Digital Payments to Encourage the Use of Technology and Enable Secure, Efficient Transactions in Senegal's Informal Taxi Sector

Sector(s): Finance, Firms, Labor Markets

Fieldwork: Société de Développement International (SDI Inc.)

Sample: 2196 Taxi Businesses

Target group: Firms Informal workers

Outcome of interest: Technology adoption Productivity

Intervention type: Digital and mobile

AEA RCT registration number: AEARCTR-0009155

Partner organization(s): Wave Mobile Money, Private Enterprise Development in Low-Income Countries (PEDL), Weiss Family Program Fund for Research in Development Economics, George and Obie Shultz Fund

Digital technologies can help businesses operate more efficiently by making workers' actions more transparent, but this visibility can also deter use. Researchers introduced a digital payment system in Senegal's informal taxi sector to investigate how digital payments affected drivers' cash-handling costs and how allowing employers different levels of access to drivers' transactions affected driver effort, employment contracts, and the use of digital payments. Digital payments substantially reduced drivers' cash-related costs - such as time spent seeking small change, lost customers, and pricing distortions from change shortages. Making transactions visible to employers further strengthened contracts by increasing driver effort, reducing turnover, and encouraging more upfront payments. But the introduction of transaction monitoring discouraged use of digital payments among lower-income and lower-performing drivers, who were more exposed to the risks of close employer scrutiny.

Policy issue

Technology has the potential to transform businesses in low and middle-income countries (LMICs) by improving efficiency and enhancing workers' productivity. Yet, technology adoption remains low, especially in the informal sector, where cash remains dominant despite its limitations. Informal transportation relies on cash, which leads to wasted time searching for change, miscalculations, misplaced payments, and lost customers when drivers cannot make change for large bills. These constraints lower workers' earnings, strain trust between employers and employees, and hold back informal enterprises' growth.

Digital payments could reduce these inefficiencies and create a more secure, traceable system for handling money. But these benefits come with greater transparency: employers can observe workers' digital earnings in real time. This visibility can improve supervision and contract enforcement, but may discourage workers from using digital tools if they could lose income or bargaining power under closer monitoring. The tension between efficiency and monitoring makes it essential to understand how transaction transparency shapes the use of digital payments, particularly in sectors like informal transport, where monitoring worker performance and enforcing contracts remains a challenge. However, existing research offers limited evidence on how transaction visibility affects the uptake of digital payments in contexts where monitoring and enforcement are difficult.

Context of the evaluation

Dakar's informal taxi sector is a major source of employment, mostly for men in urban areas. Most taxi owners have just one vehicle and usually hire a single driver, often a relative. Both owners and drivers tend to have low levels of formal education, and many drivers live on tight budgets with little savings or access to credit. In Senegal, cash is the dominant form of payment in the informal economy despite the rapid growth of mobile money services. Within the taxi sector, relationships between vehicle owners and drivers are typically governed by daily rental contracts, but weak monitoring and enforcement make these arrangements fragile. Owners often struggle to verify revenues, and drivers may underreport earnings, reduce effort, or abandon contracts, leading to distrust and frequent turnover.



Taxi driver scanning a passenger's Wave card to receive a digital fare payment in Senegal.

Deivy Houeix, MIT

Details of the intervention

Researchers evaluated how digital payments and altering owner visibility of drivers' transactions affected drivers' effort, employment contracts, and the use of technology in the taxi sector. To understand how digital payments affect both contract dynamics and technology use in the informal economy, the author designed a study in Dakar's taxi sector that combined two randomized evaluations. The first was a technology adoption evaluation, offering taxi drivers access to a new digital payment system. The second was a firm performance evaluation that randomized whether and how vehicle owners could observe drivers' digital payments. This measured the effects of owner visibility on driver effort, contracts, and use.

In partnership with Wave, Senegal's largest mobile money provider, researchers introduced a QR-code-based digital payment system that allowed passengers to pay fares electronically. Drivers received revenues directly in their Wave accounts, from which they could transfer funds to owners free of charge.

Within the firm performance evaluation, 608 taxi businesses, each consisting of an owner-driver pair, were randomly assigned to one of four groups:

- *No observability (20 percent of the taxi businesses):* Drivers used Wave to collect fares and transfer revenues, but owners had no access to transaction information.
- *Coarse observability (20 percent of the taxi businesses):* Owners received a daily SMS with a partial revenue message that indicated only whether collections were above 5,000 CFA (about US$8), but not the exact amount.
- *Granular observability (20 percent of the taxi businesses):* Owners had full real-time visibility into drivers' digital revenue, including timestamps, customer counts, and transaction values. They also received an SMS report summarizing total digital collections at midnight.
- *Comparison group (40 percent of the taxi businesses):* Drivers and owners continued operating as usual, relying exclusively on cash.

The research team recruited the taxi drivers and owners between March and May 2022 at garages, car washes, and meeting points. The baseline group included 2,196 taxi stakeholders, comprising 608 owner–driver pairs and 1,821 drivers. Outcomes were measured using Wave's transaction data, surveys with owners and drivers, and mystery passenger audits. Follow-up surveys were conducted one month after baseline and again up to nine months later to track impacts on use, effort, and contract performance.

Results and policy lessons

Digital payments substantially reduced drivers' cash-handling costs—cutting frictions like time spent seeking small change and lost customers by about half—and drivers valued the technology highly. When transactions were also visible to owners, contracts strengthened: drivers worked harder, defaults fell, and turnover declined. But this added transparency deterred lower-income and lower-performing drivers from adopting in the first place.

Use of the digital payment system: Before the intervention, many drivers expressed interest in using the digital payment system, but the uptake was uneven. About half of the drivers refused to use the system, as the drivers did not want to share owners' contact information, a requirement to register. Twenty percent of the drivers expressed concerns about the taxi owners gaining visibility into the digital transaction history. Among those who did adopt, drivers from wealthier households and those with longer-term relationships with their vehicle owners were more likely to take up the technology, while lower-income and less productive drivers disproportionately opted out.

Cash-related costs: At baseline, drivers reported losses of about 9 percent of weekly profits due to cash frictions, such as time spent searching for change or losing customers who preferred digital payment. Mystery passenger audits confirmed this: digital payments reduced fare distortions from small-change shortages by 44 percent relative to the comparison group. Even though digitalization covered only about 13 percent of a driver's daily revenues (around two customers per day), after 7–9 months drivers reported a willingness to pay for the technology equivalent to a full week of profits, underscoring its value beyond monitoring by employers.

Contract outcomes: Observability reshaped employer–employee contracts. Under granular observability, drivers worked 40 percent more often relative to the comparison group and processed 33 percent more digital transactions. Owners who could observe transactions reported 34 percent fewer rent defaults. To compensate drivers for their increased effort, owners became 16 percent more likely to provide an upfront monthly payment, often described as a "salary", in addition to sharing a portion of the usual rent.

Retention and turnover: High turnover was a chronic challenge within the study sample, with 33 percent of owner–driver pairs having separated within nine months and 61 percent within two years. Visibility helped address this challenge. Transaction

observability reduced turnover by 31 percent after nine months, particularly in non-family employment relationships, where trust is harder to maintain. By reducing contract breakdowns, observability supported longer, more stable relationships between owners and drivers.

Uneven gains from digital payments: The benefits of visibility were not shared equally. Drivers with strong performance or long-standing ties to owners were more inclined to use digital payments and gained more from the security of clearer contracts. For lower-income or less productive drivers, closer monitoring threatened their income and flexibility, so many chose to avoid adoption. If digital payments under observability were made compulsory, these drivers would be worse off even as overall efficiency increased. In contrast, when digital payments were designed so that transactions were hidden by default, adoption became universal, extending even to the lowest-income drivers, while owners were not disadvantaged.

These findings highlight both the promise and risks of embedding observability into digital payment systems. Transparency can strengthen contracts by reducing default, increasing driver effort, and improving retention, but it also discourages adoption among lower-income and less productive drivers who are most vulnerable to close monitoring. Given the central role of informal transport in urban livelihoods, lessons from this study are relevant for other cash-dominated sectors where digital financial inclusion remains uneven.

Improving the program's monitoring systems: The evaluation's results have informed Wave's product design. Although observability improved contract efficiency, it discouraged adoption among lower-income drivers, leading Wave to modify its system so that transactions are non-observable by default. Wave is also applying lessons from the study as it expands digital payment services across West Africa, including Côte d'Ivoire, The Gambia, and Mali. In addition, the company has expressed interest in partnering with the researchers on follow-up evaluations, including studies examining how digital transaction data can be used to expand access to digital credit.