Compensation preferences in agricultural insurance among smallholders in rural Kenya

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Preliminary draft

Abstract

Despite the high incidence of adverse weather shocks, the demand for agricultural insurance remains stubbornly low, even among risk-averse smallholder farmers with poor access to social safety nets. Two major barriers to adoption concern (i) cyclical illiquidity in agriculture households and (ii) the lack of trust in insurance providers. Standard insurance contracts that provide compensation for losses as a lump sum over an uncertain time horizon post-harvest exacerbate these concerns. In this study, we leverage recent advancements in digitally-enabled loss estimation and payments infrastructure to modify contracts in a manner than can address these barriers. We test whether allowing farmers greater choice in structuring compensation transfers from agricultural insurance reveals preferences for earlier and/or smaller transfers and secondly, whether farmers value an insurance product with customized compensation preferences more than a standard contract. We pilot this innovation through a randomized control design over one agricultural season among 1600 farmers in Kenya. We compare farmers payment preferences, and estimate differences in willingness-to-pay (WTP) and uptake for a contract offering customized compensation compared to the standard contract. We test for differences in preferences across gender, access to liquidity and other characteristics captured through a single in-person survey round. We measure time preferences at multiple points through the season using an innovative USSD-code based platform to describe the effect of seasonal liquidity and preferences on the timing and size of transfers.

Keywords: Crop insurance, Agricultural risk, Time preferences, Liquidity
JEL codes: D91 (Role and Effects of Psychological, Emotional, Social, and Cognitive Factors on Decision Making), D15 (Intertemporal Household Choice), O16 (Economic Development: Financial markets), O13 (Economic Development: Agriculture)
Trial Registration: https://doi.org/10.1257/rct.15731-1.0
Funding: This study is conducted with funding from the Women's Economic Empowerment and Digital Finance (WEE-DiFine) initiative of the BRAC Institute for Governance and Development.

1 Introduction

Inadequate insurance against weather shocks negatively affects both the welfare and productivity of rural households dependent on agriculture. Smallholder households experience adverse effects on consumption (Kazianga & Udry, 2006), health and education outcomes (Alderman and Paxson, 1992, Maccini and Yang, 2009), migration, labour force participation (Bryan et al., 2014), accumulation of assets (Rosenzweig and Binswanger, 1993, Morduch, 1995) and productive investments (Dercon & Christiaensen, 2011), when exposed to extreme weather events. With accelerating climate change, formal financial risk-sharing can play an important role in preventing rural poor from getting trapped in chronic poverty (M. R. Carter and Barrett, 2006). Market failures, high transaction costs and under-performing products have historically hindered both the supply and demand of agricultural insurance to vulnerable farmers. Improvements in index-based insurance, which alleviates concerns of information asymmetry and reduces the costs of loss assessment, has expanded supply in the last two decades (Barnett and Mahul, 2007). However, the demand for crop insurance still remains extremely low. Take-up rates range between 5-20% among smallholders in Africa and South Asia, despite the potential for large gains from insuring crop production (Cole et al., 2013). Several reasons have been identified for the poor demand for index-based insurance among smallholder farmers, such as the presence of basis risk, low levels of trust and financial literacy, lack of liquidity and time discounting (M. Carter et al., 2017).

Households that depend on agriculture are characterized by cyclical incomes, and in the absence of well-functioning financial markets, farmers adopt multiple ways to smooth consumption (Morduch, 1995). Transfers in a standard insurance contract mimic agricultural income flows and make consumption smoothing harder for farmers who lack financial access. Premiums are required to be paid ahead of the cropping season when opportunity costs are high, and compensation for losses is disbursed over an often unannounced period post-harvest when farmers' liquidity improves. Insurance adoption is thus lower among those who face severe liquidity constraints ahead of harvest (Cole et al., 2013, Giné and Yang, 2009). Additionally, the transfer of income over time makes insurance unappealing to those with high discount rates (Casaburi & Willis, 2018). Multiple studies show that tailoring transfers to farmers' seasonal cash flows can improve the adoption of productive technology and improve incomes (Duflo et al., 2011, Beaman et al., 2014, Burke et al., 2019, Fink et al., 2020). In the context of insurance, contracts that delay premium payments until harvest witness significant improvements to adoption of up to 70% by overcoming both liquidity and behavioural constraints (Casaburi and Willis, 2018, Belissa et al., 2019, Liu et al., 2020). A second major barrier to adoption is the poor understanding of insurance and lack of trust in the insurance provider. Low financial literacy in under-served regions and the difficulty of learning about insurance through experiencing payouts leads to poor uptake (Cai and Song, 2017). Compensation payment delays, in addition to prevalent basis risk, contribute to an environment of poor trust in insurance providers as they introduce additional uncertainty in the probability distribution of outcomes from insurance. Traditional methods of insurance loss assessment that rely on data from crop cuts or physical weather gauges are particularly restrictive and prone to delays and have dissuaded insurance adoption among vulnerable farmers in countries like India (Ghosh et al., 2021).

Protracted post-harvest compensation payments thus affect insurance adoption by reducing trust, increasing the time lag between premiums and payouts, and dampening its ability to smooth consumption or undertake recovery investments in the same or subsequent cropping season following a shock. Contracts that can provide compensation without delays and prior to harvest increase access to liquidity during the "lean" or "hungry" season in which poverty and malnutrition increase, as documented in several developing societies [1] including in Kenya (Swift, 1989). Recent improvements in methods to assess losses and the prevalence of mobile and financial technology make it possible to improve the timeliness of insurance compensation to farmers in remote rural areas. In a standard weather-index insurance product, crop losses are assessed at the end of each defined crop growth stage, but are aggregated at the end of the season and disbursed in a single lump-sum transfer from the insurance company to the farmer. Each assessment stage accounts for a fixed proportion of the total sum insured depending on the contribution of that stage to total yield loss as determined by agronomic experts. New data sources such as satellite data and internet-linked on-the-ground sensors allow for real-time data collection and index measurement using modeling and machine learning based predictive techniques. Furthermore digital payment platforms using mobile money make it easier for payments to reach farmers faster and in more customized ways. As a result of these advancements, index-based agricultural insurance contracts can now be modified to provide compensation payments at the end of each crop growth or assessment stage, including prior to harvest. However, since each stage represents a proportion of the total insured amount, earlier compensation can also only be provided in installments, i.e through transfers which are smaller in size relative to lump-sum compensation provided under standard insurance contracts.

Evidence from literature indicates that there is a strong preference for receiving larger and more infrequent transfers particularly among those experiencing poverty or low access to finance (Brune et al., 2021, Casaburi and Macchiavello, 2019, Kramer and Kunst, 2020, Brune and Kerwin, 2019, Kansikas et al., 2019). Demand for deferred or infrequent payments arises from the need for inexpensive savings or commitment devices, to undertake large expenditures and investments, and to avail arbitrage or bulk buying opportunities. These studies are less clear on whether the demand for lumpiness differs among those with varied agency over transfers, such as among women, who may lack bargaining power within the household (Doss and Quisumbing, 2020, Suri and Jack, 2016). Preference for crop insurance compensation provided in installments involves a trade-off between preferences for earlier transfers and preferences for lumpier transfers. These preferences may also differ between farmers based on the extent of their access to and decision-making over the transfer.

In this study, we aim to (i) understand farmers preferences for scheduling compensation transfers from insurance given the trade-off between installment size and timing, and (ii) assess the potential for insurance contracts that offer customized compensation schedules to improve insurance adoption among smallholder farmers. We leverage recent digitally-enabled advancements in yield estimation and financial platforms to improve the timeliness of index-based crop insurance compensation by allowing farmers greater choice on the scheduling and size of incoming transfers. Through this contract modification, which we refer to as "timely pay" insurance, farmers can choose to receive compensation at the end of each assessed stage or accumulate compensation over multiple stages and receive it at a time they feel they most need it. Transactions are made using mobile money directly to the beneficiaries account on chosen dates improving transparency and ease of use. We pilot this contract modification within an weather-index based insurance policy in Kenya. We analyse how farmers choose to receive payments when provided a choice to do so, and examine differences in payment preferences based on gender, empowerment, financial decision-making power, experience of food insecurity and time discounting. We measure willingness-to-pay (WTP) and uptake for the "timely pay" insurance product compared to the standard insurance product through a randomized control design over one agricultural season, and analyse these differences for heterogeneity across gender and other characteristics.

[1] See Devereux et al., 2008 for a review.

We conduct the study with 1600 farmers in Elgeyo-Marakwet, Uasin Gishu and Nakuru counties of west central Kenya where most farmers rely on rains for irrigation yet remain uninsured for weather shocks. We collect data on willingness-to-pay, access to liquidity, and standard socio-economic and demographic indicators through a personal interview and measure uptake using administrative data. Over one season of implementation, during the short rains season in 2023-24, we were able to successfully pilot the "timely pay" contract together with an insurance provider offering farmers compensation transfers over customized payment schedules. We find that farmers exhibit a strong preference for receiving compensation in tranches and sooner than is typically provided in standard insurance contracts. Farmers are also willing to pay significantly more for a contract that allows them to customize transfer schedules, particularly if they prefer quicker or smaller transfers. We find no impact on uptake of insurance in the season of implementation. We find evidence to indicate that economic empowerment levels and gender mediate preferences. This draft outlines the pilot study and preliminary analyses. Section 2 provides an overview of the methodology, including the intervention and research design. Section 3 and 4 outline the data collection and empirical strategy. Section 5 provides a brief overview of the context and Section 6 showcases preliminary results.

2 Methodology

We use an experimental design to study farmers' preferences for customization in the transfer of insurance compensation for crop failures and study its effects on demand among smallholder farmers in the primarily rain-fed Rift Valley region of Kenya. We sample farmers interested in purchasing a weather index-based crop insurance contract for the upcoming season. We first introduce the concept of customized insurance transfers to farmers and record their preferences for the timing and size of transfers. Respondents can choose to receive insurance compensation in up to 4 transfers spread over 6 months of the cropping season. In doing so, the policy (a) allows farmers to determine the transfer size and timing most suited to their needs, (b) reduces uncertainty regarding payment horizons and (c) makes (parts of the total) compensation available before the end of the season, thus improving the farmers' adaptive capacity to weather shocks in the current season itself. We record farmers' willingness-to-pay for both a standard insurance contract and the customized transfer contract to allow relative comparison within individual. We then randomly vary the offered insurance contract and measure differences in uptake between respondents offered a standard contract and the customized transfer contract.

The underlying insurance product is designed and implemented by Acre Africa, a microinsurance service provider in East Africa, and utilizes a soil moisture index to assess crop losses. Throughout the crop's growth cycle, the amount of soil moisture in various insured locations is monitored using a combination of satellite data and in-field sensors. Index ranges that deviate from the historical norm for that location trigger proportional compensation payments up to a maximum sum insured. The insurance product covers four crop growth stages - germination, vegetative, flowering and pre-harvest - with each stage accounting for between 20-40% of the total payout for a crop depending on their relevance to the final yield. Each stage spans a pre-determined calendar window divided into 10-day blocks. If the measured soil moisture index is above the historical average for a 10-day block, the product triggers a payout. The compensation increases proportionally with each affected 10-day block, up to the maximum insured amount for that crop growth stage. If the index exceeds a predetermined exit point, the farmer is eligible to receive the maximum compensation for that growth stage. The commercial price of the insurance is 6.5% of the total sum insured, with the typical policy priced at 500 KES (Kenyan Shillings, approximately 3.8

USD) for a total compensation of 7500 KES.

Insurance is marketed ahead of the growing season by Acre Africa's network of progressive farmers, known as *champion farmers*, who visit interested farmers in their village or neighbouring villages and assist them in registering for insurance. All insurance operations are conducted remotely through mobile phones and transfers are made using only mobile money, both widely prevalent in Kenya. Farmers formally register for insurance through a short Unstructured Supplementary Service Data (USSD) system and pay the premium via the mobile money system, M-PESA. Farmers who complete a transfer are sent a confirmation of the transfer and coverage level by SMS within one week of payment. At the end of the season, farmers who are deemed by Acre Africa to be eligible for compensation will be sent the appropriate amount via the same M-PESA account. For this study, champion farmers will not only introduce the standard commercially available crop insurance contract but also the treatment (customized transfer) contract which we refer to as "timely-pay" insurance. They also collect the data for the study, including the willingness-to-pay exercise and complete insurance sales.

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2.1 Intervention

The evaluated intervention modifies the standard weather index-based crop insurance product to introduce customization in insurance compensation transfer schedules. In the standard insurance policy, the eligible payout from each stage is aggregated at the end of the agricultural season and the total compensation is transferred to the farmer as a lump sum. The timing of the transfer is typically not announced beforehand and can vary based on the time taken to complete and review assessments. In the "timely-pay" intervention, the eligible payout from each stage is made available to the farmer as soon as the assessment is complete. Farmers' preferred transfer schedules are recorded by the champion farmer and shared with the insurance provider. The insurance provider, Acre Africa, assesses the payout due at the end of each growth stage according to a pre-determined term sheet using current soil moisture index measurements. They then disburse the accumulated payout at requested intervals through mobile money.

In this study, respondents can receive the eligible payout at the end of each growth stage, or combine them into larger transfers. We allow respondents to receive up to 4 transfers within a 6 month window extending from one month after the typical start of the season till the typical end of the harvest. Recruited champion farmers first explain the details of the standard insurance contract using a brochure and video to respondents, and then introduce the intervention offering customized compensation as new product being developed. They record farmers' preferred payment schedule using a using a simple tactile survey tool developed specifically for this purpose as described in detail in Section 2.3.4. Farmers are invited to express their maximum willingness to pay for both the standard and intervention contracts. They are informed that they will be offered the opportunity to purchase a randomly allocated contract (standard or treatment) at a randomly allocated discounted price if their WTP is above the discounted price.

2.2 Experimental design

Our pilot measures farmers' preferences for compensation transfers from crop insurance and compares demand for an insurance contract that offers farmers customized transfer schedules ("timely pay") and a standard insurance contract. The pilot is conducted in 3 counties – Elgeyo-Marakwet, Uasin Gishu and Nakuru – in west central Kenya, over one agricultural season between November 2023 and February 2024, known locally as the Short Rains season. We recruited and trained 30 champion farmers to survey and market crop insurance to 1600 farmers in the study locations. Champion farmers marketed insurance as they normally would, selecting farmers into the study if they expressed an interest in crop insurance for the upcoming short rains season. This screened sample of farmers, regardless of gender, are invited to participate in the study by answering a short survey. Farmers who either have their own M-PESA account or have decision-making power over a household member's M-PESA account are deemed eligible to participate in the willingness-to-pay (WTP) exercise and enroll in insurance. Willingness-to-pay is elicited using an incentivized multiple price list (MPL) mechanism for both the control and the treatment products from all farmers. Farmers are randomly assigned to receive either the treatment or control product and one of 4 discount levels, incentivizing them to reveal their true maximum WTP and uptake.

We collect data on various demographic, farming, food security, empowerment measures, time preferences, and the preferred payment pattern under a "timely pay" contract from all consenting farmers. We measure differences in WTP between treatment and control product for all farmers and analyse differences across gender. We also analyse differences in preferred payment patterns for all farmers and across gender. We will compare differences in uptake, and payout rates between those assigned to treatment and control. Our analysis will provide an insight on to the role of payout timing in shaping farmers preferences for crop insurance and shed light on the commercial viability for such an innovation.

3 Data

Data on the primary outcomes of willingness-to-pay and uptake, and covariates such as demographic and farming are collected in-person data collection round ahead of the study season between August and November 2023. Insurance operations are managed by our partner Acre Africa from enrolment till the end of the growing season of the Short Rains (November 2023 – March 2024) crop. During the season, we collect primary data on time preferences remotely, piloting a novel USSD survey method that allows us to collect behavioural data at multiple points throughout the season. At the end of the season, we utilize administrative data from Acre Africa through their USSD platform on insurance enrolment, paid-up premium, assessed losses and compensation provided to insured farmers.

Farmers in study villages who are approached by the champion farmer are screened for interest in purchasing crop insurance for the short rains season of 2023-24. Interested farmers were invited to participate a short survey administered by the champion farmers through computer assisted personal interviewing (CAPI) software. The survey collects data on various socio-demographic indicators, farming practices, and past experience of food insecurity during the months encompassing the short rains season. Some key indicators of economic empowerment drawn from the Women's Empowerment in Agriculture Index questionnaire and measuring input in farming decisions, ownership of land, access to and inputs in financial decisions are included in the survey.

At the end of the survey, farmers are introduced to the standard insurance product and are requested to participate in a WTP exercise through which they can become eligible to purchase crop insurance for the short rains season at a subsidized price. Once farmers have expressed their WTP for the standard product, champion farmers introduce the “timely pay” insurance product as a novel design that is being tested at random this season. Farmers participate in a simple tactical exercise to express their preferred payment pattern in a “timely pay” contract should they be offered one. They are then invited to state their WTP for the “timely pay” product. Once the WTP for both products have been stated, champion farmers reveal the randomly assigned discount price and randomly assigned insurance product to the farmer. If the farmers then wishes to progress with the purchase, they are guided on how to complete their enrollment via Acre Africa’s USSD registration system and pay the premium via M-PESA. Administrative data on enrollments, loss assessment and payouts will be received from Acre Africa at the end of the season in March 2024.

3.1 Willingness-to-pay elicitation

We elicit farmers’ WTP for the standard insurance product and the treatment insurance product (“timely pay”) through an incentivized mulitple price list (MPL) mechanism. WTP is elicited for a common sum insured level of 7500 KES through a series of “take it or leave it” (TIOLI) questions at various price levels. For all farmers, the WTP for the standard insurance product is elicited first and the price list begins at the same starting point of 500 KES , the commercial premium for this product. Subsequent TIOLI questions follow a decision tree based on the answers to previous questions as depicted in Figure 1. After three TIOLI questions, the upper and lower bounds of the farmers’ true WTP are identified and are used to elicit a bounded absolute maximum stated WTP for the standard product.

After the WTP for the standard insurance product has been stated, farmers are introduced to the innovative “timely pay” insurance contract and their payment preferences are recorded. The WTP for the treatment product is elicited in relation to the farmers’ own stated WTP for the standard product through a modified set of TIOLI questions. First, the farmer is asked whether, at the stated WTP for standard product, they would prefer to purchase the standard product or the treatment product. The subsequent modified TIOLI questions follow a decision tree based on the answers to previous questions as depicted in Figure 2. After three TIOLI questions, the upper and lower bounds of the farmers’ true WTP are identified and are used to elicit a bounded absolute maximum stated WTP for the treatment “timely pay” product.

We incentivize farmers to state their true WTP by randomizing insurance subsidy levels. All study farmers are randomly assigned to receive one of four discount levels, 30%,20%,10% and 0%, on the commercial insurance premium of 500 KES, corresponding to 350 KES, 400 KES, 450 KES and 500 KES respectively. Secondly, farmers are randomly assigned to receive this discount on either the standard insurance product or the treatment “timely pay” insurance product. If the farmers’ stated WTP for the assigned product is higher than the discounted price, the farmer is eligible to purchase this insurance policy at the discounted price. If the farmers’ stated WTP is lower than the randomized discounted price, then the farmer is not eligible to purchase the insurance policy. For farmers who are unable to purchase the insurance at the offered price at the time of data collection, we will allow them to register via USSD and follow up with them to pay up the premium till the official closing date of the insurance enrolment as determined by Acre Africa. We will adjust any outliers in either of the stated WTPs to the nearest agreed TIOLI amount.

3.2 Payment preferences data

To help champion farmers communicate the unique features of the "timely-pay" treatment contract and collect data on payment schedule preferences from smallholders with varying levels of education and experience with insurance, we utilize a simple tactile survey tool. In the pilot, we provide farmers freedom in choosing both the size and timing of payment installments. Since there are 4 crop growth stage in which assessments are made, farmers can choose to receive their insurance compensation in a maximum of 4 installments over a 6 month time period of the Short Rains season. In the first 3 months, a maximum of 1, 2 and 3 installments can be requested respectively. Champion farmers communicate the available choices and constraints to the farmer using a printed sheet and game pieces (substituted on the field sometimes with materials available on hand such as pea pods or coins). The data was entered by champions into a simple CAPI software which contained checks and balances that ensured that the constraints were met.

4 Empirical strategy

In this pilot, we utilize both experimental and non-experimental methods to evaluate preferences for "timely pay" insurance contracts and well as preferences for payment schedules within these contracts in order to assess the feasibility of this innovation and its potential to improve insurance demand and provide better protection against risks to smallholder farmers, particularly in women. We utilize data on food insecurity, empowerment, financial access and decision-making and time preferences to perform sub-group analyses and explain heterogeneity in preferences.

Our primary outcomes are willingness-to-pay (WTP) for and uptake of the offered insurance contract. WTP is estimated for both the control product (standard insurance contract) and the treatment product ("timely pay" insurance contract) for all respondents. We treat the WTP data as a panel to estimate the effect of the insurance contract robust to individual heterogeneity in WTP levels. We estimate the differences in WTP between the two products using an individual fixed effects regression of the form:

$$Y_{is} = \beta_0 + \beta_1 T_s + \alpha \mathbf{D}_i + \varepsilon_i \tag{1}$$

Where Y_{is} is willingness-to-pay for product s in Kenyan shillings (KES), T_s is the insurance product or treatment indicator taking value 1 if the product refers to the "timely pay" insurance contract, $\mathbf{D}_i$ are individual farmer fixed effects, and ε_i is the error term clustered at the individual level.

Uptake of insurance product is measured as a binary taking the value 1 if the farmer purchased the assigned policy. We experimentally vary the assigned insurance product and measure average treatment effects of the form:

$$Y_i = \beta_0 + \beta_1 T_i + \gamma \mathbf{S}_i + \delta \mathbf{G}_i + \alpha \mathbf{X}_{ig} + \varepsilon_g \tag{2}$$

Where Y_{is} is uptake of farmer i, T_i is the insurance product or treatment indicator taking value 1 if the assigned insurance product refers to the "timely pay" insurance contract, $\mathbf{S}_i$ is a vector of randomized discount level dummies, $\mathbf{G}_i$ are champion farmer or group fixed effects, $\mathbf{X}_{ig}$ is a vector of individual farmer and group controls selected agnostically through a double-selection lasso method, but with the inclusion of payment preferences, and ε_g is the error term clustered at the champion farmer level.

We analyse payment preferences under the "timely pay" insurance contract by conducting hypothesis testing on whether measures of (i) timing of transfers, (ii) size of transfers and a combined measure of (iii) "staggeredness" in a customized contract are different from that of a standard contract. We test for associations between payment preferences and some key indicators of liquidity, time discounting and financial access to motivate insights into the tradeoff between the early and lumpy payments. We also estimate equations (1) and (2) interacting treatment with a measure of farmers' payment preferences (timing, size or staggeredness) represented as P_{is} for product s and individual i. Further, we estimate equations (1) and (2) with interacting treatment with empowerment, time preferences

5 Setting

The target population for the study were smallholder farmers from 15 sub-counties in Elgeyo-Marakwet, Uasin Gishu and Nakuru counties of Kenya, cultivating in plots less than 5 acres, and including both men and women farmers. Farming in Kenya is primarily rain-fed and is organized into two main growing seasons - the 'long rains' season (Apr-Jul) and the 'short rains' season (Oct-Jan). The prevalence of insurance among smallholder farmers is comparable to levels in other countries in Sub-Saharan Africa and South Asia at 3% (Acre Africa). 30 champion farmers together reached and surveyed a total of 1770 farmers. Of these, 1756 farmers qualified for the study based on the criteria that (a) they were cultivating the insurable crops in the target season of Short Rains 2023 and (b) had access to a mobile money (M-Pesa) account within the household through which the intervention insurance program is implemented. Our primary outcomes were measured over a single data collection effort conducted at the start of the Short Rains. We experienced random attrition during the survey at various stages before we could observe the final outcome. A total of 1521 farmers completed the full survey, representing 86% of the interviewed sample (Appendix Table A).

The sample characteristics and balance across treatment is displayed in Appendix Table A. 49.5% of the sample is female. Farmers were on average 39.9 years old and had undergone 12 years of formal education. Only 20% of the sample had some form of tertiary education. The vast majority are married (70%) and employed in agriculture as their main economic activity (78%). The median landholding size is 2.5 acres and ranges from 0.05 to 25 acres. The self-report median monthly income is between KES 3,001-7,500 which is much lower than the Kenyan national average of approximately KES 20,000. 98% of the sample had access to mobile money within their household and qualified to participate in the study. Insurance in our study was offered were potato, green peas, maize and beans. 82% the farmers in our sample grew potatoes and 98% overall grew one of the study crops. 67% had knowledge of crop insurance but only 6.5% had availed of it at baseline. 65% of households experienced food insecurity at some point during or after the short rains season between the months November and April with the highest proportion lacking access in the months after harvest.

As anticipated there were differences between men and women farmers on selected indicators of economic empowerment (Appendix Table A). Women farmers could receive and spend lesser amounts of money from their own account without consulting with other members of the household. Significantly fewer women felt they could participate in decision-making about the farming activities of the household even though they worked on the farm. Women farmers were also significantly less likely to own the land that they cultivated on. Although mobile money access was high, women were significantly less likely to have their own M-Pesa account. On a simple count measure of 8 economic empowerment indicators, men scored significantly higher than women, indicating that preferences for new financial tools may be motivated by pre-existing levels of access.

6 Results

We present a set of initial findings on the distribution of farmers' compensation payment preferences and the effects of the treatment contract allowing customization of compensation on our primary outcomes of willingness-to-pay and uptake. We analyse differences in these measures based on initial levels of economic empowerment across both men and women farmers.

6.1 Payment preferences

We observe a large heterogeneity in farmers' preferences for scheduling compensation transfers in terms of both the size and timing of transfers (Table 1). 45% of farmers choose to receive the compensation in 4 separate transfers (the maximum allowed) while the remaining 55% preferred some lumping of compensation into fewer transfers. Only 13.7% of farmers wanted to receive compensation through a single payment as is done typically in standard insurance contracts. On average farmers requested approximately 3 transfers and more than 1 tranche in each transfer. On timing the transfers, 30% of farmers chose to receive compensation as soon as it was available to them but the majority of farmers, 65% preferred some deferral. Farmers chose to delay receiving compensation for each available tranch by 1.1 months on average.

There were some visible gender differences in preferences for the timing of transfers. Women were more likely to request fewer transfers and some amount of deferral. Particularly, women were less inclined to receive transfers in the initial months as compared to men and were more likely than men to request transfers in the months of February and March after the short rains harvest is likely to have been completed and sold. When compared with the self reported incidence of food insecurity (Figure 1), women were more likely to request transfers at the time of highest anticipated scarcity. However, these differences are not significant on average in our sample.

Figure 1: Farmers preferences for timing of tranches - by gender

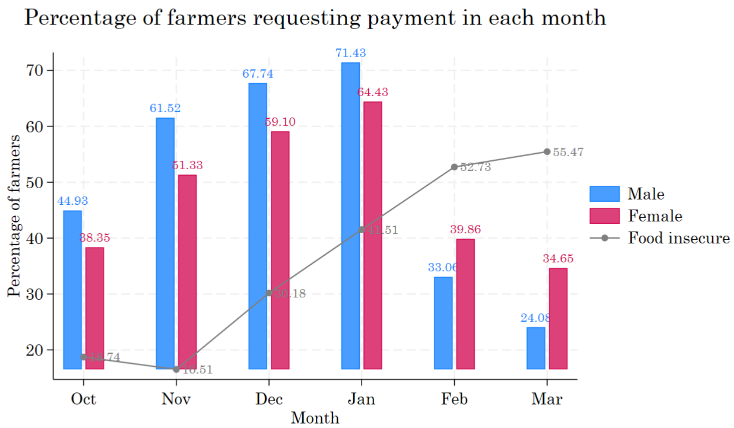


Figure 2: Farmers preferences for timing of tranches - by gender

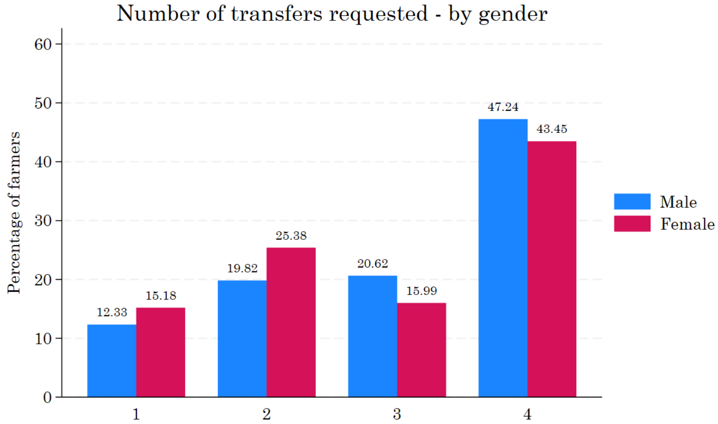


Table 1: Farmers payment preferences by - gender

Variable	(1) Total Mean/(SD)	(2) Male Mean/(SD)	(3) Female Mean/(SD)	(2)-(3) Pairwise t-test Mean difference
No. of installments requested	2.953 (7.880)	3.028 (5.412)	2.877 (5.964)	0.150
Average no. of shares in each installment	1.699 (6.887)	1.637 (4.464)	1.762 (5.410)	-0.126
Requested single payment - All in 1 transfer	0.137 (2.358)	0.123 (1.473)	0.152 (1.892)	-0.029
Requested smallest installments - All in separate transfers	0.453 (3.421)	0.472 (2.546)	0.435 (2.443)	0.038
Requested some lumping of installments	0.547 (3.421)	0.528 (2.546)	0.565 (2.443)	-0.038
No. of months of total delay over all installments	4.600 (38.888)	4.037 (27.833)	5.167 (27.294)	-1.130
Average delay in months across installments	1.150 (9.722)	1.009 (6.958)	1.292 (6.824)	-0.282
Requested maximum deferral - All in last month	0.052 (1.224)	0.039 (0.701)	0.065 (1.036)	-0.026
Requested minimum deferral - All ASAP	0.307 (2.824)	0.342 (2.172)	0.272 (1.876)	0.070
Requested some deferral	0.641 (2.850)	0.619 (2.155)	0.663 (1.978)	-0.044
Number of observations	1731	868	863	1731
Number of clusters	30	28	28	30

Fixed effect used in pairwise regressions: Champion farmer. Significance: ***=.01, **=.05, *=.1. Errors are clustered at variable: Champion farmer.

6.2 Willingness-to-pay

Willingness-to-pay (WTP) for insurance is estimated for both the control product (standard insurance contract) and treatment product ("timely pay" insurance contract) for all respondents. Table A presents results . Average willingness to pay for the standard insurance contract was KES 548.7, corresponding to a premium of rate of 7.3% of total sum insured, which is higher than the commercial price of 6.6% for a sum insured of KES 7500 offered by the partner. Willingness-to-pay for the timely insurance contract was on average KES 593.2 corresponding to 7.9% of total sum insured. Controlling for individual fixed effects we find that willingness to pay for the treatment "timely pay" insurance contract is significantly higher by approximately 8% or 46 KES (Table 6.2, model(1)). The increase average WTP is not significantly different between men and women (Table 6.2, model(2)).

Table 2: WTP : Individual FE

	(1)	(2)
Timely pay	47.61***	48.61***
	(3.624)	(5.112)
Timely pay × Female		-2.008
		(7.249)
Constant	554.6***	554.6***
	(1.790)	(2.540)
Observations	3387	3387
Control Mean	555.3	554.0
F-Stat		82.21
Prob>F		0

As expected, WTP responds to payment preferences (Appendix Tables ?? and A). WTP for the treatment contract is significantly higher when farmers request more transfers increasing by more than a tenth when farmers request 2, 3 or 4 transfers compared to a single transfer (?? model (1)). WTP for the treatment reduces among those who request only one transfer, to below approximately 15% below their WTP for control on average. Similarly WTP significantly reduces as farmers request more deferral of transfers, reducing by approximately 5 KES with every month of delay (A model (1)). WTP significantly reduces by a third when farmers request maximum deferral to approximately a fifth below the WTP for standard on average. In contrast, WTP rises by almost 15% when farmers request no deferral. Overall, WTP shows a negative relationship to both lumping of transfers and deferral of transfers as farmers' preferences move closer to the typical payment schedule in a standard insurance contract.

6.3 Uptake

We estimate average treatment effects on the uptake of insurance measured as whether a farmer has purchased insurance. After eliciting WTP we randomly assign the farmer to receive either the control product i.e a standard insurance contract that pays compensation at the end of the season, or the treatment product i.e a "timely pay" insurance contract that allows farmers to choose when they receive compensation. We measure uptake as a binary variable with 1 indicating that a premium transfer was made and insurance was purchased. We had an overall uptake rate of 14.7% across all farmers which is comparable to estimates from studies in similar settings which report insurance uptake rates from 5-20% (Cole et al 2013). We observe no significant differences in uptake rates between treatment and control (Table 6.3, model (1)) on average when controlling for champion farmer fixed effects. Uptake rates were higher among men in both control and treatment. However, we observe that when offered the timely pay treatment, women have slightly higher uptake rates, and the difference in uptake rates between men and women reduces in the treatment group. Timely treatment increases uptake rates in women by 3% (Table 6.3, model(2)).

Table 3: Uptake : Average Treatment Effect

	(1)	(2)
Timely pay	-0.00517	-0.0140
	(0.00989)	(0.0202)
Female		-0.00439
		(0.0272)
Timely pay × Female		0.0179
		(0.0336)
Constant	0.00259	0.00326
	(0.00494)	(0.0180)
Observations	1678	1678
Control Mean	0.152	0.185
F-Stat		0.000667
Prob>F		0.980

Unlike with WTP, we observe few meaningful differences in uptake based on farmers' payment preferences (Appendix tables A and **??**. Uptake of treatment contract marginally increases when farmers request for a higher number of transfers and reduces with deferral, although both the magnitude and significance of these effects are small.

6.4 Role of economic empowerment

Finally, we examine the role of economic empowerment in mediating farmers' WTP and uptake. We define a simple count measure of economic empowerment representing relevant aspects of economic decision-making power and access to finance within the household. Farmers's demand for customized compensation is likely to reflect their financial requirements both motivated and constrained by their level of economic empowerment. We use the median empowerment score to split the sample into those with scores above or equal to the median, simplistically referred to as empowered and those with scores below the median, referred to as disempowered. We depict the differences in WTP and uptake graphically in Figures 3 and 4 respectively.

Although we did not observe gender differences in WTP and uptake on average across gender, we observe differences when comparing outcomes across both gender and empowerment measures. In Figure 3, WTP is significantly higher among relatively disempowered men and disempowered women compared to relatively empowered men and women respectively for both the control as well as the treatment product. The WTP for the standard insurance contract is on average 25% higher among both men and women who are disempowered and is comparable across gender. WTP for the treatment is higher than standard among all 4 categories representing gender and economic empowerment level. However, the increase is highest for disempowered women. Higher valuations among women with lower economic empowerment scores primarily arises from those lacking access to their own M-Pesa account.

Figure 3: WTP - Gender and economic empowerment

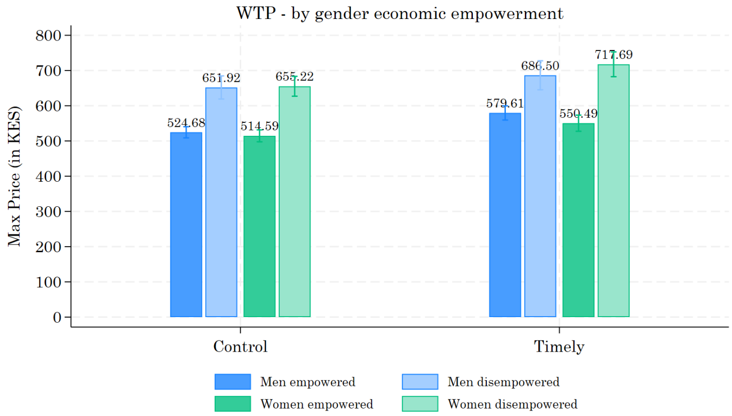
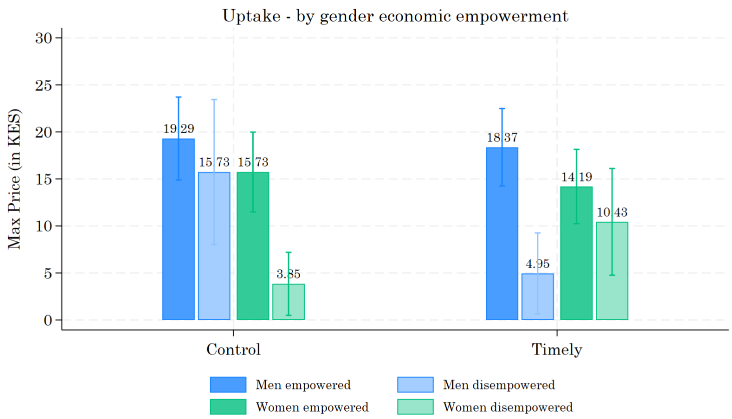


Figure 4: Uptake - Gender and economic empowerment



However the significantly higher valuation among disempowered men and women does not translate to higher uptake relative to empowered men and women. In Figure 4 we see that uptake is highest among empowered men at 19.3% and 18.4% for the standard and treatment contract respectively. Uptake among women who are economically more empowered are 15.7% and 14.2% for the standrard and treatment contracts. Among relatively disempowered men, although uptake of the standard contract was comparable to other groups at 15.7%, it is much lower for the treatment contract at 5%. On the contrary, while uptake of the standard contract was very low among disempowered women at 3.9%, uptake rises significantly to 10.43% in the treatment contact.

7 Summary of findings

We pilot a novel digitally enabled intervention designed to improve customization of transfer in agricultural insurance and observe its effects on valuation and demand over a single season trial in rural Kenya during the Short Rains season of 2023-24. We were able to successfully design and implement an insurance contract in which farmers could choose to receive compensation over a customized timeline in stages starting from one month after planting. We find that the vast majority of farmers prefer to receive more than 1 transfer and 30% prefer to receive compensation as soon as it is assessed. However farmers exhibit heterogenous preferences with some exhibiting a taste for lumping and deferring transfers. Although there are no significant gender differences on average, women tend to prefer receiving fewer and more delayed transfers relative to men. In particular, women are much more likely to choose to receive compensation in the months after harvest when food insecurity is highest, likely indicating a need for consumption smoothing. On average farmers are willing to pay 10% more for customized compensation, and this amount is higher among those who prefer to receive more number of transfers. We find no significant improvements in uptake in our single season of implementation. We observe the pre-existing levels of economic empowerment influence WTP and uptake with disempowered men and women willing to pay significantly higher amounts for the treatment contract relative to empowered men and women. Uptake of the treatment contract also increases among disempowered women indicating the potential value of such an insurance contract to those who lack access to finance to insure themselves or smooth consumption during times of adverse income shocks.

A Appendix

Table 1: Sample Flow and Consent Rates

	N	%	Control	%	Treat	%	P-value (C-T)
Sampled (screened)	1770	100.00	867	100.00	903	100.00	
Consented to survey	1765	99.72	863	99.54	902	99.89	0.253
Met inclusion criteria	1756	99.21	857	98.85	899	99.56	0.381
Consented WTP control	1634	92.32	790	91.12	844	93.47	0.145
Consented WTP treatment	1552	87.68	750	86.51	802	88.82	0.179
Consent WTP both	1521	85.93	733	84.54	788	87.26	0.047

Figure 1: Incentivized Price List - Decision Tree for Standard Insurance Product

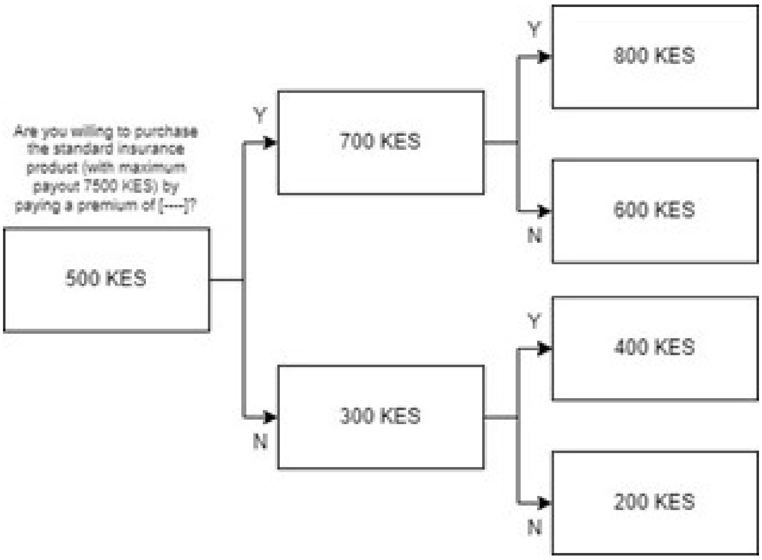


Figure 2: Incentivized Price List - Decision Tree for Treatment

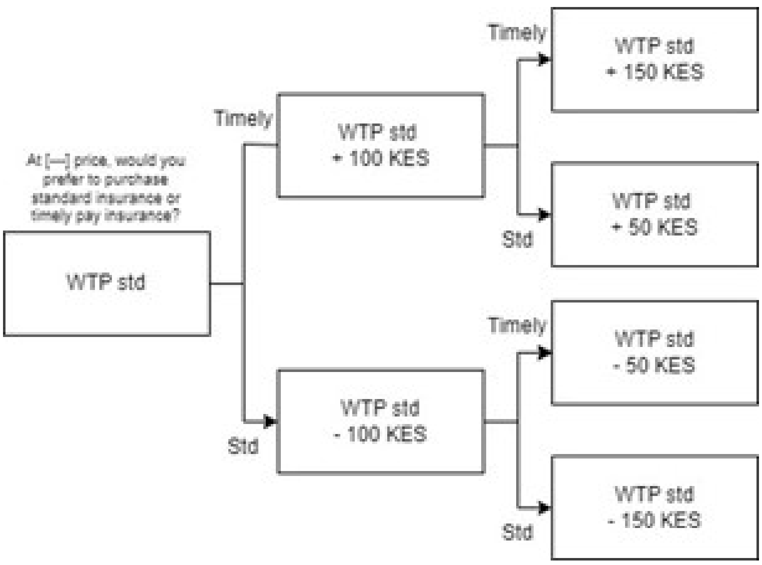


Figure 3: Preferred payment schedule

Timely pay insurance schedule

OCTOBER (Max 1)	NOVEMBER (Max 2)	DECEMBER (Max 3)
JANUARY (Max 4)	**FEBRUARY (Max 4)**	**MARCH (Max 4)**

*Payment at end of stated month.

Table 2: Balance table, by treatment

Variable	(1) Total Mean/(SD)	(2) Control Mean/(SD)	(3) Timely pay Mean/(SD)	(2)-(3) Pairwise t-test Mean difference
B0. Farmer is female (or minority gender)	0.497	0.512	0.482	0.031*
	(1.507)	(1.072)	(1.117)	
B6. MPESA account belongs to self	0.848	0.840	0.855	-0.015
	(1.772)	(1.349)	(1.188)	
B3. Takes MPESA decisions by themselves (solely)	0.765	0.761	0.769	-0.008
	(2.111)	(1.344)	(1.686)	
B.10 Number of school years	12.048	12.069	12.029	0.040
	(12.518)	(9.730)	(8.769)	
B.10 Completed primary	0.904	0.911	0.898	0.014
	(0.754)	(0.571)	(0.542)	
B.10 Completed secondary	0.626	0.628	0.625	0.003
	(1.627)	(1.315)	(1.135)	
B.10 Completed tertiary	0.192	0.190	0.194	-0.003
	(1.896)	(1.419)	(1.391)	
B.10 Less than primary	0.096	0.089	0.102	-0.014
	(0.754)	(0.571)	(0.542)	
B7. How old are you?	39.841	40.162	39.535	0.627
	(75.846)	(57.834)	(50.875)	
B9. Farmer is married	0.704	0.694	0.714	-0.020
	(1.848)	(1.439)	(1.232)	
B11. What is the total number of household members in your household? (Including	5.011	5.064	4.960	0.104
	(9.693)	(6.850)	(7.084)	
B12. Is HH Head	0.393	0.410	0.377	0.032
	(2.841)	(1.937)	(2.135)	
B12. Is Spouse of HH Head	0.212	0.201	0.224	-0.023
	(1.680)	(1.165)	(1.293)	
B13. Main economic activity is farming	0.780	0.777	0.783	-0.006
	(2.324)	(1.581)	(1.727)	
Less than Ksh 1,000	0.032	0.030	0.034	-0.004
	(0.661)	(0.469)	(0.472)	

Ksh 1,000 – Ksh 3,000	0.283 (3.323)	0.284 (2.431)	0.283 (2.296)	0.001
Ksh 3,001 – Ksh 7,500	0.200 (1.425)	0.210 (1.163)	0.191 (0.925)	0.019
Ksh 7,501 – Ksh 15,000	0.220 (1.879)	0.204 (1.353)	0.235 (1.384)	-0.031
Ksh 15,001 – Ksh 30,000	0.186 (1.735)	0.195 (1.284)	0.178 (1.209)	0.017
Ksh 30,001- Ksh 100000	0.067 (1.111)	0.067 (0.818)	0.067 (0.799)	-0.000
Ksh 100,000 – Ksh 200000	0.008 (0.209)	0.006 (0.106)	0.010 (0.201)	-0.004
Greater than Ksh 200000	0.003 (0.070)	0.005 (0.081)	0.002 (0.045)	0.002
B.14 Above median income category of Ksh 3001-7500	0.484 (3.626)	0.476 (2.655)	0.492 (2.510)	-0.016
C0. How many acres of agricultural land do you/your household OWN? (In acres)	3.897 (32.490)	3.932 (22.510)	3.864 (23.614)	0.069
C1. How many acres of land did you/your household USE FOR FARMING in the last 12	2.661 (21.286)	2.684 (13.912)	2.639 (16.318)	0.045
C2. Do you own any of the land owned or cultivated by your household?	1.860 (6.035)	1.841 (4.015)	1.878 (4.614)	-0.036
C3. How many acres of land do you intend to use for cropping activities in the u	2.340 (22.633)	2.313 (15.100)	2.366 (17.001)	-0.052
C4. More than one crop grown in short rains	0.277 (2.709)	0.284 (1.890)	0.270 (1.970)	0.013
C4. Study crops grown (Y/N)	0.986 (0.203)	0.993 (0.097)	0.980 (0.227)	0.013*
C4. Total no. of crops grown	1.411 (4.303)	1.425 (3.147)	1.398 (3.017)	0.027
C4. Short Rains Crop grown: maize	0.128 (1.724)	0.131 (1.233)	0.125 (1.230)	0.006
C4. Short Rains Crop grown: greenbean	0.133 (1.469)	0.135 (1.023)	0.130 (1.109)	0.005

C4. Short Rains Crop grown: potato	0.821	0.824	0.819	0.005
	(1.763)	(1.292)	(1.262)	
C4. Short Rains Crop grown: greengram	0.011	0.013	0.010	0.003
	(0.210)	(0.163)	(0.142)	
C4. Short Rains Crop grown: fingermillet	0.003	0.004	0.002	0.001
	(0.078)	(0.056)	(0.068)	
C4. Short Rains Crop grown: pigeonpea	0.001	0.000	0.001	-0.001
	(0.024)	(0.000)	(0.033)	
C4. Short Rains Crop grown: sorghum	0.003	0.002	0.003	-0.001
	(0.099)	(0.048)	(0.101)	
C4. Short Rains Crop grown: snowpeas	0.070	0.070	0.070	-0.000
	(1.428)	(1.097)	(0.950)	
C4. Short Rains Crop grown: greenpeas	0.118	0.114	0.121	-0.007
	(1.507)	(1.077)	(1.075)	
C4. Short Rains Crop grown: avocado	0.020	0.025	0.016	0.009
	(0.451)	(0.428)	(0.235)	
C4. (Other) Short Rains Crop grown: otherbean	0.077	0.083	0.072	0.011
	(1.721)	(1.280)	(1.165)	
C4. (Other) Short Rains Crop grown: cabbage	0.015	0.013	0.018	-0.005
	(0.348)	(0.221)	(0.293)	
C4. (Other) Short Rains Crop grown: carrot	0.004	0.005	0.003	0.001
	(0.127)	(0.111)	(0.077)	
C4. (Other) Short Rains Crop grown: onion	0.001	0.000	0.001	-0.001
	(0.024)	(0.000)	(0.034)	
C4. (Other) Short Rains Crop grown: kale	0.005	0.005	0.006	-0.001
	(0.171)	(0.135)	(0.119)	
C4. (Other) Short Rains Crop grown: pyrethrum	0.001	0.001	0.001	0.000
	(0.035)	(0.035)	(0.034)	
C4. (Other) Short Rains Crop grown: sunflower	0.001	0.001	0.000	0.001
	(0.024)	(0.034)	(0.000)	
C4. Short Rains Crop Grown: ANY Bean varieties	0.210	0.217	0.202	0.015
	(2.041)	(1.475)	(1.451)	
G1. Food insecure in - nov	0.187	0.191	0.184	0.008
	(2.630)	(1.887)	(1.850)	

G1. Food insecure in - dec	0.165	0.166	0.165	0.001
	(2.651)	(1.984)	(1.784)	
G1. Food insecure in - jan	0.302	0.291	0.313	-0.022*
	(2.875)	(2.032)	(2.078)	
G1. Food insecure in - feb	0.415	0.393	0.436	-0.043**
	(3.145)	(2.091)	(2.408)	
G1. Food insecure in - mar	0.527	0.527	0.527	0.000
	(3.511)	(2.425)	(2.575)	
G1. Food insecure in - april	0.555	0.553	0.556	-0.003
	(3.504)	(2.452)	(2.529)	
G1. Food insecure in - ANY of the months	0.652	0.650	0.654	-0.004
	(3.253)	(2.261)	(2.364)	
H1. Do you know what weather insurance is?	0.670	0.670	0.671	-0.001
	(3.345)	(2.398)	(2.366)	
H2. Have you purchased weather insurance before?	0.066	0.075	0.058	0.017**
	(1.550)	(1.145)	(1.057)	
Number of observations	1756	857	899	1756
Number of clusters	30	27	29	30

Variable	(1) Total Mean/(SD)	(2) Male Mean/(SD)	(3) Female Mean/(SD)	(2)-(3) Pairwise t-test Mean difference
E3b. [Abs] What is the largest amount you could SPEND from your own money (inclu	4647.342 (64761.555)	6073.457 (68192.657)	3201.601 (20674.139)	2871.856
F2b. What is the largest amount of money you could RECEIVE/SAVE in your account	5164.972 (64357.799)	6653.301 (68108.438)	3656.161 (21621.000)	2997.140*
Participate in farming decisions	0.415 (2.772)	0.466 (2.318)	0.362 (1.806)	0.104**
Input in farming decisions	0.847 (2.733)	0.857 (2.108)	0.836 (1.851)	0.021
Owns land	0.432 (3.023)	0.499 (2.484)	0.364 (1.998)	0.135**
Owns M-Pesa account	0.848 (1.772)	0.886 (1.201)	0.810 (1.387)	0.076***
Input in decisions on large expenditures	0.883 (2.335)	0.894 (1.937)	0.873 (1.464)	0.021
Input in decisions on small expenditures	0.821 (2.420)	0.784 (2.206)	0.858 (1.560)	-0.074
Input in decisions on savings	0.883 (2.367)	0.885 (1.919)	0.881 (1.493)	0.004
Input in decisions on use of income	0.885 (2.347)	0.894 (1.927)	0.876 (1.490)	0.018
EE Count	6.013 (11.393)	6.164 (8.904)	5.859 (7.682)	0.305*
EE Count above median (6)	0.374 (2.960)	0.446 (2.455)	0.302 (1.896)	0.144**
EE score less than med(6)	0.268 (2.985)	0.230 (2.210)	0.306 (2.124)	-0.077*
Number of observations	1756	884	872	1756
Number of clusters	30	28	28	30

Table 4: WTP Individual FE + Payment preferences (size)

	(1)	(2)	(3)	(4)	(5)
Timely pay	-65.21***	66.05***	30.53***	68.28***	118.2***
	(9.198)	(3.720)	(4.859)	(5.345)	(6.858)
Timely pay × No. of installments requested=2	137.0***				
	(11.73)				
Timely pay × No. of installments requested=3	118.7***				
	(12.24)				
Timely pay × No. of installments requested=4	133.5***				
	(10.53)				
Timely pay × Requested single payment - All in 1 transfer=1		-131.3***			
		(9.925)			
Timely pay × Requested smallest installments - All in separate transfers=1			37.75***		
			(7.223)		
Timely pay × Requested some lumping of installments=1				-37.75***	
				(7.223)	
Timely pay × Average no. of shares in each installment					-41.37***
					(3.463)
Constant	554.6***	554.6***	554.6***	554.6***	554.6***
	(2.415)	(2.416)	(2.519)	(2.519)	(2.438)
Observations	3387	3387	3387	3387	3387
Control Mean	.	563.9	595.2	507.2	.
F-Stat					
Prob>F					

Table 5: WTP Individual FE + Payment preferences (time)

	(1)	(2)	(3)	(4)	(5)
Timely pay	73.00***	55.68***	37.24***	46.33***	73.00***
	(4.957)	(3.628)	(4.336)	(6.017)	(4.957)
Timely pay × No. of months of total delay over all installments	-5.523***				
	(0.749)				
Timely pay × Requested single payment - All in 1 transfer=1		-149.9***			
		(15.64)			
Timely pay × Requested smallest installments - All in separate transfers=1			33.57***		
			(7.801)		
Timely pay × Requested some lumping of installments=1				2.008	
				(7.538)	
Timely pay × Average delay in months across installments					-22.09***
					(2.996)
Constant	554.6***	554.6***	554.6***	554.6***	554.6***
	(2.499)	(2.473)	(2.526)	(2.540)	(2.499)
Observations	3387	3387	3387	3387	3387
Control Mean	521.4	557.6	570.4	520.1	521.4
F-Stat					
Prob>F					

Table 6: Uptake + Payment preferences (size)

	(1)	(2)	(3)	(4)	(5)
Timely pay	-0.0245	-0.00188	-0.000866	-0.0118	0.00427
	(0.0212)	(0.0112)	(0.0125)	(0.0172)	(0.0200)
No. of installments requested=2	0.0163				
	(0.0400)				
No. of installments requested=3	-0.00610				
	(0.0379)				
No. of installments requested=4	0.0374				
	(0.0358)				
Timely pay × No. of installments requested=2	0.0243				
	(0.0229)				
Timely pay × No. of installments requested=3	0.0405				
	(0.0280)				
Timely pay × No. of installments requested=4	0.0128				
	(0.0273)				
Requested single payment - All in 1 transfer=1		-0.0218			
		(0.0323)			
Timely pay × Requested single payment - All in 1 transfer=1		-0.0226			
		(0.0223)			
Requested smallest installments - All in separate transfers=1			0.0353		
			(0.0305)		
Timely pay × Requested smallest installments - All in separate transfers=1			-0.0109		
			(0.0225)		
Requested some lumping of installments=1				-0.0353	
				(0.0305)	
Timely pay × Requested some lumping of installments=1				0.0109	
				(0.0225)	
Average no. of shares in each installment					-0.0104

					(0.0107)
Timely pay × Average no. of shares in each installment					-0.00549
					(0.00874)
Constant	-0.0194	0.00299	-0.0160	0.0193	0.0163
	(0.0292)	(0.00619)	(0.0147)	(0.0172)	(0.0181)
Observations	1678	1678	1678	1678	1678
Control Mean	.	0.170	0.0945	0.224	.
F-Stat					
Prob>F					

Table 7: Uptake + Payment preferences (size)

	(1)	(2)	(3)	(4)	(5)
Timely pay	0.000479	-0.00427	0.00250	-0.0191	0.000479
	(0.0166)	(0.0105)	(0.0112)	(0.0237)	(0.0166)
No. of months of total delay over all installments	-0.00341				
	(0.00305)				
Timely pay × No. of months of total delay over all installments	-0.00115				
	(0.00195)				
Requested single payment - All in 1 transfer=1		-0.0221			
		(0.0202)			
Timely pay × Requested single payment - All in 1 transfer=1		-0.0151			
		(0.0214)			
Requested smallest installments - All in separate transfers=1			0.0543		
			(0.0389)		
Timely pay × Requested smallest installments - All in separate transfers=1			-0.0197		
			(0.0352)		
Requested some lumping of installments=1				-0.0446	
				(0.0350)	
Timely pay × Requested some lumping of installments=1				0.0235	
				(0.0306)	
Average delay in months across installments					-0.0137
					(0.0122)
Timely pay × Average delay in months across installments					-0.00458
					(0.00780)
Constant	0.0169	0.00421	-0.0118	0.0307	0.0169
	(0.0160)	(0.00615)	(0.00909)	(0.0249)	(0.0160)
Observations	1678	1678	1678	1678	1678
Control Mean	0.270	0.159	0.0947	0.236	0.270
F-Stat					
Prob>F					

Table 8: WTP Individual FE + Empowerment (Male)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Timely pay	-16.94	55.98***	23.39*	54.79***	43.84***	-25.84*	19.28*	-9.896	-29.21*	79.71***
	(19.91)	(6.778)	(13.18)	(7.030)	(14.72)	(14.97)	(10.55)	(14.49)	(14.95)	(6.605)
Timely pay × EE Count	10.61***									
	(3.124)									
Timely pay × Emp: Participate farm=1		-15.74								
		(9.903)								
Timely pay × Emp: Decision farm=1			29.33**							
			(14.21)							
Timely pay × Emp: Own land=1				-12.23						
				(9.890)						
Timely pay × Emp: Own MPesa=1					5.372					
					(15.63)					
Timely pay × Emp: Decision large exp=1						83.26***				
						(15.83)				
Timely pay × Emp: Decision small exp=1							37.49***			
							(11.92)			
Timely pay × Emp: Decision savings=1								66.04***		
								(15.40)		
Timely pay × Emp: Decision income=1									87.03***	
									(15.81)	
Timely pay × maxreceive_beloweqmed=1										-66.39***
										(9.649)
Constant	554.5***	554.5***	554.5***	554.5***	554.5***	554.5***	554.5***	554.5***	554.5***	554.5***
	(3.442)	(3.460)	(3.457)	(3.462)	(3.465)	(3.410)	(3.445)	(3.428)	(3.405)	(3.372)
Observations	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704
Control Mean	.	530.0	682.3	525.7	599.8	692.4	636.9	684.5	716.3	556.5
F-Stat										
Prob>F										

Table 9: WTP Individual FE + Empowerment (Female)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Timely pay	37.12*	42.60***	61.90***	36.30***	77.14***	32.18**	58.11***	35.88**	37.24**	68.87***
	(21.07)	(6.638)	(13.62)	(6.641)	(12.44)	(15.22)	(14.52)	(15.70)	(15.46)	(8.379)
Timely pay × EE Count	1.605									
	(3.451)									
Timely pay × Emp: Participate farm=1		11.05								
		(11.04)								
Timely pay × Emp: Decision farm=1			-18.04							
			(14.79)							
Timely pay × Emp: Own land=1				28.09**						
				(10.97)						
Timely pay × Emp: Own MPesa=1					-37.26***					
					(13.74)					
Timely pay × Emp: Decision large exp=1						16.41				
						(16.24)				
Timely pay × Emp: Decision small exp=1							-13.28			
							(15.60)			
Timely pay × Emp: Decision savings=1								12.10		
								(16.68)		
Timely pay × Emp: Decision income=1									10.60	
									(16.46)	
Timely pay × maxreceive_beloweqmed=1										-36.84***
										(10.78)
Constant	554.8***	554.8***	554.8***	554.8***	554.8***	554.8***	554.8***	554.8***	554.8***	554.8***
	(3.720)	(3.718)	(3.717)	(3.706)	(3.704)	(3.718)	(3.719)	(3.719)	(3.719)	(3.694)
Observations	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Control Mean	625	542.9	674.5	529.3	619.8	674.1	703.3	725.8	681.8	559.2
F-Stat										
Prob>F										

Table 10: Uptake + Empowerment (Male)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Timely pay	-0.269**	0.0150	-0.162**	0.00256	-0.0652	-0.249***	-0.170***	-0.158*	-0.239***	-0.000437
	(0.111)	(0.0175)	(0.0732)	(0.0251)	(0.0397)	(0.0325)	(0.0537)	(0.0772)	(0.0365)	(0.0220)
EE Count	-0.0325*									
	(0.0170)									
Timely pay × EE Count	0.0411**									
	(0.0167)									
Emp: Participate farm=1		-0.0165								
		(0.0933)								
Timely pay × Emp: Participate farm=1		-0.0659*								
		(0.0331)								
Emp: Decision farm=1			-0.125**							
			(0.0565)							
Timely pay × Emp: Decision farm=1			0.172**							
			(0.0755)							
Emp: Own land=1				-0.0554						
				(0.119)						
Timely pay × Emp: Own land=1				-0.0394						
				(0.0395)						
Emp: Own MPesa=1					-0.0158					
					(0.0345)					
Timely pay × Emp: Own MPesa=1					0.0567*					
					(0.0315)					
Emp: Decision large exp=1						-0.242***				
						(0.0575)				
Timely pay × Emp: Decision large exp=1						0.264***				
						(0.0353)				
Emp: Decision small exp=1							0.0704			

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							(0.178)			
Timely pay × Emp: Decision small exp=1							0.198***			
							(0.0575)			
Emp: Decision savings=1								-0.112*		
								(0.0598)		
Timely pay × Emp: Decision savings=1								0.161*		
								(0.0844)		
Emp: Decision income=1									-0.175***	
									(0.0480)	
Timely pay × Emp: Decision income=1									0.251***	
									(0.0386)	
maxreceive_beloweqmed=1										0.140
										(0.103)
Timely pay × maxreceive_beloweqmed=1										-0.0488
										(0.0321)
Constant	0.228*	-0.00199	0.121**	0.0172	0.0201	0.234***	-0.0845	0.110*	0.169***	-0.0768
	(0.118)	(0.0348)	(0.0571)	(0.0496)	(0.0353)	(0.0601)	(0.178)	(0.0600)	(0.0491)	(0.0638)
Observations	844	844	844	844	844	844	844	844	844	844
Control Mean	.	0.101	0.193	0.0847	0.0909	0.311	0.176	0.244	0.267	0.135
F-Stat										
Prob>F										

Table 11: Uptake + Empowerment (Female)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Timely pay	0.0944	-0.0103	0.0649	-0.00318	0.00606	0.0807	0.0702	0.0934	0.0895	0.00210
	(0.102)	(0.0178)	(0.0654)	(0.0195)	(0.0197)	(0.0767)	(0.0716)	(0.0768)	(0.0728)	(0.0203)
EE Count	-0.00236									
	(0.0112)									
Timely pay × EE Count	-0.0157									

	(0.0156)							
Emp: Participate farm=1		-0.00389						
		(0.0265)						
Timely pay × Emp: Participate farm=1		0.0338						
		(0.0469)						
Emp: Decision farm=1			-0.0123					
			(0.0219)					
Timely pay × Emp: Decision farm=1			-0.0746					
			(0.0649)					
Emp: Own land=1				-0.0156				
				(0.0240)				
Timely pay × Emp: Own land=1				0.0137				
				(0.0471)				
Emp: Own MPesa=1					0.0209			
					(0.0314)			
Timely pay × Emp: Own MPesa=1					-0.00557			
					(0.0269)			
Emp: Decision large exp=1						0.0312		
						(0.0403)		
Timely pay × Emp: Decision large exp=1						-0.0902		
						(0.0759)		
Emp: Decision small exp=1							-0.0138	
							(0.0205)	
Timely pay × Emp: Decision small exp=1							-0.0801	
							(0.0709)	
Emp: Decision savings=1								-0.0174
								(0.0225)
Timely pay × Emp: Decision savings=1								-0.103

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
								(0.0770)		
Emp: Decision income=1									0.0220	
									(0.0399)	
Timely pay × Emp: Decision income=1									-0.100	
									(0.0722)	
maxreceive_beloweqmed=1										-0.0156
										(0.0294)
Timely pay × maxreceive_beloweqmed=1										-0.000759
										(0.0381)
Constant	0.0192	0.00129	0.0171	0.00413	-0.0212	-0.0264	0.0187	0.0220	-0.0167	0.0137
	(0.0752)	(0.0149)	(0.0211)	(0.0125)	(0.0396)	(0.0398)	(0.0205)	(0.0224)	(0.0391)	(0.0232)
Observations	834	834	834	834	834	834	834	834	834	834
Control Mean	1	0.0649	0.0606	0.0573	0.0625	0.0800	0.0741	0.0755	0.0816	0.123
F-Stat										
Prob>F										

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