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RANDOMIZED ENTRY:
THE EQUILIBRIUM EFFECTS OF ENTRY IN DIGITAL FINANCIAL MARKETS

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

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ABSTRACT

We created randomized variation across and within markets to estimate the equilibrium effects of small microenterprises' entry into a new market: the market for mobile money services. Entry has a negative net effect on firm misconduct in mobile money. There is a positive direct effect but a similar-sized negative indirect effect on prices for non-financial goods/services. Market-level price-cost markups decreased, indicating net gains in consumer surplus. We find evidence of within-market revenue reallocation for mobile money, and a large services multiplier: revenues for non-financial goods/services increased by 20%. We show the improvements come from adoption externalities and decreased transaction costs.

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A randomized controlled trials registry entry is available at
<https://www.socialscienceregistry.org/trials/6451>

I Introduction

Enlisting non-financial businesses to provide retail financial services is a widespread and scalable practice globally.¹ This mixed financial and non-financial services setting naturally emerges as the market entry approach for several real-world financial markets. Yet, little is known about the equilibrium effects of such market entry approach on firms and consumers, and on markets when the response by the two sectors has the potential to generate a multiplier effect. In addition to both sectors responding separately to the entry process, if the services and sectors are strategic complements, this can lead to further growth in the aggregate local services industry — an important channel that remains open and high priority area of research on firm entry and competition (Gentzkow 2007, Zhou 2017, Thomassen et al. 2017, Iaria and Wang 2020), particularly in markets for digital financial services such as mobile money (Suri et al. 2023, Annan et al. 2024; Brunnermeier et al. 2025).²

We address these gaps in research by collaborating 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) — on a large-scale field experiment that randomized the entry of small

¹ 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>). In Kenya, Safaricom introduced and expanded their M-Pesa services mainly by using existing “mom-and-pop” stores, known as dukas, who sell non-financial goods/services (<https://www.vodafone.com/news/digital-society/m-pesa-created>). Several examples of such “low-cost” approach to financial intermediation and to market expansion can also be found in other countries, including Brazil, India, Indonesia, Nigeria, etc.

² Mobile money facilitates payments, a prerequisite for all other commerce and thus a special industry to study the multiplier effects of financial and non-financial services. 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 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).

microenterprises into a new market: the financial market for mobile money services. We run a combined market- and individual firm-level field experiment, allowing us to study equilibrium effects both within and across markets. Mobile money is an important financial market innovation that has the potential to improve welfare and reduce poverty (BMGF 2021, Suri et al. 2023).³ Before our experiment, there was a ban on entry of new mobile money vendors, and so the author convinced the service providers to experimentally change their regulation on entry to induce entry.

Few facts about markets for mobile money motivated our intervention to work with the service providers to induce entry. First, competition is low at baseline. The service providers regulated competition by imposing a ban on entry of new vendors. As a result, there is substantial variation in agents per capita, suggesting scope for additional entry. Second, vendor misconduct is common (about 30% of transactions are overcharged)⁴ and consumer trust in vendors is low.⁵ Indeed, these features characterize markets in many other countries, such as Kenya, Uganda, and Nigeria (IPA Consumer Protection RI 2020).

We have 136 localities across 13 districts, each locality containing around 5,000 people, with 4.5 mobile money vendors; we call these “incumbents”. For each locality, we first gather

³ Market agents for mobile money are rapidly growing in number. 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.

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 (2025). Shleifer (2004) discusses how competition might be good for ethical behavior (or conduct) in the long run.

⁵ About 80% of market participants expected randomized entry to discipline vendor behavior, improve firm misconduct and consumer trust.

a pool of ~ 5 existing non-financial goods/service firms; we call these “potential entrants”. 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 incumbent vendors or potential entrant firms), or treatment 2 (+3 additional vendors each, representing a 70% increase relative to either incumbent vendors or potential entrant firms). Finally, for each treatment locality, we randomly select 1 (low entry) or 3 (high entry) of the 5 potential entrants to upgrade to also being financial mobile money agents. Altogether, we successfully established 170 new financial 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, firms and consumers. 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 potential entrant firms, those in treatment localities are 25 percentage points (pp) more likely to have become established as mobile money vendors and to offer financial services at endline. Predictably, the effect is smaller in low entry treatment localities (13pp), and larger in high entry treatment ones (35pp). 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 firms. This indicates that the intervention worked.

Second, randomized entry decreases firm misconduct (-46%) for financial services. An audit study measuring misconduct found that, in treated villages, entrants had a 29% lower

misconduct rate than incumbents (direct effect). Further, incumbents in treated localities had a 35% lower misconduct rate than incumbents in control villages (indirect effect). The net effect is -46%.

Third, while treated potential entrants increased their prices for non-financial goods/services, the untreated potential entrants decreased their prices such that simple comparison of firms in treated versus control localities shows no impact on overall prices. Importantly, however, price-cost markups for the non-financial goods/services meaningfully decreased by -32% at the market level. Combined with a (16%) increase in aggregate household expenditures, this indicates positive consumer surplus. Incidentally, this observed behavior of treated potential entrants is consistent with (static) loss-leader pricing (Chen and Rey 2012) or (dynamic) reputational concerns (Annan 2025): they do not exhibit misconduct for mobile money services (and so bear the opportunity cost of being honest) but they increase their prices for non-financial goods/services relative to nontreated firms.

Fourth, we find evidence of within-market revenue reallocation and expansion for mobile money, and a large services multiplier: revenues for non-financial goods/services significantly increased (+20%), with aggregate service industry revenues increasing as well. The treatment effects do not correlate well with *pre*-experiment predictions about entry effects, are larger in high-entry treatment localities (where competition is higher), and are larger in markets where the firms are geographically closer and offer common services (where competition is predictably more intense). The results so far indicate that entry increases local economic activity, not only by changing markets for mobile money, but also by transforming the non-financial goods/services, which is novel and interesting. This multiplier in services has implications on analyses of firm pricing strategies and welfare.

Fifth, what drives the improvements in market, firm and consumer outcomes? Our evaluation indicates that the improvements come from adoption externalities in cashless payments and an aggregate increase in household expenditures, both reflecting decreased transaction costs. For adoption externalities, we estimate that businesses in the treatment markets

switched from cash to cashless payments for non-financial goods/services (+15pp = +26%), implying reduced transaction costs and increased savings. For household expenditures, which increased in treatment villages by 16%, we estimate that consumers are more likely (+10pp = +11%) to make purchases within their home locality (substitution from distant markets in the city) with savings on transportation costs, and that, when combined with the additional savings from reduced vendor misconduct, this translates into large aggregate savings that rationalize the expenditure increases. Thus, interventions that reduce transaction costs could be welfare improving. We describe a simple transaction cost-based model of competition between firms and use this to generate predictions about each type of firm’s pricing and revenues for non-financial goods/services and financial services.

We make two main contributions to the existing literature. First, we advance the literature on firm entry and competition. Exogenous entry is hard to get in decentralized markets. Here, our innovation is to work with markets that are essentially monopolized, where the key decision is how many branches or financial vendors to open. An implication of this fact is that one only needs a single decision-maker (e.g., MTN MM Ltd) to “get it wrong” about the right level of entry to end up in a situation where there is a lot of value being left on the table. This is in contrast to a decentralized market where, as long as *some* people see entry as attractive, one is more likely to get them entering up to the optimal level. We design and implement a three-step experiment that measures direct, indirect 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, Björkman-Nyqvist et al. 2022). 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 in real-world markets. Market design and evaluation of entry interventions need to consider 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 (Higgins 2024, Annan 2025, Brunnermeier et al. 2025). 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 (Chodorow-Reich et al. 2020 for e-wallet transactions; Alvarez and Argente 2024 for banning cash to pay for Uber rides), and externalities in digital payments adoption (Crouzet et al. 2023 for mobile payments; Alvarez et al. 2023 for electronic P2P payment app; Higgins 2024 for debit cards).⁶ 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; Brunnermeier et al. 2025). We provide the first evidence that randomized entry improves vendor misconduct, service quality, and usage, with broader impacts on consumers and on firms. We estimate a large services multiplier generated by the entry and then identify the nature of externalities from firm entry, document firm pricing strategies, and evaluate conditions under which entry may be inefficient.

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 (Retail Finance Distribution ReFinD RI 2022). Available evidence in-

⁶ Other studies, experimental, have introduced mobile money agents *for the first time* in rural Mozambique (Batista and Vicente 2023) and in rural Uganda (Wieser et al. 2019). Unlike these studies, we (i) study incumbent markets (where incumbent agents already exist), which allows us to uniquely evaluate competition and complementarity in financial and non-financial goods/services; (ii) sample 5 non-financial firms and randomly upgrade 0, 1, or 3 of them to also being mobile money vendors, which creates an exogenous variation to quantify the nature and extent of spillovers on firms and consumers; and (iii) vary the intensity of entry, and so are able to trace out equilibrium impacts. The focus of our paper is to examine the fact that the financial and non-financial aspects may be strategic complements.

icates that these markets exhibit significant consumer protection concerns (IPA Consumer Protection 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 mobile money and a descriptive model of competition. 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 views of firms. We conclude with Section VI.

II Research Setting

A. Financial Mobile Money Services

The market for mobile money in Ghana, similar to other countries, is organized vertically. Four upstream providers interact with consumers via downstream vendors (agents), which average 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 vendor is a small to medium enterprise with around \$400 in daily sales revenue and \$2 in daily profits. Vendors are “normally” free to enter and exit the 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. The providers had two justifications for the moratorium. First, some vendors were inactive and others were selling the vendor licenses at higher prices in a secondary underground market, so MTN used the moratorium to re-evaluate their entire vendors network. Second, the restriction kept the number of vendors to levels that their field staff can effectively manage. Indeed, providers have been unsure of the optimal number of licenses or branches to open, and so any evidence of vendor inactivity or resale market was a justification to ban entry. Our experiment lifts this moratorium, allowing us to examine its commercial viability, including the welfare implications of liberalizing the market.⁷

Most consumers in these markets are vulnerable: they are poor, financially less sophisticated, and many have limited experience with formal financial transactions. As a result, the availability of mobile money has had profound effects, increasing household welfare and reducing poverty 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: 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 (for mobile phones) purchases, account open-

⁷ To advance our partnership with MTN MML and to effectively implement this project and several others ongoing with MTN, the author worked with MTN to hire a full-time staff housed at MTN. This staff only coordinates the author's projects at MTN.

ings, and over-the-counter transactions (in which consumers use someone else’s 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 2025).

B. Non-Financial Microenterprise Goods/Services

Non-mobile money businesses also operate in most localities. Such microenterprises are non-financial 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 non-financial firm earns around \$200 in daily sales revenue and \$5 in daily profits.

These microenterprises have three features that make them appealing as potential entrants for mobile money 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, consequently, failed transactions that are common in markets for mobile money. Second, they have a good reputations. Third, they have an existing customer base that visits them for non-financial goods and services. Upgrading non-financial firms to also operate as mobile money vendors allows consumers to simultaneously conduct both non-financial and financial services, as well as pay for the non-financial goods and services using cashless, 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 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 mobile money, including a survey of non-financial microenterprises and consumers across 136 localities in 13 different districts (see Figure [A.1](#) for a map of the study localities). 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 mobile money vendors (incumbents)—with an average of 4-5 vendors per locality, 575 non-financial firms (potential entrants), 4,872 consumers (2,755 customers intercepted immediately after conducting a transaction and 2,117 nearby households questioned). 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. The number of agents observed per 1000 people ranges from 1 to 8 (Figure A.2). The majority of existing agents (77%) and potential entrant firms (98%) believed that the market can sustain new entrants. Combined with the fact that service providers regulated competition by imposing a ban on entry of new vendors, there is an opportunity for market expansion without necessarily 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.3). 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 high

levels of consumer mistrust of vendors and considerable variation in mistrust across villages (Figure A.4). 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: 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.5). 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.5). In particular, they state that they would improve customer service, transaction success, and availability. This highlights how new financial agents entering the market might drive competition, thus potentially improving service quality and consumer trust in digital financial services.

Facts 1-4 suggest that 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 opportunities for market entry interventions. While consumers may not fully trust mobile money services in the status quo, the entry of new agents may improve service quality and, in turn, consumer trust, with the potential to improve consumer welfare. We evaluate how the local markets adjust as we randomly introduce 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.

D. A Descriptive Model of Competition

We seek to understand what happens when firms that offer product A (non-financial services) enter the market for B (financial services) and how this affects both their own and competitors' pricing, revenues, and profits for A and B (where competitors include both those who already offer A and B and those who only offer A). We describe a simple transaction cost-based model of competition between firms, some already offering A and B⁸ and others offering A deciding to enter the market for product B and use this to generate predictions about each type of firm's pricing and revenues for A and B.

The randomized entry intervention—which randomizes small microenterprises' entry into a new market: the market for mobile money services—makes “some” of the firms closer to—and some far from—rivals. As a result, it changes consumers' transaction costs (travel/search/etc.) and then competition between firms both directly or indirectly.

First, consider product A. There are two non-financial/rice-selling firms, playing a Nash game. It can be either Cournot, Bertrand, or Stackelberg. Demand becomes more inelastic for rice at the treated store because of transaction cost effect (i.e., the transportation costs to consumers is effectively lower to the treated firm)—and so, the treated store raises its price for rice and hence increase its revenues and profits. To compete, the untreated rice store will lower its price and hence increase its revenues but its profits either decrease or remain unchanged. The equilibrium (average) price in the market for rice depends on which of these two price changes dominate. If, for example, the untreated rice store lowers its price significantly more than the increase in price from the treated store, then the average price in the rice market will decrease. If the two price changes are similar-sized, the average price will be zero. Aggregate revenues for rice go up.

Second, consider product B. Incumbency advantage decreases for financial/mobile money services through greater competition and gains in transaction costs to consumers (i.e., re-

⁸

As discussed, incumbent mobile money firms may offer both A and B, but A (i.e., groceries) classifies as their minor line of business. This feature of incumbent mobile money firms simplifies the exposition and allows us to focus the predictions on treated firms (already offering A and now B) vs untreated A-only firms vs untreated B-only firms.

duced re-search costs if a consumer goes to the treated store). Hence, the untreated, incumbent mobile money store decreases its price (or misconduct, defined here as overcharging of transactions relative mandated rates). With an inelastic demand for financial services, the treated store steals from its rivals who are incumbent mobile money stores, leading to reallocation of revenues. The treated store, however, does not overcharge for mobile money services (it keeps to the official, mandated rates) because it can attract more customers and expect higher prices and revenues from its rice sales instead. By not overcharging for mobile money, the treated store bears a loss in the form of opportunity cost of being honest. This pricing behavior may reflect either (static) loss-leader pricing strategies (Chen and Rey 2012) or (dynamic) reputational concerns (Annan 2025). Average (equilibrium) price in the market for mobile money goes down. Aggregate revenues for mobile money remain unchanged.

The predictions from the model are straightforward. We present an experimental design based on this framework, where entry into the B market is randomized among A-only firms. Subsequently, we show several pieces of evidence consistent with the predictions about each type of firm’s pricing and revenues for A and B. We audit misconduct through secret-shopper visits and analyze heterogeneity via measures of transaction costs.

III Experiment: Design

Intervention. Our randomized entry intervention enlists existing small microenterprises, who sell non-financial goods/services, to offer financial mobile money services across rural communities. This “mixed” financial and non-financial services setting is a widespread phenomenon (80%+ of all financial agents globally), and the approach of enlisting existing non-financial businesses to also offer mobile money 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 firms 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 non-financial firms (potential entrants). We deployed a joint team of staff from MTN and GCB (our implementation partners) to each locality, under the supervision of the Ghana Statistical Service. This team identifies enterprises based on the service providers' requirements: 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 non-financial firms lacked business permits, so we assisted them in obtaining one.

Second, we assigned localities in equal proportion to either control (no entry), treatment 1 (one additional agent each, representing a 25% increase relative to either baseline incumbent vendors or eligible potential entrants), or treatment 2 (three additional agents each, representing a 75% increase relative to either baseline incumbent vendors or eligible potential entrants).

Third, for each treatment locality, we randomly select 1 (low entry) or 3 (high entry) of the 5 potential entrants to enroll as new mobile money vendors. In summary, we upgrade no, one, or three potential entrants to also being mobile money vendors, and then sample different types of firms to get at different forms of spillovers.

This three-step process 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 potential entrants became entrants, which allows us to compare business impacts on treated potential entrants vs. untreated potential entrants, and to measure equilibrium impacts. We stratify

the treatment programs based on population and incumbent vendor density at baseline, and all misfits are resolved and randomly assigned. Figure A.1 displays the spatial distribution of the treatment assignments, indicating that most localities are spatially distinct.

Entrants Enrollment. We establish the selected non-financial businesses 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 mobile money entrants to be operational. The first step is onboarding and completing the necessary 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. The entrant then signs the contractual agreement with the providers (sample Agreement Forms are displayed).

The second step requires due diligence and approvals. The operations officers send the completed agreement and supporting documents to their headquarters for evaluation. If the treated potential entrant passes the evaluation, a managerial approval is granted, and a mobile money vendor-specific SIM card with a shortcode is generated.

Step three is activation and mini branding. The officers re-visit the treated potential entrant's outlet, deliver the SIM cards, train the entrant firm about the operation and re-tailing of mobile money, and then brands the outlet with stickers or official tariff sheets. The visit concludes with customer acquisitions, whereby a few potential 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 financial 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) 7-month and above follow-up market surveys, 7-month audit study and trust game, and transaction-level data from the administrative files of service providers. We supplement this data with 16-month follow-up surveys to track long-term exits and views of firms. 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 mobile money vendors (to get incumbents, $n=627$), firm survey of non-financial goods/service firms (to get 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 ($N=4,872$). In the consumer intercepts, the field officers intercept customers while they are leaving the establishments in our firm census/surveys. In the household surveys, the field officers list households that are nearby the establishments instead, presumed to be potential customers. 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 mobile money, views about vendor misconduct, subjective trust in vendors, household expenditures, prices for goods/services, satisfaction, and others. For non-financial and financial mobile money firms, we track their sales revenue, profits, prices for goods/services, and other intermediate outcomes including firms' household expenditures and poverty. Since our study focuses on small microenterprises and mobile money in low-income and poor environments, both household consumption and poverty may be sensitive to business outcomes. We field questions that allow us to directly examine poverty. We adapt a recently developed measure of poverty, called the "Simple Poverty Scorecard", that is rigorous, inexpensive, simple, and transparent

(for details, see Schreiner 2015).⁹ See Appendix A.7 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 mobile money vendors’ business activity, money account balances (measuring the business capital), and commissioning account balances (measuring earned commissions).

Audit Data: Measuring Misconduct Objectively. Trained secret shoppers ($n=40$) were given money (physical cash and e-money) to make real transactions at mobile money vendor points across the 136 localities (Appendix A.8 provide details). We fix and use the modal transaction value of 140 GHS (inferred from our consumer intercepts data) and include all mobile money-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 for transactions. We observe that 30% or more of the transactions were overcharged. We also tracked other service quality outcomes during our audit study visits: agent absence, failed transactions, and price transparency (Figure A.3).

Trust Data: Measuring Trust Objectively. Forty trained enumerators ran trust games at-scale in the field. Each trustor/p2 corresponds to one representative anonymous vendor per village ($n=136$) and a trustee/p1 corresponding to 10 real customers per village ($n=1,044$),

⁹ We estimate an overall poverty rate of 10.6%, which is low but close to past official poverty statistics that report the rate in 2017 as 12.6% for Ghana’s Eastern Region, where our study is based (GLSS 7 Report). The difference (underestimate) in poverty rates may be linked to the following reasons: (i) our poverty measure (Shreiner 2015), which is an asset-based shortcut, underestimates poverty, or (ii) our surveyed small microenterprises are relatively richer firm households, or (iii) simply, time trends, since GLSS 7’s estimate was in 2017, while our estimate reflects 2024. In addition to firms’ household poverty, we examine impacts on firms’ household expenditures, which are alternative poverty-relevant outcomes.

each endowed with 40 GHS (see Appendix A for details). In the game, 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. The final payouts depend on their choices and are made directly via mobile money. Our measures of trust are the amounts (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.4).

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 firms (potential entrants), we ran separate regressions of baseline outcomes against a constant and against indicators for the different treatment arms: treated firms in treated markets and untreated firms in treated markets. For consumers, or for financial firms (incumbents), we ran separate regressions of baseline outcomes against a constant and against indicators for consumers/firms in treated markets. We include randomization strata dummies and cluster standard errors at the market level. The coefficient of the constant measures the control mean of firms/consumers in untreated markets in the strata whose dummy is omitted to avoid collinearity with the constant, while the other coefficients measure the average difference in the variable relative to the control group. In expectation, this constant will equal the overall control mean but there could be substantial noise across stratas. As a result, we replace the constant by a direct calculation of the control mean. 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 pre-intervention summary statistics (Tables A.1-A.3, Columns 1), around 44% of consumers are females and married, with an average age of 28. Almost all consumers

(98%) 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 are similar to those of customers, except that the operators/owners of non-financial firms are older (35 vs. 28 years old).

As far as business operations, 49% of firms accept/use digital payments, and operate their shops for roughly 10 hours per day. Predictably, the potential entrant firms are older than the incumbent firms (7 vs. 4 years), and they are also valued higher (27,000 GHS vs. 13,000 GHS). With a baseline weekly revenue of 2,629 GHS and profit of 611 GHS, the profit rate (profit/revenue; Basu (2019)) is about 23% 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. From the baseline data, it also turns out that the profit rate for the financial services is much smaller in incumbent stores that also offer non-financial goods/services than those that do not offer non-financial goods/services. Thus, at baseline, incumbents that also offer non-financial goods/services are less likely to commit misconduct. This further motivates why we might want to upgrade non-financial firms to offer financial services, as we do in the experiment. Such mixed financial and non-financial services setting could generate incentives that reflect either (static) loss-leader pricing strategies or (dynamic) reputational concerns, as discussed in Section V: C A Descriptive Model of Competition.

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, field enumerators 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

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

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: $\mathbf{Treated Firm}_{iv}$ is a dummy for those firms assigned to treatment, and $\mathbf{Treated Market}_{vd}$ is dummy for being in any treatment locality (where any positive percent of potential entrants are treated)¹⁰, 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 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. All survey-based continuous outcome variables are winsorized at the 95th percentile level. The main results are robust to multiple testing (Romano and Wolf 2005), post-double-selection LASSO over a vector of controls (Belloni et al. 2014), and without winsorization (Appendix A.5).

¹⁰ We reserve the distinction between +1 financial vendor (low) versus +3 financial vendors (high) entry localities for Section V: Discussions and Heterogeneity.

To disentangle treatment effects from potential sample composition effects for the firm-level analysis, we will report separate results for the following samples: (i) treated and untreated potential entrants, (ii) incumbents, and (iii) all firms. For the main empirical specification applied to all firms, we also include dummies for potential entrant (i.e., non-incumbent) and the interaction potential entrant x **Treated Market**_{vd} throughout. In that full sample of firms, the randomization to be a treated firm is *conditionally* random, as the firm needs to be a potential entrant (i.e., non-incumbent) in order to be treated. In addition and depending on the outcome measures, we will report (i) consumer-level results and (ii) market-level results from locality-level analysis. The main results are organized into (non-exclusive) themes as follows: first, we show the effects of the intervention on entry; second, the impacts on consumer-relevant outcomes; third, the impacts on firm-relevant outcomes; and finally, report the possible sources of welfare improvements from entry. The sample and level of analysis are clearly defined.

A. Randomized Entry

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

Program Participation: Indeed, among all the potential entrant firms, those assigned to the randomized entry program are 25pp more likely to have become established as mobile money vendors and to offer financial services (that is, to have entered) at endline (Table 3, Panel A). Predictably, the effect is smaller, at 13pp, in low entry localities, and larger, at 35pp, in high entry treatment localities. As supplemental evidence, Figure A.6 draws on administrative data from the service provider to report the distribution of treated potential entrant and incumbent vendors. The treated potential entrants are active: 94% are classified by the provider as very active in mobile money business at endline, and they are keeping meaningful money and commission account balances, though, predictably, their balances are smaller than those of the incumbents.

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 mobile money vendors and Herfindahl-Hirschman Index (HHI). The results are significant and consistent: the number of vendors increased (+39% of control mean), while the market-level HHI decreased (-30% of control mean), indicating the intervention was a shock to the local market structure (Table 3, Panel B). As Panel D shows, the program induced some business exits (2.7pp more likely in treatment localities at the 10% significance level). Exits were statistically significant in the low-entry areas (4.1pp), but not in the high-entry localities. Unpredictably, business exits, while quantitatively small, were only significant and concentrated among potential entrant firms. If we decompose the industry-level exit rate of 2.7pp by firm type, it presents a clearer picture and disentangles the treatment effects from potential sample composition effects: 1.7pp (p -value=0.368) for incumbents only, 4.6pp (p -value=0.066) for the treated potential entrants, and 3.8pp (p -value=0.135) for the untreated potential entrants.

Market Participants’ Knowledge: We next examine whether market participants were informed of the new mobile money firms entry in their community. Non-entrant firms (that is, incumbents and untreated potential entrants that were not onboarded) and consumers in treatment localities are 23pp and 33pp more likely, respectively, to report being aware of new entrant firms (Table 3, Panel D). These facts indicate not only that we reorganized the local markets through the onboarding of non-financial firms as new mobile money vendors, but also that consumers and competitor firms were well informed of this entry.

B. Treatment Effects on Consumer Outcomes

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 4-7 display the results.

Seller Misconduct: In treatment localities, firm misconduct in mobile money services fell

by 17pp (-46% of control mean; Table 5, Column 1c). This effect captures both direct and indirect effects of firm entry: within treated localities, treated potential entrants are 28% less likely to exhibit misconduct than incumbents, and incumbents are 35% less likely to exhibit misconduct than control group firms. The misconduct effects are not only present in firm audits (Table 5) but also in consumer surveys (Table 4, Column 1). We do not expect the new mobile money entrants, who are upgraded non-financial firms, to exhibit misconduct later since at baseline incumbents that also offer non-financial goods/services were less likely to commit misconduct.

Quality and Consumer Trust: Service quality for mobile money—as measured by price transparency and failed transactions/vendor absence—meaningfully improves by +62% (Table 6). Despite these positive impacts, consumer trust in financial agents—as measured by both self-reports (Table 4, Column 2) and the objective trust game (Table 4, Column 3)—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 is more nuanced. Consumers report a 6% decrease in overall prices for rice (Table 4, Column 5), the most common food item purchased from local stores (p -value=0.001). In the firm surveys, treated potential entrants increased their prices, while the untreated potential entrants decreased their prices relative to the non-financial firms in control localities. The net price effect at the firm level is insignificantly negative (Table 7).¹¹ Consumer satisfaction with both financial and non-financial services they receive increases by +9% (Table 4, Column 6). Together, the results on consumer-relevant outcomes indicate an increase in consumer surplus. Moreover, by not exhibiting misconduct for mobile money

¹¹ For detailed breakdown of the firm-level price effects, see Appendix Table A.4, showing differences in prices for the treated vs untreated non-financial firms. Predictably, the increase in prices by treated potential entrants is significantly higher in the high entry localities. The overall firm-level price effects are more negative in the low entry localities (although standard errors do not allow ruling out that the overall effects in low-entry vs high-entry localities are statistically different).

services (similar to Björkman-Nyqvist et al. 2022 for the case of antimalarial pills) but by increasing prices for non-financial goods/services relative to nontreated firms, the behavior of treated potential entrants is consistent with our descriptive model’s conjecture of loss-leader pricing or reputational concerns, which is interesting.

C. Treatment Effects on Business Revenues

Revenues: Tables 8 and 9 report the treatment effects on revenues (Figure A.7 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). Market-level revenue sums all the revenues of individual firms in a locality.

For non-financial goods/services (Table 9), 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 (-0.08/0.25=-32%). This decrease in markups for non-financial goods/services is consistent with the decrease in prices from consumer surveys and the increase in revenues for non-financial goods/services.

For mobile money services (Table 8), 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 Tables 4-6, consumer welfare possibly increased due to improvement in non-price outcomes: consumer satisfaction and service quality. We do not observe meaningful treatment effects on the revenues or profits of mobile money services at the market level. When combined, the overall results imply aggregate revenues for local services increased by at least 5% (that is, the 5,500 GHS revenue increase from non-financial goods/services-only over a total control mean of 107,000 GHS across both financial and non-financial services). The results indicate meaningful growth in aggregate revenues for the local service industry due to randomized entry (multiplier effects), and emphasize how consumer welfare might even increase regardless of changes in prices or in price-cost markups (price

effect).

Intermediate Outcomes: Table 10 reports effects on intermediate firm outcomes. Columns 1-4 show the results for 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. We also look at firm’s household poverty in Column 5 (an alternative measure for firm’s household expenditures and welfare), finding evidence for a negative net impact on overall poverty likelihood levels ($-3.6\% = -33.9\%$ of control mean). So, randomized entry increases the quality for financial services (Tables 5 and 6) and decreases price-cost markups for non-financial goods/services (Table 9), 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 16% in household expenditures for consumers in consumer surveys, who are non-firms. The improvements in firm outcomes, including firm’s household expenditures, lead to a decrease in the overall likelihood that a firm or its household will be poor.

D. What Drives the Improvements: Quantification

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 firms’ adoption of mobile money vendor services and of digital payments (Table 11). Untreated potential entrants in treatment localities are 10pp more interested in adding financial vendor services than firms in control localities. However, this desire for entry does not generally translate into actual entry. Firms in treatment localities are 15pp ($+26\%$ of control mean) 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 16% (285 GHS) in treated localities (Table 12, Column 1). First, the treatment

increased consumer savings due to lower firm misconduct (Column 2). Compared to mobile money firms in control localities, those 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 mobile money transaction value is 245 GHS per week in control localities, thus the total consumer savings in a locality of 500 households can be as large 25,000 GHS per month.¹² We also show the estimated effects on consumers travel time to vendors they typically visit within their home locality (Column 3). Consumers report a decrease in average travel time by -17%, suggesting an additional decrease in transaction costs.

Second, households in treatment localities increase the purchases they make within their home locality by about 11% of control mean (that is, a substitution from distant markets in the city which are entirely outside of our experimental villages; Table 13, Column 2).¹³ Such substitution of non-local market purchases with local spending generates savings to consumers due to reduced transportation costs. The typical fare for a round trip from most of our study localities to the closest large city market is around 30 GHS and above (either by shared taxi or tro-tro minibus). With one round trip per week and 500 households per locality, the total transportation savings to consumers amount to around 60,000 GHS per month which is large.¹⁴ Thus, the estimated increase in aggregate household expenditures come from the savings generated from a reduction in overcharging on the part of vendors, as well as the substitution of city market purchases with more local spending on good/services.

¹² Aggregate savings from reduced vendor misconduct: 1.25 GHS per 245 GHS (reduced misconduct) x 245 GHS (the average transaction value/week in control locality) x 500 households in locality x 4 weeks $\approx$ +25,000 GHS/month/locality.

¹³ Aggregate purchases within a home locality increases by: +10% of households more likely to make home purchases x 1,700 GHS/month (the average household expense/month in control locality) x 500 households in locality $\approx$ 850,000 GHS/month/locality which is large.

¹⁴ Aggregate savings from reduced transportation costs: 30 GHS per round trip (avoidable transport fares) x 4 weeks x 500 households in locality x 4 weeks x 10% of households more likely to make home purchases $\approx$ +60,000 GHS/month/locality.

To examine further the substitution effect and savings on costs, we report evidence that the household expenditure effects are only present and concentrated (i) in markets that are more rural at baseline and so were faced with larger transport costs previously and (ii) in markets that are both more rural and had few mobile money vendors at baseline and so were likely faced with larger transport costs and more overcharging previously. The results, shown in Table 13, Columns 3-4, indicate that the cost gains are plausibly driven by households who were faced with higher costs (both transportation and overcharging) at baseline. They benefitted more from the randomized entry intervention and subsequently increased their household expenditures.

We conclude that the overall welfare benefits from entry reflect adoption externalities in cashless payments (Higgins 2024), consumer savings from lower firm misconduct (Annan 2025), including lower shopping costs and lower prices (Nalebuff 2000, Thomassen et al. 2017). All reflect decreased transaction costs.

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 mobile money services, these treated firms had higher overall revenue than untreated ones. However, when compared to non-financial firms in control localities (those without entry interventions), even the untreated firms 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.

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. Insufficient entry may be related to either (i) the shape of demand, (ii) the moratorium or ban on entry by service providers, (iii) the cost of business registration or formalization, (iv) incumbent firm misconduct or hidden behavior, or (v) selection. In practice, we can reject some of these barriers to entry. We rule out selection, as there was limited firm exit following the intervention. Further, the intervention lifted both the moratorium and business registration constraints. The annual cost of permit is 200 GHS, as compared to the estimated return of around 800 GHS revenue per week under entry. Thus, the cost of formalization might not be a major factor preventing firm entry but since the returns are large, it is possible that firms either were liquidity constrained at the time of our research visit to onboard them as financial vendors, or had biased beliefs on the returns from entry. Finally, untreated potential entrants in treatment localities expressed strong interest in operating as financial vendors after the incumbent vendors significantly reduced their misconduct. We therefore conclude that entry was (inefficiently) too low mainly due to MTN MM Ltd’s ban on entry of new financial vendors, and to some extent, incumbent vendors’ misconduct behavior.

Implication 3: Might randomized entry generate a learning externality? Financial vendor misconduct might arise in equilibrium if firms underestimate the price elasticity of demand (Annan 2025). Hence, the result that incumbent vendors reduced their misconduct (Table 5, Columns 1b and 2b) is interesting, and suggests that part of the decrease in misconduct may be due to a learning externality, aside competition, from the entry intervention: incumbents reduce their misconduct as a result of the randomized entrants not engaging in misconduct.¹⁵

¹⁵This is an analog of firms using rivals’ prices as a benchmark in setting their own

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 upstream service provider does not have the incentive to reduce downstream vendor misconduct. Since not all the benefits of reduced vendor misconduct are reaped by 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 pre-specified dimensions (i) variation in the intensity of entry intervention, (ii) *pre*-experiment beliefs about randomized entry effects, (iii) *pre*-intervention incumbent vendor density and population, 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, 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 prices at the firm level which might be explained by the countervailing price responses from treated versus untreated potential entrants.

Second, and motivated by DellaVigna and Pope (2018), we examine the predictability of prices. <https://www.wsj.com/business/retail/the-old-school-spy-tactics-helping-to-set-your-grocery-prices-603f0204>

the treatment effects for the two main financial outcomes: misconduct and consumer trust in financial vendors. At baseline, we solicited the perceptions of vendors and consumers, asking them to predict the entry intervention’s likely effects. The estimated treatment effect on misconduct at the market level is around -46% (Table 5); yet vendors predicted a reduction of 74%, while consumers predicted a reduction of 91% (displayed in Figure A.5). 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.6 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.

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.7 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 classified 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.8 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. Long-Term Exits and Views of Firms

We implement follow-up surveys, 16 months after the intervention, to track long-term exits and views of firms. If the treated potential entrants do not find it worthwhile to operate as financial vendors, they will exit the market. In the main endline, 7 months after the intervention, we find quantitatively small (2.7pp) business exits overall. But it is possible that some firms may delay their exit decisions further than expected. To explore this possibility, we recently deployed a phone survey, 16 months after the intervention, of the 170 successfully-enrolled entrant firms across the treatment villages to gather information about the status of businesses. We find extremely low exit (1.2%): only 2 of the 170 entrants enrolled were not operational. One of these exiters had left for school and the other was facing liquidity constraints. In fact, 2 of the 4 entrants that were previously inactive during the main endline had become active in the 16-month follow-up, which is reassuring. When asked to compare the growth of their businesses now to the *pre*-experiment regime, most firms report greater improvement in their business revenues, with interest to add retail financial services of two other smaller service providers (Telecel and AirtelTigo). The survey responses are summarized in a word cloud in Figure A.8. These long-term, descriptive results are reassuring and reaffirm the potential lasting positive impacts of the entry intervention.

VI Conclusion

This paper provides new evidence about how entry in industry equilibrium—featuring con-

sumer protection concerns—matters for efficiency. Using a three-step design, we implement a widespread and scalable intervention across rural communities that randomizes the entry of non-financial firms into a new market: the financial market for mobile money services. The design generates randomized variation across and within markets, allowing us to study equilibrium effects.

Randomized entry has broader benefits for consumers and businesses. We estimate a very large, negative direct and indirect effect on mobile money vendor misconduct, with a negative net effect. There is a positive direct effect, but similar-sized negative indirect effect, on prices for non-financial goods/services, consistent with a simple transaction cost-based model of competition between firms, some already offering financial and non-financial services and others offering non-financial services deciding to enter the market for financial services. Market-level price-cost markups for non-financial goods/services decreased. Combined with an increase in 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 significantly increased, with aggregate service industry revenues increasing. The entry effects operate through two major channels: adoption externalities and an aggregate increase in household expenditures, both reflecting decreased transaction costs.

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. We highlight a distinct channel that previous literature has ignored: a large non-financial services multiplier generated by the entry of new financial service vendors on the local economy (Bond et al. 2012). This multiplier in services has implications on analyses of firm pricing strategies and welfare. The 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, 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, document firm pricing strategies, and evaluate conditions under which entry may be inefficient. This paper also provides an inspiration and guidance for future empirical work including—but not limited to—further market-level field experiments that generate evidence on questions around firm competition and product markets. It will be interesting to use randomized entry interventions to ultimately discipline various classes of influential and disputed theoretical models of competition: Hotelling, platform competition, monopsony, multiple (imperfectly) competitive equilibria, among others.

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Main Results for Text

Table 1: Study timeline

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

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 (treated entrants) 378 (untreated entrants)	1,186 627 (incumbents) 181 (treated entrants) 378 (untreated entrants)	1,105	0.932	0.932	0.931	0.001 (0.016)
Consumer survey	4,872	1,130 (w/ backup sample=454) =1,584	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) =1,584	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 existing financial mobile money vendors, treated entrants are non-financial microenterprises assigned/onboarded as new mobile money vendors, untreated entrants are non-financial microenterprises that were not assigned/not onboarded. The lottery participants include treated and untreated 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 Potential Entrants		B. Shock to Market Structure and Reorganization				C. Firm Exit by Endline		D. Market Informed of New Entrants	
	Entry indicator		No. MOMO vendors		Market index: HHI		Not operate indicator		Awareness indicator	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any entry (δ)	0.245*** (0.031)		1.401*** (0.266)		-0.146*** (0.034)		0.027* (0.014)		0.229*** (0.032)	
Low entry (δ_1)		0.128*** (0.033)		0.832*** (0.289)		-0.094** (0.038)		0.041** (0.017)		0.206*** (0.037)
High entry (δ_2)		0.354*** (0.039)		1.983*** (0.347)		-0.199*** (0.037)		0.014 (0.018)		0.256*** (0.043)
Observations	512	512	136	136	136	136	1,105	1,105	939	939
Control mean	0.065	0.065	3.644	3.644	0.480	0.480	0.049	0.049	0.250	0.250
Sample & level	T & UT entrants	T & UT entrants	Locality	Locality	Locality	Locality	Firms (all)	Firms (all)	UT entrants & incumbents	UT entrants & incumbents
Measurement	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys
p-value (test: $\delta_1 = \delta_2$)		0.000		0.002		0.002		0.194		0.286

Note: Observations are either at the firm or market level. Dependent variables are endline survey-based measures. Includes randomization strata dummies. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Potential entrants are 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

	Financial Services: Mobile Money			Non-Financial Goods/Services		Market Experience
	Misconduct indicator	Consumer trust indicator	Consumer trust (GHS)	Value-for-money [scale: 1-10]	Price 5kg rice bag (GHS)	Consumer overall satisfaction [scale: 1-10]
	(1)	(2)	(3)	(4)	(5)	(6)
Treated Market (δ)	-0.136*** (0.034)	0.086 (0.058)	1.563 (1.321)	0.482*** (0.156)	-5.047*** (1.464)	0.644*** (0.160)
Observations	1,138	1,138	695	1,138	1,138	1,138
Control mean	0.209	0.511	25.07	7.089	90.85	7.139
Analysis sample & level	Consumers	Consumers	Consumers	Consumers	Consumers	Consumers
Measurement	Consumer surveys	Consumer surveys	Trust games	Consumer surveys	Consumer surveys	Consumer surveys

Note: Observations are at the consumer level. Dependent variables are endline survey-based or trust game-based measures. Misconduct measures households'/customers' estimates that their last transaction at vendor points was overcharged (Column 1). Consumer trust measures their trust in vendors when asked (Column 2) and the amount the consumer transferred to an anonymous vendor in the trust game (Column 3). 5kg bag of rice is a common food item purchased from local stores. To measure prices from consumers, we first ask if they have purchased a bag of rice from any shop within their community over the past 30 days; and then ask of the common price they have paid per 5kg bag (estimated based on their purchase/guess based on their knowledge). Consumer prices correlate well with survey enumerator verifications whereby enumerators check how much a bag of 5kg rice in a nearby store in the community cost during the survey visit. Outcome variables in Columns (4)-(6) winsorized at the 95th percentile level. Includes randomization strata dummies. 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 seller misconduct for financial services

A. Financial Services: Mobile Money - Seller Misconduct								
	Misconduct indicator				Misconduct amount (GHS)			
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(2c)	(2d)
Treated Firm x Treated Market (β)	ne			-0.110*** (0.029)	ne			-0.026 (0.159)
Treated Market (δ)	ne	-0.140*** (0.035)	-0.171*** (0.035)	-0.139*** (0.036)	ne	-0.493** (0.250)	-0.492** (0.253)	-0.485* (0.254)
Net effect of randomized entry ($\beta + \delta$)	ne			-0.250*** (0.041)	ne			-0.511* (0.284)
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	1.044	1.044	1.044
Analysis sample & level	T & UT entrants	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions	T & UT entrants	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions
Measurement	x transaction Audit study	x transaction Audit study	x transaction Audit study	x transaction Audit study	x transaction Audit study	x transaction Audit study	x transaction Audit study	x transaction Audit study

Note: Observations are at the firm x transaction level. Dependent variables are endline audit-based measures. Includes randomization strata dummies. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. 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 service quality for financial services

A. Financial Services: Mobile Money - Service Quality								
	Quality: vendor disclose tariff (transparency) indicator				Quality: vendor absent indicator			
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(2c)	(2d)
Treated Firm x Treated Market (β)	ne			0.307*** (0.038)	ne			-0.065*** (0.024)
Treated Market (δ)	ne	0.125** (0.054)	0.214*** (0.054)	0.125** (0.054)	ne	0.010 (0.036)	-0.013 (0.031)	0.009 (0.035)
Net effect of randomized entry ($\beta + \delta$)	ne			0.433*** (0.054)	ne			-0.055* (0.030)
Observations	322	1,171	1,493	1,493	322	1,171	1,493	1,493
Control mean	0.000	0.337	0.337	0.337	0.000	0.089	0.089	0.089
Analysis sample & level	T & UT entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions	T & UT entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Firms (all) 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. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. 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 7: Effects of randomized entry on firm prices for non-financial services

B. Non-Financial Goods/Services - Firm Prices				
	Price major item in store (GHS)			
	(1a)	(1b)	(1c)	(1d)
Treated Firm x Treated Market (β)	10.74** (4.782)			10.34** (4.803)
Treated Market (δ)	-11.07** (4.782)	-3.651 (8.490)	-4.675 (4.647)	-1.357 (8.719)
Net effect of randomized entry ($\beta + \delta$)	-0.321 (5.753)			8.987 (10.01)
Observations	512	254	766	766
Control mean	40.11	40.33	40.11	40.11
Analysis sample & level	T & UT entrants	Incumbents	Firms (all)	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys	Firm surveys

Note: Observations are at the firm level. Dependent variable is endline survey-based measure, winsorized at the 95th percentile level. Firms include all financial and non-financial microenterprise services/goods stores. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Major item in store may be rice or not: rice, soft drinks, cement, bread, frozen chicken, shirt, sachet water, weedicide, paracetamol, airtime and phone accessories are frequent. To measure prices from firms, we first ask of the major product or service item in the store; second, ask of the sales that item generated during the previous week (this averages around 50% of the total business sales revenue); and third, ask of the current selling price. Includes randomization strata dummies. 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 8: Effects of randomized entry on business revenues for financial services

	A. Financial Services: Mobile Money - Revenue and Profit						
	Firm-level				Market-level		Profit/wk
	revenue/wk (GHS)				revenue/wk (GHS)	markups μ	(GHS)
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(3)
Treated Firm x Treated Market (β)	2864* (1802)			1748 (1671)			
Treated Market (δ)	4808** (2414)	-2926 (2191)	-2652 (2143)	-2931 (2180)	8753 (12115)	0.001 (0.004)	22.26 (18.13)
Net effect of randomized entry ($\beta + \delta$)	7673*** (2086)			-1182 (2796)			
Observations	176	593	769	769	136	136	769
Control mean	2,333	22,139	21,722	21,722	91,718	1.016	202.0
Analysis sample & level	T & UT entrants	Incumbents	Firms (all)	Firms (all)	Locality	Locality	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys

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

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

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

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

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

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 10: Effects of randomized entry on intermediate firm outcomes

	No. customers/week		Firm's hh. expenses last month (GHS)		Capital investment last 3 months (GHS)		Hours of work/week (Hours)		Firm's hh. poverty likelihood (%)	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)
Treated Firm x Treated Market (β)		104.7*** (22.87)		240.5 (185.2)		7,077*** (987.4)		4.041** (1.880)		-3.596* (2.045)
Treated Market (δ)	31.34** (15.28)	2.023 (21.75)	289.5* (162.9)	247.3 (184.7)	3,523*** (597.3)	3,183*** (1046)	3.561*** (1.335)	4.126* (2.096)	-3.655* (1.926)	-5.016** (2.229)
Net effect of randomized entry ($\beta + \delta$)		106.7*** (31.56)		487.9* (256.2)		10,260*** (1389)		8.167*** (3.117)		-8.613*** (2.930)
Observations	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105
Control mean	191.6	191.6	2,077	2,077	5,090	5,090	76.65	76.65	10.55	10.55
Analysis sample & level	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)
Measurement	Firm surveys	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.

Note: Observations are at the firm level. Dependent variables are endline survey-based measures, winsorized at the 95th percentile level. Poverty is in percent (%) and measured using the Simple Poverty Scorecard (for details, see Schreiner 2015). Includes randomization strata dummies. 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 11: Quantification of drivers of improvements in market outcomes

	A. Adoption Externalities: Reduced Transaction Costs		
	Untreated firm interest to add mobile money indicator (Entry interest)	Untreated firm added mobile money by endline indicator (Actual entry)	Firm switched to cashless payments indicator
	(1)	(2)	(3)
Treated Firm x Treated Market (β)			0.119*** (0.042)
Treated Market (δ)	0.100** (0.039)	0.014 (0.024)	0.031 (0.033)
Net effect of randomized entry ($\beta + \delta$)			0.151*** (0.054)
Observations	346	346	1,105
Control mean	0.822	0.081	0.584
Analysis sample & level	UT entrants	UT entrants	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys

Note: Observations are at the firm level. Dependent variables are endline survey-based and audit-based measures. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Includes randomization strata dummies. 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 12: Quantification of drivers of improvements in market outcomes

B. Aggregate Consumer Household Expenditures: Reduced Vendor Misconduct Savings			
	Hh. expenses last month (GHS)	Consumer savings from reduced vendor misconduct (GHS)	Consumer avg. travel time to typical vendor's outlet (Minutes)
	(1)	(2)	(3)
Treated Firm x Treated Market (β)		-0.026 (0.159)	
Treated Market (δ)	284.8** (131.5)	-0.485* (0.254)	-0.647** (0.256)
Net effect of randomized entry ($\beta + \delta$)		-0.511* (0.284)	
Observations	1,138	1,493	1,138
Control mean	1,709	1.044	4.236
Analysis sample & level	Consumers	Firms (all) x transactions	Consumers
Measurement	Consumer surveys	Audit study	Consumer surveys

Note: Observations are either at the firm or consumer level. Dependent variables are endline survey-based and audit-based measures. Hh. expenses (Column 1) denotes total household expenditures for the past 30 days. Outcome variables in Columns (1) and (3) winsorized at the 95th percentile level. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Includes randomization strata dummies. 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 13: Quantification of drivers of improvements in market outcomes

	C. Aggregate Consumer Household Expenditures: Reduced Transportation Cost Savings					
	Hh. expenses last month (GHS)	Substitution: Hh. makes purchases within home locality indicator	More rural markets	Less rural markets	Hh. expenses last month More rural and few incumbents markets	More rural and more incumbents markets
	(1)	(2)	(3a)	(3b)	(4a)	(4b)
Treated Market (δ)	284.28** (131.5)	0.093*** (0.029)	427.0** (189.1)	123.0 (179.8)	453.9** (192.0)	300.8 (614.8)
Observations	1,138	1,138	608	530	502	106
Control mean (overall)	1,709	0.841	1,709	1,709	1,709	1,709
Control mean (sub-sample)			1,635	1,793	1,610	1,752
Analysis sample & level	Consumers	Consumers	Consumers	Consumers	Consumers	Consumers
Measurement	Consumer surv.	Consumer surveys	Consumer surv.	Consumer surv.	Consumer surveys	Consumer surveys

Note: Observations are at the consumer level. Dependent variables are endline consumer survey-based measures. Hh. expenses (Column 1) denotes total household expenditures for the past 30 days and is winsorized at the 95th percentile level. More rural market denotes below average population localities and few incumbents denotes below average number of incumbent financial vendors localities at baseline. The average population across localities is 5,000 people and the average number of incumbent financial vendors is 4.5 per locality. Includes randomization strata dummies. 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

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



B. Provider #2: GCB Ltd Vendor Agreement Forms

50

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
(Agent herein)
in the presence of:-
.....
for and on behalf of the
(Agent herein)
in the presence of:-
Name:
Signature:
Address:

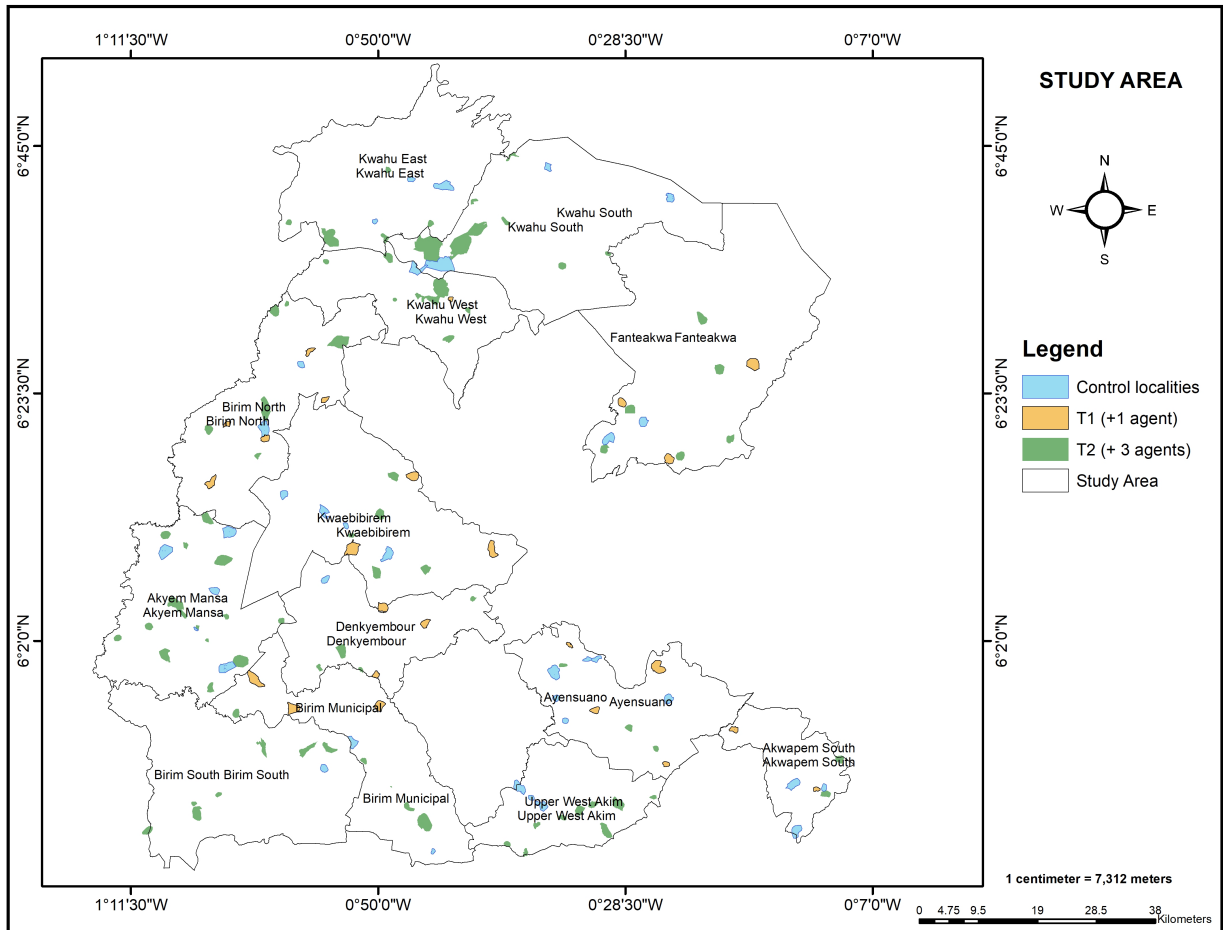


Supplemental Appendix (For Online Publication)

A Setting, Randomization Balance, and Further Results

A.1 The Setting

Figure A.1: Map of study localities by treatment assignments



Note: Figure shows the spatial distribution of localities in the study area. There are $n=136$ localities across 13 administrative districts in Ghana's Eastern Region. Districts include (1) Kwahu South Municipal, (2) Kwahu East, (3) Kwahu West Municipal, (4) Fanteakwa South & North, (5) Birim North, (6) Kwabibirem Municipal, (7) Akyemansa (23.6%), (8) Denkyembaour, (9) Birim Central Municipal, (10) Birim South, (11) Ayensuano, (12) Upper West Akim, and (13) Akwapim South Municipal.

A.2 Four (4) Motivating Market Facts

Figure A.2: There is untapped entry potential

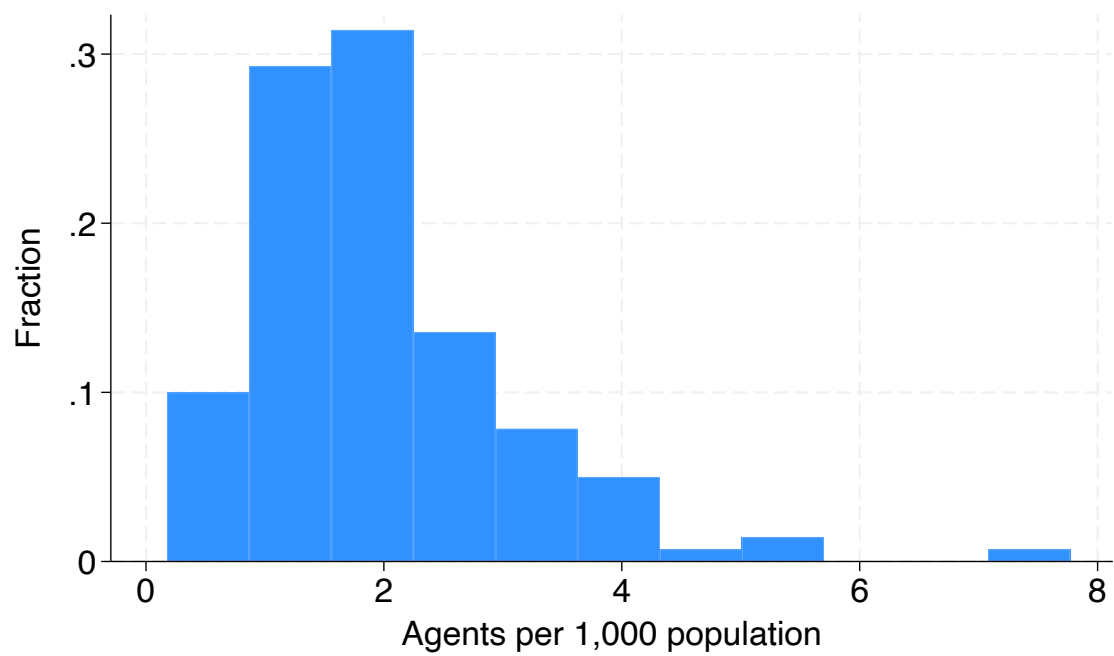
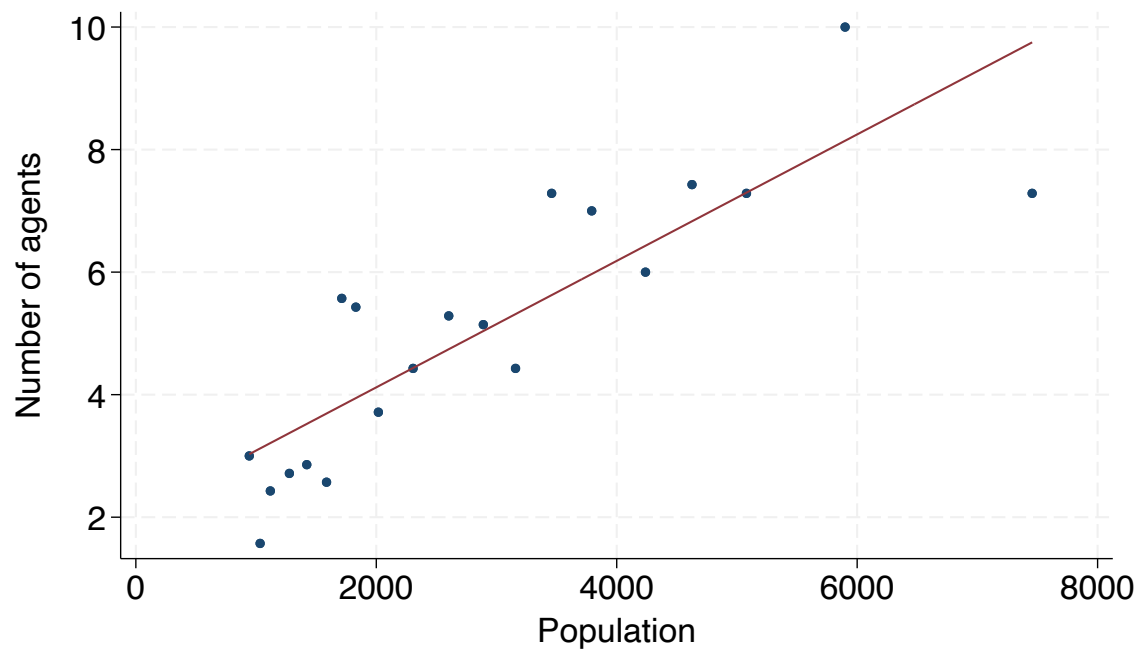


Figure A.3: Low service quality

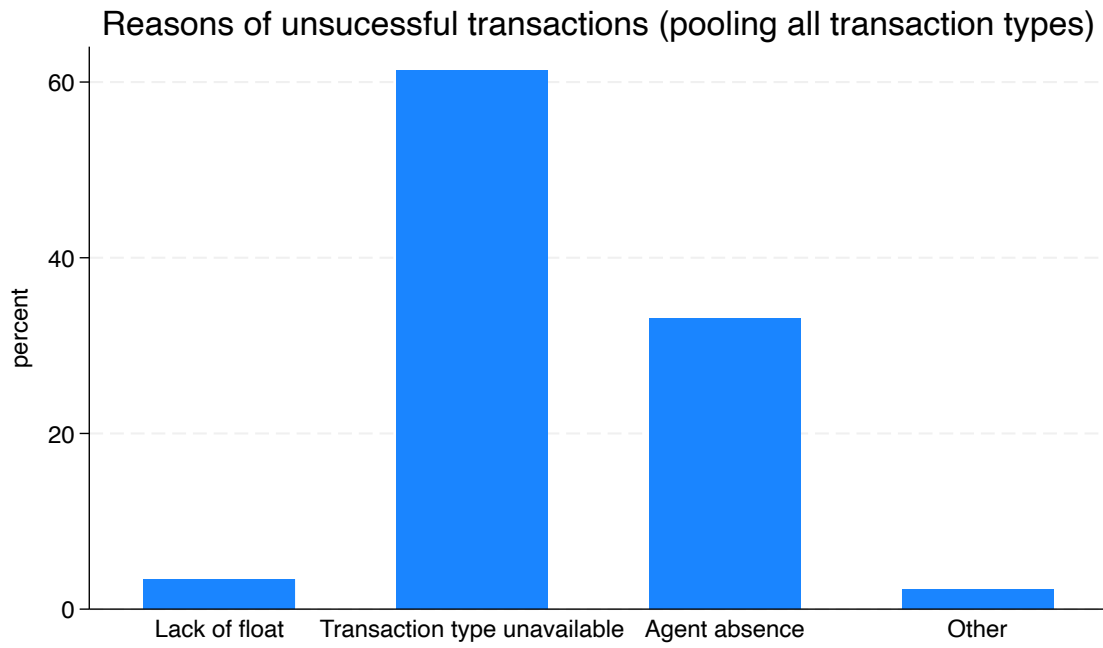
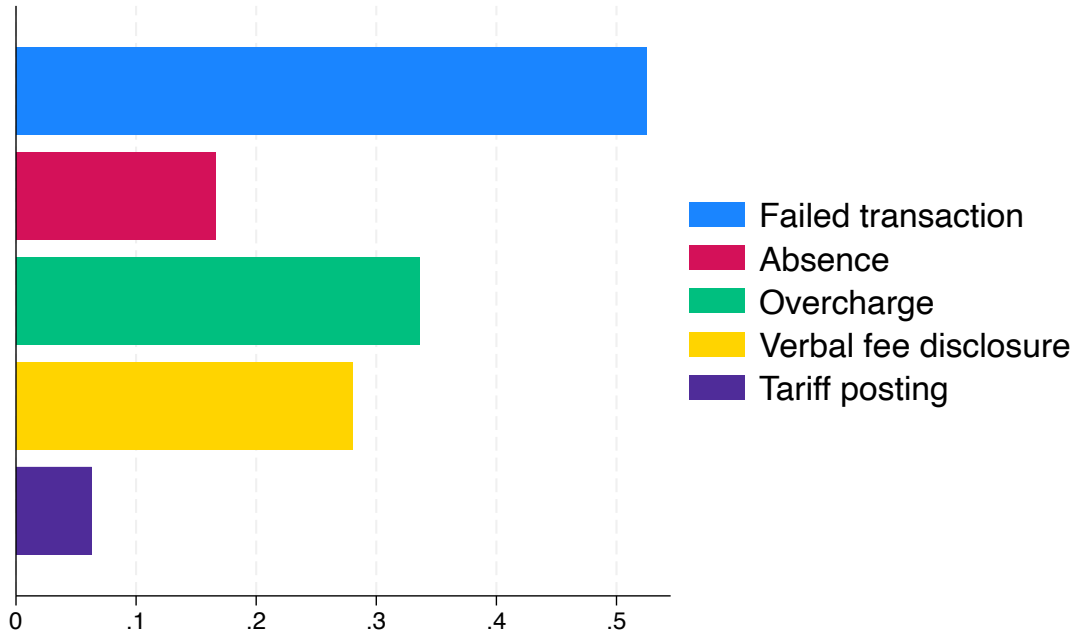


Figure A.4: Limited consumer trust

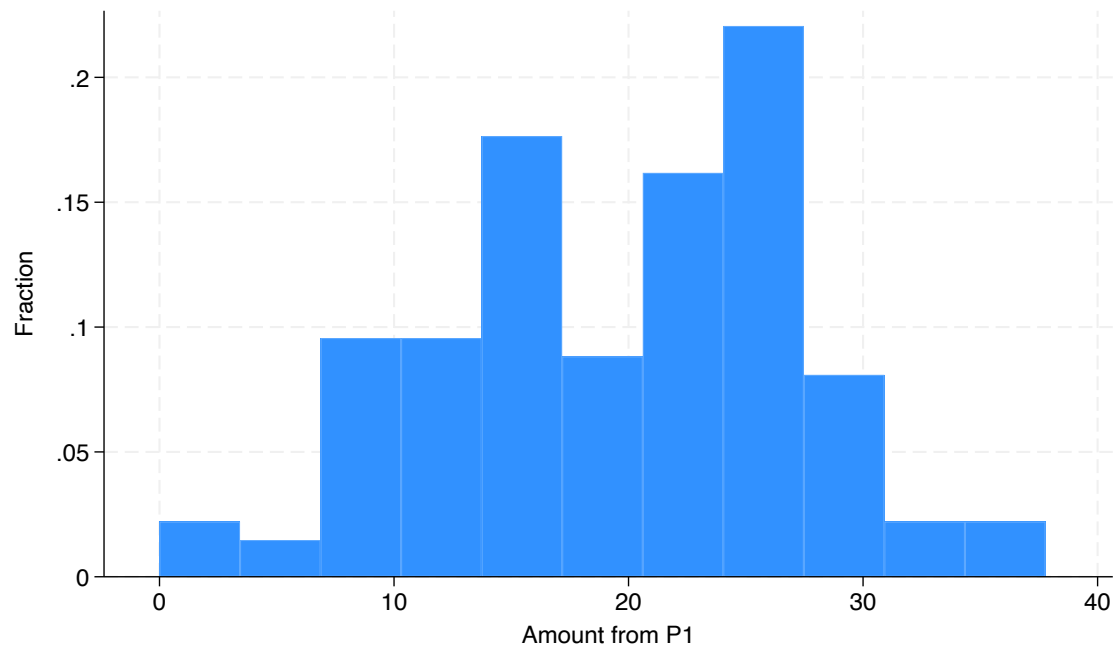
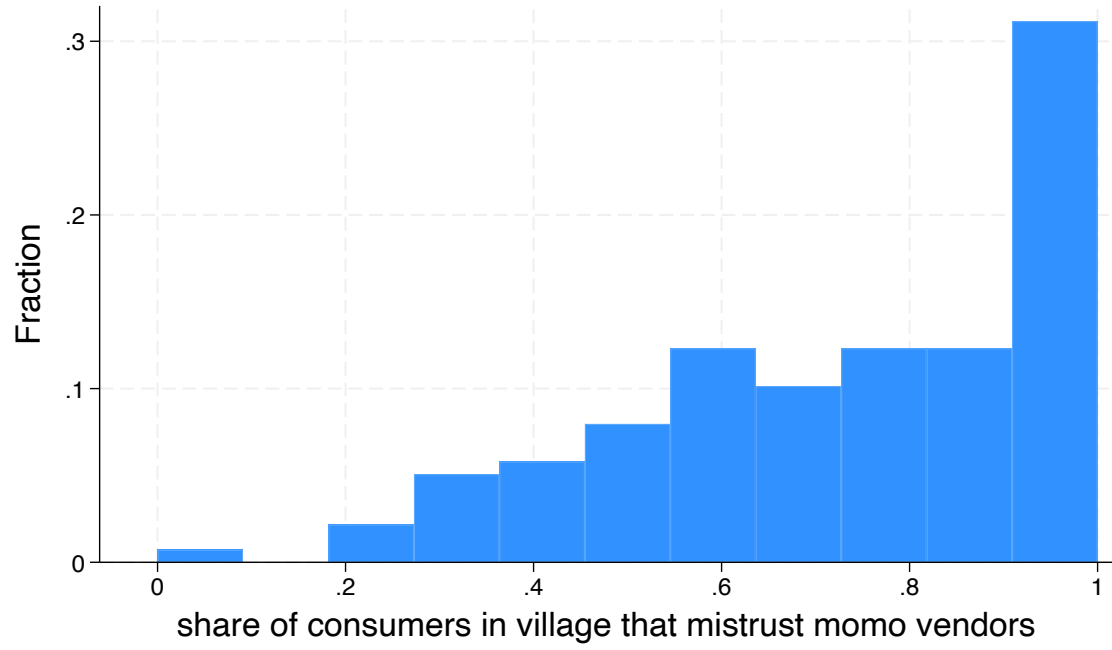
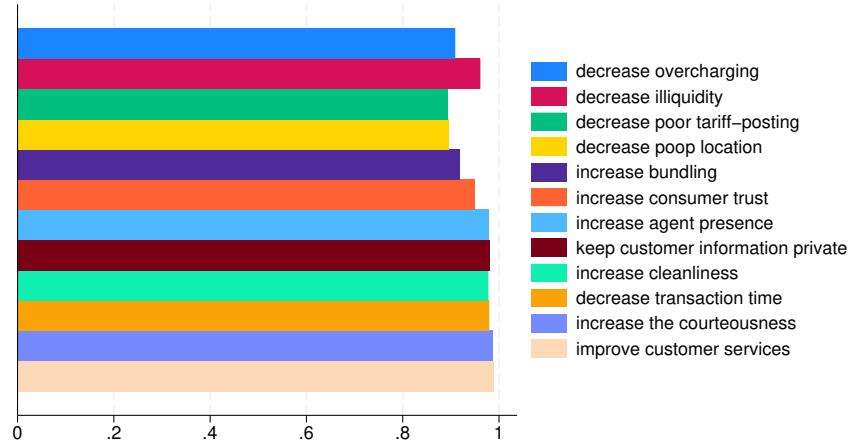
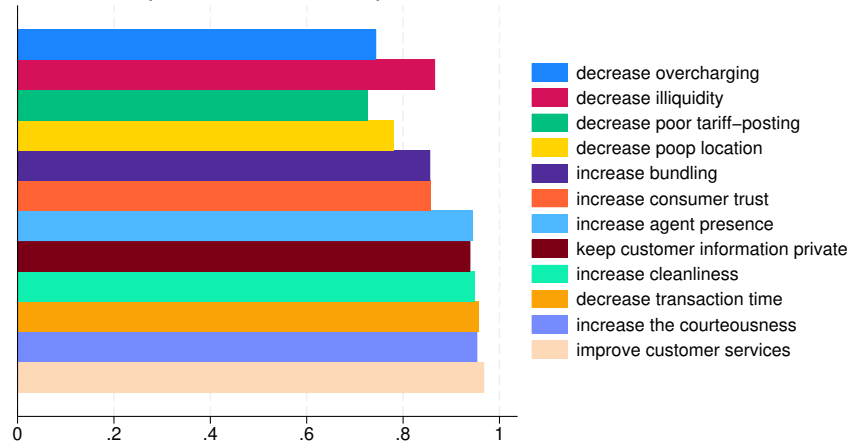


Figure A.5: Closure: Entry matters

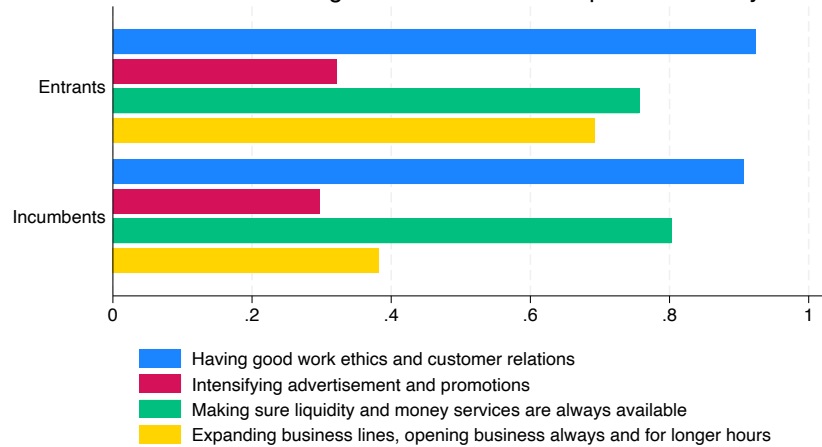
Consumer expectation about competition effects



Incumbent expectation about competition effects



Entrant strategies and incumbent responses to entry



A.3 Randomization Balance

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

	Potential Entrants: Non-Financial Firms						
	Control mean	Treated firms in Any entry	Untreated firms in Any entry	Treated firms in Low entry	Untreated firms in Low entry	Treated firms in High entry	Untreated firms in High entry
	(1)	(2a)	(2b)	(3a)	(3b)	(3c)	(3d)
A. Demographic characteristics:							
Age (yrs)	34.81	1.037 (1.207)	-0.105 (1.200)	1.964 (1.929)	-1.196 (1.254)	0.717 (1.261)	2.192 (1.829)
Female	0.506	0.043 (0.063)	0.021 (0.063)	-0.064 (0.088)	0.029 (0.069)	0.080 (0.066)	0.004 (0.078)
Education (high school)	0.885	-0.016 (0.038)	0.033 (0.034)	-0.082 (0.064)	0.028 (0.036)	0.006 (0.040)	0.043 (0.042)
Married	0.545	0.032 (0.051)	-0.030 (0.050)	0.076 (0.082)	-0.051 (0.054)	0.018 (0.054)	0.011 (0.071)
Ethnicity (Akan)	0.775	0.016 (0.055)	-0.038 (0.054)	-0.012 (0.075)	-0.041 (0.061)	0.026 (0.059)	-0.031 (0.070)
B. Business outcomes:							
Age of business (yrs)	7.502	-0.426 (0.894)	-0.984 (0.861)	-0.905 (1.269)	-1.673* (0.895)	-0.265 (0.971)	0.467 (1.289)
Revenue last week (GHS)	2629	-162.2 (298.4)	113.8 (294.1)	-119.8 (446.0)	318.8 (322.1)	-176.0 (317.6)	-317.8 (360.8)
Profit last week (GHS)	611.5	-90.77 (60.34)	-8.018 (65.37)	-94.71 (83.53)	62.25 (74.49)	-89.22 (64.62)	-156.0** (74.34)
Hours of work last week (hrs)	75.22	-1.929 (3.416)	1.939 (3.315)	-5.102 (4.461)	1.999 (3.628)	-0.847 (3.730)	1.812 (4.485)
No. customers last week (binned)	3.435	0.138 (0.180)	0.108 (0.182)	0.304 (0.235)	0.254 (0.200)	0.081 (0.197)	-0.198 (0.247)
Any digital payment	0.497	0.010 (0.062)	-0.045 (0.055)	0.007 (0.082)	-0.046 (0.060)	0.011 (0.070)	-0.043 (0.077)
Value of firm (GHS)	27137	-1768 (2940)	-3023 (2833)	-89.44 (4035)	-873.3 (3186)	-2334 (3238)	-7552** (3346)
Firm's total household expenses (GHS)	2904	-41.16 (296.1)	204.3 (305.8)	-346.2 (328.2)	185.1 (350.9)	62.75 (333.9)	244.8 (381.9)
Joint F-test (linear), <i>p</i> -value				0.933			
Chi-squared test (probit), <i>p</i> -value				0.934			
Observations				559			

Note: Observations are at the firm level. Each row is a separate regression and controls for randomization strata dummies. Column (1) reports a direct calculation of the control mean. 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 1(Entry Assignment) as the outcome. The results indicate strong evidence of balance across treatment arms. The saturated model includes separate indicators for Low entry (+1 entrant each localities) x treated firms, Low entry x untreated firms, High entry (+3 entrants each localities) x treated firms, and High entry 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.2: Balance test: pre-intervention treatment-control differences

	Incumbents: Financial Mobile Money Firms			
	Control mean	Any entry	Low entry	High entry
	(1)	(2)	(3a)	(3b)
A. Demographic characteristics:				
Age (yrs)	28.55	0.612 (0.733)	0.605 (0.809)	0.619 (0.836)
Female	0.479	-0.035 (0.043)	-0.071 (0.048)	0.001 (0.052)
Education (high school)	0.792	0.017 (0.035)	-0.014 (0.043)	0.049 (0.039)
Married	0.333	0.026 (0.043)	0.058 (0.046)	-0.005 (0.048)
Ethnicity (Akan)	0.747	-0.018 (0.042)	-0.015 (0.048)	-0.021 (0.052)
B. Business outcomes:				
Sells both financial (major) and non-financial (minor) items/services	0.863	0.041 (0.027)	0.058* (0.028)	0.025 (0.031)
Age of business (yrs)	3.893	-0.240 (0.255)	-0.256 (0.321)	-0.243 (0.282)
Revenue last week (GHS)	16075	-156.6 (1579)	-745.9 (1875)	428.9 (1780)
Profit last week (GHS)	242.1	1.260 (14.05)	-2.821 (16.27)	5.316 (16.35)
Hours of work last week (hrs)	73.83	3.147 (3.169)	2.766 (3.376)	3.526 (3.588)
No. customers last week	237.1	-12.24 (22.68)	-19.08 (25.49)	-5.446 (25.35)
Any digital payment	0.432	0.010 (0.034)	-0.002 (0.037)	0.0245 (0.041)
Value of firm (GHS)	12713	-1508 (935.3)	-1919* (1092)	-1100 (1069)
Firm's total household expenses (GHS)	2819	6.907 (274.6)	-152.3 (277.9)	165.1 (313.8)
No. of incumbents per locality ($n=136$)	5.044	0.088 (0.441)	0.117 (0.486)	0.059 (0.481)
Joint F-test (linear), p -value			0.897	
Chi-squared test (probit), p -value			0.889	
Observations			627	

Note: Observations are at the firm level. Each row is a separate regression and controls for randomization strata dummies. Column (1) reports a direct calculation of the control mean. 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 **1**(Entry Assignment) as the outcome. The results indicate strong evidence of balance across treatment arms. The saturated model includes 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.3: Balance test: pre-intervention treatment-control differences

		Consumers		
	Control mean	Any entry	Low entry	High entry
	(1)	(2)	(3a)	(3b)
A. Demographic characteristics				
Age (yrs)	28.82	0.456 (1.299)	0.167 (1.536)	0.766 (1.454)
Female	0.437	-0.069 (0.092)	-0.084 (0.105)	-0.053 (0.108)
Education (high school)	0.854	-0.044 (0.029)	-0.036 (0.035)	-0.052 (0.035)
Married	0.379	0.012 (0.035)	-0.013 (0.039)	0.041 (0.042)
Ethnicity (Akan)	0.706	0.004 (0.050)	-0.032 (0.055)	0.044 (0.061)
B. Financial Mobile Money Services				
Has mobile money account	0.977	-0.003 (0.009)	-0.011 (0.013)	0.005 (0.010)
Has bank account	0.346	0.031 (0.050)	0.034 (0.055)	0.028 (0.057)
Value of last transaction (GHS)	238.7	-0.374 (31.33)	-12.55 (38.72)	12.62 (39.27)
Mistrust vendors	0.220	0.044 (0.052)	0.078 (0.060)	0.008 (0.056)
Overcharging is common (misconduct)	0.741	-0.028 (0.063)	-0.060 (0.073)	0.005 (0.070)
Frequently switch agents in locality	0.381	-0.018 (0.071)	0.014 (0.079)	-0.054 (0.082)
Number vendors used last 3 months	1.987	-0.212* (0.103)	-0.271** (0.115)	-0.148 (0.114)
C. Non-financial Microenterprise Goods/Services				
Total household expenses (GHS)	1923	1203.1 (224.4)	48.70 (235.4)	368.0 (291.4)
No. of consumers surveyed per locality ($n=136$)	34.48	0.740 (1.577)	-0.654 (1.863)	2.168 (1.825)
Joint F-test (linear), p -value		0.749		
Chi-squared test (probit), p -value		0.762		
Observations	1,130 (of 4,725) sampled for endline			

Note: Observations are at the consumer level. Each row is a separate regression and controls for randomization strata dummies. Column (1) reports a direct calculation of the control mean. 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. The saturated model includes separate indicators for Low entry (+1 entrant each localities) and High entry (+3 entrants each localities) in treated markets. Balance results are similar using the full 4,725 consumers baseline sample. Cluster-robust standard errors at market (locality) level are reported in parentheses.

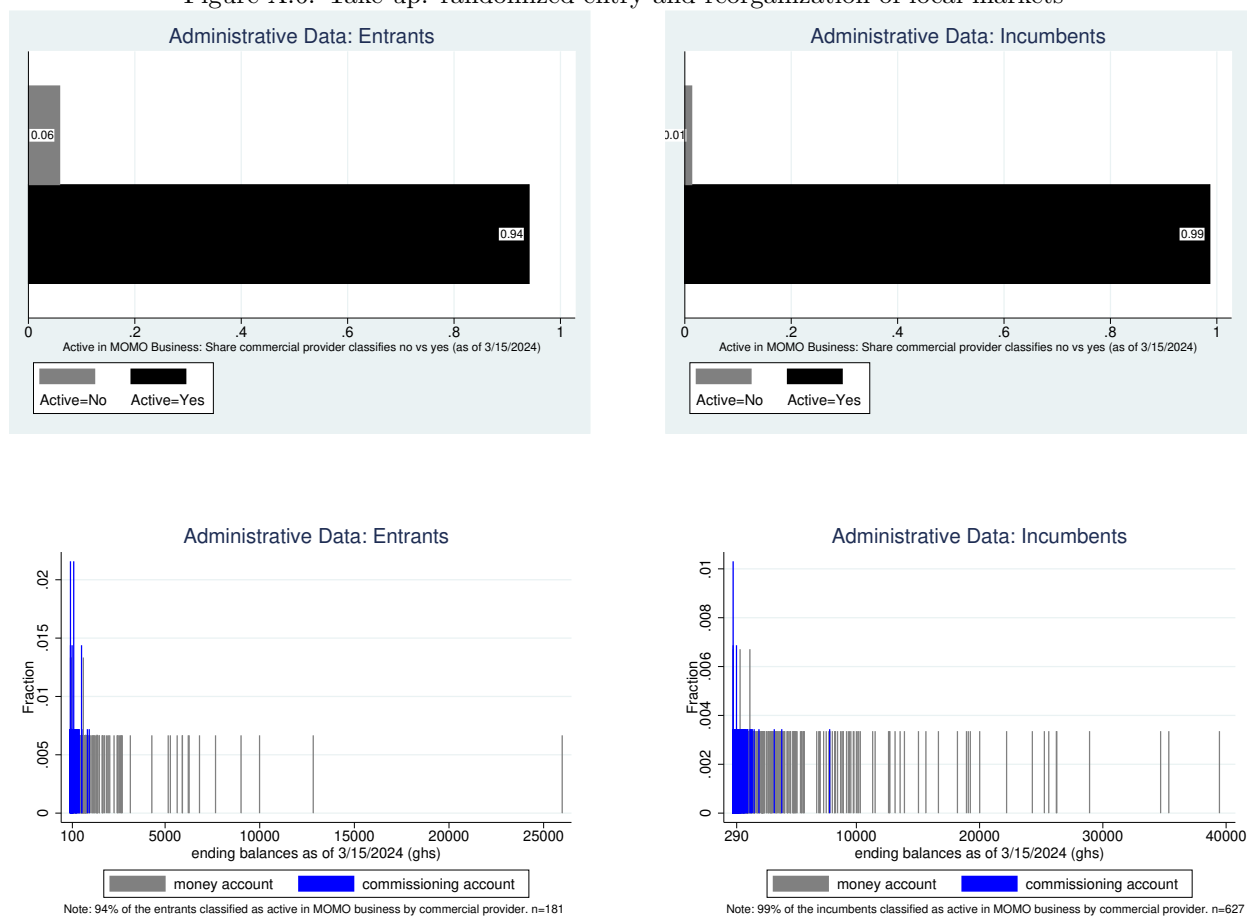
***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

A.4 Further Results

Figure A.6: Take-up: randomized entry and reorganization of local markets



Note: Administrative data from service provider.

Table A.4: Differences in price effects for treated vs. untreated non-financial firms

	Non-Financial Goods/Services - Firm Prices			
	Price major item in store (GHS)			
	(1a)	(1b)	(2a)	(2b)
Treated Firm x Treated Market (β)		10.74** (4.782)		
Treated Market (δ)	-5.982 (4.702)	-11.07** (4.754)		
Treated Firm x Low Treated Market (β_1)				0.312 (6.064)
Low Treated Market (δ_1)			-10.13** (4.859)	-10.17** (5.118)
Treated Firm x High Treated Market (β_2)			-2.095 (5.775)	16.19** (6.517)
High Treated Market (δ_2)				-12.92** (6.093)
Observations	512	512	512	512
Control mean	73.59	73.59	73.59	73.59
Analysis sample & level Measurement	T & UT entrants Firm surveys	T & UT entrants Firm surveys	T & UT entrants Firm surveys	T & UT entrants Firm surveys
p-value (test: $\beta_1 = \beta_2$)				0.076
p-value (test: $\delta_1 = \delta_2$)			0.120	0.631

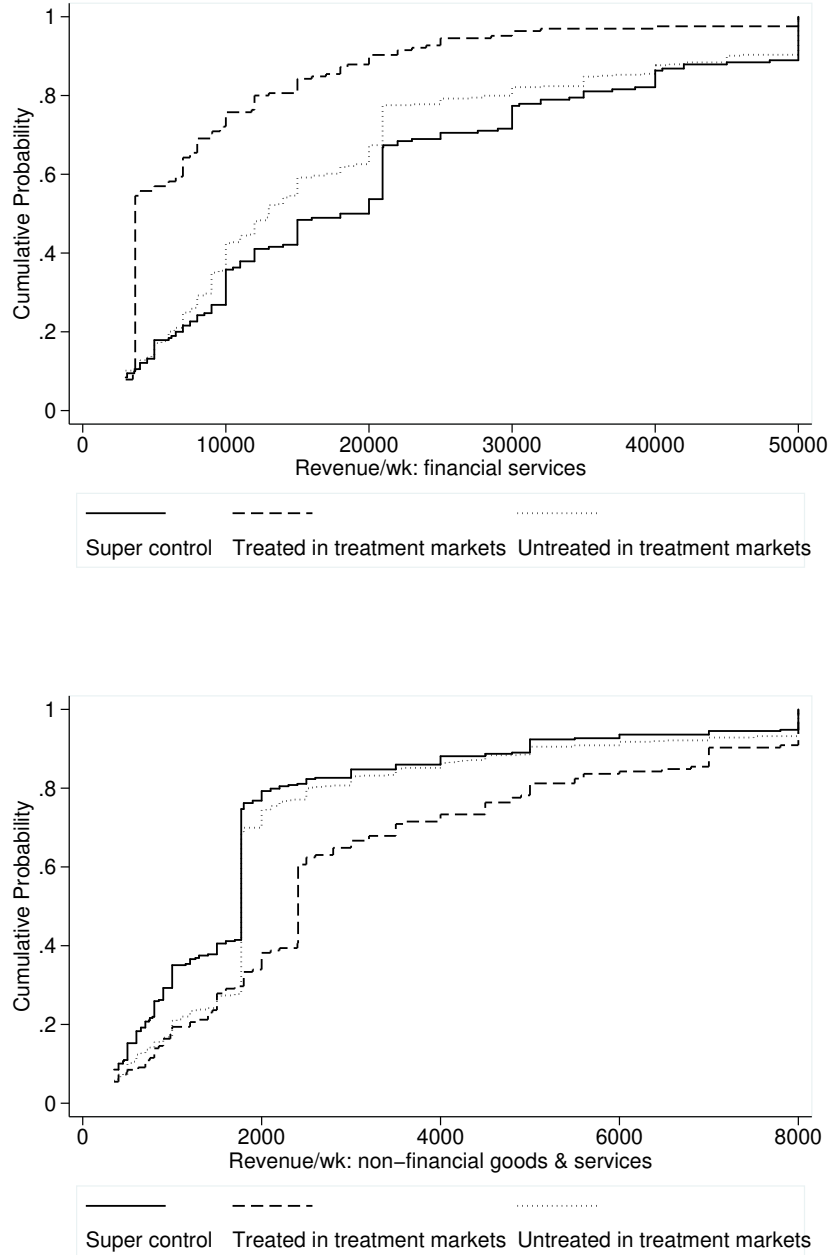
Note: Observations are at the firm level. Dependent variable is endline firm survey-based measure, winsorized at the 95th percentile level. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Major item in store may be rice or not: rice, soft drinks, cement, bread, frozen chicken, shirt, sachet water, weedicide, paracetamol, airtime and phone accessories are frequent. To measure prices from firms, we first ask of the major product or service item in the store; second, ask of the sales that item generated during the previous week (this averages around 50% of the total business sales revenue); and third, ask of the current selling price. Includes randomization strata dummies. 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.

Figure A.7: 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, $p\text{-value} \leq 0.013$ in all cases for financial services and $p\text{-value} \leq 0.001$ in all cases for non-financial goods/services.

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

	A. Financial Services: Mobile Money			B. Non-Financial 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 Treated Market (δ_1)	-0.112*** (0.040)	0.001 (0.004)	-4539* (2530)	-10.89** (5.11)	-0.076** (0.037)	456.1** (226.1)
High Treated Market (δ_2)	-0.215*** (0.037)	0.001 (0.004)	-6182*** (2092)	-2.294 (5.901)	-0.085** (0.036)	568.8*** (239.8)
Observations	1,493	136	769	766	136	1,052
Control mean	0.372	1.014	20,587	40.18	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
p-value (test: $\delta_1 = \delta_2$)	0.004	0.988	0.014	0.055	0.067	0.031

Note: Observations are either at the firm or locality level. Dependent variables are endline audit-based and firm survey-based measures. Outcome variables in Columns (3), (4) and (6) winsorized at the 95th percentile level. Low Treated Market 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 Treated Market 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). Includes randomization strata dummies. 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: 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)
Treated Market (δ)	-0.135*** (0.031)	0.008 (0.086)	0.105* (0.056)	0.372 (0.285)	-0.135*** (0.031)	-0.044 (0.328)	0.105* (0.056)	0.449 (0.882)
$\mathbf{x}$ Baseline Prediction		-0.187* (0.111)		-0.307 (0.325)		-0.099 (0.354)		-0.358 (0.919)
Baseline Prediction		0.028 (0.080)		(0.355) (0.259)		-0.150 (0.301)		0.474 (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.7: Heterogeneity by baseline number of incumbents and randomization strata for main outcomes

	A. Financial Services: Mobile Money			B. Non-Financial Goods/Services		
	Misconduct	Markups μ	Revenue/wk	Price major item	Markups μ	Revenue/wk
	indicator		(GHS)	in store (GHS)		(GHS)
	(1)	(2)	(3)	(4)	(5)	(6)
Treated Market (δ) x Low pop. & Low # incumbents	-0.146*** (0.042)	0.002 (0.004)	-9574*** (2122)	0.558 (6.516)	-0.083** (0.040)	748.9** (315.2)
Treated Market (δ) x High pop. & Low # incumbents	-0.164*** (0.055)	0.003 (0.007)	-9044*** (2935)	-7.323 (7.381)	-0.091** (0.040)	422.0 (396.2)
Treated Market (δ) x Low pop. & High # incumbents	-0.148** (0.057)	-0.004 (0.004)	-2186 (3802)	-1.755 (9.442)	-0.077* (0.044)	172.6 (262.4)
Treated Market (δ) x High pop. & High # incumbents	-0.198*** (0.043)	-0.001 (0.005)	-3784 (2392)	-7.787 (5.037)	-0.078** (0.039)	474.3** (237.6)
Observations	1,493	136	769	766	136	1,052
Control mean	0.372	1.016	21,722	40.18	1.245	2,222
Sample & level	Firms (all)	Locality	Firms (all)	Firms (all)	Locality	Firms (all)
	x transactions					
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. Outcome variables in Columns (3), (4) and (6) winsorized at the 95th percentile level. 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.8: Heterogeneity by both store locations and commonness of services for main outcomes

	A. Financial Services: Mobile Money			B. Non-Financial Goods/Services		
	Misconduct	Markups μ	Revenue/wk	Price major item	Markups μ	Revenue/wk
	indicator		(GHS)	in store (GHS)		(GHS)
	(1)	(2)	(3)	(4)	(5)	(6)
Treated Market (δ) x Stores closer & Services common	0.025 (0.059)	0.008 (0.007)	-11418*** (2039)	-14.85*** (5.256)	-0.089* (0.047)	1300** (610.7)
Treated Market (δ) x Stores not closer but Services common	-0.150* (0.079)	-0.001 (0.004)	-6361*** (2232)	1.606 (8.817)	-0.039 (0.051)	908.5 (597.8)
Treated Market (δ) x Stores closer but Services not common	-0.164*** (0.039)	-0.001 (0.004)	-2836 (2699)	-6.655 (5.382)	-0.086** (0.039)	329.0 (223.7)
Treated Market (δ) x Stores not closer & Services not common	-0.215*** (0.041)	0.001 (0.004)	-6625*** (2069)	-1.872 (5.613)	-0.079** (0.036)	455.7* (239.5)
Observations	1,493	136	769	766	136	1,052
Control mean	0.372	1.016	21,722	40.18	1.245	2,222
Sample & level	Firms (all)	Locality	Firms (all)	Firms (all)	Locality	Firms (all)
	x transactions					
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. Outcome variables in Columns (3), (4) and (6) winsorized at the 95th percentile level. 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. Includes randomization strata dummies. 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.

Figure A.8: Follow-up surveys to track long-term exits and views of firms



Note: A word cloud summarizing the most frequent words that appear in the responses of entrant firms ($n=170$) to the question, *how would you describe the growth of your business now compared to before you were enrolled as a financial mobile money vendor?* VodaCash, a minor provider, was recently renamed Telecel.

A.5 Robustness Checks: Multiple Testing, Post-Double-Selection LASSO Estimation, Winsorization

Table A.9: Take-up: randomized entry and reorganization of local markets

	A. Program Participation Among Potential Entrants		B. Shock to Market Structure and Reorganization				C. Firm Exit by Endline		D. Market Informed of New Entrants	
	Entry indicator		No. MOMO vendors		Market index: HHI		Not operate indicator		Awareness indicator	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Any entry (δ)	0.245*** (0.031)		1.401*** (0.266)		-0.142*** (0.034)		0.028* (0.015)		0.2289*** (0.024)	
<i>p</i> -value: R-W MHT	0.002		0.002		0.002		0.070		0.002	
Low entry (δ_1)		0.128*** (0.033)		0.808*** (0.287)		-0.098** (0.037)		0.039** (0.019)		0.207*** (0.027)
<i>p</i> -value: R-W MHT		0.008		0.002		0.002		0.046		0.002
High entry (δ_2)		0.354*** (0.039)		2.016*** (0.333)		-0.202*** (0.037)		0.015 (0.017)		0.254*** (0.032)
<i>p</i> -value: R-W MHT		0.002		0.002		0.002		0.398		0.002
Observations	512	512	136	136	136	136	1,105	1,105	939	939
Control mean	0.073	0.073	3.644	3.644	0.480	0.480	0.049	0.049	0.250	0.250
Sample & level	T & UT entrants	T & UT entrants	Locality	Locality	Locality	Locality	Firms (all)	Firms (all)	UT entrants & incumbents	UT entrants & incumbents
Measurement	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys	Firm Surveys
<i>p</i> -value (test: $\delta_1 = \delta_2$)		0.000		0.001		0.001		0.210		0.183
Controls	Post-Double LASSO									

Note: Observations are either at the firm or market level. Dependent variables are endline survey-based measures. Includes randomization strata dummies. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Potential entrants are 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. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for market structure-related outcomes family (entry indicator; no. MOMO vendors; HHI index; awareness indicator; not operate indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.10: Effects of randomized entry on consumer outcomes

	Financial Services: Mobile Money			Non-Financial Goods/Services		Market Experience
	Misconduct indicator	Consumer trust indicator	Consumer trust (GHS)	Value-for-money [scale: 1-10]	Price 5kg rice bag (GHS)	Consumer overall satisfaction [scale: 1-10]
	(1)	(2)	(3)	(4)	(5)	(6)
Treated Market (δ)	-0.137*** (0.033)	0.086 (0.058)	1.563 (1.312)	0.482*** (0.155)	-5.047*** (1.457)	0.644*** (0.160)
<i>p</i> -value: R-W MHT	0.002	0.010	0.100	0.002	0.002	0.002
Observations	1,138	1,138	695	1,138	1,138	1,138
Control mean	0.209	0.511	25.07	7.089	90.85	7.139
Analysis sample & level	Consumers	Consumers	Consumers	Consumers	Consumers	Consumers
Measurement	Consumer surveys	Consumer surveys	Trust games	Consumer surveys	Consumer surveys	Consumer surveys
Controls	Post-Double LASSO					

Note: Observations are at the consumer level. Dependent variables are endline survey-based or trust game-based measures. Misconduct measures households'/customers' estimates that their last transaction at vendor points was overcharged (Column 1). Consumer trust measures their trust in vendors when asked (Column 2) and the amount the consumer transferred to an anonymous vendor in the trust game (Column 3). 5kg bag of rice is a common food item purchased from local stores. To measure prices from consumers, we first ask if they have purchased a bag of rice from any shop within their community over the past 30 days; and then ask of the common price they have paid per 5kg bag (estimated based on their purchase/guess based on their knowledge). Consumer prices correlate well with survey enumerator verifications whereby enumerators check how much a bag of 5kg rice in a nearby store in the community cost during the survey visit. Outcome variables in Columns (4)-(6) winsorized at the 95th percentile level. Includes randomization strata dummies. Outcomes gathered directly from consumers allow for only cross-village comparisons. Cluster-robust standard errors at market level are reported in parentheses. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for consumer-related outcomes family (reported misconduct indicator; consumer trust; value-for-money; price of 5kg bag rice; overall satisfaction; household expenditures; travel time to agents; home locality purchases indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all consumer controls and randomization strata dummies in the control set. Controls include consumer's age, gender, education, marital status, ethnicity, mobile money account ownership, bank account ownership, value of last market transaction, mis/trust in vendors, estimate of vendor misconduct/overcharging, frequency of switching agents, and number of agents used. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.11: Effects of randomized entry on seller misconduct for financial services

A. Financial Services: Mobile Money - Seller Misconduct								
	Misconduct indicator				Misconduct amount (GHS)			
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(2c)	(2d)
Treated Firm x Treated Market (β)	ne			-0.110*** (0.029)	ne			-0.026 (0.158)
<i>p</i> -value: R-W MHT				0.002				0.046
Treated Market (δ)	ne	-0.140*** (0.035)	-0.171*** (0.035)	-0.139*** (0.036)	ne	-0.493** (0.248)	-0.492** (0.251)	-0.485* (0.253)
<i>p</i> -value: R-W MHT		0.002	0.002	0.002		0.018	0.002	0.020
Net effect of randomized entry ($\beta + \delta$)	ne			-0.250*** (0.041)	ne			-0.511* (0.283)
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	1.044	1.044	1.044
Analysis sample & level	T & UT entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions	T & UT entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions
Measurement	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study
Controls	Post-Double LASSO							

Note: Observations are at the firm x transaction level. Dependent variables are endline audit-based measures. Includes randomization strata dummies. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. 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. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related outcomes family (audit misconduct indicator; misconduct amount; vendor disclose tariff indicator; vendor absent indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.12: Effects of randomized entry on service quality for financial services

A. Financial Services: Mobile Money - Service Quality								
	Quality: vendor disclose tariff (transparency) indicator				Quality: vendor absent indicator			
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(2c)	(2d)
Treated Firm x Treated Market (β)	ne			0.307*** (0.038)	ne			-0.065*** (0.024)
<i>p</i> -value: R-W MHT				0.002				0.002
Treated Market (δ)	ne	0.121** (0.052)	0.214*** (0.054)	0.126** (0.054)	ne	0.014 (0.033)	-0.013 (0.031)	0.009 (0.035)
<i>p</i> -value: R-W MHT		0.004	0.002	0.002		0.616	0.002	0.786
Net effect of randomized entry ($\beta + \delta$)	ne			0.433*** (0.054)	ne			-0.055* (0.030)
Observations	322	1,171	1,493	1,493	322	1,171	1,493	1,493
Control mean	0.000	0.337	0.337	0.337	0.000	0.089	0.089	0.089
Analysis sample & level	T & UT entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions	T & UT entrants x transaction	Incumbents x transaction	Firms (all) x transactions	Firms (all) x transactions
Measurement	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study	Audit study
Controls	Post-Double LASSO							

Note: Observations are at the firm x transaction level. Dependent variables are endline audit-based measures. Includes randomization strata dummies. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. 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. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related outcomes family (audit misconduct indicator; misconduct amount; vendor disclose tariff indicator; vendor absent indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.13: Effects of randomized entry on firm prices for non-financial services

B. Non-Financial Goods/Services - Firm Prices				
	Price major item in store (GHS)			
	(1a)	(1b)	(1c)	(1d)
Treated Firm x Treated Market (β)	10.75** (4.741)			10.34** (4.764)
<i>p</i> -value: R-W MHT	0.038			0.222
Treated Market (δ)	-11.07** (4.713)	-3.652 (8.383)	-4.675 (4.619)	-1.357 (8.647)
<i>p</i> -value: R-W MHT	0.044	0.938	0.268	0.194
Net effect of randomized entry ($\beta + \delta$)	-0.321 (5.704)			8.987 (9.932)
Observations	512	254	766	766
Control mean	40.11	40.33	40.11	40.11
Analysis sample & level	T & UT entrants	Incumbents	Firms (all)	Firms (all)
Measurement	Firm	Firm	Firm	Firm
	surveys	surveys	surveys	surveys
Controls	Post-Double LASSO			

Note: Observations are at the firm level. Dependent variable is endline survey-based measure, winsorized at the 95th percentile level. Firms include all financial and non-financial microenterprise services/goods stores. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Major item in store may be rice or not: rice, soft drinks, cement, bread, frozen chicken, shirt, sachet water, weedicide, paracetamol, airtime and phone accessories are frequent. To measure prices from firms, we first ask of the major product or service item in the store; second, ask of the sales that item generated during the previous week (this averages around 50% of the total business sales revenue); and third, ask of the current selling price. Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related outcomes family (prices in store; revenues; profits) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.14: Effects of randomized entry on business revenues for financial services

	A. Financial Services: Mobile Money - Revenue and Profit						
	Firm-level				Market-level		Profit/wk
	revenue/wk (GHS)				revenue/wk (GHS)	markups μ	(GHS)
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(3)
Treated Firm x Treated Market (β)	2864* (1767)			1748 (1657)			
<i>p</i> -value: R-W MHT	0.694			0.002			
Treated Market (δ)	4808** (2366)	-2926 (2175)	-5458*** (2024)	-2931 (2162)	8753 (11890)	0.003 (0.004)	22.26 (18.02)
<i>p</i> -value: R-W MHT	0.044	0.116	0.002	0.176			0.266
Net effect of randomized entry ($\beta + \delta$)	7673*** (2045)			-1182 (2773)			
Observations	176	593	769	769	136	136	769
Control mean	2,333	22,139	21,722	21,722	91,718	1.016	202.0
Analysis sample & level	T & UT entrants	Incumbents	Firms (all)	Firms (all)	Locality	Locality	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys
Controls	Post-Double LASSO						

Note: Observations are at the firm level. Dependent variables are endline survey-based measures, winsorized at the 95th percentile level. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Revenue is sales made per week. For mobile money, this captures all cash-in/cash-out/money transfers made at financial vendor's outlet, and for microenterprise goods, it captures all non-financial goods and services at the store. Market-level revenue sums all the revenues of individual firms in a locality. Assuming constant returns to scale in production, the markup of price-cost, $\mu = 1/(1 - s_\pi)$, is estimated using profit rate s_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. Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2a and 2b, where heteroskedasticity-robust standard errors are reported. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related outcomes family (prices in store; revenues; profits) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.15: Effects of randomized entry on business revenues for non-financial services

	B. Non-Financial Goods/Services - Revenue and Profit						
	Firm-level				Market-level		Profit/wk
	revenue/wk (GHS)				revenue/wk (GHS)	markups μ	(GHS)
	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(3)
Treated Firm x Treated Market (β)	38.98 (380.2)			-8.600 (377.8)			
<i>p</i> -value: R-W MHT	0.960			0.006			
Treated Market (δ)	832.9** (398.1)	276.4* (152.9)	514.3*** (192.3)	281.5* (159.8)	5500*** (1804)	-0.087** (0.035)	37.53 (24.06)
<i>p</i> -value: R-W MHT	0.044	0.154	0.002	0.194			0.158
Net effect of randomized entry ($\beta + \delta$)	871.9** (357.8)			272.9 (419.8)			
Observations	459	593	1,052	1,052	136	136	1,052
Control mean	2,696	1,860	2,222	2,222	16,198	1.245	334.5
Analysis sample & level	T & UT entrants	Incumbents	Firms (all)	Firms (all)	Locality	Locality	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys	Firm surveys
Controls	Post-Double LASSO						

Note: Observations are at the firm level. Dependent variables are endline survey-based measures, winsorized at the 95th percentile level. T denotes treated potential entrants and refers to non-financial microenterprise stores onboarded as financial vendors. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Revenue is sales made per week. For mobile money, this captures all cash-in/cash-out/money transfers made at financial vendor's outlet; for microenterprise goods, it captures all non-financial goods and services at the store. Market-level revenue sums all the revenues of individual firms in a locality. Assuming constant returns to scale in production, the markup of price-cost, $\mu = 1/(1 - s_\pi)$, is estimated using profit rate s_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. Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses, except in Columns 2a and 2b, where heteroskedasticity-robust standard errors are reported. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related outcomes family (prices in store; revenues; profits) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.16: Effects of randomized entry on intermediate firm outcomes

	No. customers/week		Firm's hh. expenses last month (GHS)		Capital investment last 3 months (GHS)		Hours of work/week (Hours)		Firm's hh. poverty likelihood (%)	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)
Treated Firm x Treated Market (β)		104.7*** (22.72)		240.5 (183.9)		7,077*** (980.7)		4.041** (1.867)		-3.596* (2.031)
<i>p</i> -value: R-W MHT		0.002		0.200		0.002		0.030		0.200
Treated Market (δ)	31.34** (15.20)	2.023 (21.60)	289.5* (162.0)	247.3 (183.5)	3,416*** (610.1)	3,183*** (1039)	3.561*** (1.328)	4.126** (2.082)	-3.655* (1.915)	-5.016** (2.214)
<i>p</i> -value: R-W MHT	0.020	0.898	0.010	0.084	0.002	0.006	0.002	0.016	0.0126	0.020
Net effect of randomized entry ($\beta + \delta$)		106.7*** (31.34)		487.9* (254.5)		10,260*** (1380)		8.167*** (3.096)		-8.613*** (2.910)
Observations	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105
Control mean	191.6	191.6	2,077	2,077	5,090	5,090	76.65	76.65	10.55	10.55
Analysis sample & level	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)	Firms (all)
Measurement	Firm surveys	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.	Firm surv.
Controls	Post-Double LASSO									

Note: Observations are at the firm level. Dependent variables are endline survey-based measures, winsorized at the 95th percentile level. Poverty is in percent (%) and measured using the Simple Poverty Scorecard (for details, see Schreiner 2015). Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related intermediate outcomes family (number of customers; firm household expenditures; capital investment; hours of work/operation; firm household poverty) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.17: Quantification of drivers of improvements in market outcomes

A. Adoption Externalities: Reduced Transaction Costs			
	Untreated firm interest to add mobile money indicator (Entry interest)	Untreated firm added mobile money by endline indicator (Actual entry)	Firm switched to cashless payments indicator
	(1)	(2)	(3)
Treated Firm x Treated Market (β)			0.119*** (0.042)
<i>p</i> -value: R-W MHT			0.008
Treated Market (δ)	0.100** (0.039)	0.014 (0.024)	0.031 (0.033)
<i>p</i> -value: R-W MHT	0.010	0.550	0.428
Net effect of randomized entry ($\beta + \delta$)			0.150*** (0.054)
Observations	346	346	1,105
Control mean	0.822	0.081	0.584
Analysis sample & level	UT entrants	UT entrants	Firms (all)
Measurement	Firm surveys	Firm surveys	Firm surveys
Controls	Post-Double LASSO		

Note: Observations are at the firm level. Dependent variables are endline survey-based and audit-based measures. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Includes randomization strata dummies. Outcomes gathered directly from consumers allow for only cross-village comparisons. Cluster-robust standard errors at market level are reported in parentheses. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for firm-related adoption outcomes family (entry interest indicator; actual entry indicator; accept/use cashless payments indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all firm controls and randomization strata dummies in the control set. Controls include firm operator/owner's age, gender, education, marital status, ethnicity, age of business, business accept/use digital payments, and value of firm. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.18: Quantification of drivers of improvements in market outcomes

B. Aggregate Consumer Household Expenditures: Reduced Vendor Misconduct Savings			
	Hh. expenses last month (GHS)	Consumer savings from reduced vendor misconduct (GHS)	Consumer avg. travel time to typical vendor's outlet (Minutes)
	(1)	(2)	(3)
Treated Firm x Treated Market (β)		-0.026 (0.158)	
<i>p</i> -value: R-W MHT		0.046	
Treated Market (δ)	284.8** (130.8)	-0.485* (0.253)	-0.647** (0.255)
<i>p</i> -value: R-W MHT	0.002	0.020	0.040
Net effect of randomized entry ($\beta + \delta$)		-0.511* (0.283)	
Observations	1,138	1,493	1,138
Control mean	1,709	1.044	4.236
Analysis sample & level	Consumers	Firms (all) x transactions	Consumers
Measurement	Consumer surveys	Audit study	Consumer surveys
Controls		Post-Double LASSO	

Note: Observations are either at the firm or consumer level. Dependent variables are endline survey-based and audit-based measures. Hh. expenses (Column 1) denotes total household expenditures for the past 30 days. Outcome variables in Columns (1) and (3) winsorized at the 95th percentile level. UT denotes untreated potential entrants and refers to non-financial stores not onboarded as financial vendors. Includes randomization strata dummies. Outcomes gathered directly from consumers allow for only cross-village comparisons. Cluster-robust standard errors at market level are reported in parentheses. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for consumer-related outcomes family (reported misconduct indicator; consumer trust; value-for-money; price of 5kg bag rice; overall satisfaction; household expenditures; travel time to agents; home locality purchases indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all consumer controls controls and randomization strata dummies in the control set. Controls include consumer's age, gender, education, marital status, ethnicity, mobile money account ownership, bank account ownership, value of last market transaction, mis/trust in vendors, estimate of vendor misconduct/overcharging, frequency of switching agents, and number of agents used. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table A.19: Quantification of drivers of improvements in market outcomes

C. Aggregate Consumer Household Expenditures: Reduced Transportation Cost Savings						
	Hh. expenses last month (GHS)	Substitution: Hh. makes purchases within home locality indicator	More rural markets	Less rural markets	Hh. expenses last month More rural and few incumbents markets	More rural and more incumbents markets
	(1)	(2)	(3a)	(3b)	(4a)	(4b)
Treated Market (δ)	284.8** (130.8)	0.093*** (0.029)	427.0** (1897.5)	-0.592 (0.351)	453.9** (190.1)	0.642 (0.414)
<i>p</i> -value: R-W MHT	0.002	0.002	0.002	0.396	0.006	0.652
Observations	1,138	1,138	608	530	502	106
Control mean (overall)	1,709	0.841	1,709	1,709	1,709	1,709
Control mean (sub-sample)			1,635	1,793	1,610	1,752
Analysis sample & level	Consumers	Consumers	Consumers	Consumers	Consumers	Consumers
Measurement	Consumer surv.	Consumer surveys	Consumer surv.	Consumer surv.	Consumer surveys	Consumer surveys
Controls	Post-Double LASSO					

Note: Observations are at the consumer level. Dependent variables are endline consumer survey-based measures. Hh. expenses (Column 1) denotes total household expenditures for the past 30 days and is winsorized at the 95th percentile level. More rural market denotes below average population localities and few incumbents denotes below average number of incumbent financial vendors localities at baseline. The average population across localities is 5,000 people and the average number of incumbent financial vendors is 4.5 per locality. Includes randomization strata dummies. Cluster-robust standard errors at market level are reported in parentheses. R-W MHT refers to the multiple hypothesis testing procedure presented in Romano and Wolf (2005) for consumer-related outcomes family (reported misconduct indicator; consumer trust; value-for-money; price of 5kg bag rice; overall satisfaction; household expenditures; travel time to agents; home locality purchases indicator) and jointly includes both the pooled and separate treatment indicators (i.e., includes both multiple outcomes and multiple tests). The post-double LASSO specification considers all consumer controls and randomization strata dummies in the control set. Controls include consumer's age, gender, education, marital status, ethnicity, mobile money account ownership, bank account ownership, value of last market transaction, mis/trust in vendors, estimate of vendor misconduct/overcharging, frequency of switching agents, and number of agents used. Results are similar with no winsorization.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

A.6 Exhibits - Retail Firms Outlets

Incumbents: Financial Mobile Money

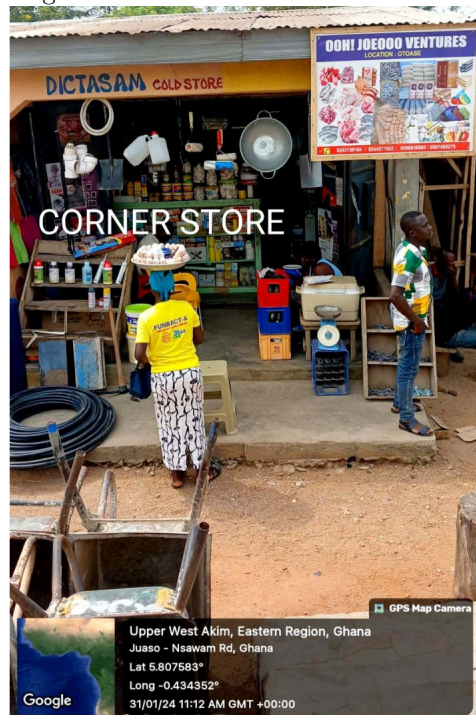
Figure A.9: Incumbent Firms



Note: Mobile money vendor stores that, at baseline, provide retail financial services (incumbents) for service providers: MTN Mobile Money Ltd, AirtelTigo Money, Telecel, GCB Ltd.'s G-Money (bank-led services provider). VodaCash, one of the three minor service providers, was recently renamed Telecel.

Potential Entrants: Non-Financial Microenterprise

Figure A.10: Potential Entrant Firms



Note: Small non-financial firms or corner stores that, at baseline, offer groceries (e.g., rice), building materials, clothing, pharmaceuticals, etc. (potential entrants, to be upgraded to also being financial vendors). In terms of frequency, provisions (eg., rice) rank first, followed by digital services (eg. phone accessories), clothing, building materials (eg., cement, iron rods), pharmaceutical, beautician services (eg., hairdressing, barbering), agrochemicals, drinking spots, electrical materials, and lastly, tailoring.

A.7 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, Barbering, Pedicure, Manicure, 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. [Demand for mobile money (GHS)] What is the value of the [mobile money] transaction you ended up completing with this agent? ghs

Qx. [Travel time to agent (mins)] What is the average travel time (from either your home or work, etc.) to your typical agent's outlet? 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 **vs.** (xb) Mobile Money provider-VodaCash **vs.** (xc) Mobile Money provider-Tigo-Cash **vs.** (xd) Mobile Money provider-G-Money **vs.** (xe) Mobile Money Agents **vs.** (xf) Carrying out transaction with Mobile Money agents (cash-in, cash-out, transfers, opening accounts, etc.) **vs.** (xg) Consumer's family and friends **vs.** (xh) Microfinance Institutions **vs.** (xi) Commercial and Rural Banks (e.g., ADB, GCB, Fanteakwa Rural Bank, Kwahu Rural Bank, etc.) **vs.** (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

Qx. Poverty Scorecard (Schreiner 2005):

1. How Many Members Does The Household Have? Use Codes: 0=Eight+ 4=Seven 9=Six 13=Five 14=Four 21=Three 24=Two 29=One
2. Are All Household Members Ages 5 To 17 Currently In School? 0=No 2=Yes 3=No One Ages 5 To 17
3. Can The Male Head/Spouse Read A Phrase/Sentence In English? 0=No 2=No Male Head/Spouse 5=Yes
4. What Is The Main Construction Material Used For The Outer Wall? 0=Mud Bricks/Earth Wood, Bamboo, Metal Sheet/Slate/Asbestos, Palm Leaves/Thatch (Grass/Raffia), Or Other 5=Cement/Concrete Blocks, Landcrete, Stone, Or Burnt Bricks
5. What Type Of Toilet Facility Is Usually Used By The Household? 0=No Toilet Facility (Bush, Beach), Or Other 4=Pit Latrine, Bucket/Pan 4=Public Toilet (E.G., WC, KVIP, Pit Pan) 6=KVIP Or WC

6. What Is The Main Fuel Used By The Household For Cooking? 0=None, No Cooking
6=Wood, Crop Residue, Sawdust, Animal Waste, Or Other 13=Charcoal, Or Kerosene
22=Gas Or Electricity
7. Does Any Household Member Own A Working Box Iron Or Electric Iron? 0=No
4=Yes
8. Does Any Household Member Own A Working Television, Video Player, VCD/DVD/MP3/MP4
Player/IPod, Or Satellite Dish? 0=No 2=Only Television 3=Video Player, VCD/DVD/MP3
Player/IPod, Or Satellite Dish (Regardless Of T.V.)
9. How Many Working Mobile Phones Are Owned By Members Of The Household? 0=None
4=One 8=Two 10=Three+
10. Does Any Household Member Own A Working Bicycle, Motor Cycle, Or Car? 0=No
3=Only Bicycle 8=Motor Cycle Or Car (Regardless Of Bicycle)

A.8 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
- Audited firms: 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 assigned transaction)? 1=yes, 2=no

Qx. If unsuccessful, did agent explain why 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 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, etc) after transaction? 1=yes, 2=no

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

Qx. What is your mobile money balance after transacting? [CHECK YOUR BALANCE IN YOUR ACCOUNT USING MOBILE APPLICATION AFTER 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.9 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]:

- EG 1: Imagine that Player 1 gives 40ghs to Player 2. [Insert name of researcher] triples this amount, so Player 2 gets 120ghs ($3 \times 40\text{ghs} = 120\text{ghs}$). 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 ($3 \times 20\text{ghs} = 60\text{ghs}$). 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 ($3 \times 10\text{ghs} = 30\text{ghs}$). 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 QUESTION ‘Measurement Questions’ below.**

[Note to researcher; RA XX: Finish all Player 1'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.]

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] ___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] ___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. Confident of your answers? 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. What was the TOTAL payout to Player 1? [OFFICER 1 COMPLETE THIS] __ghs

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