

# Beyond beneficial information: The impact of additional consulting on digital record adoption and profit measurement

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Working Paper:  
**Beyond Beneficial Information: The  
Impact of Additional Consulting on  
Digital Record Adoption and Profit  
Measurement**  
Evidence from Nigeria\*

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## Abstract

Can the introduction of digital methods for record-keeping, provided with personalized support among small firms in developing countries, increase the likelihood of adoption compared to firms that receive only beneficial information? In a pilot randomized evaluation involving small business owners, information on systematic bookkeeping, presented in a more digestible and actionable form through additional support, offers business owners a higher likelihood of adopting digital record-keeping, particularly as first-mover adopters. This, in turn, leads to a more precise recall of business profit over a longer period. Additional findings indicate that firms receiving general training on record-keeping best practices, such as paying oneself a salary, are likely to improve these practices. This study reinforces the need to provide specific training and additional support to small firms when introducing new technology and highlights the implications of digital records on the precision in measuring small firms' behavior.

*Keywords:* Best practices, Measurement; Microenterprise; International Development.

# 1 Introduction

The inaccuracy and inconsistency in measuring the behavior of microenterprises are one of the main concerns of researchers and policymakers. Little is known about the behavior of small businesses in low-income countries, particularly concerning record-keeping practices. These businesses offer significant opportunities for growth and job creation. However, the absence of business records, including digital traces of firms, may hinder efficient operations and financial best practices

Business owners in low-income communities have exhibited reluctance to maintain detailed and systematic product records, primarily driven by a perceived cost or lack of benefits. The associated costs can be categorized into heuristic costs, encapsulating the effort or cognitive thinking businesses need to invest, and attentional costs, which pertain to the level of attention businesses need to dedicate while utilizing digital tools for real-time data collection. Firms are also constrained by informational costs, representing the perceived value businesses attribute to using the app, raising doubts about its worth for their operations. Lastly, intellectual costs reflect the cognitive effort businesses need to exert, including the learning curve involved.

However, these costs may be mitigated by providing more direct and personalized support about navigating the costs associated with adopting new technology, as well as the benefits and implementing best practices for systematic accounting (Kahsay and Zeleke 2019). More broadly, interventions in business practices, often incorporating financial training, are recognized to be correlated with the success of small firms (McKenzie and Woodruff 2017), and providing consulting services to small and medium firms has a notable impact (Bruhn, Karlan, and Schoar 2018). However, certain studies indicate that traditional training that provides beneficial information has little or no effect on small firms because they are often not tailored to capture the heterogeneity of firms and the specific needs of business owners (Bruhn and Zia 2011; Giné and Mansuri 2014).

Because some of the costs and benefits associated with adopting best practices may vary among firms, businesses may be more hesitant if they lack support on how to navigate the costs or the potential benefits of best practices, such as new technology for keeping business records. Evidence demonstrates that the results of training vary by the social class of firm owners (Field et al. 2010) and the level of establishment of firms (Klinger and Schündeln 2011). Additional evidence

shows that the survival effect of the training may also depend on its intensity, as business owners may revert to their initial positions post-implementation (Karlan et al. 2015). Other promising results show that direct mentoring and business role models, rather than traditional training, have been proven to enhance the economic performance of small firms (Dalton et al. 2019).

In this regard, beyond beneficial information, research suggests that additional consulting and interventions may be necessary to see an actual increase in a business's performance, such as increased profits or survival. Recent studies provide evidence that rule-of-thumb financial training works better than standard accounting training. When accounting training nudges firms on their specific business needs, such as advice to separate business and personal money and on estimation techniques for calculating profits, firms' business performance improves significantly (Drexler et al. 2014). Additional consulting and best practice interventions are impactful to small firm entrepreneurs. This research aims to contribute to research in this domain (Bruhn, Karlan, and Schoar 2018; Drexler et al. 2014; Mano et al. 2012; McKenzie and Woodruff 2017). I propose that providing small firms with more customized provisions of the informational benefits of digital methods and guidance on navigating the costs is likely to attract a higher number of first-mover adopters compared to firms neglecting such training (Hypothesis one). Small firms that receive supplementary support, coupled with training in digital record-keeping methods, are more likely to enhance their best practices, encompassing the segregation of personal and business funds, regular salary payments, and meticulous maintenance of business records, in contrast to firms without such support.

Technology can reduce recall bias and discrepancies in data collection periods. Recall bias from self-reporting has been shown to lead to underreported profits and sales (S. J. De Mel et al. 2007; Fafchamps et al. 2012). I intend to investigate how technology, specifically mobile applications, can mitigate these problems and improve the precision of financial information. For instance, self-reported data and sales revenue are often not well correlated (S. De Mel et al. 2009; Vijverberg and Mead 2000); due to divergent timing of expenses and reported sales. Traditional methods of data collection are less effective because they are collected intermittently and over a longer period (Fafchamps et al. 2012; Samphantharak and Townsend 2018). Additionally, recent studies have shown that technology has a lower correlation of variation with self-reported data from firms (Anderson et al. 2019). Small firms utilizing digital records demonstrate higher precision in reporting profits than those relying on paper records (Hypothesis two).

The rest of the paper is structured as follows. I discuss the different empirical strategies used to capture different hypotheses and the experimental design. I proceed with a discussion of the main findings and additional findings on factors that improve the chances of firms keeping digital records. In the discussion section, I address the limitations of the research, mainly stemming from the limited data from the pilot study, and discuss the implications of the research for further full-scale studies or other policy implications.

## **2 Research Questions**

The project aims to address two overarching questions:

- Does providing small business owners with intensive and personalized information on record-keeping incentivize them to adopt digital methods rather than mere traditional introduction of the technology?
- Does the adoption of digital methods for record-keeping enhance the precision of a firm's recall of business profits compared to using paper records?

## **3 The Context**

### **3.1 Small Firms in Lagos**

The study sample is Lagos, a city of 16 million people, the second largest city in Africa, and has over 500 markets as recorded by the state government with a projection of over 1,000 markets. The urban, open-air trading market is an integral part of the city of Lagos. Along with being a center of commerce, the markets in Lagos also showcase the political, ethnic, and gender-based dynamics that characterize the city of Lagos as a whole.

In 2019, our research team conducted an extensive survey covering 15 local councils (out of 20), which represented 75 percent of the state councils in Lagos, to achieve a representative sample. Subsequently, we engaged with 432 vendors across 101 organized markets. The exercise, due to its wide-reaching nature, served as the first comprehensive understanding of the key characteristics of small firms in Lagos and readiness for the intervention. The key findings are presented in the table below:

<b>Characteristics</b>	<b>Percentage</b>
Firms using a mobile phone	98.4%
Firms utilizing internet-enabled applications	77.8%
Firms willing to learn new applications	56.5%
Firms keeping one-entry records (not best practice)	66.2%
Firms using third-party record-keeping app or consultant	None
Firms keeping records in a specific book, not scattered sheets	94.6%
Firms open to learning better record-keeping methods	75.9%

The majority of firms owner in Lagos reported using mobile phones, with 98.4 percent indicating this preference. Additionally, 77.8 percent of vendors reported utilizing internet-enabled applications. Over half of the vendors, 56.5 percent, expressed a willingness to learn new applications. However, a notable percentage of 66.2 percent reported keeping one-entry records, which falls short of best practices. Interestingly, none of the vendors reported using third-party record-keeping apps or consultants. The majority, or 94.6 percent, recorded transactions in a specific book rather than on scattered sheets. Furthermore, a substantial 75.9 percent of vendors indicated openness to learning and implementing improved record-keeping methods.

## **4 Experimental Design**

### **5 Fieldwork**

I conducted an exploration of a single intervention within a straightforward design, primarily utilizing a Randomized Control Trial (RCT) to assess the impact of a best practice intervention and the potential enhancement in record-keeping practices. While the initial design involved a two-level randomization with a control group, we encountered constraints as several firms were unwilling to participate in the training, including app training. Foreseeing a potentially low number of app adopters and considering the initial small sample size, we opted to designate the control group as those who did not receive micro-consulting and were solely introduced to the app. We also intended to estimate the intention-to-treat effect between those randomized and participated in the training and those who did not.

The first intervention group underwent micro-consulting, receiving tailored best practice advisories for their businesses. Although the initial plan was to use their paper records for tailoring the consulting, time constraints compelled

us to reemphasize what they had learned during the training, which took precedence.

The app was introduced to both groups and while we initially planned to ensure consistency in data collection through audit reports or independent checks, this will be done during post-online visits.

A cross-sectional data collection took place for three weeks post-intervention, encompassing data on best practices, profits, and expenses for both treatment and control groups. We created simple record-keeping templates and shared them digitally and in-person with participants in both groups. Data from the Kippa app ( a popular Nigeria record-keeping app and a paper-based ledger were utilized for data collection, enabling the measurement of consistency in reporting, cost price, selling price, labor cost, profit/loss per product, and adherence to best practices.

We employed digital training methods, specifically WhatsApp and YouTube videos, over four months starting August 2023. This unconventional and inclusive approach aimed to foster interaction and community within WhatsApp groups, serving as the primary training method. Monitoring of the WhatsApp groups ensured interactions occurred only during scheduled sessions, with quizzes taking place for limited hours each day. Training content, except for videos or text content on micro-consulting, remained consistent across both WhatsApp groups. Additionally, training associates personally visited, engaged, called, and texted firms assigned to micro-consulting on an individual basis.

The Kippa app was designed to provide high-frequency data for firms enabling us to track the impact of our treatment on recorded items such as sales, stock, profit, etc. Details on the two treatment arms will be discussed in the subsequent passage.

The pilot study revealed a compliance rate of about 28 percent (83/396) for the first-time adoption of the bookkeeping app but erratic use of the app. The endline assessment was completed three months after the baseline in December 2023. The primary instruments for baseline and endline surveys aimed to collect demographic information (including ethnicity and religion), business management capacity, household expenditure, record-keeping behavior, record-keeping constraints, digital technology usage, training needs, preferred training methods, business constraints, current practices, loan capacity, and interactions with government and loan agencies.



## 5.1 Sample and Random Assignment

Our primary focus centered on Lagos markets, characterized by their organized structures and market associations. As discussed below, our attention was directed toward specific industries or product types. The initial baseline, commencing in mid-2022, comprised 982 firms. With additional support, we expanded the baseline in mid-2023 to encompass an additional 946 firms, resulting in a total of 1,928 firms. We specifically targeted firms likely to be receptive to training. For the additional baseline, we inquired whether the firms had a mobile phone, as the initial pilot revealed that about 77.8 percent of small business owners in Lagos possessed one.

Before proceeding with randomization, we contacted all baseline vendors to confirm their interest in the four-month training. Unfortunately, we experienced a 47 percent loss during this process, with only 1,036 firms confirming their agreement. This loss was anticipated, and the field team was advised to reach out to a larger number of people, considering the possibility that some firms might lack a stable mobile phone.

It is noteworthy that the decision to use WhatsApp as a training method was influenced by findings from the baseline. Although the initial plan was to have a pure control group, power analysis revealed that dividing the group into three would make detecting the minimum effect size difficult. The 1,036 firms were then randomly assigned to either treatment 1 (App + micro-consulting) or treatment 2 (App only) using a blocked design, with gender, market location, and product type as blocking criteria.

During the second phase of calling firms and adding them to WhatsApp groups, we encountered a 62 percent rejection rate, with only 396 firms agreeing to join the groups. One significant challenge was the extended time it took to add firms to the groups compared to our initial contact point. For instance, firms from the mid-2022 baseline were called to join the groups in mid-2023, resulting in a disconnection period of over a year. Although they had initially agreed to join the training a few months before, the idea of using WhatsApp, combined with the lengthy time it took, triggered some concerns and eventual rejection.

	<b>Treatment1</b>	<b>Treatment2</b>
<b>Unwilling</b>	311	354
<b>Willing(WhatsApp)</b>	207	169

Table 1: Comparison of Treatment1 and Treatment2

## 5.2 The Design

Due to the aforementioned challenge, we had to focus on two types of analyses based on the research question. The first considered firms that were willing versus unwilling, eliminating causal interpretation. The second compared randomly assigned firms that received additional consulting to those who only received the app. The key question for the first analysis was whether more intensive personalized information than more traditional training increased the chances of firms becoming first-mover adopters of the app compared to those unwilling.

In cases where a comparison between willing and unwilling firms was necessary, concerns arose about self-selection into the willing group. The table in this section (refer to Table 2) indicates that there were no systematic differences between those who were willing and unwilling at baseline, particularly regarding previous record-keeping practices. This suggests that unwilling firms declined to join for reasons other than those influencing the outcomes. Further inquiry revealed that the main reason was a lack of trust.

The final design engaged 376 firms that joined the WhatsApp group, with 55 percent in treatment 1. Both groups underwent the first two weeks of general training on work-life balance to integrate them and mitigate any treatment effects directly correlated to the outcome. We curated training videos related to the curriculum designed for record-keeping over a month. Initially, we focused on record-keeping as firms needed to grasp the concept before effectively interpreting the impact of digital apps. Subsequently, both groups received intensive WhatsApp training on record-keeping, covering best practices such as profit calculation, separating business from personal funds, maintaining records, understanding sales journals, and more.

We embedded these videos on YouTube to measure engagement, which was impressive in the first week but subsequently declined. To supplement those with limited data or time to watch videos, we introduced text-curated content training.

Additionally, we introduced quizzes within the WhatsApp group to prompt engagement and assess learning progress. We were keen on understanding whether firms were actively learning, and training associates engaged with firm owners in both groups via personal WhatsApp messages. This approach applied to both groups. After the training, we shared a video demonstrating how to operate the chosen app, divided into different sessions covering features such as profit calculation, accounting for salaries, stock management, and more.

Following the training, training associates actively conducted meetings with firms in the micro-consulting arm only for a more intensive, detailed, and personalized analysis of their records and record-keeping practices. This in-person support included reinforcing best practices, conducting business health checks, providing guided insights on accounting reports, highlighting growth opportunities, and focusing on financial flow.

Table 2: Baseline difference between treated and unwilling firms

<b>Characteristic</b>	<b>N</b>	<b>Category</b>	<b>Unwilling</b>	<b>Willing</b>
Keep records	1,046	Yes	453(68%)	146 (65%)
Take product home	607	Yes	273 (73%)	164 (70%)
Pay self salary	605	Yes	58 (16%)	31 (13%)
Mean Stock Held	566		7 (3, 20)	6 (3, 20)
Mean Years in business	1,030		8 (4, 15)	8 (5, 15)
Mean Age	1,039		38 (31, 45)	38 (30, 45)
Gender	1,046	Female	351(53%)	182 (48%)
		Male	314 (47%)	199 (52%)
Browse Internet	1,015	No	153(24%)	73 (20%)
		Unsure	7 (1.1%)	7 (1.9%)
		Yes	488 (75%)	287 (78%)
Education	1,044	Diploma/Degree	187 (28%)	132 (35%)
		Secondary or less	378 (57%)	195 (51%)
		Vocational Education	100 (15%)	52 (14%)
Mean Daily Profit	958		10,000 (4,500, 30,000)	10, 000(4,000, 25,000)

Continued on next page

Table 2 – continued from previous page

<b>Characteristic</b>	<b>N</b>	<b>Category</b>	<b>Unwilling</b>	<b>Whatsapp</b>
Previous training received	1,045		146(22%)	87(23%)
ProductType	1,039	Cosmetics	68 (11%)	45 (11%)
		Electronics	110 (17%)	65 (16%)
		Fabrics and Textiles	125 (19%)	84 (21%)
		Jewelries	46 (3.6%)	15 (3.8%)
		Kitchen Utensils	41 (6.4%)	13 (3.3%)
		Others	18 (2.8%)	6 (1.5%)
		Provisions	79 (12%)	43 (11%)
		Ready-made Dresses	46 (7.1%)	35 (8.9%)
		Stationaries	23 (3.6%)	20 (5.1%)
		Tiles and Building Materials	31 (4.8%)	15 (3.8%)
		Toiletries	28 (4.3%)	17 (4.3%)
		Women Shoes and Bags	53 (8.2%)	36 (9.1%)
Fin. training willingness	941	No	123 (21%)	95 (26%)
		Unsure	45 (7.8%)	35 (9.7%)
		Yes	411 (71%)	232 (64%)
Primary Method for records	687	Mobile App	4 (0.6%)	0 (0%)
		Others (Specify)	7 (1.6%)	3 (1.1%)
		Scattered Sheet of paper	19 (4.5%)	11(4.2%)
		Specific Book	396 (93%)	247 (95%)

2 Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test

### 5.2.1 Selection of Product Types

Various levels of complexity are associated with record-keeping practices, and these complexities are likely to influence the observed effects. The first complexity arises from the highly heterogeneous nature of the products sold by these firms. The second complexity is linked to the degree of informality or formality inherent in each firm. The third and final complexity is tied to the time constraints associated with the sales turnover of individual items per firm. For instance, there is a noticeable

<b>Product Type</b>	<b>Level of Complexities</b>
Car spare parts	Non-basic
Fabrics	Basic
Cosmetics	Non-basic
Fruits (Wholesale)	Basic
Food Stuff (Wholesale)	Basic
Kitchen Utensils	Non-basic
Electronics	Non-basic
Women shoes & Bags	Basic
Stationery & Books	Non-basic
Toiletries (Wholesale)	Basic
Tiles	Non-basic
Jewelry	Non-basic

Table 3: Selected Product Type in Lagos Market by Level of Demand Complexities

disparity in the time required to complete the sales of an electronic device compared to the sales of a similar unit of toiletries, both within and between enterprises. As previously discussed, the inherent variability in product types introduces additional heuristic complexities to record-keeping, potentially impeding the ability to discern differences between treatment and control groups.

In light of this, I narrowed down the sample to product types characterized by lower sales turnaround complexities and focused specifically on wholesalers. An exploratory study conducted in May 2022 aimed to identify these product types. The final constraint relates to the nature of demand for each product, considering both basic and non-basic product types. Basic products are those likely to experience higher demand compared to non-basic products. 3 displays the selected product types and their categorization based on market demand complexities.

More generally, we are focusing on product types where there is less heterogeneity in the varieties of products sold by each enterprise, but high homogeneity in the standards. For example, we considered enterprises selling similar brands of textiles but different sizes and types.

## 6 Empirical Strategy

### 6.1 Best Practices Interventions

To examine the effect of the experiment's best practices intervention, I conducted a binomial logistic regression, with 1 representing firms adopting the best practices and 0 indicating those that do not. The experiment's best practices encompass whether firms (1) take business products home, (2) maintain separate business accounts from personal funds, and (3) pay themselves a periodic salary. Below are the details of the simple empirical methods employed.

$$Y_{ij} | \sum_{i=k}^n = \text{ConsulApp}(\text{ITT})_i \varpi + \text{Baseline}_i \kappa + \text{Prdtype}_i \eta + e \quad (1)$$

$Y$  is a vector of best practices intervention with binary values at different  $K_i$  periods. The  $\varpi$  is the ITT of receiving the micro-consulting treatment. The  $\kappa$  measures baseline differences such as gender, how long the business has existed, the number of staff, average stock level, and whether firms have received training before. The  $\eta$  is a product-type fixed effect that may explain some of the variances.  $e$  is the error term.

### 6.2 Firstmover adoptors

I applied a similar method to assess the impact of first-mover adoption as discussed earlier for the best practices intervention. The only difference lies in the outcome variable, which is a binary variable indicating whether firms keep records or not. The panel comprises both baseline and endline data.

### 6.3 Precision of Profit

$$\text{Precision} = \rho = \frac{\text{cov}(X, Y, Z)}{\sigma_x \sigma_y \sigma_z}$$

$X$  = Reported profit at  $k_i$  week one.  $Y$  = Reported profit at  $k_i$  week one.  $Z$  = Reported profit at  $k_i$  week one. Also for  $\sum_{i=k}^n$

We did not measure profit in this research not because it is inherently noisy measure (McKenzie and Woodruff 2008), but because we anticipated that a record-keeping intervention would influence profit through changes in strategic decisions. This process typically unfolds over an extended period, and we aimed to observe these changes during the endline data collection period following the two-month intervention

## 7 Results

Turning to the main results, I will discuss them in the order of the hypotheses and provide additional findings.

### 7.1 The effect of micro-consulting on first-move adoption

In the initial layer, a key question is whether firms participating who received additional consulting are more likely to become early adopters of an e-bookkeeping app than those who received the WhatsApp training only. The results presented in Table 4 emphasize a 3.59 odds ratio for firms that received additional personalized support to the training in the WhatsApp group, indicating an increased likelihood of downloading and utilizing a record-keeping app for the first time compared to firms that only received information on digital record-keeping. This implies a 95 percent probability <sup>1</sup> that firms provided additional micro-consulting will take steps to use digital methods for record-keeping more than firms that were only provided with information about the benefits of the technology.

Figure 1 illustrates that, within the WhatsApp group that received the training, micro-consulting emerged as the primary catalyst for the initial adoption effect. The percentage of male-owned firms that solely received beneficial information was 9.6 percent, contrasting with 45.1 percent for those that also received additional micro-consulting, highlighting its substantial benefit for male-owned businesses. Similarly, for female-owned firms, the percentage increased from 14.4 percent to 29.3 percent with the inclusion of micro-consulting.

It's worth noting that both firms in treatments 1 and 2 received a modest incentive of N500 (0.5 USD) to download the app, intended to cover data costs for

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<sup>1</sup>Odds ratios converted to probability; probability ( $p$ ) can be derived from odds ratio ( $OR$ ) using the formula  $p = \frac{OR}{1+OR}$

Micro-consulting intervention improves first-move adoption of digital record-keeping

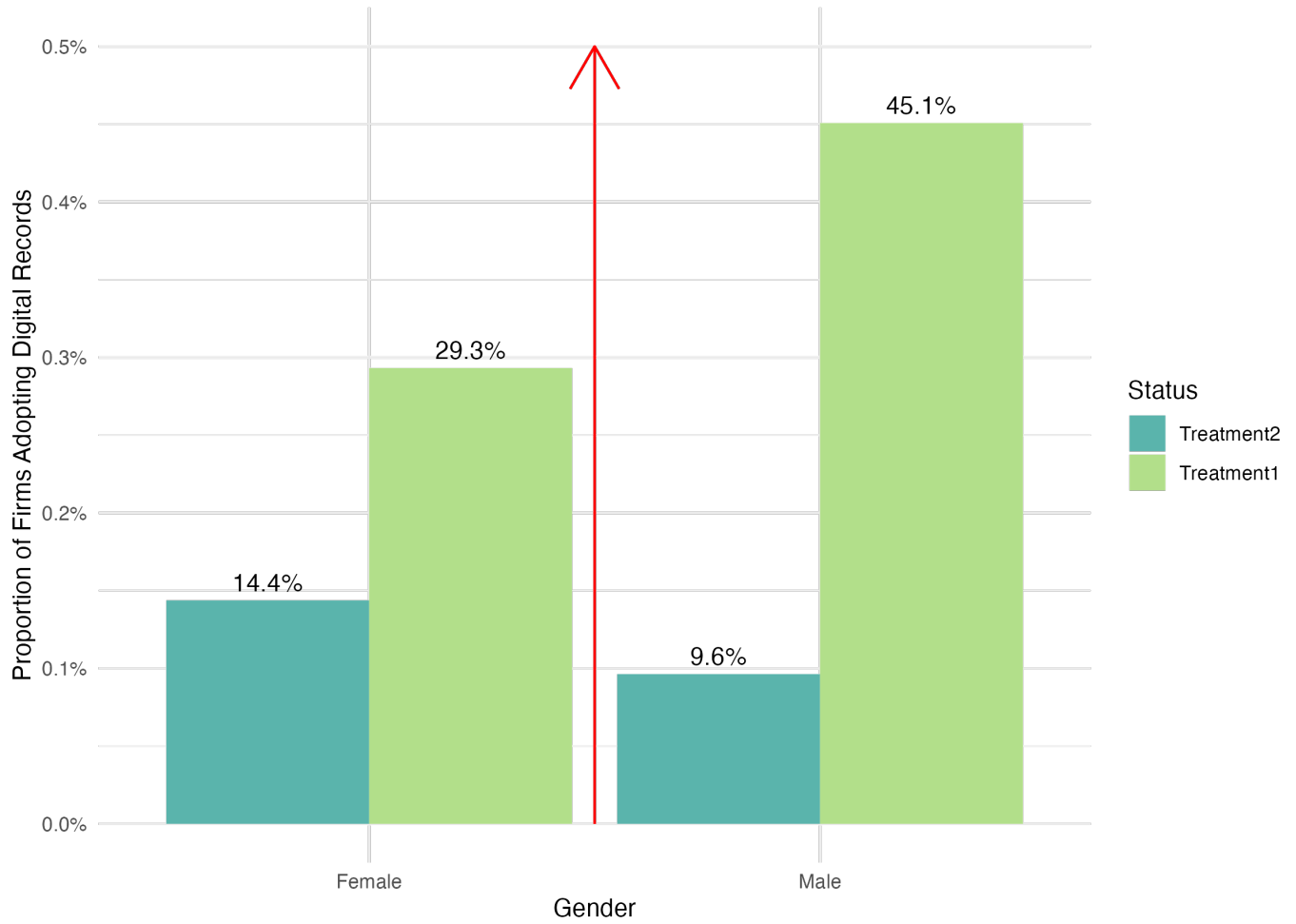


Figure 1: Micro-consulting and App Only Intervention by Gender



the first week. However, this incentive may have had a slight influence on adoption, considering that most firms report a daily profit of 10 USD <sup>2</sup>. It's important to mention that this incentive was introduced to both groups.

## 7.2 Willing Firms vs. Unwilling Firms Effect of Best Practice

Secondly, I investigated whether firms that received additional consulting adopted best practices more than those that received the app without additional in-person support. This extended support included a more detailed and customized usage of the app, adherence to best practices, a comprehensive business health check, guided insights on accounting reports, a focus on financial flow records, and general bookkeeping (see Table 6). I observed that firms randomly assigned to receive micro-consulting support were more likely not to take business products home and maintain business records than those unwilling to join the training such support by odds as high as 16.3 and statistically significant and they were also more likely to pay self salary with as odds of 1.1

Due to the study design for this research question lacking the capability for full causal interpretation or comparison against a similar random group, the reason why firms in the training program exhibit this effect is vague. Additionally, it is unclear whether this effect is solely driven by treatment 1, as evidenced by a negative interaction effect of -0.67.

While one might argue that there could be a tradeoff between firms taking business products home or paying themselves, it seems less likely that firms would avoid both actions. However, the results do not support this direction, and a more insightful analysis would involve making comparisons across randomly assigned groups. Nevertheless, we discovered positive associations between receiving WhatsApp training and various financial best practices outcomes, such as firms taking products home, paying oneself a salary, and separating personal funds from business funds.

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<sup>2</sup>Profit, in this context, refers to the amount firms believe they earn after deducting expenses from sales for their entire business

Table 4: Effect of Micro-consulting treatment Whatsapp training on first-time app adopters and financial best practices

	<i>Odds Ratio</i>					
	App Download	Take Product Home	Keep Records	Methods Profit	Separate Personal Fund	Pay Self
	(1)	(2)	(3)	(4)	(5)	(6)
Ref: (App only)	-	-	-	-	-	-
App + consulting	3.596** (1.485)	1.135 (1.918)	0.728 (1.268)	4.203* (2.411)	1.297 (1.287)	0.986 (1.373)
Ref:(unwilling)	-	-	-	-	-	-
Whatsapp		16.395*** (1.964)	0.562 (1.315)	0.988 (2.904)	1.485 (1.389)	1.183 (1.419)
Past training	1.169 (1.556)	0.977 (1.695)	2.013 (1.256)	1.421 (1.977)	4.111*** (1.455)	0.652 (1.489)
Stock Quantity	1.000 (1.559)	1.001 (1.690)	1.001 (1.233)	1.002 (2.166)	(1.372)	(1.362)
Diploma/Degree	-	-	-	-	-	-
High School or Less	1.173 (1.559)	0.486 (1.690)	0.610 (1.233)	2.955 (2.166)	0.610 (1.372)	0.790 (1.362)
Artisan training	3.509 (5.004)	0.541 (5.694)	0.043 (3.713)	0.00000 (0.000)	1.064 (1.395)	0.771 (1.436)
Gender -	-	-	-	-	-	-
Male	1.035 (1.607)	0.575 (1.753)	0.766 (1.254)		1.552 (1.301)	0.582 (1.350)
Staff	0.882 (1.119)	0.997 (1.145)	1.558 (1.097)	1.176 (1.190)	1.210 (1.093)	1.233 (1.080)
Years in business	0.928 (1.032)	1.045 (1.027)	0.974 (1.011)		1.001 (1.003)	0.985 (1.017)
Constant	0.380 (1.869)	0.220 (2.687)	2.883* (1.478)	0.000 (Inf.000)	0.864 (1.543)	0.276 (1.564)

Observations	242	147	569	278	452	602
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Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

*All models control for product types*

*And the interaction of treatment and training\_status (Unwilling vs WhatsApp)*

Furthermore, I observed that the supported firms in the micro-consulting arm utilized the app more frequently than those relying on methods that do not include the app, with odds of 4.2, which is statistically significant at the 10 percent level. Subsequent findings indicate that firms employing app-based methods for tracking profits receive some rewards for doing so. This observation aligns with the information presented in Table 2, Model 4, where firms receiving micro-consulting demonstrate a more purposeful use of their apps.

### 7.3 Does digital method increase the precision of profits?

Finally, we investigated the correlation between the methods firms use to keep records and their reported profits over an extended period. We asked firms to recall the profits of one of their top three best-selling products over 3 weeks. Conducting a Pearson correlation of these reported profits, as shown in Figure 3, revealed that firms using an e-bookkeeping app as part of their record-keeping methods (all methods) exhibit higher correlations between profits recalled over three weeks, up to 98.7 percent.

In contrast, firms that mainly rely on paper correlate 75 percent. This indicates that firms using an e-bookkeeping app are more likely to precisely recall their profits, and depending on paper may not be reliable. From figure 3 firms that rely mainly on memory also reported highly correlated profits compared to firms that use only paper. This draws attention to the fact that the biggest advantage of using technology for recalling profits may not be against paper only.

To delve deeper, I investigated whether the average number of years in business influences the adoption of e-bookkeeping apps for profit records. I discovered as shown in Table 5 that individuals who use an app generally have more years of business experience compared to those who primarily rely on paper and memory. While this result may undergo further evolution as the sample size increases, it implies a departure from the observed trend where more experienced firms tend to keep fewer

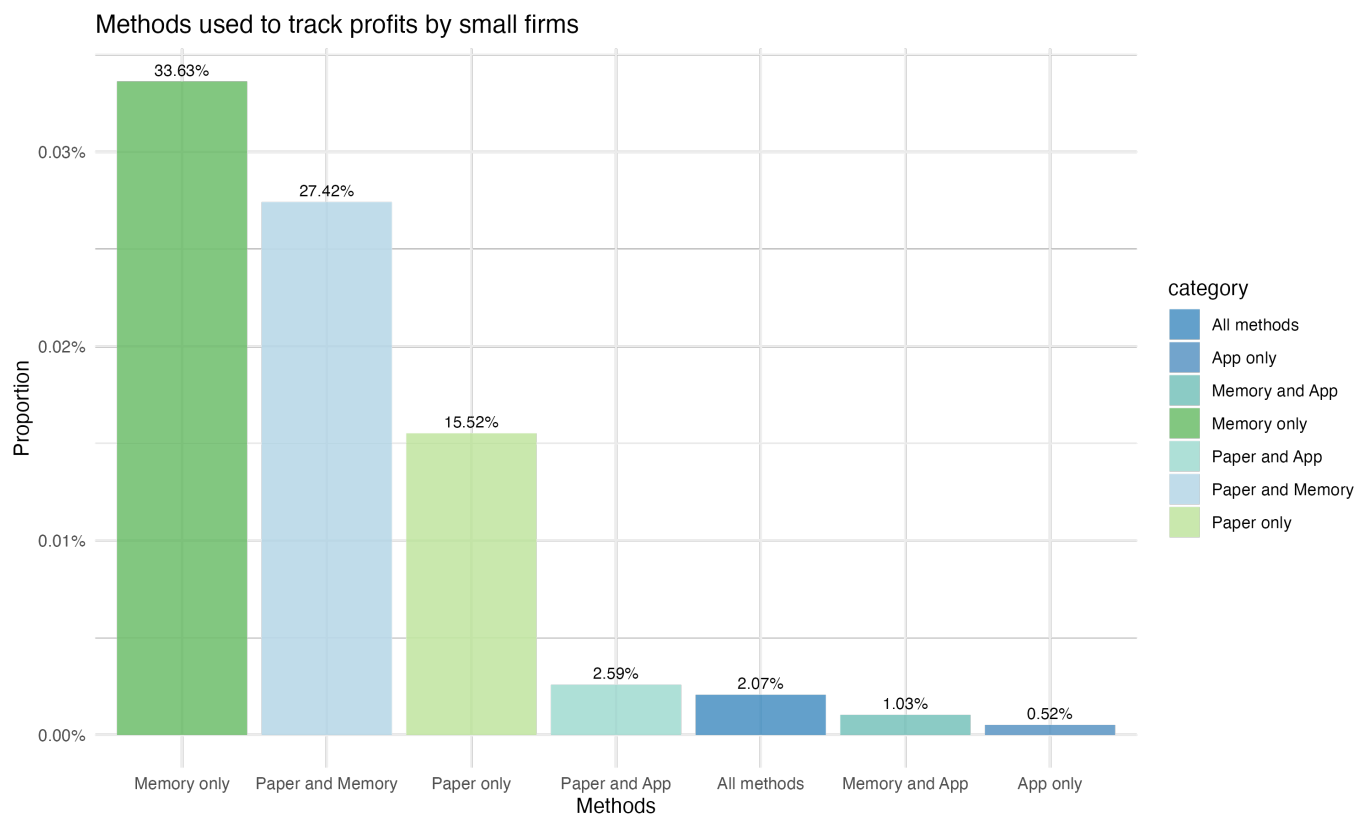


Figure 2: Methods used to track profit: endline only.

records. This suggests that, in contrast to the overall trend, e-bookkeeping apps may be particularly effective for specific purposes, such as managing stock, where reliance on memory or paper is less common, as observed earlier in the paper or memory methods used by most firms in the sample.

<b>Methods</b>	<b>Mean years in business</b>
All methods	6.25
App inclusive	13.5
Memory only	10.7
Paper mainly	10.8

Table 5: Methods for calculating period by mean years in business. endline only.

The advantage of record-keeping for stock management and improving business partnerships has not been tested in the research. Baseline data shows that small businesses that keep records desire accurate records, with almost 90 percent wanting real-time updates on their stock and around 81 percent desiring precise knowledge of their profits, or at least a value very close to the exact amount. Stock management is likely the most important reason small firms may need digital record-keeping, but it stands from our assessment of e-bookkeeping apps in Nigeria that functionality still lags. It is important to stress that precision, indicating the ability to obtain consistent results over time, is not synonymous with accuracy, which refers to the extent to which firms can ascertain the true value of their profits.

## **7.4 Additional findings: What drives record-keeping behavior?**

A more focused analysis on whether firms keep general records or not revealed that factors such as firm owners having more staff, received past training experience, and possessing a degree or diploma (compared to the largest group with a high school education) were significant predictors of which firms maintained a record, compared to none at all. Men were significantly more likely to keep a separate business account than women while women performed better in other best practices but results were not statistically significant.

An interesting finding arises as we observe that experienced firm owners are less likely to maintain business records. These businesses may heavily rely on memory as a critical resource for decision-making, especially when assessing profits from their products. While the majority of small businesses (65 percent) prioritize memory over

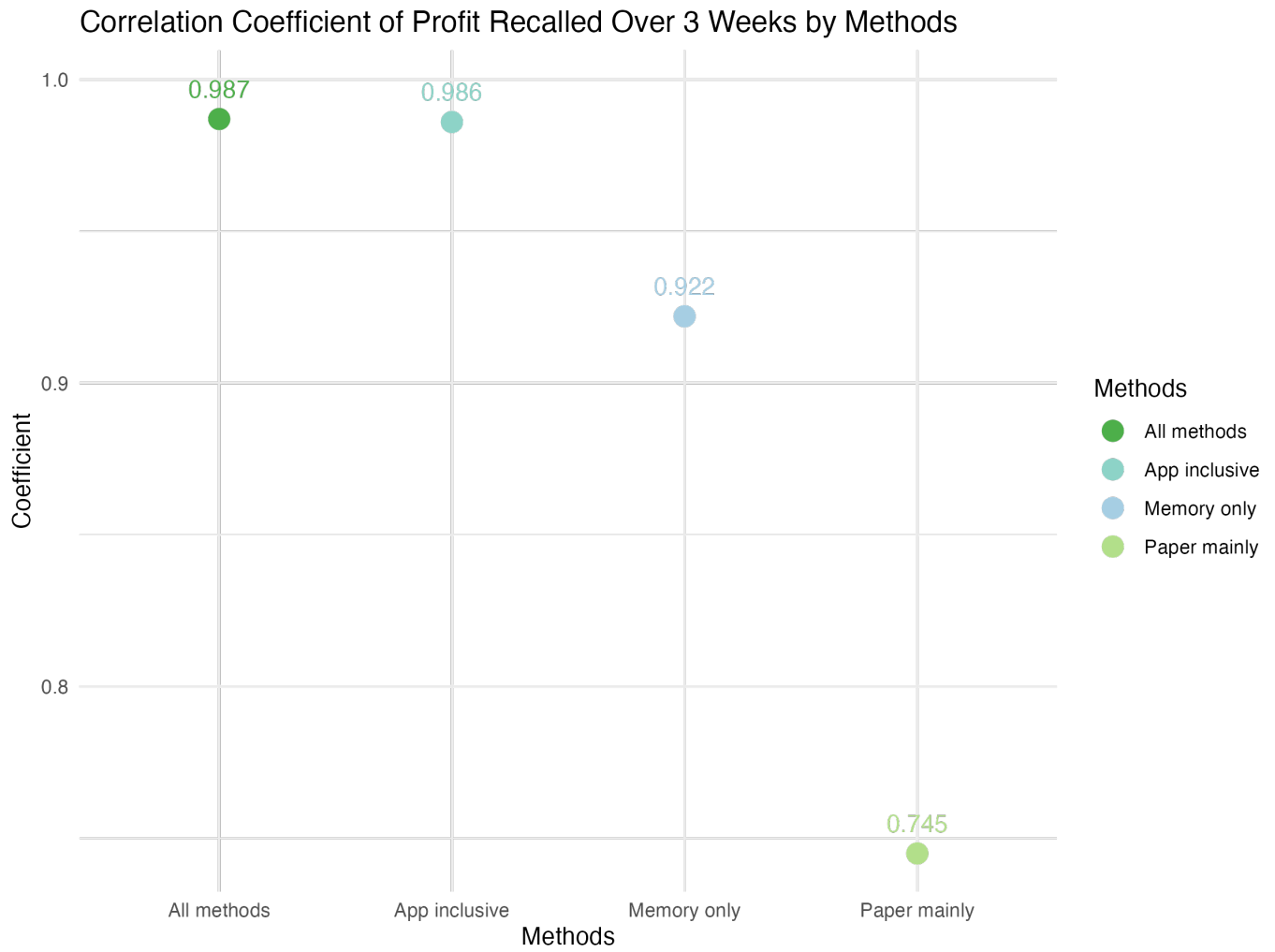


Figure 3: Correlation Coefficient

written records (52 percent) in decision-making, many employ a combination of both methods. Our in-depth qualitative research delved into traditional record-keeping methods, and the underlying reasons for this will be summarized and published in a separate report. It appears that businesses with experienced owners may draw on their extended understanding of their operations and relationships with suppliers to inform their decisions. However, I will demonstrate in the subsequent discussion that this reliance on memory may impact the precision of their measurements, and firms that adopt digital record-keeping may not be influenced by business experience.

## **8 Discussion and Summary**

Understanding the behavior of small firms in developing countries has long remained a mystery, primarily due to a lack of record-keeping among many of these firms. For those that do maintain records, the use of paper or memory is common, practices that may not align with the best standards for scaling, obtaining loans, establishing business partnerships, managing stock, or making strategic decisions based on data and business patterns.

This pilot study aims to uncover whether offering personalized and direct information about the use of digital records can motivate firms to adopt them for the first time, as opposed to merely informing them about the potential benefits. This individualized approach may prove especially valuable for firms where nearly 75 percent have no more than a high school or vocational education. Additionally, the study explores whether additional consulting can enhance best-practice interventions. Although we found support for both claims, it's important to note that most of the findings were not statistically significant. This lack of significance is not surprising, given the pilot study's sample size and the reluctance of many firms to participate.

The research is constrained by a low sample size, attributed to a delayed start of the intervention, leading to a lack of trust among firms. Furthermore, a few firms discontinued using the app after the initial weeks, preventing the paper from demonstrating the benefits of digital record-keeping with prolonged usage. Future research should focus on integrating traditional methods with new technology, such as artificial intelligence for optimal character recognition. This integration allows firms to continue using digital apps even when records are not maintained digitally in real-time.

Additionally, the attrition of firms after joining the training group did not significantly impact the research. We assessed the attitudes of firms that ultimately joined the WhatsApp group through quizzes and YouTube engagement records, revealing higher engagement with only about a 1 percent dropout rate.

I would like to highlight areas for future research. First, the design to tease out the effects of e-bookkeeping versus non-record keepers must not be underpowered, especially considering that adoption rates still tend to be low. Second, we discovered that firms adopting technology are likely to do so in conjunction with other traditional methods. This suggests that future research should allow firms to use technology alongside their paper records until the switching cost is low, and they fully grasp the advantages of technology. Another crucial aspect is that research using technology from third parties may be limited by available resources. Although we found a better app after the intervention had commenced, that could allow us to track firms using the app with additional features for marketing, these features must remain within the researcher's control. Future research should consider influencing firm owners to adopt the app as a first step, allowing for non-real-time use of technology, possibly through OCR methods to capture images of paper records initially.

Lastly and more importantly, the pathways for keeping paper records differ from those of using an app or technology. I found that firms with more experience in business tend not to keep records in general but are more inclined to associate with using apps. This suggests that research should focus on specific advantages of using an app, such as stock management, loans, or business partnerships. Therefore, the sample should be tailored to these categories, potentially increasing adoption and allowing the research to concentrate on the specific group that may benefit the most. It is evident from our qualitative study that some firms will never keep records, primarily because the marginal benefit will never outweigh the marginal cost.

The optimal policy involves offering firms willing to embrace technology simple training on financial best practices, as opposed to general record-keeping. This approach has demonstrated improvements in firms' adherence to these practices compared to those that do not participate.

These results carry implications for the precision of firms' profit reporting. Policymakers and nonprofits interested in enabling firms to track their profits, especially in



specific features like stock management, should recognize that digital methods have shown greater precision than paper or memory. However, it is crucial for policies to acknowledge that the benefits of record-keeping on paper for firms may differ from those experienced with technology. This distinction suggests that target beneficiaries may need to be adjusted accordingly.

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Table 6: Micro-consulting Activities

<b>Activities</b>	<b>Description</b>
Reinforcing Best Practices	<ul style="list-style-type: none"> <li>- Emphasizing the importance of separating personal and business finances for clarity and accountability.</li> <li>- Stressing the significance of recording personal use of business products as expenses for accurate financial documentation.</li> <li>- Collecting regular data on best practices in record-keeping and providing follow-up advice to firm owners.</li> <li>- Providing support based on questions such as paying oneself a salary, separating business and personal money, recording business product usage, and updating inventory.</li> </ul>
Business Health Check	<ul style="list-style-type: none"> <li>- Assessing the overall well-being of businesses to identify trends, areas for improvement, and growth opportunities.</li> <li>- Listening to various challenges to identify pain points.</li> </ul>
Guided Insights on Accounting Reports	<ul style="list-style-type: none"> <li>- Providing personalized guidance on understanding and interpreting accounting reports from App and paper bookkeeping records.</li> </ul>
Opportunities for Growth	<ul style="list-style-type: none"> <li>- Highlighting the possibility of linking firm owners with larger NGOs and government institutions supporting small firms.</li> <li>- Building alliances, for instance, with the Lagos State Employment Trust Fund for loans and grants to support small businesses.</li> <li>- Stressing the importance of maintaining detailed business and financial records to qualify for growth opportunities.</li> </ul>
Focus on Financial Flow	<ul style="list-style-type: none"> <li>- Emphasizing that sustained financial flow records over time are crucial for attracting potential partners.</li> <li>- Encouraging vendors to focus on long-term financial performance as a key factor for success.</li> </ul>

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