Randomized entry*

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Abstract

We study the equilibrium effects of entry with bundling. Enlisting non-financial businesses to provide retail financial services is a widespread and scalable practice globally. This mixed financial and non-financial services setting naturally emerges as the market entry approach for several real-world financial markets, and can create a multiplier: both sectors respond separately, and if the services are strategic complements, this can lead to additional growth in the aggregate local services industry. In partnership with the two largest service providers in Ghana, we implement a three-step design that randomizes the entry of new financial mobile money vendors, who also sell non-financial goods/services, across local markets. Randomized entry decreases firm misconduct, increases service quality, and decreases price-cost markups, indicating positive consumer surplus. We find evidence of within-market revenue reallocation and expansion for mobile money, and a large services multiplier: revenues for non-financial goods/services increased by 20%, with aggregate service industry revenues increasing as well. These improvements emphasize the "real effects" of financial markets on the local economy, and come from adoption externalities and aggregate increase in household expenditures. Our findings demonstrate that entry increases local economic activity, not only by changing markets for digital financial services, but also by transforming the non-financial services sector. These effects are key ingredients for advancing basic and applied knowledge on firm entry with bundling in industry equilibrium.

JEL: D18, G23, L22, L26, O12, O16

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I Introduction

Firm entry is the key source of competitive pressure in markets, and an extensive body of research examines entry decisions made by firms, and the direct effects of these decisions on incumbents (see Bresnahan and Reiss 1991 and Syverson 2004 for static entry; and Ryan 2011 and Dunne et al. 2013 for dynamic entry). But in industry equilibrium, entry can also have indirect external effects on other actors and sectors. For instance, entry may affect peer firms through revenue reallocation or market expansion, non-peer firms in other sectors through bundling of common services, or consumers through improvements in prices and in nonprice outcomes, such as firm misconduct, service quality, and transparency.

Despite its evident importance, there are major gaps in research on the indirect effects of firm entry on competition. In particular, randomized supply-side entry interventions are limited. As a result, the key ingredients for advancing basic and applied knowledge on firm entry are often unidentified: mechanisms, impacts of entry, and, especially externalities/multiplier from entry (Borusyak et al. 2024). This paper addresses these gaps in two ways. First, we collect original data on the organization of local businesses, market facts and frictions, and firm and consumer household outcomes. Second, we run a combined market- and individual-level field experiment measuring how local markets endogenously respond in equilibrium to randomized entry of new vendors.

In collaboration with the two largest commercial service providers in Ghana — MTN MM Ltd (90% market share of all mobile network operator MNO-led mobile money services) and GCB Ltd G-Money (100% share of all bank-led mobile money services) — we conduct a large-scale experiment, randomizing the entry of financial mobile money (MOMO) service vendors who also sell non-financial goods/services (MICROE) across 136 independent, geographically-distinct low-income localities. Mobile money has emerged as a promising approach to providing financial services, most prominently in developing countries. By integrating the widespread mobile technology with the financial system, mobile money allows

consumers to access financial services through their cellular phone-linked accounts, as well as through a network of retail agents (Annan Forthcoming, B&MGF 2021, Jack and Suri 2014, Suri et al. 2023). In rural areas where brick-and-mortar banks are nonexistent, the agents serve as the backbone of financial transactions, and are often referred to as "Human ATMs," derived from the practice where service providers enlist the owners of local businesses, such as corner stores, to serve as agents — facilitating deposits, withdrawals, and transfers, while also acting as gatekeepers of digital financial services and tools. As a result, the heartbeat of the local economy can be felt through the fingertips of these mobile money agents, who are rapidly growing in number.[1]

Enlisting local, non-financial businesses to provide retail financial services—a widespread and scalable practice globally[2]—can create a multiplier: both the financial services sector and non-financial goods/services sector respond separately to the entry process. Further, if the services and sectors are strategic complements, this can lead to additional growth in the aggregate local services industry — an important channel that remains open and high priority area of research on firm entry and competition with bundled services (Gentzkow 2007, Iaria and Wang 2020), especially in markets for digital financial services (Annan et al. 2024).[3] We

[1] In Ghana, where our study is based, the number of mobile money agents expanded from 505,000 to 609,000 between 2022 and 2023, an increase of 21% (Bank of Ghana 2023). The Global System for Mobile Communications (GSMA) reports a staggering 8.3 million active mobile money agents globally in 2023, with a year-on-year growth rate of 14% (GSMA 2024). Most of that global expansion in agency came from Sub-Saharan Africa, where registered agents grew by a third. These financial agents digitized more than two-thirds of all the money entering the mobile money ecosystem: $307 billion in 2023 (the total cash-in transactions), which is 12% higher than in 2022.

[2] For example, in the United States, Wells Fargo & Co., as well as other banking institutions, expanded their financial services by adding in-store ATMs/outposts in supermarkets such as Safeway, Raley's, Von's and Ralph's (https://www.sfgate.com/business/article/Wells-Fargo-s-Supermarket-Strategy-Traditional-2996187.php). Several examples of such "low-cost" financial market expansion approach can also be found in other countries, including India, Kenya, Indonesia, etc.

[3] This indirect/multiplier effect has implications for welfare and market efficiency. For firms, it can generate economies of scale in selling (Zhou 2017). For consumers, this could generate

examine whether such a multiplier in services exists, and measure how markets for digital financial services (MOMO) improve service industries in rural economies—a channel implied by the velocity of money equation: by increasing the volume of money within the locality, and the frequency with which it changes hands, mobile money can boost the nominal value of transactions and service industries.

We leverage the fact that service providers have earmarked low-income communities to expand their financial services. Moreover, these markets for mobile money exhibit significant variation in agent per capita across villages (which suggests room for additional vendors), vendor misconduct (agents overcharge on over 30% of transactions)[4], and limited consumer trust (50% of customers express mistrust in vendors), with over 80% of market participants expecting randomized entry to improve firm misconduct, consumer trust, etc. (which suggests value for entry).[5] These features, which we show at baseline, are also widespread in other countries (see IPA CP Research Initiative 2020), and further motivate our intervention.

We have 136 localities across 13 districts, each locality containing around 5,000 people, with 4.5 incumbent mobile money vendors. For each locality, we first gather a pool of existing MICROE-only firms (~5 per locality). We then assign the markets in equal proportions to one of three groups: control (no entry), treatment 1 (+1 additional vendor each, representing a 25% increase relative to either baseline vendorship or eligible non-financial firms),

complementarity in consumption, reflecting synergies in consumption (Gentzkow 2007, Iaria and Wang 2020), or transport costs in shopping (Pozzi 2012, Thomassen et al. 2017), or preference for variety (Hendel 1999).

[4] For detailed discussion and measurement of firm misconduct—failure to comply with rules/ laws/standards—which is prevalent and costly, see Egan, Matvos, and Seru (2019) and Annan (Forthcoming). Shleifer (2004) discusses how competition might be good for ethical behavior (or conduct) in the long run.

[5] Together with Innovations for Poverty Action (IPA), we published a blog in July 2024, highlighting these four critical facts about markets for mobile money. https://poverty-action.org/unlocking-potential-competition-insights-ghanas-mobile-money-market

or treatment 2 (+3 additional vendors each, representing a 70% increase relative to either baseline vendorship or eligible non-financial firms). Finally, for each treatment locality, we randomly select 1 (low entry) or 3 (high entry) out of 5 eligible MICROE stores to enroll as MOMO agents. Altogether, we successfully established 170 new MOMO entrant vendors out of a theoretical target of 181 across the treatment villages. The design generates experimental variation both across- and within-markets, allowing us to measure the direct and indirect effects of randomized entry on markets and microbusinesses. We measure outcomes combining market census, surveys of firms and consumers, audit studies, trust games, and administrative data from service providers.

We have five sets of results — leading us to conclude that financial markets for mobile money, now widespread in developing countries and being transformed by their rapidly-expanding retail agent networks that also sell non-financial goods/services, meaningfully unlock rural services industries, and that the design and evaluation of specific market entry and expansion interventions need to account for such market-wide responses. First, the intervention dramatically induces entry. Among all the eligible non-financial (MICROE) firms, those in treatment localities are 49 percentage points (pp) more likely to have become established as MOMO vendors and to offer financial services at endline.[6] Predictably, the effect is smaller in low-entry treatment localities (43pp), and larger in high-entry treatment ones (51pp). Market participants are informed of such randomized entry. When asked, around 36pp of non-entrant firms and 23pp of consumers report being aware or informed of the new entrant stores. This indicates that the intervention worked.

Second, randomized entry decreases firm misconduct (-50%) for financial (MOMO) services. An audit study measuring misconduct found that, in treated villages, entrants had a 28% lower misconduct rate than incumbents (direct effect). Further, incumbents in treated

[6] In practice, firms promoted their MOMO services together with the non-financial MICROE services and vice versa e.g, they offered a non-financial service, gift, or add-on to new clients of mobile money.

localities had a 35% lower misconduct rate than incumbents in control villages (indirect effect). The net effect is -50%.

Third, randomized entry decreases the overall prices for non-financial (MICROE) goods/services (around -9% but insignificant at the 5% level). While bundled firms (lucky MICROEs) increased their prices, the non-bundled firms (unlucky MICROEs) significantly decreased their prices. Importantly, price-cost markups for the non-financial goods/services meaningfully decreased (-0.06/0.22=-27%) at the market level. Combined with a (20%) increase in aggregate household expenditures, this indicates positive consumer surplus. The results on prices are consistent with standard models of competition with bundling (Zhou 2017; Armstrong and Vickers 2010) — which predict, under fairly general conditions, that competition with bundling raises prices when there are many bundled firms. We report consistent evidence that prices for goods/services are relatively higher for MICROE firms that were onboarded as financial vendors, compared to those firms that were within the same local market not onboarded. Predictably, such price differences are three times larger in high-entry localities, where the number of bundled firms is much higher compared to low-entry localities. The existing models on competition with bundling, however, are "blind" about the potential indirect effects on non-bundled firms, which we show decreased their prices, and more so when the number of nearby bundled firms is high.

Fourth, we report evidence of within-market revenue reallocation and expansion for financial MOMO, as well as a large services multiplier: revenues for non-financial goods/services in the MICROE sector significantly increased (+20%), with aggregate service industry revenues increasing. The treatment effects do not correlate well with *pre*-experiment predictions about randomized entry effects, are larger in high-entry treatment localities (where competition with bundling is higher), and are larger in markets where the stores are geographically closer and offer common services (where competition is predictably more intense). The results so far indicate that entry increases local economic activity, and it does so not only by changing markets for MOMO, but also by transforming the non-financial (MICROE)

goods/services, which is novel and interesting.

Fifth, what drives the meaningful improvements in consumer and firm outcomes? Our evaluation indicates that the improvements come from both adoption externalities and an aggregate increase in household expenditures. For adoption externalities, we estimate that competitor firms in treatment villages also added mobile money to their non-financial businesses (10pp), and that businesses in the treatment markets switched from cash to cashless payments for non-financial goods/services (+18pp), implying reduced transaction costs and increased savings. For household expenditures, which meaningfully increased in treated villages by 20%, we estimate that consumers are more likely (10pp) to make purchases within their home locality (substitution from markets in the city), and that, when combined with the savings from reduced vendor misconduct, this translates into large aggregate savings that rationalize the expenditure increases.

We make two main contributions to the existing literature. First, we advance the literature on firm entry and competition. We design and implement a three-step experiment that measures indirect, direct, and multiplier impacts of entry which are often unidentified (Borusyak et al. 2024). Previous studies have examined the effects of entry on competitive conduct (Bresnahan and Reiss 1991), productivity (Syverson 2004), prices and welfare (Atkin et al. 2018, Busso and Galiani 2019, Bergquist and Dinerstein 2020), and quality (Matsa 2011, Bennett and Yin 2019). Yet, we are not aware of any work that experimentally randomizes entry at different intensities using within- and across-market variation to study multi-sector industry equilibrium effects of entry with bundling in real-world markets. Our results are not only important for welfare and policy, but are key ingredients for advancing basic and applied knowledge on firm entry in industry equilibrium. Market design and evaluation of entry and expansion interventions need to take into account such market-wide responses, which we show are large and significant.

Second, we contribute to the literature on household finance and digital payments. There is a growing body of research on the consumer effects of digital payments, but there is a

dearth of evidence on the supply side and supply-side behavior (Annan Forthcoming; Higgins 2024). Studies, mostly quasi-experimental, have explored the impacts of mobile money on consumption smoothing (Jack and Suri 2014; Suri and Jack 2016), substitution between cash and digital payments (see Chodorow-Reich et al. 2020 for e-wallet transactions; Alvarez and Argente 2022 for banning cash to pay for Uber rides), and externalities in digital payments adoption (see Crouzet et al. 2023 for mobile payments; Higgins 2024 for debit cards; Alvarez et al. 2024 for electronic P2P payment app). The drivers of digital payments—prices, quality, trust, coordination, etc.—depend on the underlying market structure, yet how market structure affects the use of digital payments remains an open question (Annan et al. 2024). We provide the first evidence that forced entry improves vendor misconduct, service quality, and usage, with broader impacts on consumers and on firms that vend mobile money services. We then highlight a channel implied by the velocity of money equation that previous literature has ignored: a large services multiplier generated by the entry of new financial vendors who also sell non-financial goods/services.

From a policy perspective, our results highlight how understanding entry effects in equilibrium is particularly important, and first-order in evolving markets for digital financial services, with new players entering the business environment to expand financial services, and to serve the poor (ReFinD RI 2022). Available evidence indicates that these markets exhibit significant consumer protection concerns (IPA CP RI 2020), making it crucial, then, to understand how entry and competition interventions might affect firm misconduct, service quality, and consumer trust, including the aggregate spillovers on the local economy.

We proceed as follows: In Section II, we describe the research setting, and, in particular, four critical facts about markets for financial mobile money at baseline. Section III contains the description of our experimental design and data. Section IV presents our main results and interpretations. In Section V, we discuss the implications of our results, heterogeneity, and the connection with models of competition with bundling. We conclude the paper with Section VI.

II Research Setting

A. Financial Mobile Money Services: MOMO

The market for mobile money (MOMO) in Ghana, similar to other countries, is organized vertically. Four upstream providers interact with consumers via downstream vendors (agents) of which there are around four per locality. MTN Mobile Money Ltd. is the dominant provider, claiming 90% market share. The remaining 10% is split between G-Money, VodaCash, and TigoCash. Vendors retail the financial services on behalf of the providers, and are non-exclusive in that they can offer services for multiple providers simultaneously. They serve as human ATMs, providing consumers with various digital financial services, such as the ability to open new Mobile Money accounts (wallets), purchase SIMs, or cash-in (deposits) and cash-out (withdrawals). Around 80% of vendors, however, also provide non-financial goods/services, such as groceries, which classifies as their minor line of business.

The average MOMO vendor is a small-medium enterprise with around $400 in daily sales revenue and $2 in daily profits. Vendors are free to enter and exit the MOMO market although providers require startup capital (a minimum of $300), business training (on the transaction tariffs, commissions, and services), a business operating permit, and a signed agreement that specifies their contractual relationship with the providers. MTN is unique in that it is not only the largest provider in Ghana with broader presence of vendor networks in rural communities, but, at the time of our experiment, it had also imposed a moratorium on establishing new vendors. As we discuss below, our experiment lifts this moratorium, allowing us to further examine its commercial viability.

Consumers in these markets are typically vulnerable: they are poor, financially less sophisticated, and they engage in formal financial transactions for the first time. As a result, the impact of mobile money has been profound in that it has increased the welfare and decreased the poverty of households in Sub-Saharan Africa and Asia through several channels (Suri and Jack 2016, B&MGF 2021). Despite these benefits, vendor misconduct, including poor

service quality, is prevalent and limits the value of mobile money. As part of the contractual agreement, providers set transaction tariffs *ex-ante*, making it possible for the researcher to observe the extent to which vendors overcharge. We define misconduct as overcharging, an analog of double marginalization: this occurs because the downstream vendor imposes illegal markups after the upstream provider has already set the official tariff (around 1% of the transaction value), this 1% fee is later shared between the provider (60%) and vendor (40%). Indeed, vendors are known to overcharge on transaction charges, and consumers report high levels of mistrust. Transactions that are especially prone to overcharging are SIM purchases, account openings, and over-the-counter transactions (in which consumers use someone else's MOMO account for a transaction while paying in cash). Any misconduct suggests that there is room to improve consumer welfare, because it diminishes consumer trust and reduces demand (Annan Forthcoming).

B Nonfinancial Microenterprise Goods/Services: MICROE

Purely non-mobile money businesses also operate in most localities. Such microenterprises (MICROEs) are small firms or corner stores, offering groceries (e.g., rice), building materials, clothing, pharmaceuticals, etc. Entry and exit in this sector is also free. The average MICROE earns around $200 in daily sales revenue and $5 in daily profits. We note three features of MICROEs that make them appealing as potential entrants for MOMO vendorship. First, they have more liquidity, so they can easily convert money between physical cash and digital currency. This addresses major concerns about illiquidity and, hence, failed transactions that are common in markets for mobile money. Second, they have a good reputation for doing local business. Third, they have an existing customer base that visits them for non-financial goods/services. MOMO vendorship in MICROEs allows consumers to simultaneously conduct both non-financial goods/services and financial services, as well as pay for the non-financial goods/services using digital payments.

C Descriptive Motivating Facts

We use detailed baseline data combining a market census, surveys, audit study, and trust games in the field to document four critical facts about markets for mobile money. Through locality-to-locality and door-to-door visits, between March-May 2023 we construct a unique census of markets for MOMO, including a survey of MICROEs and consumers across 136 localities in 13 different districts (see Figures A.1-A.5). We use a master gazetteer of localities kept by the Ghana Statistical Service (GSS), our survey and fieldwork implementation partner for the project. The localities have a population between 900-9,000 people, as of 2018. This baseline data collection exercise was comprehensive, and yields a total of 627 MOMO vendors (incumbents)—with an average of 4-5 vendors per locality, 575 MICROE stores, 4,872 consumers (2,755 customers intercepted immediately after conducting a transaction and 2,117 nearby households). The large number of localities allows for randomization at the market level. We turn to the critical facts about the market that suggest room and value for entry.

Fact 1: There is untapped entry potential

There is a direct relationship between the number of agents in a village and its market size. We find an unsurprising positive correlation between the number of agents and population size at the village level. Nevertheless, we still observe significant variation in agent density across villages, suggesting there is room for additional vendors. The number of agents observed per 1000 people ranges from 1 to 8 (Figure A.7). The majority of existing agents (77 percent) and potential entrant stores (98 percent) believe that the market can sustain new entrants. Therefore, there is an opportunity for market expansion without hurting existing operators.

Fact 2: Low service quality

We uncovered, through the audit study described below, high rates of failed transactions,

absent agents, and overcharging (Figure A.8). This is compounded by a lack of price transparency, as only a small fraction of vendors disclose prices verbally or through physical tariff postings. These findings, echoed by consumer perceptions in our survey, highlight a critical concern about service quality and consumer protection within the market.

Fact 3: Limited consumer trust

Using self-reports in surveys, in addition to a trust game described below, we observe alarming levels of consumer mistrust of MOMO vendors and considerable variation across villages (Figure A.9). This fact is supported by the low number of transactions per consumer in the 90 days preceding the survey, indicating limited consumer trust overall. This lack of trust, combined with poor service quality, may present a significant barrier to market growth, and a reason to worry about consumer protection.

Fact 4: Closure: Entry matters

We observe that both consumers and vendors are optimistic about the effects of new vendors on misconduct and service quality. Consumers were asked what they thought would happen when new agents entered the market. They stated their belief that vendor misconduct, service quality, and trust would improve (Figure A.10). Potential and existing vendors were asked what they would do if more agents opened up shop. In response, they expressed willingness to exert effort to build or maintain a customer base (Figure A.10). In particular, they state that they would improve customer service, transaction success, and availability. This highlights how new financial agents entering the market can drive competition, thus potentially improving service quality and consumer trust in digital fincancial services.

Facts A.7-A.10 suggest entry matters, which is the focus of our randomized experiment. These market facts provide an interesting view of the landscape for digital financial services, highlighting ample opportunities for market entry interventions. While consumers may not fully trust mobile money services in the status quo, an influx of new agents may improve

service quality and, in turn, consumer trust, with the potential to improve consumer welfare. We evaluate how these local markets adjust as we randomly allocate new financial vendors who also sell non-financial goods/services. We examine whether this increased competition in both the financial and non-financial services improves important market outcomes, including vendor growth, as well as how it affects local economic activity.

III Experiment: Design

Intervention. Our randomized entry intervention enlists existing MICROEs, who sell non-financial goods/services, to offer MOMO services across rural communities. This "mixed" MOMO and MICROE services setting is a widespread phenomenon (80%+ of all financial agents globally), and the approach of enlisting existing MICROEs to also offer MOMO services is the typical market entry approach for digital financial markets, from MOMO in Ghana, to MPESA in Kenya, to FINO CI/CO merchants in India, to bank agents in India or Indonesia, to Wells Fargo & Co. in-store ATMs/branches in Safeway Inc.'s supermarkets in the United States, among others. As a result, we study the broader, market-wide impacts of an intervention that is widespread and scalable. In our case, we establish the selected non-financial MICROEs to offer both MTN MOMO and G-Money financial services, akin to the incumbents who are all non-exclusive.

Entrants Assignment. We combine a market- and individual-level design, randomizing the 136 localities into three groups: control (no entry), treatment 1 (low entry), and treatment 2 (high entry). Entrants assignment is in three steps. First, for each locality, we gather a pool of ~5 existing MICROEs. This is done by deploying to each locality a joint team of staff from MTN and GCB (our implementation partners), under the supervision of the GSS. This team identifies enterprises based on the service providers set rules: startup capital ($\geq$\$300), presence of store infrastructure, minimum literacy, and proof of a business operating permit. In practice, we observed that over 70% of MICROEs do not have business permits, and

so we facilitated this process for them. Second, we assign localities in equal proportion to either control (no entry), treatment 1 (+1 additional agent each, representing a 25% increase relative to either baseline vendorship or eligible non-financial firms), or treatment 2 (+3 additional agents each, representing a 75% increase relative to either baseline vendorship or eligible non-financial firms). Third, for each treatment locality, we randomly select 1 (low entry) or 3 (high entry) out of 5 eligible non-financial (MICROE) stores to enroll as new MOMO vendors.

This three-step design creates three different exogenous variations at the market- and individual-levels: (i) only a subset of localities receives entry, and so we can compare the market impacts of entry vs. none, (ii) the density of entry is varied, and so we can use this to trace out equilibrium impacts, and (iii) only a subset of the eligible MICROEs became entrants, which allows us to compare business impacts on entrants (lucky MICROEs) vs. non-entrants (unlucky MICROEs), and to measure equilibrium impacts. We stratify based on population and baseline financial vendor density, and all misfits are resolved and randomly assigned. Figure A.6 displays the spatial distribution of the treatment assignments, indicating that most localities are spatially distinct.

Entrants Enrollment. We establish the selected MICROEs to offer both MTN MOMO and G-Money services, akin to the incumbents who are all non-exclusive. There are three major steps, which take around 6 months to complete, for the new MOMO entrants to be operational. Step #1 is onboarding and paperwork. The operations officers from MTN and GCB verify all entry requirements, including the business operating permit (BOP), and then completes the vendor registration forms and agreement. If needed (which occurs 70% of the time), we subsidize either 50% or 100% of the total BOP cost of ~200 GHS ($15), depending on how much the entrant can contribute at the time of our visit to acquire their BOP. The entrant then signs the contractual agreement with the providers (for sample Agreement Forms, see Appendix A).

Step #2 is due diligence and approvals. The operations officers send the completed agreement and supporting documents to their headquarters for evaluation. If the MICROE passes the evaluation, a managerial approval is granted, and a vendor-specific SIM card with a shortcode is generated. Step #3 is activation and mini branding. The officers re-visit the entrant's outlet, deliver the SIM cards, train the entrant firm about the operation and retailing of MOMO, and then brands the outlet with stickers or tariffs. The visit concludes with customer acquisitions, whereby a few potentail customers are identified to conduct mobile money transactions at the new entrant outlet in the presence of the operations officers. We successfully established 170 new MOMO entrant vendors out of a theoretical target of 181 across the treatment villages. Table 1 shows the timetable of all field activities.

Data Collection. We gather information from multiple sources and rounds of data collection (Table 1): (i) combined listing and baseline market census/surveys of firms and consumers; (ii) baseline audit study (approach discussed below); (iii) baseline trust game (approach discussed below); and (iv) 29-week and above follow-up market surveys, 29-week audit study and trust game, and transaction-level data from the administrative files of service providers. We call all of (iv) an endline.

Market Census and Survey Data. We measure several repeated outcomes at different stages of the study. At baseline, we implement a firm census of MOMO vendors (to get MOMO incumbents, n=627), firm survey of MICROEs (to get competitor MICROE stores and potential entrants pool, n=575), as well as consumer intercepts (n=2,755) combined with household surveys near vendors (n=2,117), to get the customers pool (N=4,872). With these measurements, we gather data from both sides of the market, which allows us to cross-validate outcomes and examine market-wide impacts. For consumers, we solicit their usage of MOMO, views about vendor misconduct, subjective trust in vendors, household expenditures, prices for goods/services, satisfaction, poverty (Schreiner 2015), and others. For MI-

CROE and MOMO businesses, we track their sales revenue, profits, prices for goods/services, and other intermediate outcomes. See Appendix A for definitions of relevant select variables.

Administrative Data. We complement the market survey and census data with vendor x transaction-level data from providers. This provides measures of incumbent and entrant MOMO vendors' business activity, money account balances (business capital), and commissioning account balances.

Audit Data: Measuring Misconduct Objectively. Trained customers (n=40) were given money (physical cash and e-money) to make real transactions at mobile money vendor points across the 136 localities (Annan Forthcoming and Appendix A provide details). We fix and use the modal transaction value of 140 GHS (inferred from our consumer intercepts data) and then include all MOMO-relevant transaction types: cash-in, cash-out, over-the-counter, SIM purchase, account opening, and airtime purchase. We define misconduct to entail transactions that are overcharged when compared to the provider-approved tariff rates (we estimate around 30%+ of transactions are overcharged). We also track other service quality outcomes during our audit study visits: agent absence, failed transactions, and price transparency (Figure A.8).

Trust Data: Measuring Trust Objectively. Trained enumerators (n=40) implement trust games at-scale in the field. There is a trustor/p2 corresponding to 1 representative, anonymous vendor per village (N=136) and a trustee/p1 corresponding to 10 real customers per village (N=1,044), each endowed with 40 GHS (Appendix A provide details and visual illustrations). In its basic form, the game is as follows: p1 decides how much (s GHS) to send to p2. We triple it ($3\times s$ GHS) and give it to p2. Next, p2 decides how much (r GHS) to send back to p1. All payouts depend on their choices and are made directly via mobile money. We define trust (or lack thereof) as the amount (i) p1 sent to p2, (ii) p1 expected

from p2, or (iii) p2 sent back to p1. The baseline results indicate limited consumer trust in agents of 50% (19.94 out of 40 GHS), with substantial variation across villages, similar to the self-reports from consumer surveys (Figure A.9).

Summary Statistics, Balance, and Validity of Design. In our estimation of treatment effects, we compare treated and untreated units, untreated units across treated and untreated markets (where applicable), and treated units across treated markets (based on the intensity of entry treatment). To test for randomization balance, for non-financial (MICROE) firms, we run separate regressions of baseline outcomes against a constant and against two indicators for the different treatment arms: treated firms in a treated market and untreated firms in a treated market. For consumers, or for MOMO firms, we run separate regressions of baseline outcomes against a constant and against an indicator for consumers/firms in treated markets. The coefficient of the constant measures the average of the variable in the "pure control" group of firms/consumers in untreated markets, while the other coefficients measure the average difference in the variable relative to the pure control group. We include randomization strata dummies and cluster standard errors at the market level. Tables A.1-A.3 report the results, providing strong evidence in favor of balance on both sides of the market, with no difference across the groups.

In terms of summary statistics, around 40% of consumers are females and married, with an average age of 28. Almost all consumers have mobile money accounts, transact with around 1-2 vendors, and do not frequently switch agents in their locality, perhaps due to limited numbers of nearby financial vendors. The demographic characteristics of firms compare well with those of consumers, except operators/owners of microenterprise firms are much older, averaging 35 years. As far as business operations, 40% of firms accept/use digital payments, and operate their shops for roughly 10 hours/day. Predictably, the MICROE stores are older than the MOMO stores (7 years vs. 4 years), and they are also valued higher (22,000 GHS vs. 11,000 GHS). With a baseline weekly revenue of 2,074 GHS and profit of 548 GHS, the

profit rate (profit/revenue) is about 26% for non-financial goods/services. For mobile money services, the profit rate is 1.5%, which reveals some of the vendor misconduct: The official tariff is around 1% of the transaction value and the vendor receives about 40% of this 1% fee, which can hardly justify a profit rate of 1.5% for their financial services, unless all of this is, implausibly, coming from measurement error. It also turns out that the profit rate for the financial services is much smaller in bundled MOMO stores than unbundled ones. This further motivates why we might want to promote bundling with competition, as we do in the experiment. Such bundling incentives could reflect either (static) loss-leader pricing strategies or (dynamic) reputational concerns.

Response Rates and Attrition. Table 2 displays the breakdown of response rates conditional on been assigned to either the treatment or control group. To maximize response rates at endline, trained field officers conduct multiple visits at different times, varying between weekdays and weekends. In all measurements, the response rates remained extremely high, and very similar in treatment and control groups: 93% for firm surveys, 95% for consumer surveys, 90% for audit study, and 62% for trust games, the latter which were attempted only once. The difference between groups in response rates and attrition, which is less than 3 percentage points overall, is not significant at the 10% level.

IV Experiment: Results

We present and discuss the treatment effects. We estimate treatment effects using versions of the model

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

which links various endline outcomes y_{ivd} of subject (consumer household or firm) i in locality v in randomization strata d to the random treatment variables: $\mathbf{Treated}_{iv}$ is a dummy for those firms assigned to treatment, and $\mathbf{ENTRY}_{vd}$ is dummy for being in any treatment

locality (where any positive percent of non-financial MICROEs are treated)[7], and strata-level (stratification unit) dummies η_d. β measures the direct effect of randomized entry (holding fixed indirect effects), δ measures the indirect effect (allowing for +100% entry), and $\beta + \delta$ measures the net effect of entry (accounting for externalities or indirect effects) compared to the super-control locality, that received no entry. Notice that outcomes gathered directly from households allow for only cross-village comparisons (we estimate the model where $\beta = 0$). We report cluster-robust standard errors for outcomes with more than one observation per locality, and heteroskedasticity-robust standard errors when there is one observation per locality. The results are robust to multiple testing (Romano and Wolf 2005) and post-double-selection LASSO over a vector of controls (Belloni et al. 2014).

Randomized Entry (1)

We begin by examining whether the intervention worked, and whether market participants were informed of it. Tables 3 displays the results.

Program Participation: Indeed, among all the eligible non-financial MICROE firms, those assigned to the randomized entry program are 49pp more likely to have become established as MOMO vendors and to offer financial services (that is, to have entered) at endline. Predictably, the effect is smaller, at 43pp, in low-entry localities, and larger, at 51%, in high-entry treatment localities. As supplemental evidence, Figure A.11 draws on administrative data from the service provider to report the distribution of entrant and incumbent MOMO vendors. The MICROEs established as entrants are active and promising: 94% are classified by the provider as very active in MOMO business at endline, and they are keeping meaningful money and commission account balances, though, predictably, their balances are smaller than those of the incumbents.

[7] We reserve the distinction between +1 financial vendor (low) versus +3 financial vendors (high) entry localities for Section V: Discussions and Heterogeneity.

Shock to Market: To examine how the intervention reorganized the local markets, we report treatment effects at endline on two standard measures of market structure: number of MOMO vendors and Herfindahl-Hirschman Index (HHI). The results are significant and consistent: the number of MOMO vendors increased (+40%), while the market-level HHI decreased (-30%), indicating the intervention was a shock to the local market structure (Panel B). We will show treatment effects on price-cost markups later, to help interpret the results. The program induces some business exits (2.7% more likely in treatment localities), but not at a statistically significant level in the high-entry localities. Unpredictably, business exits, while quantitatively small at 2.7%, were only significant and concentrated among MICROE firms.

Market Participants' Knowledge: We next examine whether market participants are informed of MOMO stores entry in their community. Non-entrant firms (that is, MOMO incumbents and unlucky MICROEs that were not onboarded) and consumers in treatment localities are 23pp and 33pp more likely, respectively, to report being aware of new entrant stores. These facts indicate not only that we reorganized the local markets through the onboarding of non-financial stores as new MOMO vendors, but also that consumers and competitor firms were well informed of this entry.

Treatment Effects on Consumer Outcomes (2)

The main outcomes we examine are related to consumers and firms. For consumers, we observe that randomized entry has an effect on firm misconduct, prices, and consumer satisfaction, but not on consumer trust. Tables 4 and 6 display the results.

Seller Misconduct: In treatment localities, firm misconduct in MOMO services falls by 50%. This effect captures both direct and indirect effects of firm entry: within treated localities, MOMO entrants are 28% less likely to exhibit misconduct than incumbents, and MOMO incumbents are 35% less likely to exhibit misconduct than control group firms.

Quality and Consumer Trust: Service quality for MOMO—as measured by failed trans-

actions, vendor absence, and price transparency—improves by 10% (net effect). Despite these positive impacts, consumer trust in financial agents—as measured by both self-reports and the objective trust game—is, surprisingly, unaffected: whilst consumers believe that the intervention has led to vendors not overcharging, their perceptions about vendor honesty (trust) do not change.

Prices and Consumer Satisfaction: The effects of randomized entry on the prices of non-financial goods/services in MICROE stores is more nuanced. Consumers report a 5% decrease in overall prices for rice, the most common food item purchased from local stores (p-value=0.001). In the firm surveys, bundled entrants (lucky MICROEs) increased their prices, while the non-entrants (unlucky MICROEs) meaningfully decreased their prices relative to the non-financial (MICROEs) stores in control localities. The net effect is around a 9% decrease in prices, which is not significant at the 5% level. Consumer satisfaction with both financial and non-financial services they receive increases by +9%. As we show later in Table 10, aggregate household expenditures also increase by 20% (276 GHS) in treated localities. Together, these results on consumer outcomes indicate an increase in consumer surplus.

Treatment Effects on Business Revenues (3)

Revenues: Tables 7 and 8 report the treatment effects on revenues (Figure A.12 provides a graphical illustration), including price-cost markups μ at the locality level. We calculate μ assuming constant returns to scale in production, $\mu = 1/(1 - s_\pi)$, where the profit rate s_π = profit/revenue, and is directly observed from the firms' survey data (Basu 2019). For non-financial goods/services, randomized entry has a positive 20% net effect on revenues, but no meaningful effect on overall profits. Market-level revenues increased, while price-cost markups decreased (-0.06/0.22=-27%). This decrease in markups in the MICROE sector suggests a positive consumer surplus, and is consistent with both the decrease in prices and the increase in revenues for non-financial goods/services.

For MOMO services, we provide evidence of noteworthy within-market reallocations and

expansions. Market-level revenues and markups did not change as one would expect, yet, as we report in Table 4, consumer welfare possibly increased due to improvement in non-price outcomes: firm misconduct, service quality, and consumer satisfaction. We do not observe meaningful treatment effects on the revenues or profits of MOMO services at the market level. Similar patterns emerge when we look at administrative data from the provider on the financial vendors. However, these results mask noteworthy effects on business operations. For instance, incumbents in treatment localities earn 50% larger commissions and keep 59% larger money account balances compared to entrants in treatment localities. When combined, the overall results imply aggregate revenues for local services increased by at least 5% (that is, the 4,900 GHS revenue increase from non-financial goods/services-only over a total control mean of 100,000 GHS across both financial and non-financial sectors). The results indicate meaningful growth in aggregate revenues for the local service industry due to randomized entry or competition with bundling, and emphasize how consumer welfare might increase regardless of changes in price-cost markups.

Intermediate Outcomes: Table 9 reports effects on intermediate firm outcomes: number of customers, firm's household expenditures, capital investments, and work hours (reflecting the number of days per week and hours per day stores are open for business). We find positive net effects. So, randomized entry decreases price-cost markups for non-financial goods/services and increases quality for financial services (Tables 4 and 6), some of which is due to increases in marginal costs (more hours and more capital) and some fixed costs (more capital). Moreover, household expenditures for firms increased by around 10%, which is consistent with, but smaller than, the observed increase of 20% in household expenditures for consumers.

What Drives the Improvements: Quantification (4)

A positive story emerges with the decrease in price-cost markups for non-financial goods/services,

the rise of consumer expenditures, and the growth of firm revenues. To understand the mechanisms driving these results, it helps to examine treatment effects on firm adoption of MOMO services and digital payments. Untreated non-financial stores in treatment localities are 10pp more interested in adding MOMO services than stores in control localities. However, this desire for entry does not generally translate into actual entry. Table 10 shows the results. Firms that offer non-financial goods/services in treatment localities are 18pp more likely to switch from cash to cashless payments, implying reduced transaction costs for businesses.

We examine possible drivers of the effect on aggregate household expenditures, which increased by 20% (276 GHS) in treated localities (Table 10, Column 3). First, households in treatment localities increase the purchases they make within their home locality by about 10% (that is, a substitution from markets in the city). With an average household expenditure of 1,700 GHS in control localities, and 500 households per locality, this effect amounts to an 85,000 GHS increase in expenditures per month which is large. Another important effect of treatment is the increase in consumer savings due to lower firm misconduct. Compared to MOMO stores in control localities, MOMO stores in treatment localities exhibit a decrease of 0.50 GHS for every 100 GHS transaction in the average amount appropriated via vendor misconduct. The average weekly transaction amounts to 100 GHS, thus the total consumer savings in a locality of 500 households can be as large 10,000 GHS per month. We conclude that the estimated increase in aggregate household expenditures can be explained by the substitution of city market purchases with local spending on good/services, as well as the savings generated from a reduction in overcharging on the part of vendors.

V Discussions and Heterogeneity

A Discussions

The broader improvements in consumer and business outcomes are noteworthy, and raise three immediate questions and implications.

Implication 1: Do financial mobile money services unlock non-financial goods/services? In treatment localities, where the entry intervention randomly enlisted non-financial microenterprises to provide MOMO services, these treated stores had higher overall revenue than untreated ones. However, when compared to MICROEs in control localities (those without entry interventions), even the untreated stores in treatment localities had much higher overall revenues. This generates a positive spillover effect of 20% from financial markets on the non-financial goods/services, which is large and significant. Indeed, many wonder how markets for digital financial services, such as mobile money, will transform service industries in rural economies, and whether it will be akin to structural transformations within the rural services sector. Our results emphasize a channel implied by the velocity of money equation: by increasing the volume of money within the locality (e.g., through changes in intermediate outcomes, substitution from markets in the city, consumer savings from reduced misconduct), and the frequency with which it changes hands, mobile money can boost the nominal value of transactions and service industries.

Implication 2: Did the market equilibrium have sufficient entry, and if not, why? The randomized entry intervention increased service industry revenues, and improved consumer welfare outcomes, suggesting that *pre*-experiment entry was insufficient. In theory, insufficient entry may be related to either (i) the shape of demand, (ii) barriers like business registration costs/ hassle/ moratorium on entry, (iii) firm misconduct/ incumbents' hidden behavior, or (iv) selection issues. In practice, we can reject some of these possible drivers. We rule out selection, as there was limited firm exit following the intervention. Further, the intervention lifted both the moratorium and business registration constraints. Finally, untreated MICROE firms in treatment localities immediately expressed strong interest in operating as financial vendors after the incumbents vendors significantly reduced their misconduct. We therefore believe entry was (inefficiently) too low due to misconduct/ mistrust (i.e., linked to incumbent firms' behavior) and/or MTN's moratorium on new licenses (linked

to a commercial policy banning entry).

Implication 3: Might forced entry generate a learning externality? Financial vendor misconduct might arise in equilibrium if firms do not understand their demand curve very well (Annan Forthcoming). Hence the result that incumbent financial vendors reduced their misconduct (Columns 1b and 1d of Table 5) is interesting, and suggests there may be a learning externality from the forced entry: incumbents reduce their misconduct as a result of the randomized entrants not engaging in misconduct.[8] Such "learning externality" may be an important channel for inducing short-term entry, even if it leads to short-term losses for incumbents. This externality from reduced vendor misconduct also makes the case for potential government intervention or regulation, particularly in market settings where the service provider does not have the incentive to reduce misconduct at the downstream. Since not all the benefits of reduced vendor misconduct are reaped the provider, it might not internalize consumer welfare benefits.

B. Heterogeneity

The analyses so far assume that the direct and indirect effects of the randomized entry intervention are uniform. Here, we examine heterogeneity along four dimensions (i) *pre*-experiment beliefs about randomized entry effects, (ii) variation in the intensity of entry intervention, (iii) *pre*-intervention incumbent vendor density and randomization strata, and (iv) geographic distance between stores and commonness of services offered across stores. This heterogeneity analysis helps identify compliers of the randomized entry intervention, and reaffirms the main results.

First, and motivated by DellaVigna and Pope (2018), we examine the predictability of the treatment effects for the two main financial outcomes: misconduct and consumer trust

[8] This is an analog of firms using rivals' prices as a benchmark in setting their own prices. https://www.wsj.com/business/retail/the-old-school-spy-tactics-helping-to-set-your-grocery-prices-603f0204

in financial vendors. At baseline, we solicited the perceptions of vendors and consumers, asking them to predict the entry intervention's likely effects (displayed in Figure A.10). The estimated treatment effect on misconduct at the market level is around -40%; yet vendors predicted a reduction of 74%, while consumers predicted a reduction of 91%. For consumer trust, the treatment effect at the market level is about 0% (and generally insignificant across models); yet vendors predicted an increase of 86%, while consumers predicted an increase of 95%. Vendors' perceptions are less optimistic compared to consumers, although both are generally incorrect in their forecasts. Formally, we regress the endline outcomes against an indicator for entry interacted with baseline perceptions. Table A.4 shows the results. We find a weak correlation between the treatment effects and baseline predictions similar to the descriptive comparisons. These results suggest imperfect forecasts, and limited selection on the treatment, further indicating the significance of the main estimates.

Second, markets assigned the high-entry program—where around 70% of non-financial firms were onboarded as financial vendors—are likely to respond more to randomized entry than markets assigned the low-entry program, in which 25% of non-financial firms were onboarded. In our research design, we created experimental variation in the intensity of entry to examine such potential nonlinear effects. Table A.5 shows consistent evidence for the main financial and non-financial outcomes: misconduct, prices, price-cost markups, and revenues. The impacts of the intervention are larger in high-entry markets across all outcomes, except for the in-store prices of major items.

Third, and motivated by previous work (Matsa 2011), we examine heterogeneity by baseline market conditions or competition. In our research design, we stratified the intervention by both the population of a locality (reflects differences in market size, operational costs, etc) and the number of incumbent vendors in a locality (reflects differences in prevailing competition, supply-side effects, etc). This stratification generates four distinct strata that are representative of the market, with power to compare the treatment effects across strata. Table A.6 shows the results for the main financial and non-financial outcomes. The impacts

of randomized entry seem concentrated in localities with (i) smaller populations and fewer incumbents and (ii) larger populations and more incumbents.

Fourth, the entry effects may vary with geographic distance between stores, and, plausibly, differently for competitors and non-competitors based on the services offered. We have data on the location (latitude/longitude) of firms, and all services offered across stores. We use this to construct two measures of closeness by location and by services, and then classify markets as either (i) stores closer in location and services common among stores, (ii) stores not closer in location but services common, (iii) stores closer in location but services not common, and (iv) stores not closer in location and services not common. Table A.7 shows the results for the main financial and non-financial outcomes across these four groups. Predictably, and except for the misconduct outcome, the broader impacts of randomized entry are concentrated in localities where competition is likely more intense — i.e., where stores are closer in location and services are common.

C Models of Competition with Bundling

The price results (summarized in Table A.8) are consistent with standard models of competition with bundling (Zhou 2017; Armstrong and Vickers 2010) — which predict, under fairly general conditions, that competition with bundling raises (or lowers) prices and benefits firms when the number of bundled firms are relatively many (or few). The intuition is as follows: when there are many firms, a firm's marginal consumers tend to have a high valuation for its product, because, with a high chance, their valuation for the best rival product is high. That is, they tend to be positioned on the right tail of the valuation density; and since bundling yields a thinner tail, it tends to induce fewer marginal consumers, and therefore, a less elastic demand. Firms then raise their prices. In contrast, when there are relatively few firms in the market, the average position of marginal consumers is close to the mean, and, since bundling makes the valuation density more peaked, it tends to induce more elastic demand. Firms then lower prices.

The randomized assignments of select non-financial firms, and experimental variation in the number of stores that bundle non-financial goods/services with financial services across localities allows us to test these predictions from models of competition with bundling. First, we report consistent evidence that, within the same local market, prices for goods/services are relatively higher for non-financial firms that were onboarded as financial vendors compared to those firms not onboarded. Second, and predictably, such price differences are three times larger in high-entry localities (where the number of bundled firms are many) compared to low-entry localities (Column 2 of Table A.8), although standard errors do not allow ruling out that the two price differences are statistically different.

VI Conclusion

This paper provides new evidence about how entry in industry equilibrium—featuring consumer protection concerns—matters for efficiency. We implement a widespread and scalable intervention across rural communities that randomizes the entry of existing non-financial (MICROE) firms as new financial mobile money vendors. Randomized entry has broader benefits for consumers and businesses across sectors. We estimate a very large, negative direct and indirect effect on mobile money vendor misconduct, with a net effect of -50%. There is a positive direct effect, but negative indirect effect, on prices for non-financial goods/services in the MICROE sector, consistent with standard models of competition with bundling (Zhou 2017; Armstrong and Vickers 2010). Price-cost markups for the non-financial goods/services decreased (-27%) at the market level. Combined with an observed increase in aggregate household expenditures, this indicates positive consumer surplus. We report evidence of within-market revenue reallocation and expansion of mobile money, as well as a large services multiplier: revenues for non-financial goods/services in the MICROE sector significantly increased (+20%), with aggregate service industry revenues increasing by 5%. Randomized entry operates through two major channels: adoption externalities and an aggregate increase in household expenditures.

Our results provide a proof-of-concept that entry increases local economic activity, not only by changing markets for digital financial services, but also by transforming the non-financial goods/services sector. We highlight a distinct channel implied by the velocity of money equation that previous literature has ignored: a large non-financial services multiplier generated by the entry of new financial vendors. The results show the "real effects" of financial markets on the local economy (Bond et al. 2012). Market design, industrial policy, and evaluation of entry interventions need to account for broader market-wide responses, which, we show, are meaningful. We identify the nature of externalities from firm entry, and evaluate conditions under which entry may be inefficient.

Table 1: Study timeline

	DATE	ACTIVITY
Part 1	January-June 2020	**Pilot work**
Part 2	Mar 2023	**Baseline:** Market census and surveys
	Apr 2023	**Trust games I (Baseline)**
	Apr/May 2023	**Audit study I (Baseline)**
Part 3	Jun 2023	**Intervention:** Markets and entrants assignment
	Jun - Oct 2023	**Intervention:** Entrants enrollment
Part 4	Apr 2024	**Endline:** Market surveys
	Apr 2024	**Trust games II (Endline)**
	Apr 2024	**Audit study II (Endline)**
	Mar/Apr 2024+	**Administrative data:** Market records from provider

Table 2: Response rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Response rates at 7 months measurements			
Status	Baseline census/surveys	Number sampled for endline follow-up	Number of responses at endline	All	Treatment	Control	Difference
Firms survey	1,186 627 (incumbents) 181 (lucky entrants) 378 (unlucky entrants)	1,186 627 (incumbents) 181 (lucky entrants) 378 (unlucky entrants)	1,105	0.932	0.932	0.931	0.001 (0.016)
Consumer survey	4,872	1,130 (w/ backup sample=454)	1,138	0.940 (among original sample)	0.950	0.930	0.024 (0.016)
Trust game	1,130	1,130 (w/ backup sample=454)	695	0.615	0.632	0.580	0.052 (0.040)
Audit study	358 358 (incumbents) 0 (lucky entrants) 0 (unlucky entrants)	539 358 (incumbents) 181 (lucky entrants) 0 (unlucky entrants)	487 345 (incumbents) 142 (lucky entrants) 0 (unlucky entrants)	0.904	0.899	0.921	-0.022 (0.030)

Note: Table reports the number of responses to the endline measurements conducted 7 months after the deployment of intervention, separately for firm surveys, consumer surveys, trust game and audit study. Incumbents are financial (MOMO) vendors, lucky entrants are non-financial MICROEs assigned/onboarded as new MOMO vendors, unlucky entrants are MICROEs that were not assigned/not onboarded. The lottery participants include lucky and unlucky non-financial enterprises. Columns 4-6 report response rates, and Column 7 shows the difference between columns 5 and 6 (standard errors are reported in parentheses).

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 3: Take-up: randomized entry and reorganization of local markets

	A. Program Participation Among MICROEs		**B. Shock to Market Structure and Reorganization**				**C. Market Informed of New Entrants**		**D. Firm Exit by Endline**	
	Entry indicator		No. MOMO vendors		Market index: HHI		Awareness indicator		Not operate indicator	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any entry	0.490***		1.401***		-0.146***		0.229***		0.027*	
	(0.042)		(0.266)		(0.034)		(0.032)		(0.014)	
Low entry		0.432***		0.832***		-0.094**		0.206***		0.041**
		(0.074)		(0.289)		(0.038)		(0.037)		(0.017)
High entry		0.508***		1.983***		-0.199***		0.256***		0.014
		(0.049)		(0.347)		(0.037)		(0.043)		(0.018)
Observations	512	512	136	136	136	136	939	939	1,105	1,105
Control mean	0.073	0.073	3.644	3.644	0.480	0.480	0.250	0.250	0.049	0.049
Sample & level	L & UL entrants	L & UL entrants	Locality	Locality	Locality	Locality	UL entrants & incumbents	UL entrants & incumbents	Firms (all)	Firms (all)
Measurement	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys

Note: Observations are either at the firm or market level. Dependent variables are endline survey-based measures. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UL denotes unlucky entrants and refers to non-financial stores not onboarded as financial vendors. MICROEs denotes non-financial microenterprise stores, MOMO denotes financial mobile money stores, and the Herfindahl-Hirschman Index (HHI) $= \sum_{i=1}^{n} s_i^2$ is constructed using firm sales, s_i is the local market share of firm i, and a lower index reflects higher levels of market competition. Firm exit is defined as stores that stopped operating by the endline follow-up. Cluster-robust standard errors at market (locality) level are reported in parentheses, except in panel B, 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.

Table 4: Effects of randomized entry on consumer outcomes for financial services

	A. Financial Services: Mobile Money						
	Misconduct indicator	Misconduct amount (GHS)	Transparency: disclose tariff	Quality: vendor absent indicator	Misconduct indicator	Consumer trust indicator	Consumer trust (GHS)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ENTRY (δ)	-0.171***	-0.492**	0.213***	-0.013	-0.136***	0.086	1.523
	(0.035)	(0.253)	(0.054)	(0.031)	(0.034)	(0.058)	(1.317)
Observations	1,493	1,493	1,493	1,493	1,143	1,143	695
Control mean	0.372	1.044	0.337	0.089	0.209	0.511	25.07
Analysis sample & level	Firms (all) x transactions	Firms (all) x transactions	Firms (all) x transactions	Firms (all) x transactions	Consumers	Consumers	Consumers
Measurement	Audit study	Audit study	Audit study	Audit study	Consumer surveys	Consumer surveys	Trust games

Note: Observations are either at the firm x transaction or consumer level. Dependent variables are endline audit-based, survey-based, or trust game-based measures. Includes randomization strata dummies. In Column 5, misconduct measures households'/customers' estimates that their last transaction at vendor points was overcharged. Consumer trust measures their trust in vendors when asked (Column 6) and the amount the consumer transferred to an anonymous vendor in the trust game (Column 7). Outcomes gathered directly from consumers allow for only cross-village comparisons. Cluster-robust standard errors at market level are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 5: Effects of randomized entry on consumer outcomes for financial services

	A. Financial Services: Mobile Money							
	Misconduct indicator				Transparency: disclose tariff indicator			
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(2c)	(2d)
Treated x ENTRY (β)	ne			-0.110***	ne			0.307***
				(0.029)				(0.038)
ENTRY (δ)	ne	-0.140***	-0.171***	-0.139***	ne	0.125**	0.214***	0.125**
		(0.035)	(0.035)	(0.036)		(0.054)	(0.054)	(0.054)
Net effect of	ne			-0.250***	ne			0.433***
randomized entry ($\beta + \delta$)				(0.041)				(0.054)
Observations	322	1,171	1,493	1,493	322	1,171	1,493	1,493
Control mean	0.000	0.372	0.372	0.372	0.000	0.337	0.337	0.337
Analysis sample & level	L & UL entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Pooled: x transactions	L & UL entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Pooled: x transactions
Measurement	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study

Note: Observations are at the firm x transaction level. Dependent variables are endline audit-based measures. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UL denotes unlucky entrants and refers to non-financial stores not onboarded as financial vendors. ne is not estimable because financial audit outcomes are not observed for non-financial stores that were not onboarded. Cluster-robust standard errors at market level are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 6: Effects of randomized entry on consumer outcomes for non-financial services

	B. Non-Financial Goods/Services: Microenterprises						**C. Market Experience**
	Price major item in store (GHS)				Price 5kg rice bag (GHS)	Value-for-money [scale: 1-10]	Consumer overall satisfaction [scale: 1-10]
	(1a)	(1b)	(1c)	(1d)	(2)	(3)	(4)
Treated x ENTRY (β)	27.16*			11.32			
	(14.07)			(14.78)			
ENTRY (δ)	-35.12***	-19.22	-19.44	-22.96	-4.195***	0.453***	0.645***
	(13.51)	(25.62)	(14.71)	(15.08)	(1.182)	(0.150)	(0.160)
Net effect	-7.962			-11.64			
of randomized entry ($\beta + \delta$)	(18.10)			(18.50)			
Observations	512	254	766	766	1,143	1,143	1,143
Control mean	73.59	73.32	73.51	73.51	91.45	7.146	7.140
Analysis sample & level	L & UL entrants	Incumbents	Firms (all)	Pooled	Consumers	Consumers	Consumers
Measurement	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Consumer surveys	Consumer surveys	Consumer surveys

Note: Observations are either at the firm or consumer level. Dependent variables are endline survey-based measures. Includes randomization strata dummies. Firms include all financial and non-financial microenterprise services/goods stores. L denotes lucky entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UL denotes unlucky entrants and refers to non-financial stores not onboarded as financial vendors. Outcomes gathered directly from consumers allow for only cross-village comparisons. Cluster-robust standard errors at market level are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 7: Effects of randomized entry on business revenues for financial services

	A. Financial [Mobile Money] Services						
	Revenue/wk (GHS)				Market-level		Profit/wk (GHS)
					revenue/wk (GHS)	markups μ	
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(3)
Treated x ENTRY (β)	3226**			-8466***			
	(1658)			(1254)			
ENTRY (δ)	3641*	-2807	-4952***	-2634	9857	0.001	-6.254
	(2075)	(1910)	(1787)	(1909)	(10982)	(0.003)	(14.19)
Net effect	6867***			-11100***			
of randomized entry ($\beta + \delta$)	(1713)			(1711)			
Observations	176	593	769	769	136	136	769
Control mean	3,666	20,951	20,587	20,587	86,925	1.014	193.2
Analysis sample & level	L & UL entrants	Incumbents	Firms (all)	Pooled	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. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial stores onboarded as financial vendors. UL denotes unlucky 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_π=profit/revenue, which is directly observed from the firms' survey data. (Basu 2019) (Column 2b). Profit is income earned after paying all business expenses. 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.

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

	B. Non-Financial [Microenterprise] Goods/Services						
	Revenue/wk (GHS)				Market-level		Profit/wk (GHS)
					revenue/wk (GHS)	markups μ	
	(1a)	(1b)	(1c)	(51d)	(2a)	(2b)	(3)
Treated x ENTRY (β)	-16.31			798.5***			
	(296.8)			(195.6)			
ENTRY (δ)	802.6**	215.2*	455.7***	274.3*	4919***	-0.060**	57.38
	(324.0)	(122.4)	(152.8)	(155.1)	(1529)	(0.023)	(35.93)
Net effect	786.3***			1072***			
of randomized entry ($\beta + \delta$)	(277.1)			(224.0)			
Observations	459	593	1,052	1,052	136	136	459
Control mean	2,407	1,771	2,046	2,046	14,919	1.222	337.5
Analysis sample & level	L & UL entrants	Incumbents	Firms (all)	Pooled	Locality	Locality	L & UL entrants
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. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial stores onboarded as financial vendors. UL denotes unlucky 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_π=profit/revenue, which is directly observed from the firms survey data. (Basu 2019) (Column 2b). Profit is income earned after paying all business expenses. 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.

Table 9: Effects of randomized entry on intermediate firm outcomes

	No. customers/wk		Firm's hh. expenses last 1mn (GHS)		Capital investment last 3mn (GHS)		Hours of work/wk (Hrs)	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Treated x ENTRY (β)		31.01		288.1**		-726.5		1.361
		(19.64)		(121.5)		(1031)		(1.791)
ENTRY (δ)	30.77**	24.01*	239.8*	176.7	3130***	3,288***	3.561***	3.264**
	(12.85)	(13.58)	(143.5)	(146.1)	(481.3)	(537.9)	(1.335)	(1.329)
Net effect of		55.02***		464.8***		2,562***		4.625**
randomized entry ($\beta + \delta$)		(19.75)		(171.0)		(930.6)		(2.087)
Observations	1,105	1,105	1,047	1,047	1,105	1,105	1,105	1,105
Control mean	181.7	181.7	2,039	2,039	4,828	4,828	76.65	76.65
Analysis sample & level	Firms (all)	Pooled: L & UL entrants & incumbents	Firms (all)	Pooled: L & UL entrants & incumbents	Firms (all)	Pooled: L & UL entrants & incumbents	Firms (all)	Pooled: L & UL entrants & incumbents
Measurement	Firm surveys	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. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UL denotes unlucky entrants and refers to non-financial stores not onboarded as financial vendors. Cluster-robust standard errors at market level are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 10: Quantification of drivers of improvements in broader market outcomes

	A. Adoption externalities			**B. Aggregate consumer household expenditures**		
	Interest to add MOMO indicator (Entry interest)	Added MOMO at endline indicator (Actual entry)	Firm switch to cashless payments indicator	Hh. expenses last 1mn (GHS)	Substitution: Hh. makes purchases within home locality indicator	Consumer savings from reduced vendor misconduct (GHS)
	(1a)	(1b)	(2)	(3)	(4)	(5)
Treated x ENTRY (β)			0.101***			-0.026
			(0.040)			(0.159)
ENTRY (δ)	0.100**	0.014	0.076**	276.9**	0.093***	-0.485*
	(0.039)	(0.024)	(0.037)	(130.5)	(0.029)	(0.254)
Net effect of			0.177***			-0.511*
randomized entry ($\beta + \delta$)			(0.041)			(0.284)
Observations	346	346	1,105	1,143	1,143	1,493
Control mean	0.822	0.065	0.584	1,720	0.841	1.044
Analysis sample & level	UL entrants	UL entrants	Pooled: L & UL entrants & incumbents x transaction	Consumers	Consumers	Pooled: L & UL entrants & incumbents x transaction
Measurement	Firm surveys	Firm surveys	Firm surveys	Consumer surveys	Consumer surveys	Audit study

Note: Observations are either at the firm or consumer level. Dependent variables are endline survey-based and audit-based measures. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial microenterprise stores onboarded as financial (MOMO) vendors. UL denotes unlucky entrants and refers to non-financial stores not onboarded as financial vendors. Outcomes gathered directly from consumers allow for only cross-village comparisons. Cluster-robust standard errors at market level are reported in parentheses.

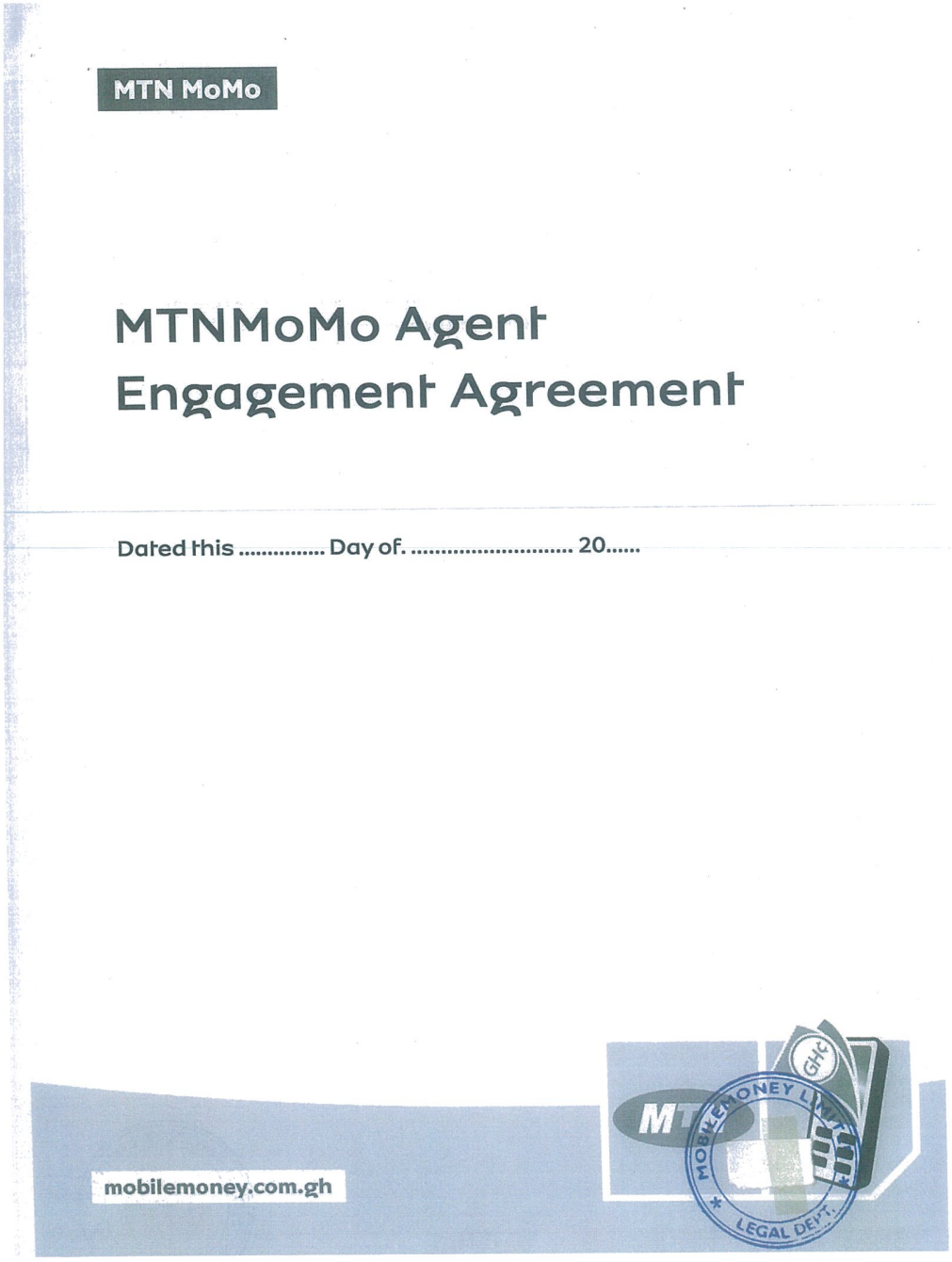
***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Randomized Entry Programs

A. Provider #1: MTN MML Vendor Agreement Forms



MTN MoMo

MTNMoMo Agent
Engagement Agreement

Dated this ..... Day of. ..... 20.....

mobilemoney.com.gh

THIS Agreement is made this ..... day of .....20.....

BETWEEN

MOBILEMONEY LIMITED a company incorporated under the laws of the Republic of Ghana with its head office situated at Independence Avenue, MTN House Ridge Accra, Ghana and whose postal address is P.O. Box TF281, Trade Fair La, Accra (hereinafter referred to as **"the Company"**) acting per its **Mobile Financial Services General Manager** and authorized representative **Eli Hini** of the one part;

AND

Name and Address of Agent.
.....
.....
.....
(hereinafter referred to as **"the Agent"**) of the other part.

WHEAREAS:

A. The Company is a leading company in Ghana's mobile financial services industry;

B. The Agent is desirous of engaging in the business of mobile financial transactions on behalf of and in collaboration with the Company;

C. The Company is committed to a policy of openness and integrity in the conduct of its business;

D. This commitment is based on a fundamental belief that business should be conducted honestly, fairly, ethically and legally;

E. In furtherance of this belief, the Company has formulated the following rules and guidelines for the moral and ethical conduct of Agents who work for/with the company and who conduct business and interact with stakeholders on behalf of the Company; and

F. This Agreement shall be binding on all Agents always and Agents shall conduct themselves always in a manner which contributes to the highest standards of ethical business practices.

MOBILEMONEY LIMITED

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

maintenance of acceptable standards of both personal and corporate governance so as to benefit all parties and third parties to this Agreement.

IN WITNESS WHEREOF the Parties have hereunto set their hands the day and year first above written

Signed on behalf of MobileMoney	Signed by the within named Agent Ltd by:
Name:	Name: .....
Title:	Title: .....
Signature:	Signature: .....
Date:	Date: .....
Witnessed By:	**Witnessed By:**
Name:	Name: .....
Title:	Title: .....
Signature:	Signature: .....

MOBILEMONEY LIMITED

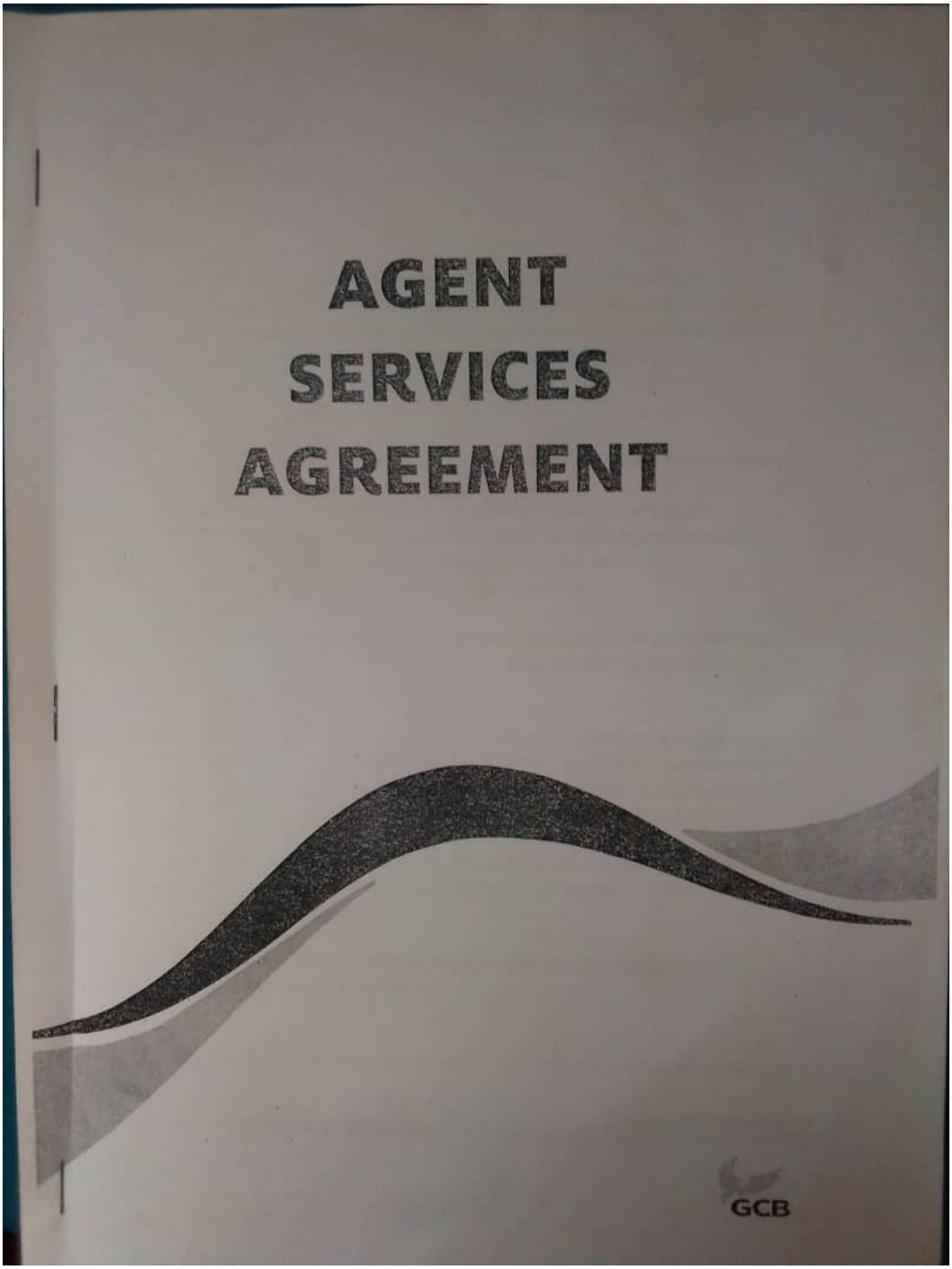
APPENDIX 1

Approved Customer Fees at Agent Point

Transaction type	Fees
Money Transfer (Token/Cash In/sending)	GHS 2.50 (GHS1 – 50)
	5% (Above 50)
Money Transfer (Token Cash Out)	No charge
Deposit (onto the wallets of registered subscribers)	No charge
Withdrawal/Cash Out (by subscribers)	GHP 50 (1 – 50)
	1% (Above 50) 10GHS (Above 1000)
Bill Payment - DStv	No fees charged
- GoTv	GHS 1.00
Bill Payment - ECG	GHP 50 – flat fees
Airtime Top-Up	Free

MOBILEMONEY LIMITED

B. Provider #2: GCB Ltd Vendor Agreement Forms



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

..... for and on behalf of

and in the name of GCB BANK LIMITED

in the presence of:-

Name:

Signature:

Address:

SIGNED and DELIVERED by

.....

for and on behalf of the [redacted]

(Agent herein)

in the presence of:-

[redacted]

for and on behalf of the .....

(Agent herein)

in the presence of:-

Name: [redacted]

Signature: [redacted]

Address:

References

[1] Alvarez, Fernando E., David Argente, Francesco Lippi, Esteban Méndez, and Diana Van Patten. 2023. "Strategic Complementarities in a Dynamic Model of Technology Adoption: P2P Digital Payments." NBER Working Paper Series, No. 31280.

[2] Annan, Francis. (Forthcoming). "Misconduct and Reputation under Imperfect Information." Journal of Political Economy.

[3] Annan, Francis, William Blackmon, Xavier Giné, Brian Mwesigwa, and Arianna Zapanta. 2023. "Transaction Cost Index Year 1 Comparative Report." Innovations for Poverty Action (IPA), https://poverty-action.org/transaction-cost-index-year-1-comparative-report

[4] Armstrong, Mark and John Vickers. 2010. "Competitive Non-Linear Pricing and Bundling." Review of Economic Studies, 77(1): 30-60.

[5] Atkin, David, Benjamin Faber, and Marco Gonzalez-Navarro. 2018. "Retail Globalization and Household Welfare: Evidence from Mexico." Journal of Political Economy, 126(1): 1-73.

[6] Belloni Alexandre, Victor Chernozhukov, and Christian Hansen. 2014. "Inference on Treatment Effects after Selection among High-Dimensional Controls." Review of Economic Studies, 81(2): 608-650.

[7] Bennett, Daniel and Wesley Yin. 2019. "The Market for High-Quality Medicine: Retail Chain Entry and Drug Quality in India." Review of Economics and Statistics, 101(1): 76-90.

[8] Bergquist, Lauren Falcao, and Michael Dinerstein. 2020. "Competition and Entry in Agricultural Markets: Experimental Evidence from Kenya." American Economic Review, 110(12): 3705–47.

[9] B&MGF: Bill and Melinda Gates Foundation. 2021. "Research Brief: The Impact of Mobile Money on Poverty." https://docs.gatesfoundation.org/Documents/ImpactofMobileMoneyonPoverty_ResearchBrief.pdf

[10] Bond, Philip, Alex Edmans, and Itay Goldstein. 2012. "The Real Effects of Financial Markets." Annual Review of Financial Economics, 4(): 339-360.

[11] Borusyak, Kirill, Mauricio Caceres Bravo, and Peter Hull. 2024. "Design-Based Estimation of Structural Parameters, with an Application to Demand." Mimeo.

[12] Bresnahan, F. Timothy and Peter C. Reiss. 1991. "Entry and Competition in Concentrated Markets." Journal of Political Economy, 99(5): 977-1009.

[13] Busso, Matias and Sebastian Galiani. 2019. "The Causal Effect of Competition on Prices and Quality: Evidence from a Field Experiment." American Economic Journal: Applied Economics, 11(1): 33–56.

[14] Chodorow-Reich, Gabriel, Gita Gopinath, Prachi Mishra, and Abhinav Narayanan. 2020. "Cash and the Economy: Evidence from India's Demonetization." Quarterly Journal of Economics, 135(1), 57–103.

[15] Crawford, S. Gregory, Robin S. Lee, Michael D. Whinston, and Ali Yurukoglu. 2018. "The Welfare Effects of Vertical Integration in Multichannel Television Markets." Econometrica, 86(3): 891–954.

[16] Crouzet, Nicolas, Apoorv Gupta, and Filippo Mezzanotti. 2023. "Shocks and Technology Adoption: Evidence from Electronic Payment Systems." Journal of Political Economy, 131(11): 3003-3065.

[17] DellaVigna, Stefano and Devin Pope. 2018. "Predicting Experimental Results: Who Knows What?", Journal of Political Economy, 126(6): 2410-2456.

[18] Dunne, Timothy, Shawn D. Klimek, Mark J. Roberts, and Daniel Yi Xu. 2013. "Entry, Exit, and The Determinants of Market Structure." RAND Journal of Economics, 44(3): 462-487.

[19] Egan, Mark, Gregor Matvos, and Amit Seru. 2019. "The Market for Financial Adviser Misconduct." Journal of Political Economy, 127(1): 233-295.

[20] Garz, Seth, Xavier Giné, Dean Karlan, Rafe Mazer, Caitlin Sanford, and Jonathan Zinman. 2021. "Consumer Protection for Financial Inclusion in Low and Middle Income Countries: Bridging Regulator and Academic Perspectives." Annual Review of Financial Economics, 13(1): 219-246.

[21] Gentzkow, Matthew. 2007. "Valuing New Goods in a Model With Complementarities: Online Newspapers." American Economic Review, 97(3): 713-744.

[22] GSMA: Global System for Mobile Communications. 2024. "State of the Industry Report on Mobile Money 2024." https://www.gsma.com/sotir/wp-content/uploads/2024/03/GSMA-SOTIR-2024_Report.pdf

[23] Hendel, Ignal. 1999. "Estimating Multiple-Discrete Choice Models: An Application to Computerization Returns." Review of Economic Studies, 66(2): 423–446.

[24] Higgins, Sean. (Forthcoming). "Financial Technology Adoption: Network Externalities of Cashless Payments in Mexico." American Economic Review.

[25] Iaria, Alessandro and Ao Wang. 2020. "Identification and Estimation of Demand for Bundles." Mimeo, University of Bristol.

[26] IPA CP Research Initiative. 2021. "IPA Consumer Protection Research Initiative: RFP Overview". https://poverty-action.org/sites/default/files/presentation/IPA-Consumer-Protection-RFP-Info-Session-Feb-10-11-2021-Presentation-Final.pdf

[27] Jack, William and Tavneet Suri. 2014. "Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution." American Economic Review, 104(1): 183-223.

[28] Matsa, A. David. 2011. "Competition and Product Quality in the Supermarket Industry." Quarterly Journal of Economics, 126(3): 1539-1591.

[29] Pozzi, Andrea. 2012. "Shopping Cost and Brand Exploration in Online Grocery." American Economic Journal: Microeconomics, 4(3): 96–120.

[30] ReFinD Research Initiative. 2022. "Digital Finance Retail Distribution Networks in Low- and Middle- Income Countries: A Research Agenda." https://refind-isser.ug.edu.gh/sites/default/files/inline-files/Framework%20Paper_compressed.pdf

[31] Romano, P. Joseph and Michael Wolf. 2005. "Stepwise Multiple Testing as Formalized Data Snooping." Econometrica 73(4): 1237-1282.

[32] Ryan, P. Stephen. 2012. "The Costs of Environmental Regulation in a Concentrated Industry." Econometrica, 80(3), 1019–1061.

[33] Shleifer, Andrei. 2004. "Does Competition Destroy Ethical Behavior?" American Economic Review, 94(2): 414–418.

[34] Schreiner, Mark. 2015. "Simple poverty scorecard--Poverty-assessment tool for Ghana." Available here: http://www.simplepovertyscorecard.com/GHA_2012_ENG.pdf

[35] Suri, Tavneet and William Jack. 2016. "The Long-run Poverty and Gender Impacts of Mobile Money." Science, 354(6317): 1288-1292.

[36] Suri, Tavneet, Jenny Aker, Catia Batista, Michael Callen, Tarek Ghani, William Jack, Leora Klapper, Emma Riley, Simone Schaner, and Sandip Sukhtankar. 2023. "Mobile Money." VoxDevLit, 2(2).

[37] Syverson, Chad. 2004. "Market Structure and Productivity: A Concrete Example." Journal of Political Economy, 112(6): 1181-1222.

[38] Thomassen, Øyvind, Howard Smith, Stephan Seiler, and Pasquale Schiraldi. 2017. "Multi-category Competition and Market Power: A Model of Supermarket Pricing." American Economic Review, 107(8): 2308–51.

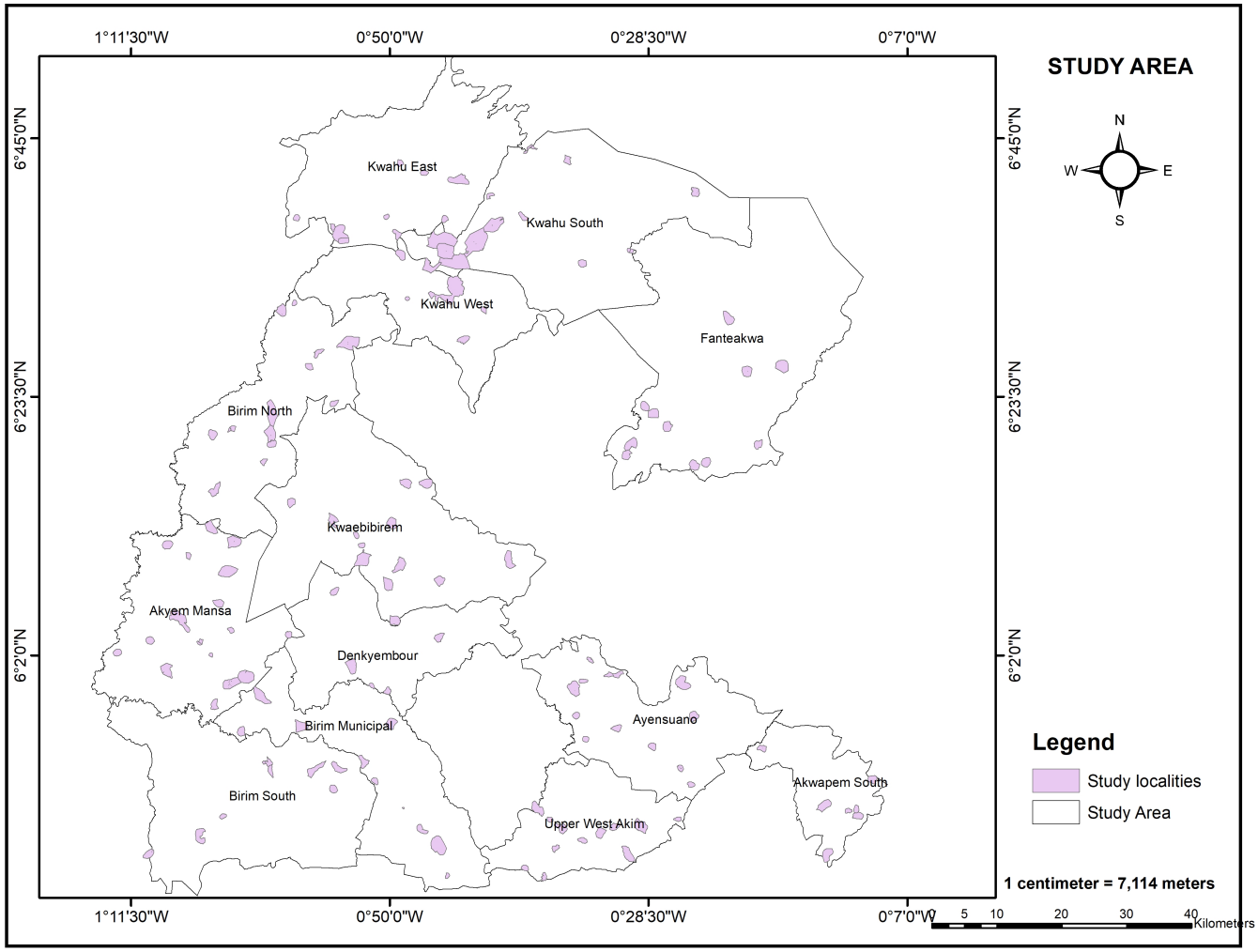
[39] Zhou, Jidong. 2017. "Competitive Bundling." Econometrica, 85(1): 145-172.

Supplementary Appendix (For Online Publication)

A Setting, Randomization Balance, and Further Results

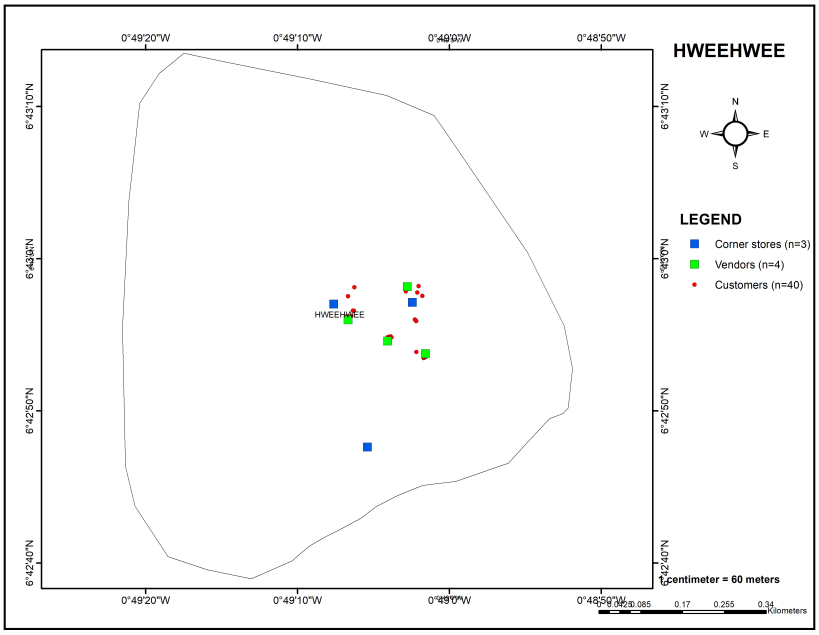
A.1 The Setting

Figure A.1: Map of study localities



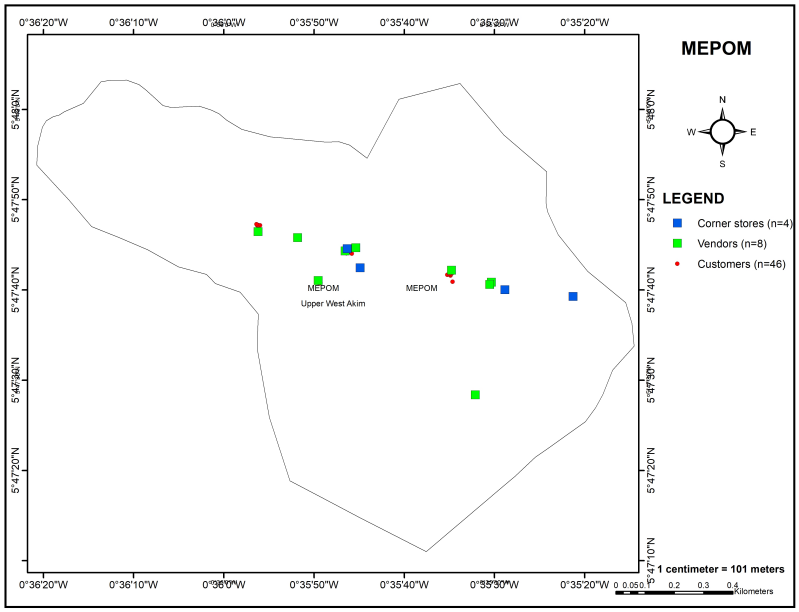
136 LOCALITIES, 13 DISTRICTS IN EASTERN GHANA

Figure A.2: Spatial distribution of respondents in Hweehwee community



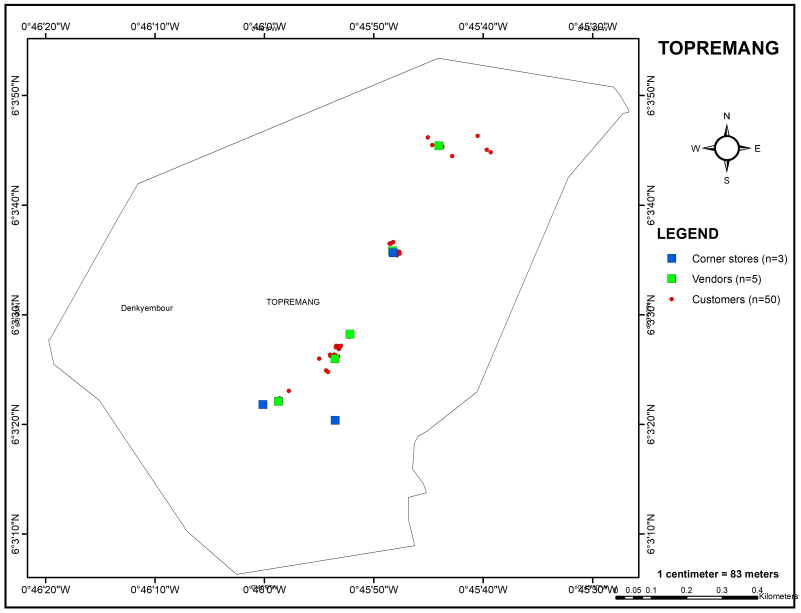
MARKET: HWEEHWEE

Figure A.3: Spatial distribution of respondents in Mepom community



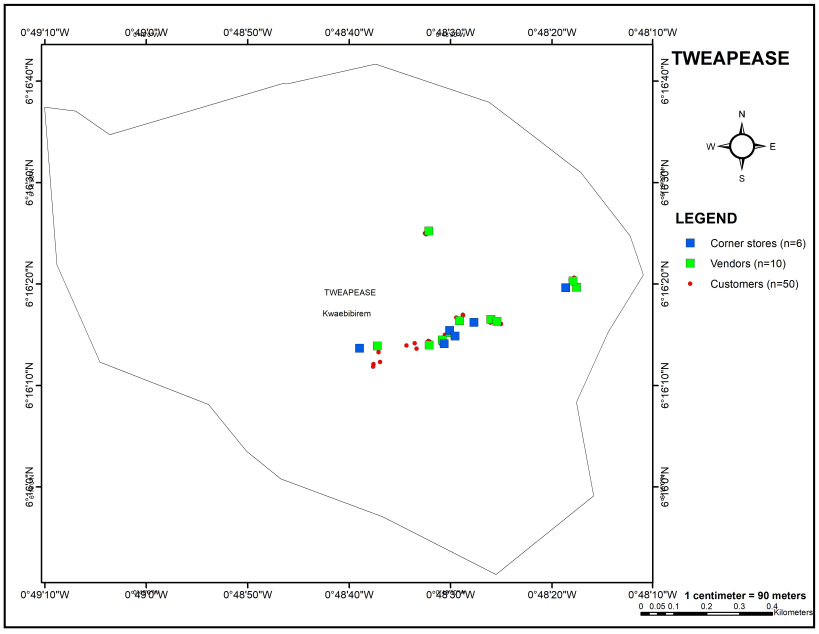
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Figure A.4: Spatial distribution of respondents in Topremang community



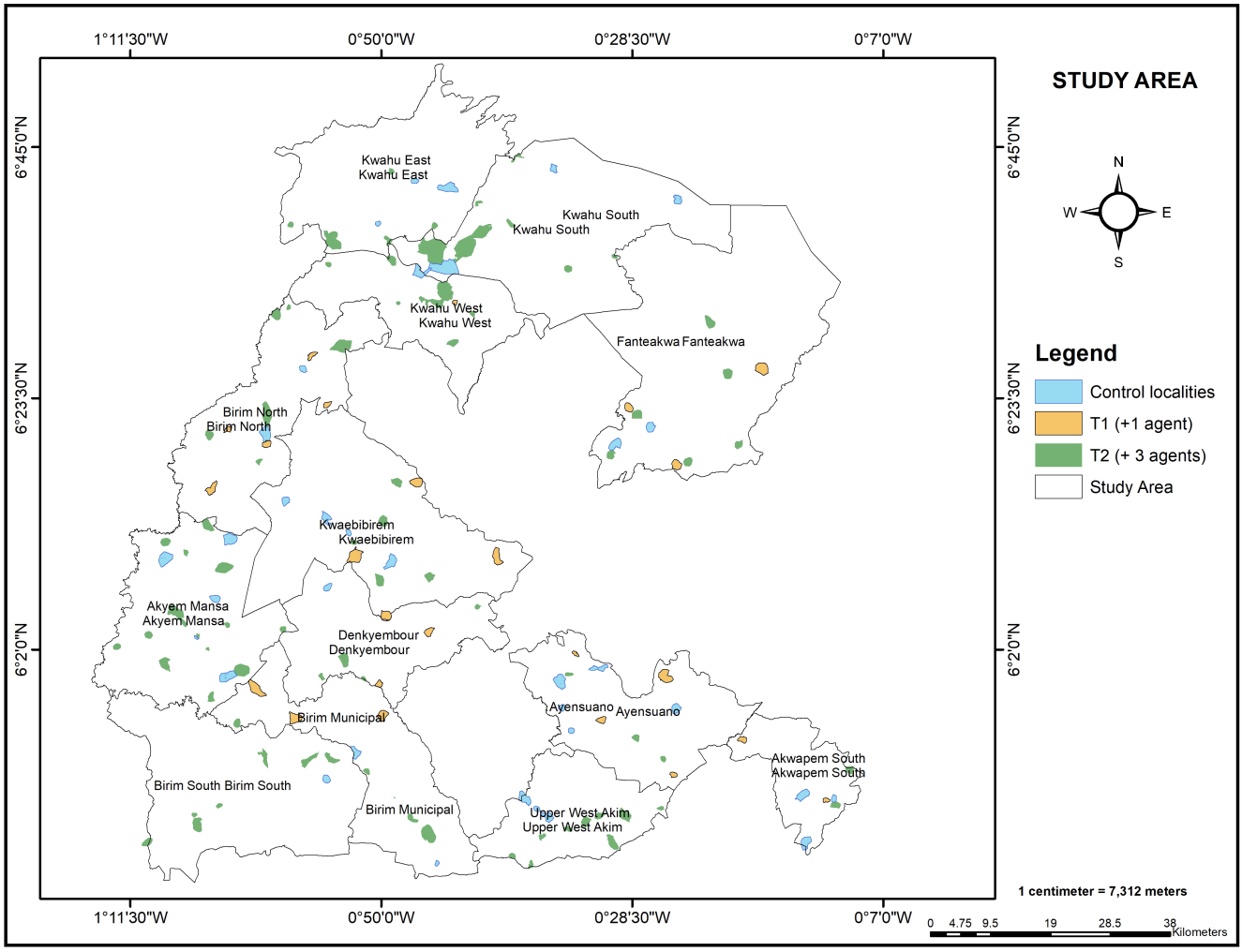
MARKET: TOPREMANG

Figure A.5: Spatial distribution of respondents in Tweapease community



MARKET: TWEAPEASE

Figure A.6: Map of study localities by treatment assignments



136 LOCALITIES, 13 DISTRICTS IN EASTERN GHANA

A.2 Four (4) Motivating Market Facts

Figure A.7: There is untapped entry potential

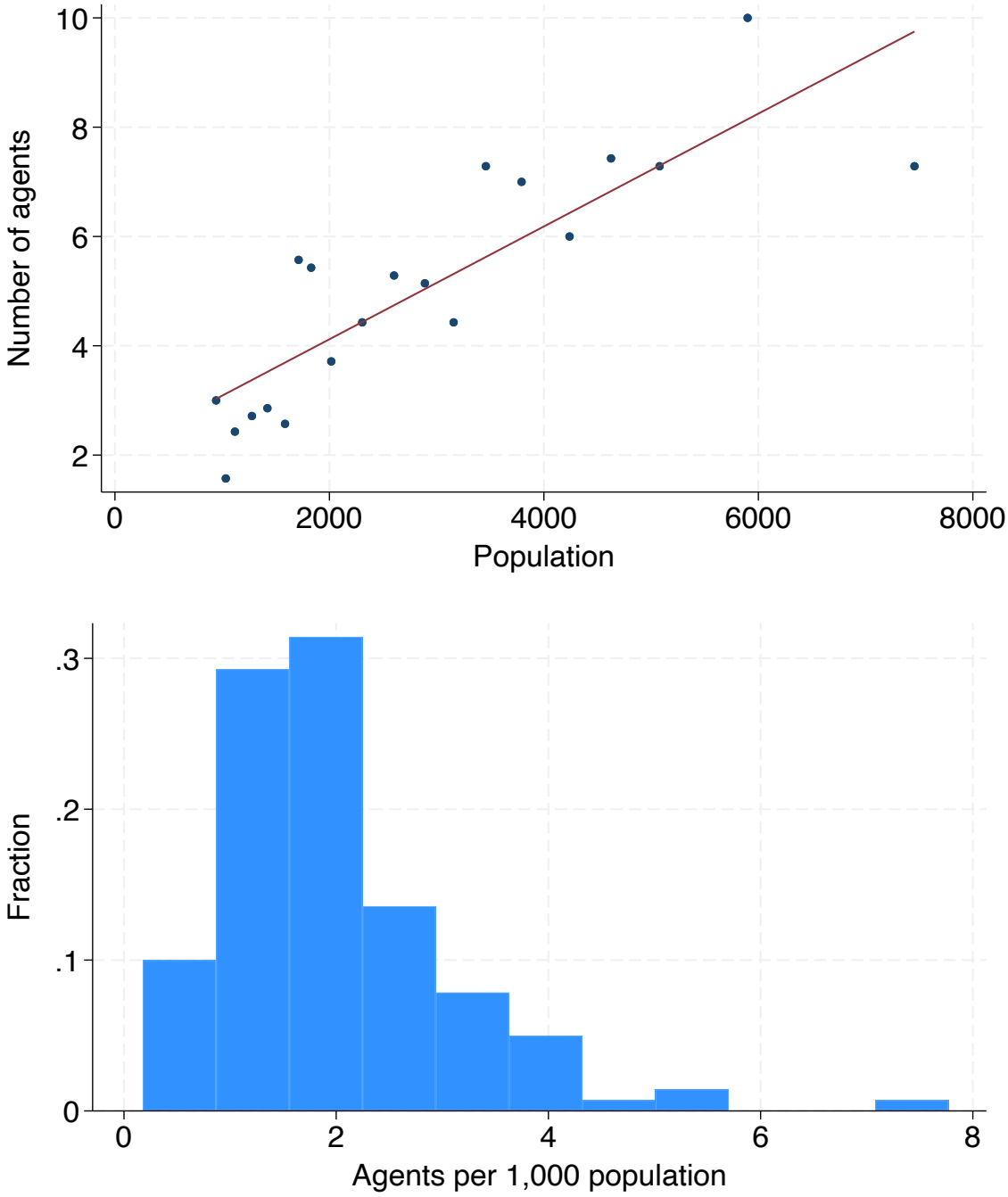


Figure A.8: Low service quality

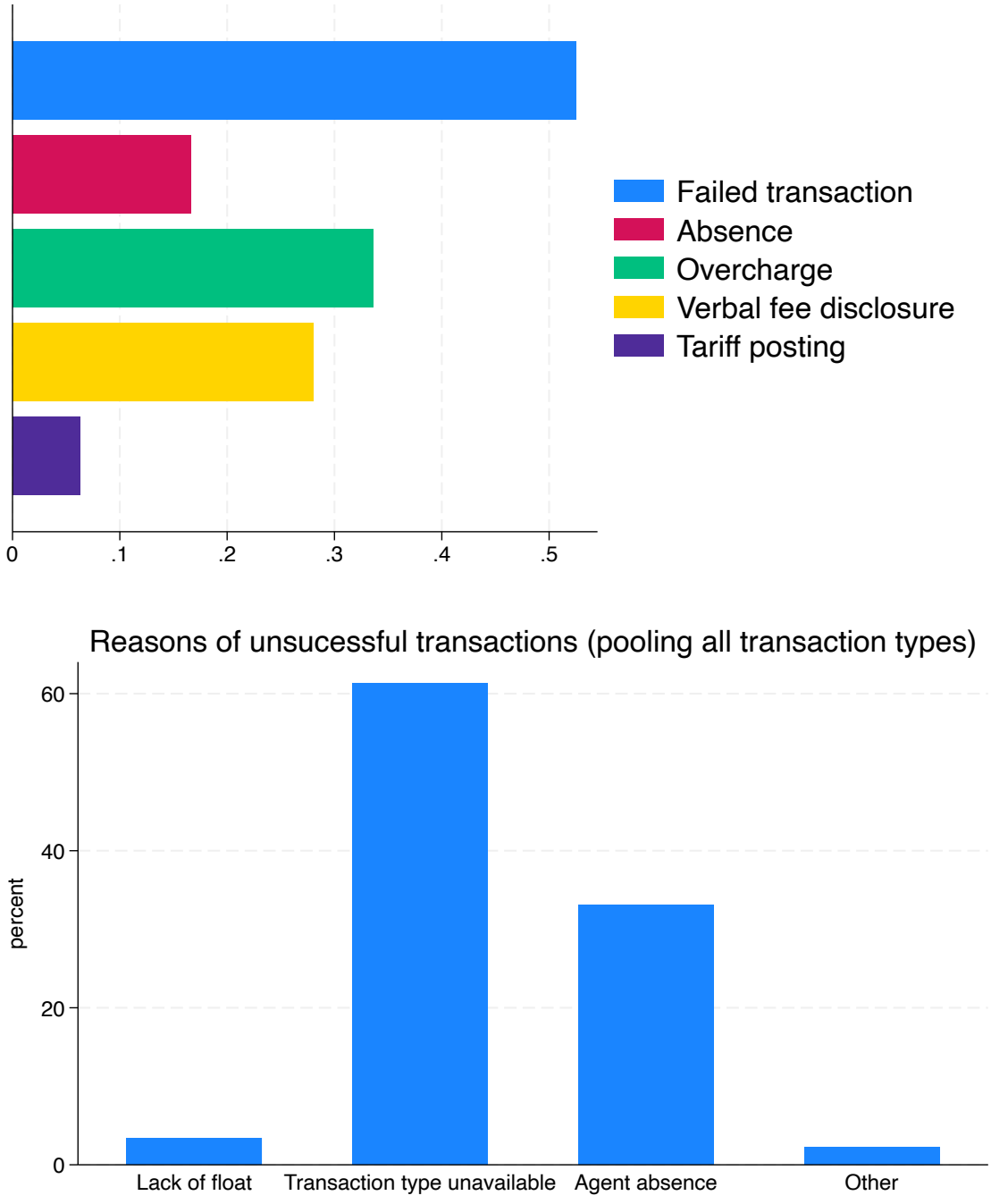
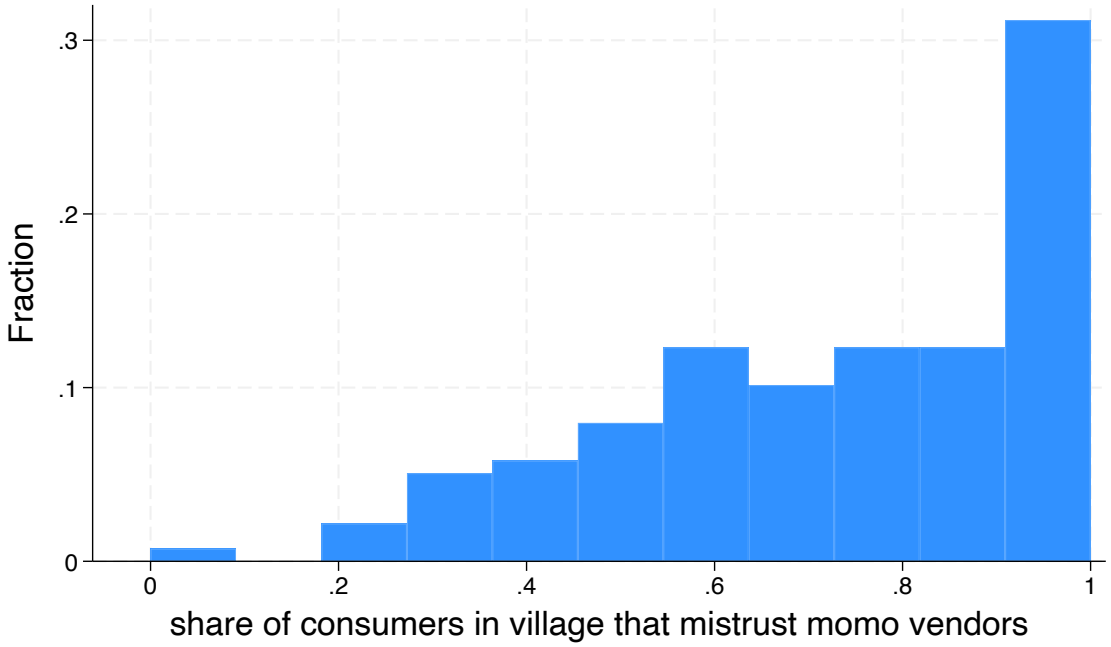


Figure A.9: Limited consumer trust



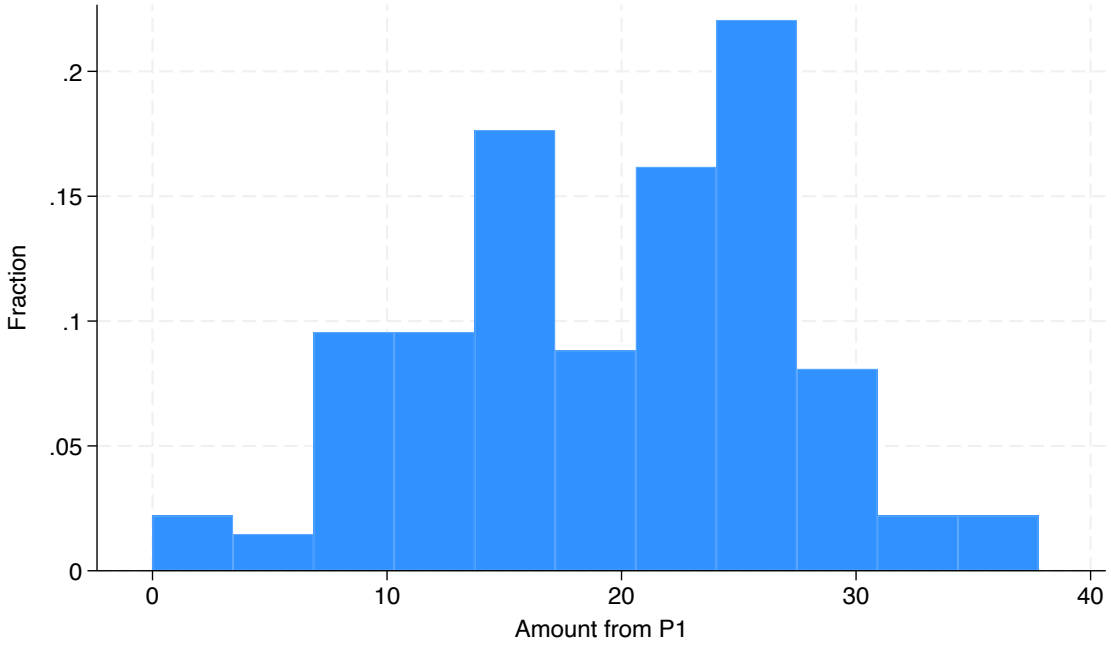
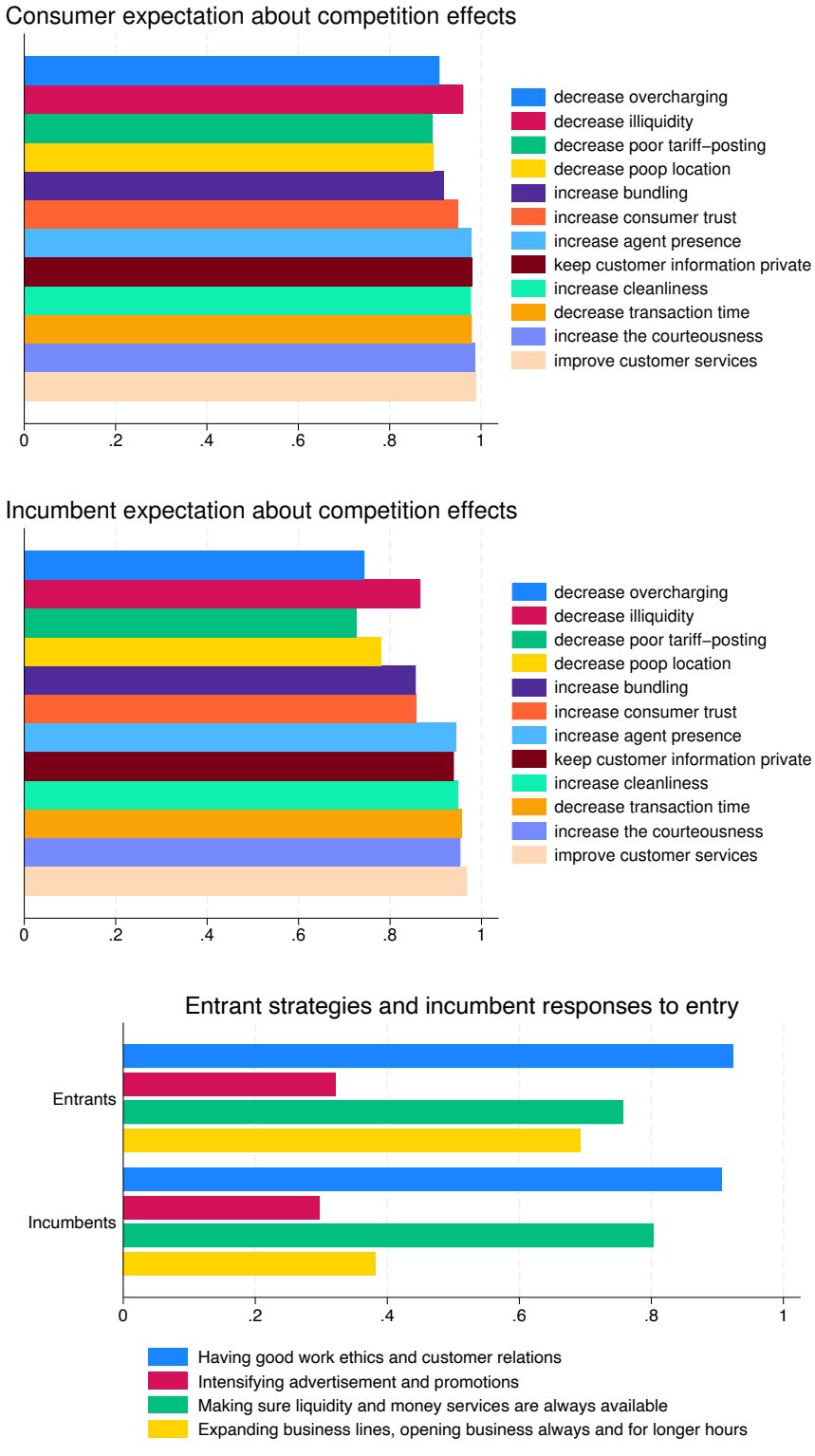


Figure A.10: Closure: Entry matters



A.3 Randomization Balance

Table A.1: Balance test: pre-intervention treatment-control differences

	Consumers	
	Constant	Any entry
	(1)	(2)
A. Demographic characteristics		
Age (yrs)	28.33***	1.001
	(0.871)	(0.706)
Female	0.409***	-0.003
	(0.049)	(0.042)
Education (high school)	0.811***	-0.010
	(0.028)	(0.021)
Married	0.382***	0.025
	(0.020)	(0.019)
Ethnicity (Akan)	0.606***	0.006
	(0.048)	(0.036)
B. Financial Mobile Money Services		
Has mobile money account	0.974***	0.001
	(0.005)	(0.005)
Has bank account	0.316***	0.007
	(0.031)	(0.030)
Value of last transaction (GHS)	257.4***	-23.47
	(21.02)	(22.62)
Mistrust vendors	0.234***	0.002
	(0.032)	(0.026)
Overcharging is common (misconduct)	0.778***	0.004
	(0.050)	(0.050)
Frequently switch agents in locality	0.362***	-0.002
	(0.040)	(0.037)
Number vendors used last 3 months	1.809***	-0.079
	(0.821)	(0.060)
C. Non-financial Microenterprise Goods/Services		
Total household expenses (GHS)	1682***	174.7
	(159.3)	(176.1)
Joint F-test (linear), p-value	0.887	
Chi-squared test (probit), p-value	0.883	
Observations	4,725	

Note: Observations are at the consumer level. Each row is a separate regression and controls for randomization strata dummies. The F and Chi-squared tests are conducted using the pooled indicator **1**(Entry Assignment) as the outcome. The results indicate strong evidence of balance across treatment arms and are similar to results from a more saturated model (which we do not report here to conserve space) where we include separate indicators for Low entry (+1 entrant each localities) and High entry (+3 entrants each localities) in treated markets. Cluster-robust standard errors at market (locality) level are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.2: Balance test: pre-intervention treatment-control differences

	MICROE: Non-Financial Microenterprises		
	Constant	Treated firms in treated locality	Untreated firms in treated locality
	(1)	(2)	(3)
A. Demographic characteristics:			
Age (yrs)	35.41***	1.037	-0.105
	(1.311)	(1.207)	(1.200)
Female	0.519***	0.043	0.021
	(0.059)	(0.063)	(0.063)
Education (high school)	0.840***	-0.016	0.033
	(0.042)	(0.038)	(0.034)
Married	0.532***	0.032	-0.030
	(0.050)	(0.051)	(0.050)
Ethnicity (Akan)	0.674***	0.016	-0.038
	(0.066)	(0.055)	(0.054)
B. Business outcomes:			
Age of business (yrs)	7.349***	-0.426	-0.984
	(0.797)	(0.894)	(0.861)
Revenue last week (GHS)	2074***	-162.1	113.8
	(255.7)	(298.4)	(294.1)
Profit last week (GHS)	548***	-90.77	-8.018
	(56.55)	(60.34)	(65.37)
Hours of work last week (hrs)	74.59***	-1.929	1.939
	(3.038)	(3.416)	(3.315)
No. customers last week	3.343***	0.138	0.108
	(0.161)	(0.180)	(0.182)
Any digital payment	0.411***	0.010	-0.045
	(0.053)	(0.062)	(0.055)
Value of firm (GHS)	22147***	-1768	-3023
	(2508)	(2940)	(2833)
Total household expenses (GHS)	2554***	-41.16	204.3
	(278.5)	(296.1)	(305.8)
Joint F-test (linear), p-value		0.965	
Chi-squared test (probit), p-value		0.966	
Observations		559	

Note: Observations are at the firm level. Each row is a separate regression and controls for randomization strata dummies. Value of firm is the current value of all inventories, raw materials and holdings (ie. the price the owner will accept to hand over entire business). Number of customers binned: 1=[1-10], 2=[11-30], 3=[31-50], 4=[51-80], 5=[80+]. The F and Chi-squared tests are conducted using the pooled indicator $\mathbf{1}$(Entry Assignment) as the outcome. The results indicate strong evidence of balance across treatment arms and are similar to results from a more saturated model (which we do not report here to conserve space) where we include separate indicators for Low entry (+1 entrant each localities) x treated firms, Low entry (+1 entrant each localities) x untreated firms, High entry (+3 entrants each localities) x treated firms, and High entry (+1 entrant each localities) x untreated firms in treated markets. Cluster-robust standard errors at market (locality) level are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.3: Balance test: pre-intervention treatment-control differences

	MOMO: Financial Mobile Money	
	Constant	Any entry
	(1)	(2)
A. Demographic characteristics:		
Age (yrs)	28.67***	0.602
	(0.892)	(0.732)
Female	0.437***	-0.035
	(0.051)	(0.043)
Education (high school)	0.763***	0.017
	(0.043)	(0.035)
Married	0.394***	0.026
	(0.057)	(0.043)
Ethnicity (Akan)	0.643***	-0.018
	(0.060)	(0.042)
B. Business outcomes:		
Bundling MOMO (major)	0.871***	0.041
with MICROE (minor)	(0.031)	(0.027)
Age of business (yrs)	4.005***	-0.240
	(0.321)	(0.255)
Revenue last week (GHS)	14167***	-273.0
	(1663)	(1561)
Profit last week (GHS)	218.02***	0.492
	(16.70)	(14.12)
Hours of work last week (hrs)	77.40***	3.217
	(2.527)	(3.170)
No. customers last week	200.1***	-13.33
	(21.41)	(22.91)
Any digital payment	0.422***	0.010
	(0.040)	(0.034)
Value of firm (GHS)	11641***	-1510
	(1049)	(935.4)
Total household expenses (GHS)	2356***	4.054
	(237.9)	(274.3)
Joint F-test (linear), p-value	0.932	
Chi-squared test (probit), p-value	0.924	
Observations	627	

Note: Observations are at the firm level. Each row is a separate regression and controls for randomization strata dummies. Value of firm is the current value of all inventories, raw materials and holdings (ie. the price the owner will accept to hand over entire business). The F and Chi-squared tests are conducted using the pooled indicator $\mathbf{1}$(Entry Assignment) as the outcome. The results indicate strong evidence of balance across treatment arms and are similar to results from a more saturated model (which we do not report here to conserve space) where we include separate indicators for Low entry (+1 entrant each localities) and High entry (+3 entrants each localities) in treated markets. Cluster-robust standard errors at market (locality) level are reported in parentheses.

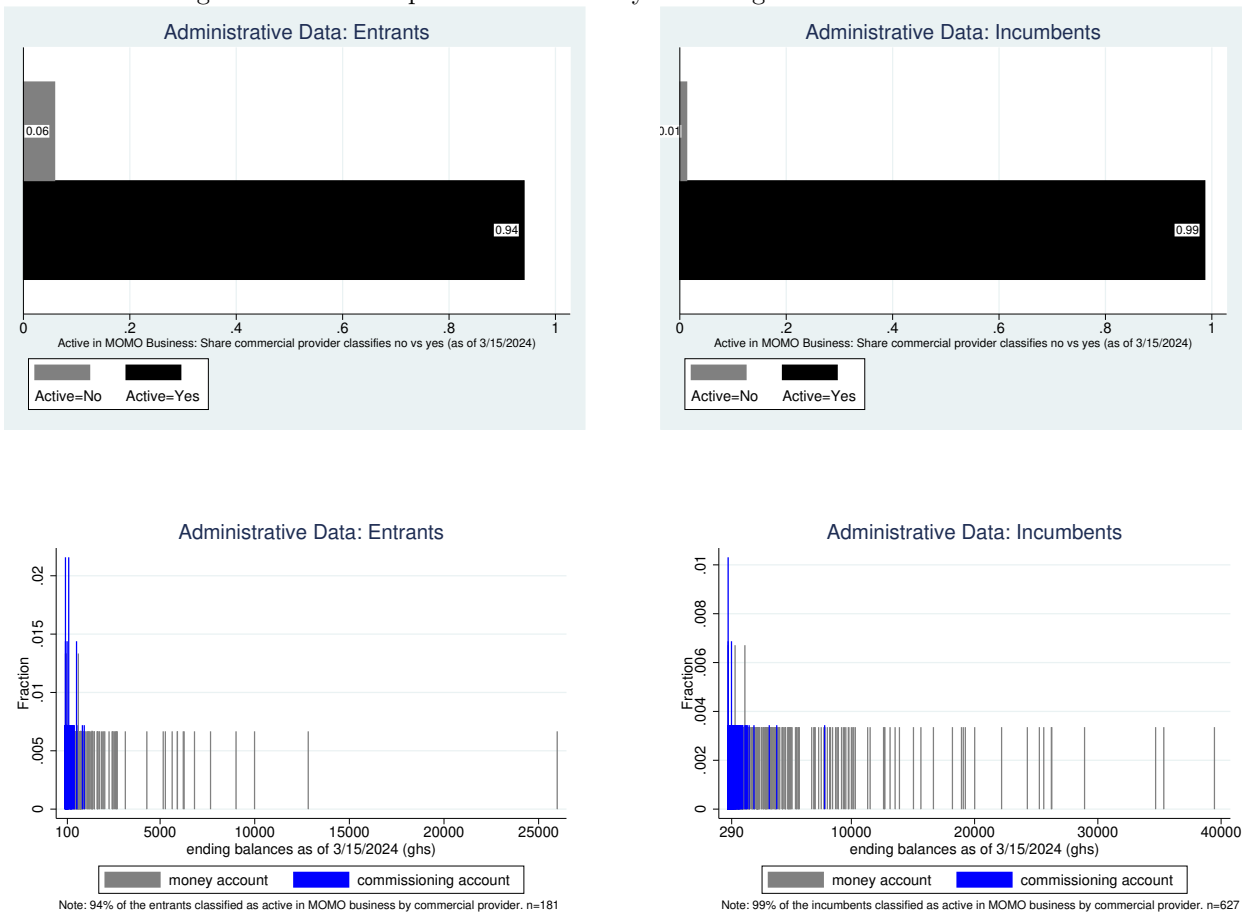
***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

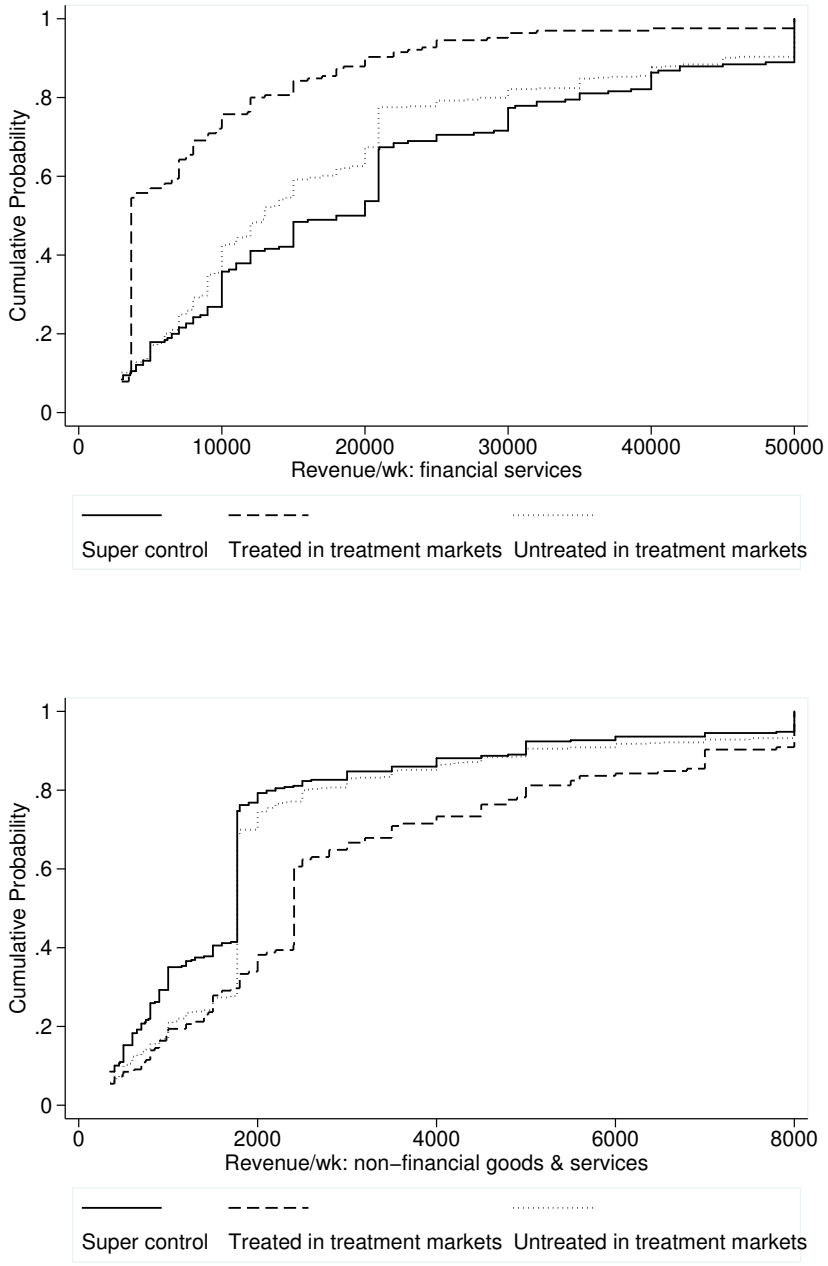
A.4 Further Results

Figure A.11: Take-up: randomized entry and reorganization of local markets



Note: Administrative data from service provider.

Figure A.12: Business revenue impacts by treatment



Note: Figure plots distributions (CDFs) of firm revenues at endline for the different experimental subsamples. Observations are at the firm level. 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. From a Kolmogorov–Smirnov test for the equality of distributions, p-value ≤ 0.013 in all cases for financial services and p-value ≤ 0.001 in all cases for non-financial goods/services.

Table A.4: Predictions about randomized entry effects

	A. Correlation of Treatment Effects with Financial Vendors' Baseline Predictions				**B. Correlation of Treatment Effects with Consumers' Baseline Predictions**			
	Misconduct indicator	Misconduct indicator	Consumer trust indicator	Consumer trust indicator	Misconduct indicator	Misconduct indicator	Consumer trust indicator	Consumer trust indicator
	(1a)	(1b)	(2a)	(2a)	(3a)	(3b)	(4a)	(4b)
ENTRY (δ)	-0.135***	0.008	0.105*	0.372	-0.135***	-0.044	0.105*	0.449
	(0.031)	(0.086)	(0.056)	(0.285)	(0.031)	(0.328)	(0.056)	(0.882)
x Baseline Prediction		-0.187*		-0.307		-0.099		-0.358
		(0.111)		(0.325)		(0.354)		(0.919)
Baseline Prediction		0.028		(0.355)		-0.150		0.474
		(0.080)		(0.259)		(0.301)		(0.881)
Observations	136	136	136	136	136	136	136	136
Control mean	0.366	0.366	0.472	0.472	0.366	0.366	0.472	0.472
Sample & level	Locality	Locality	Locality	Locality	Locality	Locality	Locality	Locality
Measurement	Audit study	Audit study	Consumer surveys	Consumer surveys	Audit study	Audit study	Consumer surveys	Consumer surveys

Note: Observations are either at the firm or consumer level, aggregated by locality. Dependent variables are endline audit-based and consumer survey-based measures. Includes randomization strata dummies. Heteroskedasticity-robust standard errors are reported in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.5: Heterogeneity by experimental variation in intensity of entry intervention for main outcomes

	A. Financial [Mobile Money] Services			**B. Non-Financial [Microenterprise] Goods/Services**		
	Misconduct indicator	Markups μ	Revenue/wk (GHS)	Price major item in store (GHS)	Markups μ	Revenue/wk (GHS)
	(1)	(2)	(3)	(4)	(5)	(6)
Low ENTRY (δ_1)	-0.112***	0.001	-4309*	-35.58**	-0.054**	419.5**
	(0.040)	(0.003)	(2193)	(14.61)	(0.025)	(181.2)
High ENTRY (δ_1)	-0.215***	0.001	-5460***	-3.951	-0.062**	489.5***
	(0.037)	(0.002)	(1827)	(17.55)	(0.024)	(184.4)
Observations	1,493	136	769	766	136	1,052
Control mean	0.372	1.014	20,587	73.51	1.222	2,046
Sample & level	Firms (all) x transactions	Locality	Firms (all)	Firms (all)	Locality	Firms (all)
Measurement	Audit study	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys

Note: Observations are either at the firm or locality level. Dependent variables are endline audit-based and firm survey-based measures. Includes randomization strata dummies. Low ENTRY is an indicator for +1 entrant each treated localities, where +1 non-financial microenterprise was enrolled as a financial vendor and represents about 25% increase relative to either the number of incumbent financial vendors (4-5 per locality) or the number of eligible non-financial microenterprises pool (5 per locality). High ENTRY is an indicator for +3 entrants each treated localities, where +3 non-financial microenterprises were enrolled as financial vendors and represents about 70% increase relative to either the number of incumbent financial vendors (4-5 per locality) or the number of eligible non-financial microenterprises pool (5 per locality). Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2 and 5, 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.

Table A.6: Heterogeneity by baseline number of incumbents and randomization strata for main outcomes

	A. Financial [Mobile Money] Services			**B. Non-Financial [Microenterprise] Goods/Services**		
	Misconduct indicator	Markups μ	Revenue/wk (GHS)	Price major item in store (GHS)	Markups μ	Revenue/wk (GHS)
	(1)	(2)	(3)	(4)	(5)	(6)
ENTRY (δ) **x** Low pop. &	-0.146***	0.002	-8344***	1.925	-0.040	659.7***
Low # incumbents	(0.042)	(0.002)	(1902)	(21.33)	(0.028)	(250.1)
ENTRY (δ) **x** High pop. &	-0.164***	0.002	-8682***	-22.44	-0.058*	367.9
Low # incumbents	(0.055)	(0.005)	(2419)	(18.72)	(0.030)	(278.1)
ENTRY (δ) **x** Low pop. &	-0.148**	-0.002	-2332	6.280	-0.057	140.7
High # incumbents	(0.057)	(0.002)	(3134)	(34.29)	(0.032)	(220.5)
ENTRY (δ) **x** High pop. &	-0.198***	-0.001	-3419	-36.89***	-0.059**	426.2**
High # incumbents	(0.043)	(0.003)	(2072)	(13.80)	(0.026)	(184.7)
Observations	1,493	136	769	766	136	1,052
Control mean	0.372	1.014	20,587	73.51	1.222	2,046
Sample & level	Firms (all) x transactions	Locality	Firms (all)	Firms (all)	Locality	Firms (all)
Measurement	Audit study	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys

Note: Observations are either at the firm or locality level. Dependent variables are endline audit-based and firm survey-based measures. Low pop. denotes below average population localities and low # incumbents denotes below average number of incumbent financial vendors localities. The average population across localities is 5,000 people and the average number of incumbent financial vendors is 4.5 per locality. Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2 and 5, 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.

Table A.7: Heterogeneity by both store locations and commonness of services for main outcomes

	A. Financial [Mobile Money] Services			**B. Non-Financial [Microenterprise] Goods/Services**		
	Misconduct indicator	Markups μ	Revenue/wk (GHS)	Price major item in store (GHS)	Markups μ	Revenue/wk (GHS)
	(1)	(2)	(3)	(4)	(5)	(6)
ENTRY (δ) **x** Stores closer &	0.025	0.006	-9825***	-45.27***	-0.059*	967.0**
Services common	(0.059)	(0.005)	(1875)	(15.06)	(0.036)	(488.1)
ENTRY (δ) **x** Stores not closer but	-0.150*	0.001	-5222**	-0.040	-0.021	785.8
Services common	(0.079)	(0.003)	(1993)	(31.08)	(0.044)	(488.1)
ENTRY (δ) **x** Stores closer but	-0.164***	0.001	-2977	-22.52	-0.063**	339.5*
Services not common	(0.039)	(0.003)	(2265)	(17.23)	(0.026)	(176.1)
ENTRY (δ) **x** Stores not closer &	-0.215***	0.001	-5880	-16.40	-0.059**	391.2**
Services not common	(0.041)	(0.002)	(2069)	(16.01)	(0.024)	(176.4)
Observations	1,493	136	769	766	136	1,052
Control mean	0.372	1.014	20,587	73.51	1.222	2,046
Sample & level	Firms (all) x transactions	Locality	Firms (all)	Firms (all)	Locality	Firms (all)
Measurement	Audit study	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys

Note: Observations are either at the firm or locality level. Dependent variables are endline audit-based and firm survey-based measures. Includes randomization strata dummies. Stores closer is an indicator that firms in a given locality are more-than-median likely closer to each other based on geographic distance. Services common is an indicator that firms in a given locality are more-than-median likely to offer the same business services/goods. This is used to classify markets as either (i) both stores closer in location and services common among stores, (ii) stores not closer in location but services common, (iii) stores closer in location but services not common, and (iv) stores not closer in location and services not common. Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2 and 5, 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.

Table A.8: Price effects and models of competition with bundling

	Non-Financial Goods/Services	
	Price major item in store (GHS)	
	(1)	(2)
Treated x ENTRY (β)	27.16*	
	(14.07)	
ENTRY (δ)	-35.12***	
	(13.51)	
Treated x Low ENTRY (β_1)		11.86
		(16.76)
Low ENTRY (δ_1)		-37.16***
		(13.23)
Treated x High ENTRY (β_2)		29.40
		(21.69)
High ENTRY (δ_2)		-30.88*
		(18.60)
Observations	512	512
Control mean	73.59	73.59
Analysis sample & level	L & UL entrants	L & UL entrants
Measurement	Firm surveys	Firm surveys

Note: Observations are either at the firm or locality level. Dependent variables are endline audit-based and firm survey-based measures. Includes randomization strata dummies. L denotes lucky entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UL denotes unlucky entrants and refers to non-financial stores not onboarded as financial vendors. Cluster-robust standard errors at market level are reported in parentheses.

***Significant at the 1 percent level.

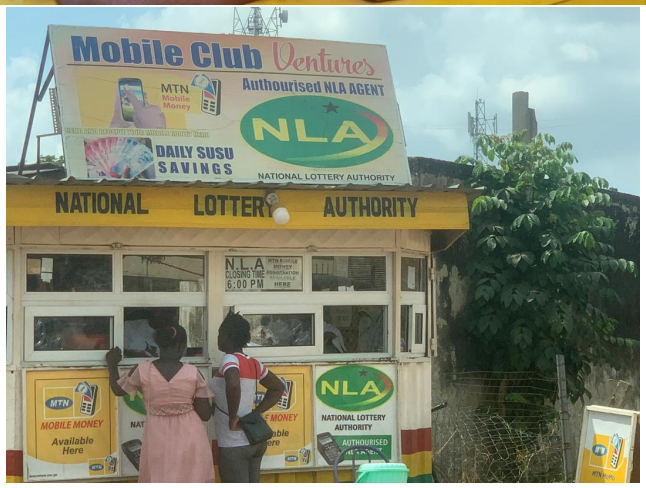
**Significant at the 5 percent level.

*Significant at the 10 percent level.

Financial Mobile Money Vendor Outlets [MOMO]

Figure A.13: MOMO: Vendor Points – Photos









Note:

Non-financial Microenterprise Outlets [MICROE]

Figure A.14: MICROE: Microenterprises – photos



Note:

A.5 Surveys - Select Measurement Questions

A. Financial Mobile Money Services

Qx. [Revenue/week (GHS)] What was the total MOMO business sales made during the last 7 days/ last week (MOMO revenues)? (NOTE: think about all cash-in and cash-out transaction volume records) `ghs`

Qx. [Profit/week (GHS)] What was the total MOMO business income earned during the last 7 days / last week after paying all expenses including wages of employees, but not including any income you [owner] paid yourself? [NOTE: think about Total commissions -Wage expenses to MOMO worker(s) + any extra money that the Providers pay you] (MOMO profits) `ghs`

Qx. [Hours of work/week (hrs)] How many hours did you operate your MOMO shop during the last 7 days/last week (labor supply)? `...hours (estimate)`

Qx. [Capital investment last 3mn (GHS)] Consider the last 90 days -- how much capital (both physical + e-cash) are you using for your MOMO business? `...ghs (estimate)`

Qx. [No. customers/week] Total number of customers that transacted / did MOMO business with your business during the last 7 days/ last week (excluding the owner; customers)? `...number (estimate)`

B. Non-financial Microenterprise Goods/Services

Qx. [Revenue/week (GHS)] What was the total business sales made during the last 7 days/ last week (revenues)? `ghs`

Qx. [Profit/week (GHS)] What was the total business income earned during the last 7 days / last week after paying all expenses including wages of employees, but not including any income you [owner] paid yourself? [NOTE: think about Total Profits/Revenues-Wage expenses to worker(s)] (nonmomo profits) `ghs`

Qx. [Major item in store] What is the major product or service item you offer at your store? `[please provide the one that brings you the highest sales or customers] enter`

Qx. [Price major item in store (GHS)] What is the selling price of this item in your store now? `ghs`

Qx. [Digital payments] Which way do you use or accept payment technologies or df? (multiple responds allowed) `SELECT ALL APPLICABLE (MULTIPLE): 1=pay employees (B2E), 2=pay bills (electricity, water, taxes, etc.) (B2G), 3=pay input suppliers (B2B), 4=accept as payments for output to customers/buyers (C2B), 5=accept loans on it (B2B), 6=accept payments from government on it (G2B), 7=i don't use or accept any payment technologies or df, 8=other (specify)...`

Qx. [No. customers/week] Total number of customers that transacted / did business with your business during the last 7 days/ last week (excluding the owner; customers)? `...number (estimate)`

Qx. [Value-for-money] `On a scale of 1-10, with 1 being the very-low and 10 being the very-high, how would you rate the overall value-for-money of the nonmomo services you receive in this community? 1=verylow...10=veryhigh`

C. General Questions

Qx. [Hours of work/week (hrs)] How many hours did you operate your shop during the last 7 days/last week (labor supply)? `...hours (estimate)`

Qx. [Capital investment last 3mn (GHS)] Consider the last 3 months / last 90 days -- how much capital are you using for all your businesses (both MOMO and NONMOMO)? `...ghs (estimate)`

Qx. Qx. [Listing of services in store] Now – Can we list all services/products/goods you offer? `SELECT ALL APPLICABLE: 1=MOMO (Cash-In and Cash-Out), 2=Provisions (Groceries, Beverages, Cream, Toothpaste, Bread/Drinks, Appliances etc), 3=Pharmacy/Herbal/Drug store., 4=Agrochemicals & Farm Tools., 5=Digital (Printing Press, Airtime, SIMs, Phones, Bookshop and Phone Accessories, etc)., 6=Tailoring., 7=Beautician (Hairdressing, Barbaring, Perdicure, Menicure, etc)., 8=Fashion (Clothing, Garments, Shoes, Wigs, Boutiques, etc)., 9=Electricals., 10=Building Materials (cements, woods, iron rods, plumbing, roofs, etc)., 11=Drinking Spot. , 12=Others - specify .....`

Qx. [Total household expenses (GHS)] What is the total household expenses (i.e., food, bills, education, health, durables/appliances/accessories, personal care, durables) made over the last 30 days/ last month by your household? `ghs`

Qx. [Total household rice-only expenses] Have you purchased a bag of rice from any shop within this community over the past 30 days/ last month? [any brand] `1=yes 2=no`

Qx. [Total household rice-only expenses (GHS)] What is the total expenditure for your rice purchase over the past 30 days/ last month? `ghs`

Qx. [Consumer trust] How much do you trust each of the following or you haven't you heard enough to say? `1=not at all, 2=very little, 3=somewhat, 4=a lot, 5=haven't heard enough to say`

- (xa) Mobile Money provider-MTN MOMO
- (xb) Mobile Money provider-VodaCash
- (xc) Mobile Money provider-Tigo-Cash

- (xd) Mobile Money provider-G-Money
- (xe) Mobile Money Agents
- (xf) Carrying out transaction with Mobile Money agents (cash-in, cash-out, transfers, opening accounts, etc.)
- (xg) Consumer's family and friends
- (xh) Microfinance Institutions
- (xi) Commercial and Rural Banks (e.g., ADB, GCB, Fanteakwa Rural Bank, Kwahu Rural Bank, etc.)
- (xj) Bank of Ghana (the regulator of financial services in Ghana)

Qx. [Consumer trust] In my view, consumers mistrust M-Money vendors in this locality. NOTE: "consumer mistrust" = general lack of trust towards both vendors and conducting services at vendor points. `1=Agree, 2=Disagree`

Qx. [Vendor misconduct] In my view, overcharging is a common major issue at retail M-Money vendor points. NOTE: "Overcharging" = tendency for a vendor to overcharge consumers for services. `1=Agree, 2=Disagree`

Qx. [Home-based purchases] In the past 6 months/ past 180 days, did you do most of your mobile money transactions inside or outside this community? `1=own community, 2=outside community`

Qx. [Home-based purchases] Where did you do either your last momo or non-momo transaction? `1=own community, 2=outside community`

Qx. [Consumer satisfaction] `On a scale of 1-10, with 1 being the worst and 10 being the best, how would you rate your overall satisfaction of the services received in this community?  1=worst...10=best`

A.6 Auditors' Training - Measuring Financial Vendor Misconduct

- Attempt the following transactions:
  - (i) t1: cash-out (140ghs) + (ii) t2: SIM purchase + (iii) t3: open account (deposit 5ghs and verify);
  - (iv) t4: cash-in (140ghs);
  - (v) t5: otc / third-party transfer (140ghs) + (vi) t6: airtime purchase (10ghs), where the modal transaction across these local markets is roughly 140ghs

- Respondents: 3 incumbents per village (the same ones as selected for the baseline audit) (n=357) + all lucky entrants (n=181)
- **Transaction approach:** We all use the following very simple language and approach, no deviations allowed: `(1) Good morning/afternoon/evening. I want to make a MOMO transaction [use code: A. t1-t3, B. t4, C. t5-t6]. (2) Present the necessary details: phone number and sender or recipient's details. Follow the instructions given to you by the agent and don't ask about fees and alternatives upfront. Keep the conversation friendly, natural, and focused on the transaction. (3) Thank you for your service. (4) Right after the visit, immediately complete the short questionnaire (see the Questions below) using your assigned tablets.`

Select Measurement Questions:

Qx. What is your mobile money balance before transacting? [CHECK YOUR BALANCE IN YOUR ACCOUNT USING THE MOBILE APPLICATION AFTER THE AUDIT VISIT] `...ghs`

Qx. Take a screenshot of your balance before your audit visit and upload it here.

Qx. Please select the group of transaction types you will be completing with this agent today based on your tracking sheet. A: 1=cash-out (140ghs), 2= SIM purchase, 3= open account (deposit 5ghs and verify), B: 4= cash-in(140ghs), C: 5= over-the-counter/ transfer (140ghs), 6= airtime purchase (10ghs) `...A= 1,2,3; B= 4; C= 5,6`

Qx. Which provider will you use for this mystery shopping visit? `1=MTN M-Money, 2=Tigo-AirtelCash, 3=VodaCash, 4=G-Money`

Qx. [This is the X attempt to this agent for this group of transaction(s)]`...X=1 if first attempt, X=2 if second attempt, X=3 if third and last attempt`

Qx. Was the agent present when you visited? `1=yes, 2=no, 3=lucky entrant not operational yet`

Qx. Was the price list posted, visible, clear, or clarified? `1=yes, 2=no`

Qx. For which providers, does the agent have a price list displayed? SELECT ALL APPLICABLE (MULTIPLE): `1=MTN M-Money, 2=Tigo-AirtelCash, 3=VodaCash, 4=G-Money`

Qx. Was the transaction successful (able to complete the assigned transaction)? `1=yes, 2=no`

Qx. If unsuccessful, did the agent explain why the transaction failed before you asked? `1=yes, 2=no`

Qx. If unsuccessful -- what reason did the agent give for the transaction not succeeding? 1=network down, 2=lack of float/ insufficient liquidity, 3=agent says this type of transaction is not possible with this provider, 4=agent doesn't know how to do the transaction, 5=agent offer the service (e.g., SIM, open account) but is out of stock now, 6=location does not offer the service at all, 7= Other (specify)...

Qx. Wait or queue time: How many minutes did you wait before you were served? if you did not have to wait enter 0 (mins) minutes

Qx. Transaction time: How many minutes did you spend conducting the transaction with agent? (min) minutes

Qx. Did the agent discuss and/or well-inform you of the price before conducting the transaction? 1=yes, 2=no

Qx. How much in total did you pay to complete the transaction? This includes all fees charged to your account by the provider, all extra funds transferred to the agent's account, and all extra cash given to the agent. Do not count in the transaction value. Remember to include taxes. (ghs) ghs

Qx. Did the agent tell you how much the fee was, and if so when? 1=agent did not ever state the fee, 2=agent told me the fee before completing the transaction, 3=agent told me the fee after completing the transaction.

Qx. Did the agent tell you whether you would pay cash or from your account (or both) before completing the transaction? 1=yes, with cash, 2=yes, from the account, 3=yes, with cash and from the account, 4=no

Qx. How did you pay the fee? SELECT ALL APPLICABLE (MULTIPLE) 1=fee was automatically deducted from my account by the provider, 2=fee was sent from my account to the agent, 3=fee was paid in cash

Qx. How much did you pay in fees that was automatically deducted from your account by the provider? ghs

Qx. How much did you pay in fees to the agent from your account? ghs

Qx. How much of the fee did you pay in cash? ghs

Qx. The allocation of fees between provider, account, and cash does not equal to the total fees you said you were charged. Please check your inputs again: [sum 19, 20, 21] = 15 ...ghs

Qx. Enumerator verification: check your sms receipt. Did the receipt show a total charge of more than 141.4ghs for the 140 cash out you just did? If yes, enter the total charge from the receipt. Enter ghs if yes (overcharged), Enter 999 if no (not overcharged) [ONLY show this question for Q3=A and transaction type = T1]

Qx. Enumerator verification: call your colleague recipient to verify if a total of 140ghs was received or less. If no, enter the total amount the recipient received. `Enter ghs if no (overcharged) Enter 999 if yes (not overcharged) [ONLY show this question for Q3=C and transaction type = T5]`

Qx. Enumerator verification: enter the amount of cash you handed over to the agent for 10ghs airtime: `Enter the amount of airtime you received CAPI: two fill numbers in the blank; Enter cash handed over (...ghs); Enter airtime received (...ghs); Enter AGENT NUMBER from your airtime SMS receipt (...10 digits) [ONLY show this question for Q3=C and transaction type = T6]`

Qx. What is the official fee or rate for this transaction? `ghs`

Qx. [Misconduct incidence] Was the transaction overcharged? (Hint from CAPI: "The correct official fee or rate for this transaction T is X") X = 1.4ghs and automatically deducted if T1, X = 10ghs cash to the agent if T2, X = minimum 5ghs cash to the agent to be deposited in your account (so verify) if T3, X = 0ghs if T4, X = 1.4ghs cash to the agent if T5, X = 0ghs, you should receive exactly the amount of cash you gave to the agent if T6 `...1=yes 2=no`

Qx. [Misconduct severity] If overcharged, then by how much? `ghs`

Qx. Did you receive any confirmation (receipt, paper, code, etc.) after the transaction was completed? `1=yes, 2=no`

Qx. Please upload a photo of the confirmation [Use the screenshot function on your phone, not a different phone]

Qx. What is your mobile money balance after transacting? [CHECK YOUR BALANCE IN YOUR ACCOUNT USING THE MOBILE APPLICATION AFTER THE AUDIT VISIT] `ghs`

Qx. Take a screenshot of your balance after your mystery shopping visit and upload it here.

Qx. Was the transaction simulated or actual? `1= simulated, 2= actual` [ONLY show this question for Q3=A and transaction type = T2 or T3]

A.7 Training - Measuring Consumer Trust

This game is played by pairs of individuals locality by locality: i.e., 10 select MOMO consumers (trustors) vs one randomly selected anonymous MOMO agent (trustee). Each pair is made up of a **Player 1 (select MOMO consumers; trustors)** and a **Player 2 (anonymous MOMO agent; trustee)** from the same locality. None of you will know exactly with whom you are playing with. Only [Insert name of researcher; RA XX] knows who is to play with whom and will never tell anyone else. [Insert name of researcher; RA XX] will give 40ghs to each Player 1. Player 1 then has the opportunity to give a portion

of their 40ghs to Player 2. They could give 40ghs, or 30ghs, or 20ghs, or 10ghs, or nothing 0ghs. Whatever amount Player 1 decides to give to Player 2 will be tripled by the research before it is passed on to Player 2. Player 2 then has the option of returning any portion of this tripled amount to Player 1.

Then, the game is over.

Player 1 (MOMO consumers) goes home with whatever he or she kept from their original 40ghs, plus anything returned to them by Player 2. Player 2 (MOMO agent) goes home with whatever was given to them by Player 1 and then tripled by [Insert name of researcher; RA XX], minus whatever they returned to Player 1.

TRIAL EXAMPLES – ONE BY ONE (Enumerators Task)

Here are some examples [you should work through these examples by having all the possibilities laid out in front of people, with Player 1's options from 40ghs to 0ghs and a second column showing the effects of the tripling. As you go through each example demonstrate visually what happens to the final outcomes for each Player:

- EG 1: Imagine that Player 1 gives 40ghs to Player 2. [Insert name of researcher] triples this amount, so Player 2 gets 120ghs (3 x 40ghs = 120ghs). At this point, Player 1 has nothing and Player 2 has 120ghs Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so, how much. Suppose Player 2 decides to return 30ghs to Player 1. At the end of the game Player 1 will go home with 30ghs and Player 2 will go home with 90ghs.
- EG 2: Imagine that Player 1 gives 20ghs to Player 2. [Insert name of researcher] triples this amount, so Player 2 gets 60ghs (3 x 20ghs = 60ghs). At this point, Player 1 has 20ghs and Player 2 has 60ghs. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so, how much. Suppose Player 2 decides to return 30ghs to Player 1. At the end of the game Player 1 will go home with 50ghs and Player 2 will go home with 30ghs.
- EG 3: Imagine that Player 1 gives nothing to Player 2. There is nothing for [insert name of researcher] to triple. Player 2 has nothing to give back and the game ends here. Player 1 goes home with 40ghs and Player 2 goes home with 0ghs.

Now, can you work through this example for me (Players task):

Imagine that Player 1 gives 10ghs to Player 2. So, Player 2 gets 30ghs (3 x 10ghs = 30ghs). Then, suppose that Player 2 decides to give 10ghs back to Player 1.

- Q1: At the end of the game Player 1 will have how much? [ENUMERATOR: The initial 40ghs-10ghs (given to Player 2) = 30ghs + return from Player 2 of 10ghs = 40ghs. If they are finding it difficult, talk through the math with them and be sure to use demonstration with the actual money; repeat process if necessary].
- Q2: And Player 2 will have how much? [ENUMERATOR: 60ghs (after the tripling of the 30ghs sent by Player 1) - 10ghs they returned to Player 1 = 50ghs. If they are finding it difficult, talk through the math with them; repeat process if necessary].

NOW LET'S PLAY THE GAME FOR REAL MONEY – ONE BY ONE

First player: You are Player 1 (MOMO consumers). Here is your 40ghs. [At this point 40ghs is placed on the table in front of the player.] While I [RA] am turned away, you must hand [Insert name of researcher; RA XX] the amount of money you want to be tripled and passed on to Player 2. You can give Player 2 nothing 0ghs, 10ghs, 20ghs, 30ghs, or 40ghs (**NB: Taking into account all contingencies and risks**). Player 2 will receive this amount tripled by me. Remember the more you give to Player 2 the greater the amount of money at his or her disposal. While Player 2 is under no obligation to give anything back, we will pass onto you whatever he or she decides to return. [Now the player hands back whatever he or she wants to have tripled and passed to player 2.]

[ENUMERATORS: NOW ASK CONSUMER]:

- What will be the MAXIMUM (in the best possible case) you would expect Player 2 to send back to you? [ENUMERATOR COMPLETE THIS, SEE FIRST PLAYER SCRIPT] _____ghs (max)
- What will be the MINIMUM (the worst possible case) you would expect Player 2 to send back to you? [ENUMERATOR COMPLETE THIS, SEE FIRST PLAYER SCRIPT] _____ghs (min)
- Taking into account all contingencies and risks -- how much do you expect Player 2 (anonymous MOMO agent) to send back to you? [ENUMERATOR COMPLETE THIS, SEE FIRST PLAYER SCRIPT] _____ghs

[Note to researcher; RA XX: Finish all Player 1's and send them to a third holding location— they must not return to the group of Player 1's who have not played and they must not join the Player 2's. Once all Player 1's have played you can begin to call Player 2's. Player 2's can be paid off immediately after they play and sent home.]

Second player: You are Player 2 (MOMO agent). This pile represents Player 1's initial 40ghs. [Put this 40ghs in front of the researcher.] Now [Insert name of researcher; RA XX] will show you how much Player 1 decided to give to you. It will be tripled. Then you must hand back the amount that you want returned to Player 1. [Take Player 1's offer out of the pile representing Player 1's stake and put it down in front of Player 2. Then add to Player 1's offer to get the tripled amount. Receive back Player 2's response.] Remember, you can choose to give something back or not. Do what you wish. While I [RA] am turned away, you must hand [Insert name of researcher; RA XX] the amount of money you want to send back to Player 1. [Now the player hands back his return for Player 1.] You are now free to go home, but do not visit with any of the waiting players.

Select Measurement Questions:

Qx. The amount Player 1 (MOMO consumer) handed back to RA to be tripled and passed to Player 2 (anonymous MOMO agent)? [ENUMERATOR=OFFICER 1 COMPLETE THIS] ___ghs

Qx. What will be the MAXIMUM (in the best possible case) you would expect Player 2 to send back to you? [ENUMERATOR=OFFICER 1 COMPLETE THIS, SEE FIRST PLAYER SCRIPT] ___ghs (max)

Qx. What will be the MINIMUM (the worst possible case) you would expect Player 2 to send back to you? [ENUMERATOR=OFFICER 1 COMPLETE THIS, SEE FIRST PLAYER SCRIPT] ___ghs (min)

Qx. Taking into account all contingencies and risks -- much do you expect Player 2 (anonymous MOMO agent) to send back to you? [ENUMERATOR=OFFICER 1 COMPLETE THIS, SEE FIRST PLAYER SCRIPT] ___ghs

Qx. How confident are you of your answers to Q2a-Q2c? 1=No confidence at all, 2=Not very confident, 3=Somewhat unconfident, 4=Somewhat confident, 5=Very confident, 6=Certain

Qx. Under Players Task (SEE TRAIL EXAMPLES SCRIPT), how many attempts did it take Player 1 (MOMO consumer) to answer both follow-up questions correctly? [ENUMERATOR=OFFICER 1 COMPLETE THIS] 1=Correct at first attempt, 2= Correct at second attempt, 3= Correct at third attempt, 4= Correct at fourth attempt, 5= Correct at fifth attempt, 6= Correct at six and above attempts

Qx. Much money did Player 2 (anonymous MOMO agent) send back to Player 1 (MOMO customer)? [ENUMERATOR=OFFICER 2 COMPLETE THIS, SEE FIRST PLAYER SCRIPT] ___ghs

Qx. ASK PLAYER 1 TO ENTER ADDITIONAL COMMENTS... [ENUMERATOR=OFFICER 1 COMPLETE THIS] ENTER TEXT

Qx. ASK PLAYER 2 TO ENTER ADDITIONAL COMMENTS... [ENUMERATOR=OFFICER 2 COMPLETE THIS] ENTER TEXT

Qx. What was the TOTAL payout to Player 1? [ENUMERATOR=OFFICER 1 COMPLETE THIS] ___ghs

Qx. What was the TOTAL payout to Player 2? [ENUMERATOR=OFFICER 2 COMPLETE THIS] ___ghs

Figure A.15: Trust game in pictures

