. Satisfaction with agent: Ordinal rating of overall satisfaction with the agent.
8. Satisfaction with MoMo services: Ordinal rating of overall satisfaction with MoMo services
9. Satisfaction with shop: Ordinal rating of overall satisfaction with the shop/agent in general.
10. Trust in agent: Indicator of customer-reported trust in agent

3.3.4 Customer perceptions

Negative customer perceptions of agents index (standardized z-index): Summary index combining minimal competition, Overcharging issue, illiquidity issue, low tariff posting issue, and mistrust issue constructed as described below.

Positive customer perceptions of competition index (standardized z-index): Sum-

mary index combining Competition and overcharging, Competition and tariff posting, Competition and trust, and Competition and service quality constructed as described below.

Positive customer perceptions of transparency index (standardized z-index): Summary index combining Transparent agents and Transparency and fees constructed as described below.

Endline customer survey:

1. Minimal competition: Indicator of customer perception that mobile money agent competition is minimal
2. Overcharging issue: Indicator of customer perception that overcharging is a common major issue
3. Illiquidity issue: Indicator of customer perception that illiquidity is a common major issue
4. Low tariff posting issue: Indicator of customer perception that low or poor tariff-posting behavior by mobile money agents is a common major issue
5. Mistrust issue: Indicator of customer perception that consumers mistrust mobile money agents
6. Competition and overcharging: Indicator of customer perception that competition improves overcharging
7. Competition and tariff posting: Indicator of customer perception that competition effects improves tariff posting
8. Competition and trust: Indicator of customer perception that competition improves trust
9. Competition and time: Indicator of customer perception that competition improves transaction time
10. Competition and service quality: Indicator of customer perception that competition

improves service quality

11. Transparent agents: Indicator of customer perception that agents are transparency
12. Transparency and fees: Indicator of customer perception that transparency improves fees

3.3.5 Agent usage

Agent usage index (standardized z-index): Agent visits, Agent comparison, Agent recommendation, and Agent visits (past month) constructed as described below.

Preference for agent tariff posting index (standardized z-index): Agent selection (when respondent selects agents who post tariffs), Future agent selection (when respondent selects agents who post tariffs), Tariff posting preference, Benefits of tariff posting (for customers), Agent recommendation rationale (when respondent selects agents who post tariffs), and Agent search (when respondent chooses agents with clearest prices) constructed as described below.

Agent diversity index (standardized z-index): Different agent visits, and Out of town transactions constructed as described below.

Endline customer survey:

1. Agent visits: Frequency of agent visits to primary agent (past 90 days)
2. Different agent visits: Frequency of different agents visited (past month)
3. Agent selection: Categorical variable for customer's reasons for agent selection
4. Future agent selection: Categorical variable for customer's reasons for agent selection in the next month
5. Tariff posting preference: Count of customers (out of 10) who prefer tariff-posting agents to non-tariff posting agents

6. Benefits of tariff posting (for customers): Ordinal variable of how beneficial tariff posting is to customers
7. Specific benefits of tariff posting (for customers): Categorical variable of perceived benefits of agent tariff transparency
8. Agent relationship: Categorical variable of how the customer knows the agent (friend, family, unrelated)
9. Agent comparison: Relative assessment of usual agent compared to other agents used
10. Agent recommendation: Indicator of whether the customer recommend this agent to friends/family
11. Agent recommendation rationale: Categorical variable of reasons for recommending the agent
12. Agent count: Total number of agents operating in the customer's market
13. Agent visits (past month): Frequency of visits to any mobile money agents in the past month
14. Agent search: Categorical variable of factors influencing which agents customers choose to transact with
15. Preference for agents who post: Frequency of agents visited in the past month who posted tariffs
16. New agent visits: Indicator of whether the customer transacted with any new agents in the past month
17. Out of town transactions: Frequency of transactions outside the customer's market area in the last 10 agent-assisted transactions
18. Out of town village transactions: Of those outside transactions, frequency conducted in other villages
19. Out of town city transactions: Of those outside transactions, frequency conducted in a city
20. Agent challenges: Categorical variable of specific challenges encountered at agent

points

21. Agent travel time: Average travel time to conduct a transaction
22. Agent travel costs: Average travel costs to conduct a transaction
23. Payment methods: Categorical variable of all payment methods used in the past month
24. Non-mobile money agent usage: Indicator of conducting non-mobile money transactions at agent points in the past month
25. Total non-mobile money agent usage: Total value of non-mobile money transactions

3.3.6 Mobile money usage

Mobile money usage index (standardized z-index): Summary index combining Account ownership, Account duration, Transaction volume, Transaction value (agents), Transaction mode (agents), Transaction value (non-agents) and Transaction mode (non-agents) constructed as described below.

Endline customer survey:

1. Account ownership: Indicator of mobile money account ownership
2. Providers used: Categorical variable of primary mobile money provider(s) used
3. Account duration: Duration mobile money account ownership (in years)
4. Transaction volume: Number of mobile money transactions attempted (past month)
5. Transaction value (agents): Total value of transactions at agent points
6. Transaction mode (agents): Typical transaction value at agent points
7. Transaction value (non-agents): Total value of transactions outside agent points
8. Transaction mode (non-agents): Typical value of transactions outside agent points

3.3.7 Awareness of the intervention

Intervention participation index (agents) (standardized z-index): Summary index combining Lottery awareness, Ongoing tariff posting, Lottery participation, Competition aware-

ness, Reputation awareness, Reputation awareness count, Perceived behavior change, and Ongoing lottery constructed as described below.

Intervention participation index (customer) (standardized z-index): Summary index combining Lottery awareness, Lottery participation, Reputation awareness, Reputation awareness count, Perceived behavior change, and Ongoing lottery constructed as described below.

Endline agent survey:

1. Lottery awareness: Indicator of whether agent is aware lottery intervention
2. Ongoing tariff posting: Indicator of agent's intention to continue posting tariffs after contest ends
3. Rationale for ongoing tariff posting: Categorical variable with reasons for continuing to post tariffs
4. Lottery participation: Indicator for agent's participation in the contest
5. Competition awareness: Indicator for agent's awareness of other agents' participation
6. Reputation awareness: Indicator for agent's awareness of customer reporting about posting behavior
7. Reputation awareness count: Agent's count of customers who he/she believes participated in the lottery
8. Perceived behavior change: Indicator of whether agent believes lottery changed other agents' behavior
9. Description of behavior change: Categorical variable of agent's perceived effects of the lottery on agent behavior
10. Ongoing lottery: Indicator of willingness to continue participating in lottery

Endline customer survey:

11. Lottery awareness: Indicator of whether customer is aware lottery intervention

12. Lottery participation: Indicator for customer's participation in the contest
13. Reputation awareness: Indicator for customer's Awareness of agent participation in contest
14. Perceived behavior change: Indicator of whether customer believes lottery changed agents' behavior
15. Description of behavior change: Categorical variable of customer's perceived effects of the lottery on agent behavior
16. Ongoing lottery: Indicator of willingness to continue participating in lottery

3.4 Construction of summary indices

Standardized index follows that each item is standardized to have mean 0 and standard deviation 1, so that higher values always indicate better outcomes. The index is then calculated as a weighted or unweighted average:

$$z_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j}, \quad \text{Index}_i = \sum_{j=1}^{J} w_j z_{ij}$$

where equal weights $w_j = 1/J$.

4 Outliers

To address the influence of extreme values, we will winsorize the top 5% of the distribution for all continuous outcome variables. Binary variables and bounded proportions (e.g., indicators, rates between 0 and 1) will not be winsorized. Winsorization will be applied symmetrically (i.e., bottom 0% and top 5%). We will present results using both winsorized and non-winsorized values in the appendix to assess robustness.

5 Empirical Strategy

5.1 Treatment effects

To estimate the impact of the interventions on agents' tariff posting behavior, we proceed in three steps:

1. **Arm-by-arm comparisons:** We first compare each treatment arm to the control group for all primary and secondary outcomes. This provides the intent-to-treat effect of each intervention relative to the status quo.

2. **Cross-arm comparisons:** We then test whether the estimated treatment effects differ across arms. These tests allow us to assess whether the impacts of the three incentive mechanisms differ from each other:

    - Comparing the coefficient for Treatment 2 (competition incentives) to that for Treatment 1 isolates the impact of competitive pressure relative to financial incentives.
    - Comparing the coefficient for Treatment 3 (reputational incentives) to those for Treatments 1 and 2 assesses whether reputational incentives have distinct effects beyond financial or competitive incentives.

3. **Pooled treatment comparison:** Finally, we pool all treatment arms together and compare this combined group to the control group to estimate the overall impact of offering any transparency incentive.

Our preferred specification regresses the outcome on treatment, controlling for baseline tariff posting, month and enumerator fixed effects, and clustering standard errors at the market level. The regression equation is:

$$\mathrm{Y}_{imt} = \alpha + \sum_{k=1}^{4} \beta_k \cdot (\text{treatment}_m = k) + \phi \cdot \text{BaselinePosting}_{im} + \varepsilon_{imt} \tag{1}$$

where

- Y_{imt} is the outcome for agent i in market m at endline t.
- $\text{treatment}_m = k$ are dummy indicators for the treatment group assigned to market m:
  - Treatment 1: Financial incentive for posting tariffs
  - Treatment 2: Financial incentive + competition with other agents
  - Treatment 3: Financial + competitive incentives + reputational pressure from customer monitoring
  - Control (Treatment 4): Offered the tariff poster but no incentives for posting
- β_k captures the effect of each treatment arm k, relative to the control group.
- ϕ controls for baseline tariff posting.
- ε_{imt} is the error term, clustered at the market level.

In addition to the intent-to-treat (ITT) effects described above, we will also explore treatment effects using an instrumental variables (IV) framework. Because not all agents assigned to treatment necessarily post tariffs (and, in fact, compliance is likely to be somewhat low), random assignment serves as an instrument for actual tariff posting behavior. This approach allows us to estimate the causal impact of tariff posting itself on secondary outcomes, business performance and customer experience.

In practice, the ITT captures the effect of being offered the intervention package, regardless of whether an agent complied, while the IV specification isolates the effect of actual posting behavior by leveraging experimental assignment as an exogenous source of variation. Together, the ITT and IV estimates provide complementary perspectives: ITT reflects the policy-relevant impact of offering transparency incentives, while IV helps identify the underlying effect of compliance with tariff posting.

5.2 Robustness checks

In addition to our preferred specification, we estimate a set of robustness checks that introduce alternative sets of controls and fixed effects. These models are designed to test

whether our main results are robust to different specifications. Specifically: (i) the **district fixed effects** specification uses district-level fixed effects; (ii) the **LASSO-selected controls** specification allows us to select among a large set of baseline covariates using a data-driven procedure.

District Fixed Effects

$$\mathrm{Y}_{imt} = \alpha + \sum_{k=1}^{4} \beta_k \cdot (\text{treatment}_m = k) + \phi \cdot \text{BaselinePosting}_{im} + \theta_d + \varepsilon_{imt} \tag{2}$$

where

- ϕ controls for baseline tariff posting.
- θ_d are district fixed effects.
- ε_{imt} is the error term, clustered at the market level.

LASSO-selected Controls

$$\mathrm{Y}_{imt} = \alpha + \sum_{k=1}^{4} \beta_k \cdot (\text{treatment}_m = k) + \mathbf{X}'_{imt}\pi + \varepsilon_{imt} \tag{3}$$

where

- $\mathbf{X}_{imt}$ is a high-dimensional vector of baseline covariates. A subset of these covariates is selected using the LASSO (Least Absolute Shrinkage and Selection Operator) procedure, and π denotes their coefficients.
- ε_{imt} is the error term, clustered at the market level.

5.3 Time Horizon of Outcomes

We distinguish between two types of outcome data: (i) audit data, collected repeatedly over the six-month study period, and (ii) endline survey data, collected once at the conclusion of the study. Although audit data were gathered over time, we will primarily use these outcomes in cumulative form to capture overall effects over the full six-month period.

- **Audit measures.** Audit-based outcomes were collected multiple times from the same agents over the six-month study period. For analysis, we will aggregate these repeated measures into cumulative outcomes that summarize performance across the entire audit period. In other words, while data were collected over time, our main specification treats them as a single cumulative measure of outcomes over six months. Tables will report these cumulative results.

- **Endline survey measures.** Endline outcomes from the agent and customer surveys were collected once at the end of the study and represent a single snapshot in time. For these outcomes, we will estimate treatment effects using the endline measure at the agent or customer level.

5.4 Heterogeneous treatment effects

To investigate whether treatment effects vary with market characteristics measured at baseline Z_m, we estimate a model that interacts the treatment indicator with Z_m. Dimensions of heterogeneity include the following (measured at baseline). :

1. markets above and below the median number of agents
2. markets above and below the median number of customers, and
3. markets in terciles of tariff posting at baseline (0–33%, 33–66%, and 66–100%).

This helps identify which environments amplify or dampen impacts and which sub-groups contribute most to average effects.

For a given heterogeneity dimension, let Z_m denote mutually exclusive subgroup indicators (e.g., High vs. Low; or terciles $g \in \{1, 2, 3\}$). We estimate:

$$\mathrm{Y}_{imt} = \alpha + \sum_{k=1}^{4} \beta_k \cdot (\mathrm{T}_m = k) + \lambda_0 Z_m + \lambda_1 (T_m \cdot Z_m) + \varepsilon_{imt} \tag{4}$$

We estimate (4) separately for each dimension (agents, customers, baseline posting).