

Economic Protection Program: Pre-Analysis Plan

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1. Introduction

This plan outlines the hypotheses to be tested and specifications to be used in the analysis of the take-up of and impact of macroeconomic shock insurance on microentrepreneurs in Egypt. Since the authors completed the plan before the follow-up data was collected and analyzed, the plan can provide a useful reference evaluating the final results of the study.

The plan is outlined as follows: Section 2 describes the intervention; Section 3 reviews the motivation for the study, sample selection, and data sources; Section 4 details the sample population's characteristics; Section 5 outlines hypotheses for loan take-up and insurance take-up; Section 6 outlines hypotheses for short term and state dependent outcomes; Section 7 outlines other pre-analysis specifications; Appendix I provides additional details on the balance of the evaluation sample at baseline; Appendix II articulates the feasibility of future scale-up.

2. The Intervention

2.1 Macroeconomic Shock Insurance

The Economic Protection Program (EPP) is an insurance product designed to help microentrepreneurs in Egypt protect their businesses against macroeconomic shocks. Alexandria Businessmen Association (ABA), the leading microfinance institution in Egypt, offers microborrowers on the cusp of renewing their loan cycles the opportunity to purchase the EPP for 0.5% of the value of the new loan. If an economic shock occurs within the period of the microborrower's loan (12 months), then the EPP will cover two loan installments equivalent to 17% of the initial value of the loan. If a second economic shock takes place, the EPP will cover an additional loan installment, which brings the total coverage to 25% of the initial value of the loan.

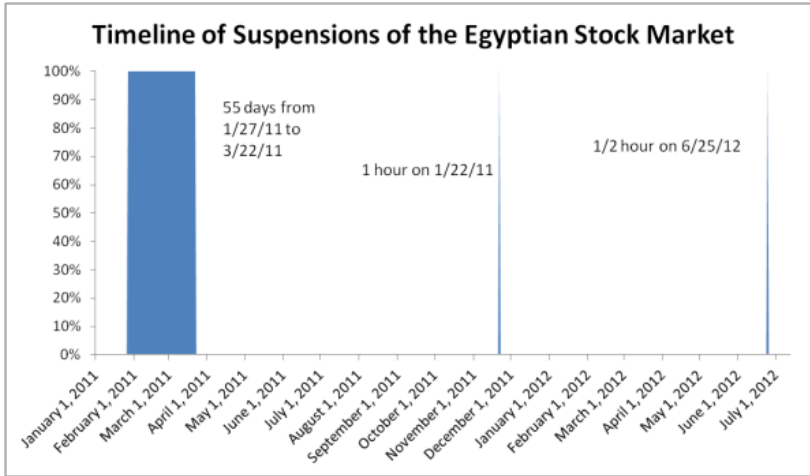
2.2 Economic Shocks as Defined by the EPP

1. The Egyptian stock exchange (EGX 30 Index) is suspended for five business days in a row
2. A curfew of 14 hours or more in Alexandria lasts for five business days in a row
3. Month to month headline CPI rises to 4.0% or more, which is higher than any time in the past 7 years
4. The official subsidized price of Benzene 80 (90) surpasses 2 (4) L.E./Ltr, which is more than double the current official subsidized price but less than market value

- 5. The official subsidized price of LPG gas cylinders surpasses 30 LE per cylinder, which is over 5 times the current official subsidized price but less than market value

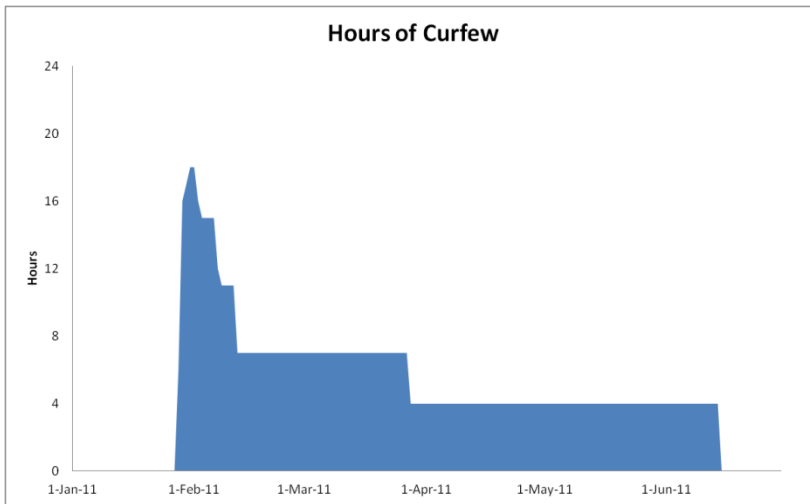
2.3 Recent History of Economic Shocks as Defined by the EPP

- a. The Egyptian stock market was suspended between January 27, 2011 and March 22, 2011 and suspended twice temporarily since then.



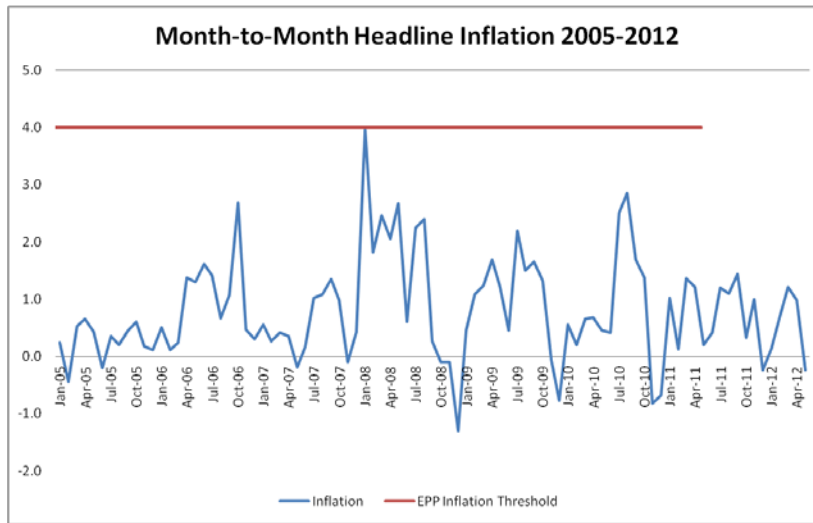
Source: Newspapers

- b. Between January 29, 2011 and February 6, 2011, the Egyptian government instated a curfew lasting 14 hours or more each day. The government reduced the curfew incrementally overtime and finally repealed the curfew on June 15, 2011. Since then there have been several localized curfews in Cairo, but there hasn't been a curfew in Alexandria.



Source: Newspapers

- c. In January 2008, month-to-month headline inflation reached 4.0%. Since the Egyptian revolution, month-to-month headline inflation has remained below 1.5%.



Source: Central Bank of Egypt

- d. In 1992, the Ministry of Petroleum set Benzene 80 to 0.9 LE/l and Benzene 90, 1 LE/l, which is codified in decision 449. Since then, Benzene 80 has remained the same. Benzene 90, however, rose to 1.3 LE/l in 2006, which is codified in decision 1326.
- e. In 1991, the Ministry of Petroleum set LPG to 2.5LE per 12.5 kg cylinder, which was codified in decision 55. Since then the price has not changed.

3. Motivation

3.1 Context

This study offers the first rigorous evaluation of an urban microinsurance product not related to health. Businesses around the world cite economic and political uncertainty as constraints to businesses growth and investment. To our knowledge, there are no experimental evaluations of how insurance can help to mitigate the pressure to delay investments and decrease consumption during periods of economic uncertainty. The current economic and political environment in Egypt presents a unique opportunity to evaluate how people make decisions to invest and consume in times of crisis and whether microinsurance can spur investment.

ABA is the largest microfinance institution in Egypt with 210,000 active clients. Innovations for Poverty Action (IPA) worked closely with ABA to design the EPP and implement a randomized impact evaluation. The EPP was designed through much iteration involving discussions with Egyptian macroeconomists, a market research survey, and several discussions between IPA and ABA.

3.2 Pre-Intervention Research

In December 2011, we conducted a pre-intervention research survey on 320 microentrepreneurs in urban areas in Cairo, Giza, and Alexandria to determine the feasibility and demand for a macroeconomic

shock microinsurance product. The responses to this pre-intervention research survey indicated a strong demand for macroeconomic shock insurance and a high likelihood of development impact.

In order to gauge demand for a macroeconomic shock insurance product, we elicited projections of future economic shocks and directly asked about interest in such an insurance product. Specifically, 77% are worried about food inflation, 66% about subsidized goods inflation, 23% about currency depreciation, 36% about a stock market crash, and 44% about a further decrease in tourism levels. Of the people who are worried about anything, 71% say food inflation is the biggest worry and 13% say subsidized goods are. 65% consider the current political climate in Egypt an obstacle to doing business. Of this 65%, 67% consider the political climate to be a "large" or "very large" obstacle. In light of these obstacles to business and macroeconomic worries, we directly asked the following question:

If a local, well trusted NGO offered you insurance on macroeconomic shocks** would that decrease risk enough for you to invest in new capital? Macroeconomic shocks are defined as any month in which the Case 30 [Egyptian stock market] is suspended or anytime year to year food inflation is above 75% or subsidized item inflation is above 20%. In the last year, there would have been a payout in February, March, and November since the stock market was suspended at that time. There would have been payouts from October 2009 to January 2010 due to food inflation, and there would have been payouts July through September 2008 due to subsidized goods payouts. The insurance product would last for 1 year and it would be paid out the first month in which there was a shock. The insurance product would cover either a new microloan or a new authorized asset purchase (up to 5000 LE) and the insurance would pay out the full value of either the loan or the authorized asset. The cost of the insurance would be 5% of the value of the loan or authorized asset purchase.¹

43% say they would purchase this macroeconomic shock insurance product for of 5% of the loan/asset value. 27% would purchase the insurance if the price was lower at 2% of the loan/asset value.

The median microentrepreneur would like to make an investment of 5000 LE in new capital. But, 57% plan to delay investments until the economic and political climates regain stability, 14% don't know whether to delay or not, and 29% plan on investing anyways. Of the people who would take up the insurance, 48% say their investments would differ whether they have or don't have the macroeconomic shock insurance and 24% say they don't know. Of the people who would invest differently with insurance, the median microentrepreneur would invest 2,000 LE more if he had the insurance than he otherwise would without it.

It's also of interest to note that only 8% owned any kind of insurance, which is not surprising since Egypt has one of the least developed insurance industries in the world and this sample consisted of microentrepreneurs.

3.3 Informed Expectations and Actuarially Fair Price

ABA clients, ABA management, and World Bank economists working in Egypt believe that the likelihood of any one of the shocks occurring in the next year is about 50%. See Table 1 for expectations of specific

¹ The description of this macroeconomic insurance product is different than the EPP because the EPP evolved based on the market research and discussions between Innovations for Poverty Action (IPA) and ABA.

macroeconomic shocks.

Table 1. Macroeconomic Shock Expectations

	ABA Clients	World Bank Economists and ABA Management
Suspension of the stock market for 5 or more consecutive days	24	11
Higher inflation than any other time in the last 5 years	37	23
Increase in the official subsidized price of benzene 80 to over 2 LE/ltr	32	14
Increase in the official subsidized price of benzene 90 to over 4 LE/ltr	31	16
Increase in official subsidized price LPG cylinder to 30 LE/cylinder	31	17
Curfew for 14 or more hours per day for 5 or more consecutive days	21	11
Any of the above 6 events happening	47	49

Given the vast economic and political uncertainty in Egypt, it's difficult to apply any economic or political models to predict economic shocks (even month-to-month inflation). We can approximate the actuarially fair price by ignoring the EPP's potential second payout (and thereby underestimating the price) and defining the likelihood of a macroeconomic shock through the wisdom of crowds: the mean expected likelihood of any macroeconomic shock.

Actuarially Fair Price

$$= (\text{Mean Expected Likelihood of a Macroeconomic Shock}) * (\text{Value of Payout})$$

The actuarially fair price comes out to be 8%, which is 16 times greater than the price of the EPP. We intentionally devised the price of the EPP to be lower than even an underestimate of the actuarially fair price to boost take-up enough to successfully evaluate the EPP's social impact.

3.4 Sample Population

The evaluation sample consists of 2,980 individuals, with equal numbers assigned to treatment and control. The initial sample was selected from a list of 3,807 clients in 14 of ABA's branches in Alexandria who were scheduled to repay their loans between 4/15/2012 and 7/31/2012 and whose loans are between 1,500 LE and 10,000 LE (\$250 and \$1,667). In the field, we excluded 927 clients from the initial sample who either didn't own a business themselves or ABA's loan officers indicated are not eligible for future loans due to likelihood of future repayment delinquency.

3.5 Randomized Experimental Design

The 2,980 ABA clients in our sample were randomly assigned by a computer program to two groups: treatment and control. The only difference between the two groups is the treatment group was eligible to purchase the EPP and the control was not. In order to achieve balance between the two groups, we used a combination of stratification and pair-wise matching.

First, we stratified on gender and microfinance office branch to create 32 strata. There were 16 office branch codes; 14 of which are branches that make up ABA's operations in Alexandria, 1 was the code for clients who've transferred between branches, and 1 was the code for clients who've graduated from a sub-microlending program within ABA to microlending.

Within these 32 strata, we created pair-wise matches using an “optimal greedy algorithm” to minimize the Mahalanobis distance between the values of 13 variables likely to drive loan take up and investment decisions. These 13 variables include the following:

- **Minimum expected likelihood of payout** (403) defined by the maximum expected likelihood of any individual macroeconomic shock
- **Risk aversion** (1403) defined as 1 for anyone who chooses business 1 through 4 and 0 for anyone who chooses business 5 through 8 in the Binswanger lottery
- **Ambiguity neutral** (1404) defined as 1 for anyone who chooses the bag with an unknown proportion of green and white marbles and 0 for anyone who chooses the bag with a specified number of green and white marbles
- **High basis risk** (607) defined as decrease in sales of 20% or more immediately after the Egyptian revolution in February and March 2011
- **Medium basis risk** (607) defined as decrease in sales of 5 to 20% immediately after the Egyptian revolution in February and March 2011
- **Considering delaying investments** (313) defined as 1 for yes and 0 for no
- **Not expecting to renew** (306) defined as a dummy variable
- **Expecting to renew a loan less than 3000 LE** (308) defined as a dummy variable
- **Expecting to renew a loan between 3001 and 5000 LE** (308) defined as a dummy variable
- **Self reported profits in February 2012** (605)
- **Self reported profits in January 2012** (605)
- **Missing profit data in February 2012** (605) defined as a dummy variable
- **Missing profit data in January 2012** (605) defined as a dummy variable

Table 1 in Appendix I reveals the balanced sample.

3.6 Power Calculations

We expect the macroeconomic shock insurance will boost profits by 10% or more (the minimum detectable effect) for firms who purchase the product, but we also expect that take-up of the EPP will only be about 40%. Based on the pre-intervention research survey, we can predict the median microentrepreneur income will be 775 LE per month and the standard deviation 250 LE for our experimental sample. With 2980 individuals, we have over 90% power to detect type II errors.

It's less clear what the loan renewal rate is at ABA, but firm executives suggest it's about 70%. Given a sample size of 2980 individuals split evenly into treatment and control groups, if 10% is our minimum detectable effect, then we have 87% power to avoid type II errors.

3.7 Key Data Sources

The primary sources of data are a baseline survey conducted in March 2012 immediately before the EPP was offered to ABA clients, a follow-up survey in September or October, another follow-up survey immediately after any economic shock, and an endline survey one month after the last ABA client's EPP expires or one year after the economic shock. In addition, ABA will provide us with administrative loan tracking data.

4. Baseline Snapshot

64% of the microentrepreneurs are male and the median age is 44 years old. 80% are married and the median household size is 4 people. 14% never attended school, 49% completed less than high school, 28% completed high school, 4% completed vocational school, and 6% completed university.

In terms of business ventures, 49% participate in retail (groceries, apparel, etc.), 8% manufacture textiles (clothing, furniture, etc.), 6% work in land transport (taxis, minibuses, etc.), 6% work in the food and beverage (cafes, restaurants, etc.). The median age of a business is 6 years. 98% of the businesses are permanent as opposed to seasonal, and only 16% operate in a mobile location. 61% of businesses are located in a residential area, and only 5% of businesses are in a central or secondary market place. 22% businesses operate inside a home, and 9% of businesses don't operate in any one specific place. 41% own the land upon which the business rests. 48% own the building, shed, or kiosk in which they conduct business.

89% own the business themselves rather than through a joint-venture with someone else. 28% have a tax ID card and 23% have a business license. 76% have 0 full time paid employees and 23% have between 1 and 4 employees. Only 7% of firms have any part time employees. The median business owner spends about 9 hours a day, 6 days a week at his or her business.

The median loan size is 3000 LE, and the median expected value of a new loan is 5000 LE with 89% intending to renew their loans. 97% of those who desire to renew their loans intend to renew within one month of paying off the current loan. 85% used their current loan to increase inventory and 3% bought new assets. With a new loan 13% plan on making new investments in machinery and equipment, but 10% of the population is considering delaying investment due to political and macroeconomic instability. Specifically, 70% are concerned about a large political crisis, 88% are concerned with inflation, 62% are concerned with currency depreciation, and 75% are concerned about the price of subsidized goods. 63% of respondents believe that inflation is the greatest worry followed by 15% who are most worried about a future political crisis.

94% indicated an interest in joining the EPP, which is not too surprising given the high risk aversion of many respondents. Only 15% of respondents rate themselves as 6 or higher on a 1-10 scale of appetite for risk. Furthermore, 89% of respondents prefer a "business with less profit every month where you can't lose money to a business with a lot of profit but you can possibly lose your money." The discount rate among the sample is fairly high: more than 50% of the sample discounts the value of money by 30% or more to receive money today rather than one month from now and about 25% of the sample discounts the value of money by 30% or more to receive money in 5 months rather than 6 months.

For the 89% of businesses who own any assets (tools, equipment, machinery, or vehicles), the median value of assets is 1010 LE. For the 66% of business who have any inventory, the median value of inventory is 2000 LE. For the 79% of business who have anything on hand to sell at the beginning of the day, the median value of these things is 1900 LE. For the 75% of businesses with any cash on hand, the median cash on hand is 1000 LE. If business owners had an extra 1500 LE, 82% would spend it to buy more inventory and 7% would spend it on new assets.

The reported median monthly profit is 800 LE and median monthly household consumption is 507 LE. The median monthly sales is 2000 LE and the median monthly expenses is 2129 LE, which suggests (1) business owners are likely reporting lower than actual sales and (2) monthly expenses might be exaggerated.

71% faced significant decline in sales after the Egyptian revolution. 7% of firms started operations after the first couple months of the Egyptian revolution. 35% earn income outside of their businesses, which amounts to a median additional income of 750 per month. Since the revolution, 66% are making less profit and 55% have more expenses. 41% say that macroeconomic uncertainty is still an obstacle to business.

95% could fill in the missing number in a sequence that increases by 10 but only 49% could fill in the missing number in a sequence that increases by 8. 70% of people could successfully subtract 7 three times from 100. 60% of people seem to understand that inflation makes one's money less valuable. 50% of people can successfully compute a 16% interest rate on a 1000 LE loan. 37% have a basic understanding of insurance.

6% have ever received a loan from a bank and 2% have ever received a loan from an MFI other than ABA. 1% has ever defaulted on a loan.

5. A simple model of the insurance and borrowing decision

We set out a simple model of the insurance and borrowing decision in order to motivate our first sets of empirical analysis.

For simplicity, assume there are two states of the world s , where $s=0$ if one a macroeconomic shock that would be covered by the insurance does not occur, and $s=1$ if it does occur.

The microfinance client's problem is to choose whether to borrow or not ($L=1$ if borrow, $L=0$ if do not), and whether or not to purchase the insurance ($I=1$ if insured, $I=0$ if not), where insurance can only be purchased if they borrow. Let z denote the premium for the insurance, $p(s)$ the perceived probability of the bad state occurring, $Q(L)$ the loss that the client will suffer to business profits if the crisis does occur, A the perceived amount that they will receive from the insurance if the bad state occurs, $\pi(L)$ the profits they make from their business's activities, and r the interest rate on the loan. The insurance premium must be paid immediately, lowering current consumption which is C (profits from the immediate period) less any premium paid. The discount rate is δ . We assume for simplicity that all net income is consumed:

Expected utility if they do not borrow is then:

$$U(C) + \delta[p(s = 0)U(\pi(0)) + p(s = 1)U(\pi(0) - Q(0))] \quad (1)$$

Expected utility if they borrow but do not take insurance is:

$$U(C) + \delta[p(s = 0)U(\pi(L) - rL) + p(s = 1)U(\pi(L) - Q(L) - rL)] \quad (2)$$

Expected utility if they borrow and also take insurance is:

$$U(C - z) + \delta[p(s = 0)U(\pi(L) - rL) + p(s = 1)U(\pi(L) - Q(L) - rL + A)] \quad (3)$$

Hypothesis 1: Offering the option of insurance will increase loan renewal rates.

We see this is theoretically possible if there are parameter values such that a client will not take a loan without insurance, but will take a loan if insurance is possible; i.e. such that $(2) < (1) < (3)$. For example, this could happen if $\pi'(L) > r$ (i.e. that it is profitable to borrow in the good state) and $\pi(L) - Q(L) - rL < \pi(0) - Q(0)$ (i.e. that the return on the loan is low in the bad state, so that if the bad state occurs paying the loan interest rate reduces consumption below what it would be if they had never borrowed), and the insurance reduces the hardship in the bad period.

To test this hypothesis we will estimate the following ITT equation via OLS:

$$TakeupLoan = \beta_0 + \beta_1 OfferedEPP + X'_s \theta + \varepsilon$$

where X'_s is a vector of dummies for the randomization pairs. We expect $\beta_1 > 0$ under standard conditions. Since purchasing the insurance is voluntary, it seems unlikely that we will find $\beta_1 < 0$, although several possibilities could lead to this outcome:

- If clients think that purchasing the insurance is in fact compulsory if they take out a loan, and have $(3) < (1)$, even though $(2) > (1)$. This would be most likely for individuals with high discount rates, or individuals with low perceived payouts A.
- If offering individuals the insurance causes them to revise their subjective probabilities about the likelihood of the bad state occurring, so that they think the likelihood of a crisis is higher after being offered the insurance, and losses would be high for them if the crisis did occur.

In addition to looking at the extensive margin (whether or not individual's borrow), we will also expect similar logic to work at the intensive margin (how much to borrow), and estimate a similar equation for the amount of loan borrowed (coding as zero borrowed individuals who do not renew their loans), controlling for the original value of the loan last taken before baseline:

$$LoanAmount = \beta_0 + \beta_1 OfferedEPP + X'_s \theta + \gamma BaselineLoanAmount + \varepsilon$$

Data sources: data on whether an individual has borrowed a new loan and the size of the individual's new loan will be as of August 31, 2012, and will come from administrative data on client records provided by ABA.

Hypothesis 2: The insurance offer will have most impact on loan take-up and loan amounts for individuals with parameter values that put them in the range where $(2) < (1) < (3)$ – and the least effect on people who will never renew or always renew.

The “always renews” are those people for whom $(2) > (1)$. This is more likely if their basis risk is low (low Q), their return on capital is very high, or their perceived likelihood of the crisis occurring is very low. To

investigate this hypothesis we will examine the heterogeneity in the treatment effect on loan take-up as follows:

- a) Use the control group to estimate a probit model of the probability of renewing a loan as a function of the following characteristics suggested by theory:
- **Minimum expected likelihood of payout** (403) defined by the maximum expected likelihood of any individual macroeconomic shock – a measure of the perceived likelihood of the shock occurring.
 - **Risk aversion** (1403) defined as 1 for anyone who chooses business 1 through 4 and 0 for anyone who chooses business 5 through 8 in the Binswanger lottery – a measure of how they trade off the two different states.
 - **High basis risk** (607) defined as decrease in sales of 20% or more immediately after the Egyptian revolution in February and March 2011
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 - **Considering delaying investments** (313) defined as 1 for yes and 0 for no
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 - **Expecting to renew a loan less than 3000 LE** (308) defined as a dummy variable
 - **Expecting to renew a loan between 3001 and 5000 LE** (308) defined as a dummy variable
 - **Female**(102) defined as a dummy variable
 - **Branch** (administrative)
 - **Type of business** (202a) dummies for manufacturing and for retail
 - **Total number of loans client has received from ABA** (administrative)
 - **Age of business** (202a)

We will then use the model estimated on the control group to obtain the predicted probability of renewal for both the treatment and the control groups, and create a dummy variable “High chance of renewing regardless of insurance” which is coded as 1 if the predicted probability is above 80%, and zero otherwise. We will then estimate the following regression:

$$TakeupLoan = \beta_0 + \beta_1 OfferedEPP + \beta_2 OfferedEPP * HighChanceRenewal + \beta_3 HighChanceRenewal + X'_s \theta + \varepsilon$$

We predict $\beta_2 < 0$, i.e. that the offer of insurance will have less positive impact on take-up of the loan for people who are likely to take a loan even if insurance is not offered, provided that $\beta_1 > 0$.

- b) To get at the issue of whether the impact is greater for people who will only renew if they have insurance, we instead estimate treatment heterogeneity with respect to
- i) **Considering delaying investments** (313) defined as 1 for yes and 0 for no – expect positive interaction with treatment
 - ii) **Interested in buying insurance in baseline questionnaire** (316) defined as 1 for yes and 0 for no – expect a positive interaction with treatment.

Hypothesis 3: The basic model provided above will help predict which individuals purchase the insurance among the treatment group.

We will estimate a probit model of take-up of the EPP among those offered, with the basic model above showing that we should expect take-up to be determined by the following variables (with signs that theory would suggest):

- $p(s = 1)$: measure by **Minimum expected likelihood of payout** (403) defined by the maximum expected likelihood of any individual macroeconomic shock – a measure of the perceived likelihood of the shock occurring – expect a positive effect.
- $Q(L)$: basis risk, measure by **High basis risk** (607) defined as decrease in sales of 20% or more immediately after the Egyptian revolution in February and March 2011 and **Medium basis risk** (607) defined as decrease in sales of 5 to 20% immediately after the Egyptian revolution in February and March 2011- expect a positive effect on take-up.
- δ , discount rate: measure by **Discounts future by 30% or more** (406 and 801) – expect a negative impact on take-up
- $U(.)$ – a key aspect is risk aversion: measure by **Risk aversion** (1403) defined as 1 for anyone who chooses business 1 through 4 and 0 for anyone who chooses business 5 through 8 in the Binswanger lottery – a measure of how they trade off the two different states. The basic model here would predict risk averse individuals should be more likely to take insurance, although research on rainfall insurance has pointed out the possibility that when insurance is seen as a new untested product, it may be the more risk-seeking who take it up.
- A - how much they expect it to pay-out. This will depend on the size of the loan expected (higher loans will have higher payouts), and on how much they trust ABA. Measure the first by **Planning to renew below 3,000** and **Planning to renew between 3,000 and 5,000** (expect higher take-up the larger the loan they are planning on taking); measure trust by length of prior relationship with ABA (defined as **Total number of loans client has received from ABA**) – expect a positive sign.
- $\pi(L)$, the extent to which profits are higher when taking a loan. This will depend on the marginal return to capital, which is likely to be related to:
 - o Gender: **Female** (102) expect a negative sign, since studies in other regions have found returns to capital lower for females.
 - o Skill level: expect higher returns for more skilled individuals. Measure by **Completed high school** (106); and **numeracy** (measured by whether or not they get all three missing numbers in the sequences in 1001 correct, and also are able to count backwards from 100 by 7s (1002)). Expect positive impact on returns to capital for both.
 - o Liquidity constraints: we expect those who are more liquidity constrained to have higher returns to capital. Liquidity constraints should be lower for those with more **wealth** (measured by the first principal component of the asset indicators in 1205); and for those **without access to other sources of finance** (measured by whether they have never applied for financing from another bank, microfinance lender, or informal lender (70, 706, 712)).

- Whether they think there are key machines/equipment that could increase profits if they had them (901) – expect positive impact.

This specification will form column 1 of our take-up table. In the remaining columns we will add several additional variables that more nuanced versions of the theory would suggest:

Column 2: **Marketing effects** – the effort and ability of different loan officers to market may be different, so we will add branch dummies to this model.

Column 3: **Financial literacy**: the model as presented assumes that people understand insurance. If not, we might expect people who do not understand insurance to be less likely to take it. Measured by variable 1006 (whether they know what insurance is); and also by whether they get questions 1007 and 1008 right (understanding when insurance pays out). Expect positive impact for knowing how insurance works.

Column 4: **Ambiguity aversion**: Gharad Bryan has shown that individuals who are ambiguity averse are less likely to take up insurance, and that this interacts with risk aversion. We will therefore add **Ambiguity neutral** (1404) defined as 1 for anyone who chooses the bag with an unknown proportion of green and white marbles and 0 for anyone who chooses the bag with a specified number of green and white marbles; and its **interaction with our risk aversion measure**.

6. Impacts of insurance on business and household outcomes

The impact of the insurance on business and household outcomes will be state dependent, differing whether or not a crisis which triggers the insurance pay out occurs. Our choice of outcomes to look at will therefore depend on whether such a crisis happens or not.

6.1 Short-term Impact

The main short-term impact is expected to occur through the client changing how they make investments in their business. There could be two effects:

- To the extent that the insurance offer leads to more people taking loans, more people will have finance that they can use to make investments in their business.
- Insurance may change how loan funds are used, leading individuals to be more likely to make risky investments and longer-term investments.

We will examine these channels by estimating the ITT treatment effect regressions on the following variables:

- Whether or not they have made an investment in new machinery or equipment between March 2012 and the time of the short-term follow-up survey (expected to be September or October 2012).
- Amount invested in new machinery or equipment (coded as zero for those not investing).

- Whether they have introduced a new product to their business between March 2012 and the time of the short-term follow-up survey.
- Whether they have set up a second business since March 2012.
- Business inventory and raw material levels (estimated via an ANCOVA specification, controlling for baseline inventory levels) – to see whether they are building up business stocks.
- Hired a new worker since March 2012 – to see whether they are expanding labor.

We will also treat this as a standardized family of outcomes and look at the overall impact on investment and expansion.

A second short-term impact could be to change the extent to which people perceive macro and economic uncertainty to be constraints to their business growth. This will be measured as

- Proportion reporting that political uncertainty is a major or very severe problem for the operation or growth of their business.
- Proportion reporting that this is a very severe problem.
- Proportion reporting that macroeconomic uncertainty is a major or very severe problem for the operation or growth of their business.
- Proportion reporting that this is a very severe problem.

6.2 State-Dependent Impacts

6.2a If insurance isn't triggered

If the insurance does not pay out, then the main impact is going to come from changes in firm investment behavior caused by the insurance. To the extent we see people investing more, or investing in riskier activities, we should expect to see changes in business profits and sales. If not, individuals could be marginally worse off by the small cost of the premium. We will therefore estimate treatment effect regressions on the following outcomes:

- Reported Profits (605)
 - Monthly profits will be top-coded at the 99th percentile of the control group's distribution to reduce influence of outliers
- Obtaining Profits above the 95th percentile for the control group – action may be at the upper tail if the treatment causes individuals to undertake riskier activities.
- Revenue (604): Monthly revenue will be top-coded at the 99th percentile of the control group's distribution to reduce the influence of outliers
- Revenues above the 95th percentile of the control group's distribution
- Employment, measured by number of full-time paid employees, number of paid employees, and any paid employee.

- Total individual earnings (605, 611): Reported monthly profits plus reported personal income outside the enterprise
- Household total consumption

6.2b If insurance is triggered:

If the insurance does pay out, then in addition to impacts through business investment, there will be an insurance effect, which should improve household well-being through reducing the need to take ex-post measures to deal with the crisis. In addition to the outcomes looked at above, we will also look at:

- Loan repayment rates: whether or not they make a late or missed payment on their loan
- Borrowing from friends and family: whether or not they borrow from friends or family.
- Asset sales: whether or not they have sold a household or business asset worth 500 LE or more in the past 6 months.
- Mental health: measured by the MHI-5
- Food consumption levels

6.3 Estimation of Treatment Effects

For business and household outcomes, our main specification will be the following:

$$Y_i = \beta_0 + \beta_1 T_i + X'_s \theta + \varepsilon_i$$

where Y_i is the outcome variable, T_i is an indicator for being assigned to the treatment, X_s is a vector of randomization pair dummy variables, and ε_i is the error term. Huber-White standard errors will be used. β_1 will provide the intent-to-treat effect, which is the effect of being selected to participate in an EPP among the experimental sample.

For outcomes in which the same question was asked in both the baseline and follow-up surveys, our main specification will be the following ANCOVA specification:

$$Y_{i,t=1} = \beta_0 + \beta_1 T_i + \pi Y_{i,t=0} + X'_s \theta + \varepsilon_i$$

where $Y_{i,t=1}$ is the given outcome variable measured post-treatment, $Y_{i,t=0}$ is its baseline value, T_i is an indicator for being assigned to treatment, X_s is a vector of randomization pair dummy variables, and ε_i is the error term. Huber-White standard errors will be used. β_1 will provide the intent-to-treat effect, which is the effect of being selected to participate in an EPP among the experimental sample.

7. Other Pre-analysis Specifications

7.1 Dealing with Testing for Multiple Outcomes through Standardized Treatment Effects and Adjustments for Multiple Inference

We have a relatively rich set of outcome measures and characteristics with which to explore treatment-effect heterogeneity. To deal with multiple hypothesis testing we employ the two approaches employed by Finkelstein et al. (2010) in their pre-analysis plan for studying the Oregon Health experiment. First, we group our outcome measures into domains (loan take-up, EPP take-up, immediate outcomes, and state dependent outcomes), based on the idea that items within a domain are measuring an underlying common factor. Then we sign the outcomes within each domain so that the hypothesized effects go in the same direction, and take a standardized treatment effect within that domain. We follow Kling, Katz and Liebman in constructing this standardized treatment effect.

Secondly, to account for multiple inferences within a domain we will compute and report the family-wise error rate adjusted p-values using the Westfall and Young step-down resampling method.

To control for multiple hypothesis testing with respect to the heterogeneity of treatment effects, we will follow the recommendations of Fink, McConnell and Vollmer (2010) and employ the Benjamini and Hochberg (1995) method to minimize the false non-discovery rate (FNR). We will also limit our examination of treatment effect heterogeneity to the pre-specified hypotheses.

7.2 Survey attrition

Let A_i be an indicator of whether individual i attrites from the study by not responding to or being able to be contacted for the endline survey. We will first estimate whether attrition is related to treatment status by means of the following regression:

$$A_i = \beta_0 + \beta_1 T_i + X'_s \delta + \varepsilon_i$$

Where X_s are dummy variables for each randomization strata s . We will test $\beta_1 = 0$ to determine whether attrition from the survey is related to treatment status or not.

If treatment status is found not to significantly affect attrition at the 5 percent significance level, then all estimation will proceed without any adjustment for attrition. If attrition is found to be related to treatment status, we postulate that attrition will be higher for the control group, and will employ Lee bounds to obtain bounds on our treatment estimates which are robust to this attrition.

7.3 Missing data from item non-response

No imputation for missing data from item non-response at follow-up will be performed. Missing data on baseline variables will be dummied out of the ANCOVA specifications, as detailed above. We will check whether item non-response is correlated with treatment status following the same procedures as for survey attrition, and if it is, construct bounds for our treatment estimates that are robust to this.

7.4 Questions with Limited Variation

In order to limit noise caused by variables with minimal variation, questions for which 95 percent of observations have the same value within the relevant sample will be omitted from the analysis and

will not be included in any indicators or hypothesis tests. In the event that omission decisions result in the exclusion of all constituent variables for an indicator, the indicator will be not be calculated.

Appendix I – Data Tables

Table 2. Baseline Means by Treatment Status

	Control	Treatment
<i>Statification Variables</i>		
Female	0.36	0.36
Victorya	0.10	0.10
Mansheya	0.05	0.05
Moharen Bek	0.07	0.07
Amreya	0.13	0.13
Montaza	0.07	0.07
Karmouz	0.08	0.09
Fleming	0.07	0.07
Dekheila	0.11	0.11
Attarin	0.01	0.01
Abo Kir	0.06	0.07
Smouha	0.01	0.02
Agamy	0.09	0.09
Ras El Tin	0.06	0.06
Shamal El Tahrir	0.00	0.00
Transfers	0.00	0.00
Former Blossoms Clients	0.07	0.07
<i>Pair-Wise Matching Variables</i>		
Likelihood of Economic Shock	0.61	0.59
Risk Averse	0.49	0.47
Ambiguity Neutral	0.30	0.29
High Basis Risk	0.41	0.41
Medium Basis Risk	0.29	0.29
Considering Delay in Investing	0.10	0.10
Expect New Loan	0.89	0.89
Expect Less than 3000	0.27	0.28
Expect Between 3001 and 5000	0.26	0.27
January Profits*	1098	1037
February Profits*	1121	1073
January Profits Missing	0.04	0.04
February Profits Missing	0.04	0.04

*Top 1.5% of observations trimmed to limit the effect of outliers on the mean

Appendix II –Replicability and Potential for Scale-up

The current political and economic situation in Egypt isn't normal by any national standards anywhere in the world, but that doesn't mean that countries and regions won't face macroeconomic shocks in the future. If this intervention has a positive impact on spurring investment, increasing loan take up, boosting sales and profits, increasing household consumption, smoothing consumption in crises, reducing loan delinquency rates, or increasing financial awareness then development practitioners should seize on this product's potential. ABA is very excited about this evaluation. If we discover positive impacts, they are considering rolling out a self-financed full-fledged macroeconomic stability insurance product to protect their clients. If they did it themselves, ABA would have to limit the payouts to decrease their exposure, but they see an insurance product like this as potentially highly profitable in the long run. One can imagine an international organization like the World Bank or a social entrepreneurial firm in the private sector providing insurance to microfinance institutions across the world, which would decentralize exposure and make this a very profitable financial instrument.