# Estimating the impact of microcredit on those who take it up: Evidence from a randomized experiment in Morocco

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# Estimating the impact of microcredit on those who take it up:
# Evidence from a randomized experiment in Morocco[*]

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## Abstract

This paper reports the results from a randomized evaluation of a microcredit program introduced in rural areas of Morocco starting in 2006 by Al Amana, the country's largest microfinance institution. Al Amana was the only MFI operating in the study areas during the evaluation period. Thirteen percent of the households in treatment villages took a loan, and none in control villages. Among households identified as more likely to borrow based on ex-ante characteristics, microcredit access led to a significant rise in investment in assets used for self-employment activities (mainly animal husbandry and agriculture), and an increase in profit. But this increase in profit was offset by a reduction in income from casual labor, so overall there was no gain in measured income or consumption. We find suggestive evidence that these results are mainly driven by effects on borrowers, rather than by externalities on households that do not borrow. This implies that among those who chose to borrow, microcredit had large, albeit very heterogeneous, impacts on assets and profits from self-employment activities, but small impact on consumption: we can reject an increase in consumption of more than 10% among borrowers, two years after initial rollout.

# 1 Introduction

Several recent randomized evaluations in different countries and contexts have found that granting communities access to microcredit has positive impacts on investment in self-employed activities, but no significant impact on overall consumption – or on overall income, when that is measured (Attanasio et al. (2011); Augsburg et al. (2013); Banerjee et al. (2013); Angelucci, Karlan and Zinman (2013); Desai, Johnson and Tarozzi (2013)). A plausible interpretation of these findings is that the small businesses that the households gaining access to microcredit invest in have low marginal product of capital. Consistent with this hypothesis, these studies often find no significant impact of microcredit access on business profits or income from self-employment activities on average, although several do find an impact on profits for pre-existing businesses or for businesses at the top end of the distribution of profits (Angelucci, Karlan and Zinman (2013); Banerjee et al. (2013)). Since the marginal business funded by a microfinance loan is often more likely to be female-operated, this interpretation (that the impact of microcredit on overall profits is low because it mainly funds unprofitable businesses) is also consistent with the cash-drop literature that finds that while the marginal productivity of capital appears to be large for male-run small businesses, it is much lower for those run by women (de Mel, McKenzie and Woodruff (2008)).

One remaining question about this interpretation, however, is that while the impact on average self-employment profit is statistically insignificant in all existing studies, the point estimates are generally positive. Moreover, in most studies, the differential take-up of microcredit between treatment and control groups is generally low, either because interest in microcredit in treatment areas is low or because there is also some take-up in the control group (due either to leakage or entry of competitors into the control area). This implies that the insignificantly positive point estimates would translate into large (though still insignificant, obviously) instrumental estimates of the impact of microcredit (as opposed to microcredit access) on the average business profit. Could it be that the effect on those who take up microcredit is actually large, although perhaps imprecisely estimated?

The studies where microcredit access is randomized at the area level, however, generally focus on reporting reduced-form estimates and do not use area-level access as an instrument for

microcredit. There are good reasons to believe that microcredit availability impacts not only on clients, but also on non-clients through a variety of channels: equilibrium effects via changes in wages or in competition, impacts on behavior of the mere possibility to borrow in the future, etc. Thus, the exclusion restriction – that the instrument only affects the outcome through its impact on microcredit borrowing – is likely to be violated, and studies that randomize at the area level (rightly) avoid using area-level microcredit access as an instrument. On the other hand, in order to maximize power in the face of low demand, most of these studies use as the study sample a *convenience sample*, which surveys people who are eligible and likely to borrow based on observables (for example demographic characteristics or prior expression of interest). The results are thus reduced-form estimates on a specific population. Furthermore, (with the exception of Desai, Johnson and Tarozzi (2013)) identification comes from *increased* microcredit access in treatment areas (rather than no access versus some access), and we are thus not capturing the effect driven by those who want microcredit the most (who may borrow both in control and treatment areas).

In this paper, we present results from a randomized evaluation of microcredit in rural areas of Morocco. The study has three features that make it a good complement to existing papers. First, it takes place in an area where there is absolutely no other microcredit penetration, before or after the introduction of the product, and for the duration of the study. We are thus capturing the impact on the most interested households in villages (although those are still marginal villages for our partner, since they were chosen to be at the periphery of their planned zones of operation). Second, we designed and implemented a sampling strategy that would give us sufficient power to estimate the impact on borrowers, and also to capture impacts representative at the village level Finally, we propose a strategy to test for externalities on non borrowers, and to estimate direct effect on borrowers.

Existing strategies to estimate spillovers, which use two-step randomization (e.g.Crépon et al. (2013)) are not feasible for this question, first because excluding a subset of potential clients once an office is open would be difficult, and second because part of the potential impact of microcredit on non-participants would only affect those eligible to be clients. We thus propose a simple strategy, based on the different probabilities to borrow found among by the households that were surveyed, and build this strategy explicitly into the sample design.

The evaluation was implemented in 162 villages, divided into 81 pairs of similar villages. The pairs were chosen at the periphery of the zone where Al Amana, our partner microfinance institution (MFI), was planning to start their operations. We randomly selected one village in each pair, and Al Amana started working in that village only. In a pilot phase, we collected extensive data on a sample of 1,300 households in seven pairs of villages (seven treatment, seven control), before introduction of microcredit. Several months after the program was introduced in the pilot villages, we estimated a model of credit demand in those villages and selected a small number of variables that were correlated with higher take-up. For all the remaining villages, before Al Amana started their operation, we conducted a short survey (which included the variables correlated to higher take-up) on 100 randomly selected households. We then calculated for each household a propensity score to borrow based on our model. We interviewed at baseline and endline (two years after rollout) all the households in the top quartile of the score (in treatment and control group), plus five households randomly selected from the rest of the village. In addition, at endline, we added a third group which had an even higher propensity to borrow, by re-estimating the take-up equation in the whole sample, and using the initial census (available for all households) to construct a new score. In total, our sample includes 4,465 households at baseline, 92% of which were successfully interviewed at endline (an unusually low attrition rate), and 1,433 new households that were added at endline.

Our sample thus has three categories of households, classified ex-ante in terms of their probability to borrow. We take advantage of the heterogeneity in the propensity to borrow in our sample to test the existence of potential externalities from borrowers to non borrowers. We evaluate the effect of the treatment on households who have a high propensity to borrow and those who have a low probability to borrow. Finding no effect on low propensity households would indicate the absence of externalities or other effects of microcredit availability on non borrowers. Since low propensity households come from both villages with low microcredit take-up (where almost everyone has a low propensity to borrow) and villages with higher take-up, our estimates on this specific population are likely to capture spillovers from borrowers and anticipation effect (impact from the mere fact that microcredit is available). For most outcomes we fail to reject that microcredit has no effect on the low propensity sample. Motivated by this evidence, we use a treatment as an instrument for borrowing, the last step of our analysis.

For consistency with the other papers on microcredit, we first report a complete set of reduced-form estimates on the households in the top quartile of ex-ante propensity to borrow, as well as on households that were added at endline. Even in this sample, we find fairly low take-up of microcredit (17% in treatment and zero in control). Households in treatment villages invest significantly more in self-employment activities, particularly agriculture and animal husbandry, which are dominant ones (65% of the sample engages in either of these activities). We find a significant increase in total self-employment profit on average but the effect appears to be very heterogeneous. In particular, the effect on profits is significantly positive at the higher quantiles of profitability (as in other studies) but significantly negative at the lower quantiles. The moderate increase in self-employment income is offset by a decrease in employment income, which comes from a drop in labor supplied outside the farm or household business. Overall, income increases (insignificantly) and consumption declines slightly (again, this is insignificant). Finally, similarly to other studies, we find a significant decline in nonessential expenditures (expenditures on festivals), but no change in any of the other "social outcomes" often meant to be affected by microcredit.

We then present, for our key variables, estimates of the impact of making microcredit available in a village on the population as a whole. We do this by using our entire endline sample and applying the sampling probability in order to appropriately weight the observations. The bottom line is similar. Not surprisingly, take-up of microcredit is even smaller in this sample: 13%. Yet, the relatively small difference between the average household and one determined to be "high probability" underscores how difficult it is to predict who will take up microcredit. Correspondingly, the impact on most variables of interest is also smaller. However, even at the population level, we find that microcredit access significantly increases sales and expenditures in the business (however there is now a negative and insignificant effect on profits). We also find significant declines in labor supplied outside the home and salary income, and an insignificant decrease in consumption.

As we mentioned, our test of externality fails to reject the hypothesis of no externality, on every variable considered individually except for two (labor supply outside the home and income). Of course, a caveat could be the lack of statistical power. We nevertheless move on to present an instrumental variable estimate of the impact of microcredit, using a dummy for being in a

treatment village as an instrument for take-up. This essentially scales up our previous estimates, and gives us a sense of what the relatively modest reduced-form impact at the village level (or for likely borrowers) implies for those who actually borrow. On average, the point estimate suggests roughly a 50% increase in asset holding, a doubling of sales, and a more than doubling of profits. Labor outside the home declines by about 50% both in terms of earnings and hours supplied.

Back-of-the-envelope calculations suggest that our profit estimates imply an average return to microcredit capital in terms of business profit of around 140%, not taking into account interest payments. Given this appealing figure, why aren't more people taking out loans? One possible reason is that, according to our estimates, the impacts of credit on profits are very heterogeneous. We present counterfactual distributions for profits among compliers based on Imbens and Rubin (1997): 25% of the compliers in the treatment groups have negative profits, while almost no one in the control group does. Given this risk level, it is plausible that individuals do not fully know what kind of returns to expect and are therefore hesitant to borrow. Another possibility is that profits do not capture welfare improvement. We observe no change in total income and consumption and a drop in hours worked outside the home. We do not observe significant increase in labor supply in the household business, but the confidence interval does not rule out a relatively large increase, and it is plausible that labor in the business was not adequately measured, or that the hours spent taking care of a larger business are more stressful for the households. (Otherwise, it would suggest that the entire increase in total income due to microcredit is spent on leisure, which seems somewhat implausible given that households do not work very many hours to start with.)

Overall, our study confirms the key finding from other research: even in an environment with very little access to credit, the aggregate impact of microcredit on the population at large is fairly limited, at least in the short term. This holds true even for those who are most predisposed to borrow. We can reject that household consumption increased by more than 10% monthly among those who take up a loan. But our study reveals that, at least in this context, these lackluster impacts appear to result from the combination of several offsetting factors. First, the take-up is low, even in these rural areas of Morocco where there is essentially no formal credit alternative. Second, among those who take up, there are proportionally large average

impacts on self-employment investments, sales, and profits although there also appears to be great heterogeneity in these effects. Third, in the Moroccan context, those gains are offset by correspondingly large declines in employment income, stemming from substantial decline in labor supplied outside the household. Thus, some households choose to take advantage of microcredit to change, in pretty significant ways, the way their lives are organized. But even these borrowers do not appear to choose microcredit as a means to increase their standard of living, at least in the relatively short run.

## 2  Context and evaluation

### 2.1  Al Amana's rural credit program

With about 307,000 active clients and a portfolio of 1,944 million Moroccan dirhams or MAD (235 million USD) as of December 2012, Al Amana is the largest microfinance institution in Morocco. Since the start of its activities in 2000, Al Amana expanded from urban areas, into peri-urban and then to rural areas. Between 2006 and 2007, Al Amana opened around 60 new branches in non-densely populated areas. Each branch has a well-defined catchment area served by credit agents permanently assigned to the branch.[1]

The main product Al Amana offers in rural areas is a group-liability loan. Groups are formed by three to four members who agree to mutually guarantee the reimbursement of their loans. Loan amounts range from 1,000 to 15,000 MAD (124 to 1,855 USD) per member. It can take three to 18 months to reimburse loans, through payments made weekly, twice a month, or monthly. For animal husbandry activities, a two-month grace period is granted. Interest rates on rural loans ranged between 12.5% and 14.5% at the time of the study (i.e. between 2006 and 2009). To be eligible for a group-liability loan, the applicant must be between 18 and 70 years old, hold a national ID card, have a residency certificate, and have been running an economic activity other than non-livestock agriculture for at least 12 months. Unlike most MFIs worldwide, Al Amana does not restrict its loans to women exclusively, but it does generally require that credit

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[1]A map is established and approved by Al Amana headquarters before the branch is opened, specifying the exact area, and therefore villages, that are eligible to be served by the branch. An intervention area can consist of one to six rural communities, and several villages belong to a community.

agents have at least 35% of women among their clients. However, this requirement was first removed among the branches participating in the study and then among all branches.

From March 2008, individual loans for housing and non-agricultural businesses were also introduced in rural areas. These loans were larger (up to 48,000 MAD, or about 6,000 USD), had an additional set of requirements, and were targeted at clients that could provide some sort of collateral. During our period of focus, households almost only took out group-liability loans, so this study is primarily an evaluation of that product.

## 2.2    Experimental design and data collection

The design of our study tracked the expansion of Al Amana into non-densely populated areas between 2006 and 2007. Before each branch was opened, data was collected from at least six villages located on the periphery of the intervention areas – villages that could either have been included or excluded in the branch's catchment area. Villages that were close to a rural population center or along a route to other areas served by the branch were excluded, as this would have disrupted Al Amana's development. A very small number of villages where other MFIs were present (less than 2%) were also excluded. Selected villages were then matched in pairs based on observable characteristics (number of households, accessibility to the center of the community, existing infrastructure, type of activities carried out by the households, type of agriculture activities). On average, two pairs per branch were kept for the evaluation. In each pair, one village was randomly assigned to treatment, and the other to control. In total, 81 pairs belonging to 47 branches were included in the evaluation.

Between 2006 and 2007, Al Amana opened new branches in six phases. These branches were opened throughout rural Morocco.[2] For the purposes of our evaluation, we divided this expansion into four periods, and conducted the baseline survey in four waves of field operations between April 2006 and December 2007. Our sampling strategy followed a novel approach to maximize the evaluation's power to detect both direct and population-level effects of microfinance access. Specifically, we selected two samples of households: one containing those with the

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[2]Our sample is spread throughout rural areas of the entire country. Opened branches, 47 in total, are located in 27 provinces belonging to 11 regions (out of a total of 16 regions in the country) and cover all main dialects spoken in the country. Figure B1 in the Online Appendix shows the spatial distribution of Al Amana branches participating of the study.

highest probability to become clients of the microfinance institution and one containing a random selection of households from the rest of the population. Using the first sample increases the probability to detect an effect on those who are the most likely to become clients, if there is one. Using both samples together, with appropriate weights, allows us to measure the effect on the whole population of offering access to microfinance services.

To this end, in each of the fourteen villages of the first wave, we sampled 100 households to whom we administered a full baseline survey. In villages of fewer than 100 households, we surveyed them all. This wave took place in April-May 2006, six months before the scheduled launch of the second wave. We used data from this survey and administrative data on credit take-up in treatment villages over the first six months (reported weekly by credit agents) to estimate a model to predict the likeliness to borrow for each household. We present the result of this model in Appendix Table A1.

Based on this model, we designed a short survey instrument including the key variables predicting a higher likelihood to borrow. [3] For each of the subsequent waves, we started by administering this short survey to a random sample of 100 households in each village (or all the households if the village had fewer than 120). We entered survey data on computers on site, and an Excel macro selected the top quartile of households predicted to be the most likely to borrow on the basis of the model, as well as five additional households from the rest of the population. We administered the full baseline survey to this sample.

The baseline survey included questions on assets, investment and production in agriculture, animal husbandry, non-agricultural self-employment activities, labor supply of all household members (hours and sectors), as well as a detailed consumption survey. Since microcredit aims to have broad impacts on behavior and wellbeing, we also included questions on education, health, and women's decision-making power in the households.

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[3]The variables collected in this short survey were the following: household size, number of members older than 18, number of self-employment activities, number of members with trading or services or handicraft as main activity, gets a pension, distance to souk (in km), does trading as self-employment activity, has a fiber mat, has a radio, owns land, rents land, does crop-sharing, number of olive and argan trees, bought agriculture productive assets over the past 12 months, uses sickle, uses rake (in agriculture), number of cows bought over the past 12 months, phone expenses over the past month (in MAD), clothes expenses over the past month (in MAD), had an outstanding formal loan over the past 12 months, would be ready to form a four-person group and guarantee a loan mutually, amount that would be able to reimburse monthly (in MAD), would take out a loan of 3,000 MAD to be repaid in nine monthly installments of 400 MAD.

After the baseline survey was completed in each wave, one treatment and one control village were randomly assigned within each pair. In treatment villages, credit agents started to promote microcredit and to provide loans immediately after the baseline survey.[4] They visited villages once a week and performed various promotional activities: door-to-door campaigns, meetings with current and potential clients, contact with village associations, cooperatives and women's centers, etc.

Two years after the start of each wave of the Al Amana intervention, we conducted an endline household survey, based on the same instrument, in the same 81 pairs of villages (May 2008-January 2010). 4,465 households interviewed at baseline were sampled for endline.[5] Of them, 92% (4,118 households) were found and interviewed again. To maximize power, an additional 1,433 households (also predicted to have a high probability to borrow based on the credit model and the data from the short-form survey) were sampled at endline. To select these additional households, we re-estimated the model to predict the likelihood to borrow for each household using administrative data on who borrowed by the time of the endline survey (i.e. over the two years of the evaluation time frame), matched with data collected with the short-form survey before the rollout of microcredit (and hence not affected by the rollout), updated the dependent variables including clients over the two-year period, and re-estimated the coefficients of the model. This allowed us to much better identify likely borrowers. [6]Thus, the endline household survey was conducted, in total, with 5,551 households.[7]

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[4]By the time of the baseline survey, branches were fully operational and were conducting business in the center of their catchment areas (within a 5 km radius of the branch location). Once the baseline survey was completed, credit agents started to cover the whole branch catchment area, with the only exception of control villages.

[5]In wave 1 villages, we kept for the analysis 25% of households with a high probability to borrow, plus five households chosen randomly.

[6]Note that the sample is still selected using a linear combination of variables collected at baseline (the same in treatment and control villages) and is therefore not endogenous to the treatment.

[7]Out of the 5,551, to remove obvious outliers without risking cherry-picking, we trimmed 0.5% of observations using the following mechanical rule: for each of the main continuous variables of our analysis (total loan amount, Al Amana loan amount, other MFI loan amount, other formal loan amount, utility company loan amount, informal loan amounts, total assets, productive assets of each of the three self-employment activities, total production, production of each of the three self-employment activities, total expenses, expenses of each of the three self-employment activities, income from employment activities, and monthly household consumption), we computed the ratio of the value of the variable and the 90th percentile of the variable distribution. We then computed the maximum ratio over all the variables for each household and we trimmed 0.5% of households with the highest ratios. Analysis is thus conducted over 5,424 observations instead of the original 5,551, and no further trimming is done in the data.

## 2.3 Potential threat to experiment integrity

The experimental design was generally well respected, and we observe essentially no entry of Al Amana (or any other MFI, as it turns out) in the control group.[8] Villagers did not travel to other branches to get loans either.

Attrition was not a major concern in the experiment since 92% of the households in the baseline were found at endline. (Attrition is slightly higher in the treatment group at 8.6%, compared to 6.8% in control; see Table 1, Panel B.) Tables B3 and B4 compare attrition in the treatment and the control groups, and examine the characteristics of the attritors compared to non-attritors. Table B3 focuses on attrition of the baseline sample, while Table B4 uses the short form survey to examine attrition in the full endline sample (including households that were not included at baseline). Attritors belong to smaller households with younger household heads, and are less likely to have a self-employment activity. We then look at whether attritors' characteristics differ between the treatment and control groups (Panel C of Tables B3 and B4). We find only one characteristic that differs for attritors in treatment villages (they are relatively more likely to run a self-employment activity).

Next, we examine balance between treatment and control. Table 1 provides means in the control group and the treatment-control difference for the variables collected in the baseline survey of 4,465 households. In Appendix Table B1 and B2, we reproduce the same analysis for the whole sample of 5898 households and for the 4934 households with high probability to borrow.

Unfortunately, there are some differences between the treatment and control groups, more than would be expected by pure chance (although we know that the randomization was well done, since it was carried out in our office, by computer). Jointly, these baseline characteristics are different in the treatment and control groups. At baseline, households in treatment villages had on average a slightly larger access to financial services, but not larger loans. They had higher probability to be engaged in livestock activity in treatment villages, and hence larger sales and assets, and lower probability to run a non-farm business. As a result of these imbalances, we

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[8]A few of the originally selected pairs of treatment and control villages were removed from the sample early on – before data collection – because it turned out that the treatment and control villages were served by another Al Amana branch. A few more were removed because Al Amana decided not to operate in their area at all. Implementation was done effectively and according to plan in the rest of the sample.

include individual-level control variables in our analysis, and present a robustness check without such control variables in the appendix. Our results are not sensitive to control variables.

# 3 Reduced-form results

For consistency with the other papers in the literature, we first report a set of reduced-from results on the sample of likely borrowers (the top quartile of households selected to be most likely to borrow). We then turn to population-level estimates, and estimates of the impact of the treatment on the treated.

## 3.1 Specification

We estimate the following reduced-form specification.

$$y_{pij} = \alpha + \beta T_{pi} + X_{pij}\delta + \sum_{m=1}^{p} \gamma_m \mathbf{1}(p = m) + \omega_{ij} \tag{1}$$

where $p$ denotes the village pair, $i$ the village and $j$ the household. $T_{pi}$ is a dummy for the introduction of microcredit in village $i$, $y_{pij}$ is an outcome for household $j$ in village $i$ in pair $p$. $X_{pij}$ is a vector of control variables.[9] The regression includes the 81 pair dummies represented by $\sum_{m=1}^{p} \gamma_m \mathbf{1}(p = m)$. Standard errors are clustered at the village level.

Equation 1 is estimated on two different samples. The first is the sample of households more likely to become clients of the microfinance institution (see Section 2.2). In Section 4.2 we also present estimation results obtained using the whole sample, using sampling weights to obtain results representative of the whole village population. As we evaluate the effect of microcredit on a large number of outcomes, we account for multiple hypothesis testing. Each table of results we present focuses on a specific family of outcomes for which we produce (in the last column) an index (which is the average of the z-scores of each outcome within the family). Furthermore

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[9]The basic set of covariates most of our regression includes the number of household members, number of adults, head age, does animal husbandry, does other non-agricultural activity, had an outstanding loan over the past 12 months, household spouse responded the survey, and other household member (excluding the head) responded the survey. Since part of the sample includes households that were only included at endline, we do not have baseline information for them. In regressions, we enter a dummy variable identifying them and set to zero the other covariates. We present in Appendix Table B7 regression results in which no covariates are introduced and a table in which an extended set is considered.

we report both the standard p-value and the p-value adjusted for multiple hypotheses testing across all the indexes.[10]

For a reduced set of outcome variables (and still for the sample of likely borrowers), we also consider the corresponding quantile regressions. To perform the regression we follow Chamberlain (1994) and simply compute the desired quantiles of the considered outcome variable in each village and then implement minimum distance estimation, explaining the different estimated quantiles by the treatment variable and pair dummy variables. We consider quantiles 10, 25, 50, 75 and 90%.

## 3.2 Access to credit

Table 2 presents the results on credit access and borrowing. As in previous studies (Banerjee et al. (2013); Karlan and Zinman (2010)), we find that households tend to underreport borrowing: administrative data suggest that 17% of households in this sample borrow in the treatment villages (and none in the control villages), while in survey data only 11% of households admit to borrowing. The administrative data is more reliable in this context, and this is what we will use for the first stage in our instrumental variable regressions below. Access to any other form of formal credit is very limited. In the control villages, 2% of households report borrowing from another MFI, 2% from another bank, and 2% from any other formal source. Only 6% report borrowing from informal sources though this may be underestimated to the extent that households do not like to admit to borrowing (as it is frowned upon by Islam), or to the extent that informal loans between villagers are recorded as gifts. The only common source of loans is the utility companies: 16% of households in control villages borrow from a utility company to finance their electricity or water and sanitation installation. The pattern is very similar in treatment villages, except that households report 1pp more borrowing from other formal sources (there may be some confusion between these other sources and Al Amana, partially accounting for the underreporting of Al Amana loans). Therefore microfinance was introduced by Al Amana in our treatment villages in a context where households had very limited alternative access to

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[10]We adjust p-values following Hochberg (1988) in order to control the familywise error rate (FWER).

finance. This is a unique feature that sets our study apart from most other impact evaluations of access to microfinance.

Turning to loan amounts, households in treatment villages report additional outstanding loans of 796 MAD (USD 96) on average from Al Amana over the 12 months prior the survey.[11] There are also small but significant increases in reported amounts borrowed from both other formal credit sources and the utility companies, as well as a small insignificant substitution with informal loans, which might be related to confusion between various types of loans, as previously mentioned. In total, average outstanding loan amount increases by 1,193 MAD and repayment per month increases by 33 MAD, as reported by households in treatment villages. Appendix Table B5 uses administrative data to provide some characteristics of the loans disbursed by Al Amana in treatment villages. According to this administrative data, clients in treatment villages borrowed on average 10,571 MAD. This compares to outstanding loan amounts of 8,872 MAD as declared in our survey data.[12] Thus, households underreport borrowing both on the extensive and the intensive margins. In terms of other loan characteristics, clients most often form groups of four people who act as mutual guarantors and reimburse their loans in 12 or 18 monthly installments. The average client household took up a loan 5.7 months after microcredit was made available in the village and 50% of them took a second loan by the end of the two-year evaluation timeframe. Most of loans were taken within the first six months (67.9%). When applying for microcredit, most of clients (68%) declared to be planning to use the loan in animal husbandry activities, mainly cattle and sheep rising, 26.4% in trade-related businesses, and the remaining 5.5% in other non-agricultural businesses such as services and handicraft. It is not surprising that no client declared an intent to allocate loans to other agricultural activities (crops and fruit trees), as Al Amana did not lend for such activities.

## 3.3 Income levels and composition, and labor allocation

Table 3 shows the impact of the introduction of microcredit on self-employment activities. 83% of the households in the control group have some form of self-employment activity – the dom-

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[11]Average outstanding loans of 967 MAD (796+180) represent 2.7% of average household annual consumption in the control group. If we consider loan amounts declared by actual borrowers in our survey, this share increases to 24% of annual consumption.

[12]This amount can be directly deduced from information in Table 2 as (796+180)/(0.09+0.02)=8872.

inant forms being animal husbandry and agriculture – whereas only 14.7% of households have a non-farm business (see Appendix Table B6). The results of Table 3 suggest that the introduction of microcredit leads to a significant expansion of the existing self-employment activities in agriculture and animal husbandry, but does not help start new activities. We even find a small non significant reduction in self-employment of 1.6 percentage points for the households in treated villages.

Access to microfinance has a positive effect on assets: the estimated impact is 1,454 MAD. We do not find any effect of microcredit on investments over the last 12 months, probably because most additional investments caused by the new access to microfinance took place in the first year of the intervention (since most loans were disbursed in the first six months), thus more than 12 months before the endline.

Figure 1 shows that quantile treatment effects on asset accumulation are positive at almost all quantiles. Assets of self-employment activities mainly consist of animals (cows or goats) owned by the households. Additional results reported in Table B6 show that the impact on the stock of assets mainly comes from livestock activities. This building-up of assets could correspond to business investment strategy (the assets representing unrealized profits) or to a self-insurance mechanism (the assets are in-kind savings) or to a combination of the two.

One other important result in Table 3 is that, summed across all types of activities, there is a significant expansion in self-employment activities (which comes from existing activity since there is no impact on the extensive margin): revenues, expenditures and profit all significantly increase. Profit, defined as the difference between revenues and expenses, increases by 2,011 MAD, a substantial amount compared to the average profit in the control group, 9,056 MAD. Figure 1 presents the results of quantile regressions. It shows that quantile treatment effects are significantly negative for the lowest quantile (0.10), non-significant at the median, and significantly positive for the quantiles 80 and 90. The finding that the increase in self-employment activity is concentrated at the highest quartile echoes Banerjee et al. (2013) and Angelucci, Karlan and Zinman (2013). Negative profits at the low end of the distribution might be partially due to long-terms investments misclassified as current expenses. These quantile treatment effects are only reduced forms: they do not necessarily mean that the impact of getting credit

itself has the same heterogeneity (since there may be externalities, and we do not know where the compliers lie in the distribution of outcomes). We return to this question in 4.3.

Table 4 shows the impact of microcredit on different sources of income. The major result in this table is that the increase in self-employment profit is offset by a significant decrease in employment income. Note that, despite the fact that 83% of households have a self-employment activity, employment income accounts for as much as 56.9% of household income while self-employment activities account for only 32.7%. Most (90%) of employment income comes from casual (day) labor and very little from stable salaried work (10%). The effect of access to microfinance is quite substantial, -1,052 MAD, a reduction of 6.7% compared to the control group mean. As a result of the reduction in wage earnings, the net increase of employment and self-employment income taken together is small and insignificant. Thus, it appears that, in this context, microfinance access leads to a change in the mix of activities, but no income growth overall.

Table 5 reports on the effect of the introduction of microcredit on the time worked by household members aged 6 to 65 over the past seven days, for various age ranges. Column 1 shows that there is an insignificant reduction in the total amount of hours of labor supplied, and columns 2-4 show there is substitution between the different types of activities. Considering all members together, we find a significant reduction in work outside the home of 2.8 hours, or 8.3% of the control group mean. Time spent on self-employment activities increases, but not significantly so. Overall, hours of work decline in every age group, although the reduction is significant only for the youth (16 to 20) and the elderly (51 to 65).

The reduction in labor supplied outside the home is consistent with the results on employment income (Table 4). The relatively small increase in time spent on self-employment activities despite increased investment may be due to the fact that investments in agriculture and animal husbandry may not need to be coupled with a proportional increase in labor input. Still, this is a remarkable fact: the average quantity of labor (24 hours per week) supplied per adult household member seems relatively low, suggesting that members may have the opportunity to increase their efforts by a large margin (provided that we measure time allocation correctly). This would suggest that households take the opportunity of access to credit to invest in less labor-intensive occupations and increase their leisure time.

## 3.4 Consumption

Table 6 reports the estimated effects of the introduction of microcredit on household consumption (expenditure and consumption of home production are both included). The table shows the effect on total consumption, either at the household level (column 2) or per member (column 1), and by type of consumption expenditures: durables, non-durables, food, health, etc. (columns 3 to 9). Consistent with the lack of effect of overall income, we find a small, negative and insignificant point estimate on consumption (44.6 MAD per month). This absence of effect on consumption is confirmed by quantile treatment effect presented in Figure 1, which shows no effect at any quantile.

Turning to the composition of consumption, we do not find the increase in durable consumption that other papers have reported, but this may be due to the fact that the survey was administered more than 12 months after most people got the loans. Consistent with all the other papers, we find a statistically significant reduction in nonessential expenditures (in this case, festivals, rather than other temptation goods).

## 3.5 Education and female empowerment

The impact of microfinance is supposed to go beyond the expansion of business activity and consumption levels. Indirect effects such as the empowerment of women and improvements in the health status and education levels of children are often considered potential impacts of microfinance.

We did not see any shift in the composition of household consumption that would support this hypothesis. Table 7 looks at other "empowerment" outcomes, namely education and female empowerment. We find no impact on education, despite the reduction in outside labor among teenagers (other randomized controlled trials have found different effects, some finding positive and others negative impacts).

Since the majority of borrowers of our sample are men, the expected effect on female empowerment is less clear-cut than for standard microfinance programs, which tend to focus on women. Nevertheless, we do examine the impacts on female empowerment using several proxies.

The first is the number of income-generating activities managed by a female household member (column 5). In remote rural areas, such activities are usually managed by male members (1.5 activities on average compared to 0.39 for women). We also use a series of qualitative indicators to describe female empowerment such as the capacity of women to make decisions, and their mobility inside and outside the villages. We construct a summary index of these qualitative variables (column 3) as they are part of the same "family" of outcomes. We find no evidence of the effect of microfinance on any of these variables or on the index.

These results are in line with the fact that only a small proportion of women borrow in remote rural areas and that additional borrowing for men is unlikely to change the bargaining power of women within the household. They are also consistent with the results from all the other microfinance evaluations except for Angelucci, Karlan and Zinman (2013), which find improvements in female empowerment in Mexico.

# 4    Estimation of externalities and instrumental variable estimates

Section 3 presented reduced-form estimates of the impacts of access to microcredit on the specific population of households that were ex-ante the most likely to become clients of Al Amana. We were also interested in two other questions: measuring impacts on the population as a whole, and disentangling direct effects on those who choose to borrow from indirect effects on others, such as general equilibrium effects due to changes in prices, or changes in behavior stemming from the possibility to borrow in the future. We now exploit our experimental design to get at both questions.

## 4.1    Impact of access to microcredit over the whole population of selected villages

Measuring the impact of access to credit on the village population is straightforward given our design: we just re-estimate the same set of regressions, but using the whole sample, and weighting appropriately using the sampling weights, so that the estimates are now representative at the

village level. Those results are of course representative of the marginal villages selected to be in our experiment (and not of the entire catchment area of Al Amana branch).

Table 8 presents the results for some key outcome variables. Panel A simply reproduces the results presented in Section 3 for the population of households likely to become clients of Al Amana (those who were in the top quartile of the propensity score). Panel B presents intention-to-treat estimates on the same outcomes but over the whole population selected for the endline survey (the households in the top quartile plus the five randomly selected), weighted by the inverse of the probability to be selected in that population. Not surprisingly, take-up of microcredit is even smaller in this sample (13%), although the relatively small (though statistically significant) difference with the "high-probability" sample underscores how difficult it is to predict who will take up microcredit. Correspondingly, the impact on most variables of interest is also smaller. However, even at the population level, still we find that microcredit access significantly increases sales and expenditures in the business. We also find significant declines in labor supplied outside the home and in salary income, and an insignificant decrease in consumption. There is now a negative and insignificant impact on profits: combined with the estimate on likely borrowers and the quantile regressions, which did show significant negative treatment effects at the lowest quantiles, this suggests that those who are least likely to borrow are those with the most negative treatment effect on profit.

## 4.2   Externalities

*Prima facie*, results in the previous section are not suggestive of strong externalities. We evaluate the effect of the treatment on the samples of households with high and low propensity to borrow. Finding no effect on the households who are predicted not to borrow is an indication that the no effect on non borrowers (in the form of externalities and anticipation effects). In practice, we estimate the treatment effect separately for those with the highest 30% and lowest 30% probability to borrow, and omit the middle group.

To implement this test, we first re-estimate the propensity to borrow based on actual endline behavior. By using actual borrowing behavior as measured by the endline survey, instead of using the model based on only pilot phase 1, we increase the predictive power of the model. This is

done by estimating a logit regression for the decision to become a client of Al Amana, using the set of baseline variables obtained from the initial short survey (which we collected at baseline well before the intervention took place, and which we have for the entire population) and village dummies. This model is estimated on the whole set of households in treatment villages that were interviewed at endline. The results are presented in Online Appendix Table B8. Several characteristics are individually significant in the regression, and they are also strongly significant taken together. The predicted probability to borrow ranges from almost zero to 0.80. It has an interquartile range of 20 percentage points, and a 37-percentage-point difference between quantiles of order 90% and 10%. This allows us to identify reasonably well the heterogeneity related to the propensity to borrow.

Panel C of Table 8 presents estimation results of the main equation with the two interaction terms (high and low propensity sample).[13] Column 1 presents the results on the probability to borrow. Households in the high probability sample are 36 percentage points more likely to have taken a loan from Al Amana than their control counterparts. In the low probability sample, the difference between treatment and control households is statistically different than zero but very small (less than 2 percentage points). A caveat of our analysis is that a significant part of the low-probability sample comes from villages where there is very little or no access to credit. Thus, the estimates on the low-probability sample capture the effect of credit availability in areas where microcredit was offered but where there is no demand and a combination of credit availability and spillover (from borrowers to non borrowers) effects in villages where some households took loans.

Column 2 to 11 present the results for the key outcome variables individually. For most outcomes, estimated values for the coefficient associated to the interaction between treatment and the low probability sample are insignificant and generally fairly small.

An interesting exception to the finding that externalities do not seem to be important arises from the variables on time worked by households outside the home and the income derived from it: there we see highly significant negative impacts on hours worked outside even among

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[13]This equation is run without weights, to leverage to the maximum extent the power given to us by our design, which made sure we had enough people in the sample with relatively high probability to borrow. Under the null, OLS is BLUE and the regressions should not be weighted. With weights, we still reject the hypothesis of no externalities, but the results are noisier.

low-probability households. This is surprising, as *prima facie* we might have expected the externalities to run the other direction (if those who borrow free up opportunities, leading to more jobs or increases in wages ). It could be that the ability to borrow (and thus to smooth out shocks if needed) reduces the need for income diversification.

## 4.3 Local average treatment effect

Motivated by the finding that externalities (except for labor supply) do not seem to be very important, we present suggestive estimates of the impact of microcredit take-up on outcomes, using a dummy for residing in a treatment village as an instrument for borrowing. This amounts to re-scaling the reduced-form estimates by dividing them by 0.17. Given how noisy the evidence on externality is, this is at best tentative; still, it is useful to get an order of magnitude of what the reduced-form evidence would entail.

The equation we estimate is

$$y_{pij} = a + bC_{pij} + X_{pij}c + \sum_{m=1}^{p} \gamma_m \mathbf{1}(p = m) + u_{ij} \tag{2}$$

where $C_{pij}$ is a dummy variable corresponding to being a client of Al Amana. This equation is estimated using the treatment village dummy variable as an instrumental variable for $C_{pij}$, and for comparison by OLS. The IV strategy is valid only if the assumption of no externalities is correct.

Table 9 Panel B reports the IV estimates for the main outcome variables selected in Table 8. We present the means for compliers at the bottom of the table, as well as the control group means.[14]

The IV estimates imply that, if the entire effect can indeed be attributed to borrowers, the changes induced by Al Amana are large for those who do take up, although the orders of magnitude remain plausible. Assets (column 1) increase by 64%, and production (column 2) increases by 153% compared to the compliers' mean. Similarly, expenses increase by 147% (column 3) and profits by 168% (column 4). The reduction in weekly hours worked in employment activities and

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[14]The complier mean in the control group is calculated as $E(Y(0)|C) = [E(Y|Z = 0) - E(Y|Z = 1, T = 0) * (1 - P(T = 1))]/P(T = 1)$, where Z indicates treatment assignment, $T$ indicates being a microcredit client and $P(T = 1)$ the proportion of clients in $Z = 1$.

the derived income (columns 8 and 6) are also sizable, and both represent a substantial share of compliers' mean (wage earnings decrease from 18,530 MAD to 12,250 MAD; hours of work decrease from 42.13 to 24 hours per week).

If we assume that the impact on profits is entirely driven by borrowers, this suggests large average returns to microcredit loans. In Table 3, we found that impact of the treatment dummy on profits is 2,011 MAD for the second year of the experiment (the profits are measured over the previousyear). During that year, the average amount borrowed in the treatment group was 834 MAD (with an average maturity of 16 months).[15]. If we do not value any increase in hours worked, this suggests an average financial return to microcredit capital of 2.4, well above the microcredit interest rate. While this number is large, it is in line with prior estimates based on capital drop (de Mel, McKenzie and Woodruff (2008)), or for credit to larger firms (Banerjee et al. (2013)).

The impacts on consumption are small and relatively precise: we can reject with 95% confidence that microcredit take-up increases consumption by more than 10%.

To assess the extent of heterogeneity in the treatment effect, we first estimate, under the maintained assumptions of no externality, the cumulative distribution of potential outcomes (with and without treatment) for the compliers. The distribution $F_1$ of potential outcome when benefiting from the treatment is simply the cumulative distribution over the clients. Following (Imbens and Rubin (1997)) , the counterfactual cumulative distribution $F_0$ of potential outcome when not benefiting from the treatment for the compliers/clients is given by:[16]

$$F_0(y|C) = (F(y|T = 0) - F(y|T = 1, \ C = 0)(1 - P(C))/P(C)$$

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[15]This figure is the product of 9,520 MAD borrowed by people who borrowed, multiplied by 16% (she share of clients), and by 52.5% (the share of clients who are borrowing in the second year). See Table B5 in the Online Appendix, where we estimate these figures on a subsample of clients who could be matched into the Al Amana administrative database.

[16]We estimate the underlying cumulative distribution functions as step function with a large number of small intervals. Although the corresponding estimated function is asymptotically positive and increasing, a problem documented by (Imbens and Rubin (1997)) is that the estimated function can fail to be either positive or increasing, and they propose a method to constrain the CDF to be non negative and increasing. Following them, we start the estimation procedure with the first interval by applying the formula for unconstrained estimation and retaining either the estimated value if is positive, or zero otherwise. We then estimate the CDF recursively for all the other intervals by applying for each interval the formula for unconstrained estimation and retaining either the estimated value if greater than or equal to the estimated value in the preceding interval, or else the estimated value in the preceding interval. Finally, we rescale all estimates so that the cumulative distribution function reaches 1 on the last interval.

Figure 2 presents the results.[17] There are some interesting findings. First, while the distribution among compliers in the treatment group stochastically dominates that in the control for asset accumulation, and there is visibly no impact on consumption, the two curves are clearly different for profits: in the treatment groups, compliers have both more instances of low (negative) profits and high profits. Indeed, among the compliers in the treatment group, it seems that very few people have negative profit (the estimated CDF is very close to zero), while about 25% of compliers in the treatment group have negative profits. The two curves cross for a value of profits roughly equal to zero. On the other hand, the compliers with the top 40% of profits have higher profits in the treatment groups than in the control group.

Turning to income from employment activities, Figure 2 shows that impact of being a client of Al Amana also appears to be far from homogeneous on the population of compliers. As can be seen on the graph, there is no effect above the quantile of order 60%; all effects are concentrated at the bottom of the distribution. In particular, 45% of the compliers who are clients do not supply any labor outside their own activity, compared to only 30% for the non-clients. Similarly, a higher proportion of compliers rely less on day labor income in the treatment than in the control for low values (below 15,000 MAD) of the variables. This suggests that the negative impact of credit on work supplied outside the home is driven primarily by households that do not rely heavily on casual labor in the first place.

Last, Table 9 Panel A, presents the results of the OLS control variable regression estimates obtained from a regression of our key outcomes on a dummy variable for being a client of Al Amana on the sub-sample of households in treatment villages. The differences of these estimates with the LATE estimates are sizable both in magnitude and sign. This unsderscores the problems associated with identification of causal effect of microcerdit.

## 4.4   Robustness checks

In this section we briefly report on robustness checks. We experimented with changes in the list of control variables and different ways to compute standard errors. Results are presented in Appendix Table B7. The first panel considers simple regressions just including the set of

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[17]Note that we do not present confidence intervals, which would likely be wide, given that the first stage is not very large.

strata dummy variables, and the second panel reproduces our previous results, including a set of control variables listed in Table 2. This panel also provides standard errors computed assuming clustered residuals, as well as standard errors without clusters. The last panel provides results obtained by adding to the previous set of control variables an extended set involving, among others, the dependent variable at baseline, as well as other variables listed in the footnote of Table B7. As can be seen from the table, results are very robust. We obtain the same order of magnitude for all estimated coefficients, as well as for standard errors. Expanding the list of control variables does not lead to any gain in precision. Finally, the clustered and unclustered errors in Panel B are quite similar, suggesting that, in this case, clustering did not have a large impact on our standard errors.

## 5    Conclusion

In this paper, we measure the impact of access to microfinance in remote rural areas in Morocco, where during the span of the intervention there was no access to credit outside that provided by our partner, Al Amana.

We identified pairs of villages at the periphery of the catchment area of new branches, and randomly selected one village in each pair for treatment. We surveyed both households that were identified ex-ante as having relatively higher probability to borrow, as well as randomly selected households in the village: the objective of this sampling strategy was to be able to estimate both direct impact and possible externalities on non borrowers.

On average, take-up of microfinance is only 13% in the population and 17% in our "higher probability" sample (and zero in the control group). Consistent with other evaluations of microfinance programs, we find that households that have access to microcredit expand their self-employment activity (primarily agriculture or animal husbandry, in this context), and their profits increase. Our estimates seem to suggest that these effects are driven by those who actually borrow, implying that the modest reduced-form estimates actually come from fairly large average impacts (we estimate average returns to capital of close to 100% before repayment of interest) combined with a low take-up.

This presents a puzzle: if the returns are really that high, why are people not borrowing in

larger numbers? And why are half of the clients apparently dropping out after a year? We see two plausible explanations. The first is that although microfinance is associated with large average increases in profits, the utility gain may not be as large as these estimate suggest: running one's own business may be stressful (as (Karlan and Zinman (2010)) find in the Philippines). We may also not capture increase in labor in the household's own business, which may be difficult for survey respondents to remember.

The second possible explanation is the substantial heterogeneity in how profitable microfinance investments are. Although noisy, both the reduced-form quantile regressions and the IV estimates of the changes in the distribution of profit for the outcomes suggest that for a substantial minority of households (about 25% of those who take up microcredit), the impact on profit may actually be negative. This large dispersion may explain the fairly low take-up of microfinance: households may recognize the unpredictable rate of return, and be risk averse.

Another key finding is that despite significant increase in self-employment income (at least among the population that is most likely to borrow), we see no net impact of microcredit access on total labor income, or on consumption. This result is similar to what other evaluations of microcredit programs find. In our context, this appears to be driven by a loss in income from wage labor, which is large enough to offset the gain in self-employment income, and is directly related to a substantial decline in labor supply outside the home by those who take up microcredit.[18] What is surprising is that this does not appear to be driven by time constraints: the increase in labor supply on self-employment activities is small and insignificant, although the confidence intervals does not allow us to rule out an increase in hours spent.

There are two plausible channels for this set of results. The first is that access to microcredit allows households to invest in agriculture and animal husbandry and increase their profit. Leisure being a normal good, the income effect leads them to reduce their labor supplied, particularly outside the home. Anecdotal evidence suggests that there is a strong disutility associated with day labor, giving credence to this explanation. A second possible channel is that our results reflect a shift in the way households cope with risk. Access to credit enables households to purchase lumpy assets, such as livestock, which are typically used for self-insurance (Deaton

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[18]On the other hand, we find an increase in labor supply for those who are estimated to have a very low probability to borrow, which is consistent with a relatively closed labor market: the jobs that are left by the microcredit clients are taken up by those who do not borrow.

(1991); Rosenzweig and Wolpin (1993)). This increased form of insurance can be a substitute of other ex-ante risk-management strategies such as income diversification through day labor, which are also taking place in the absence of formal insurance markets (Kochar (1999); Rose (2001)). Regardless, microcredit appears to be a powerful financial instrument for the poor, but not one that fuels an exit from poverty through better self-employment investment, at least in the medium run (two years after the introduction of the program). We are currently following up with the households, now that a much longer time period has elapsed, to check if the investment in business assets paid off in the longer run.

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Figure 1: Quantile regression (ITT)
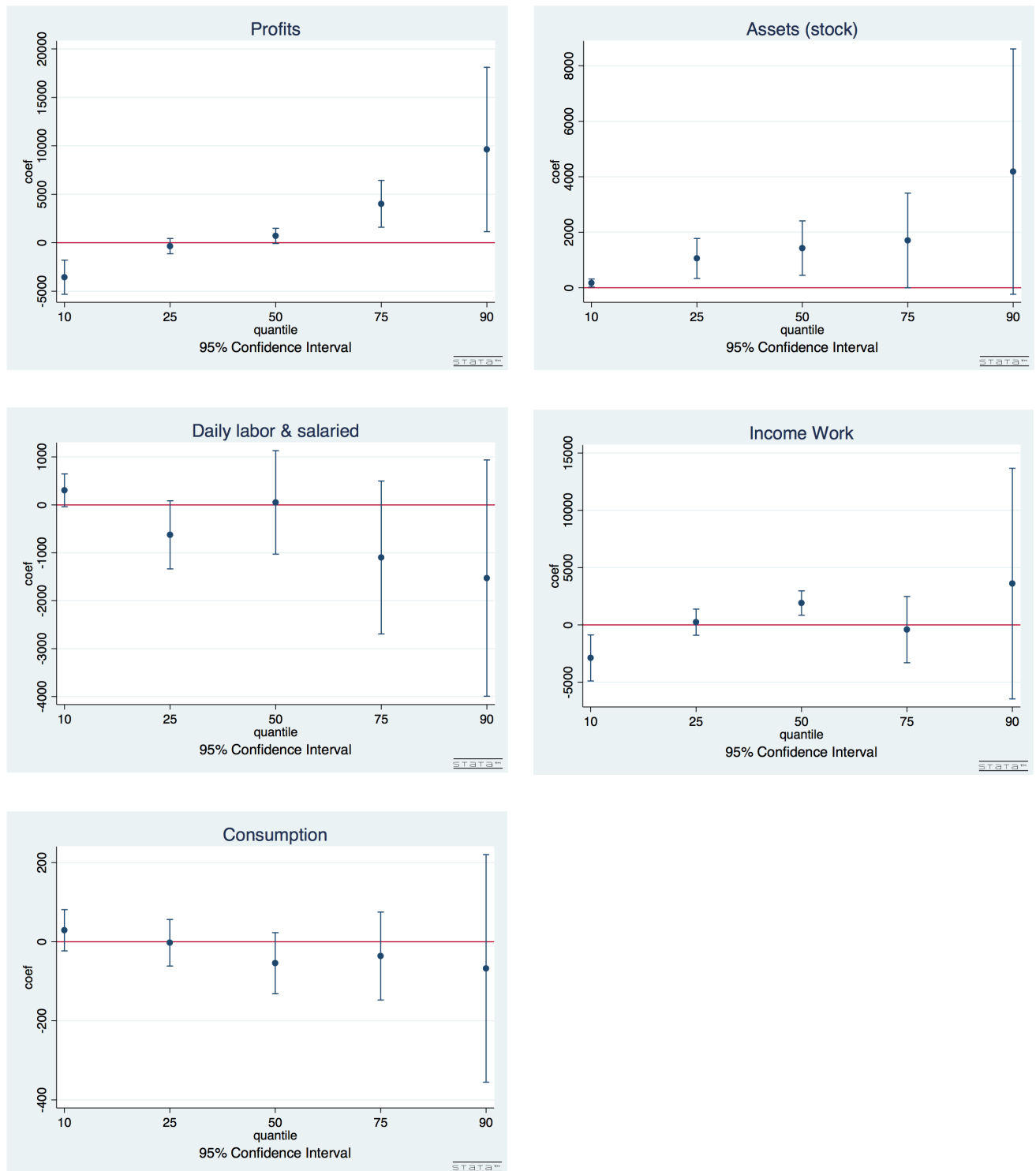
Figure 2: Cumulative distribution of potential outcomes for compliers
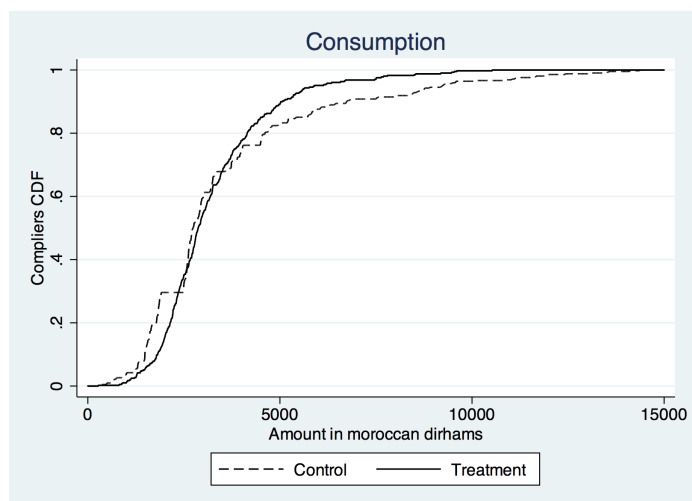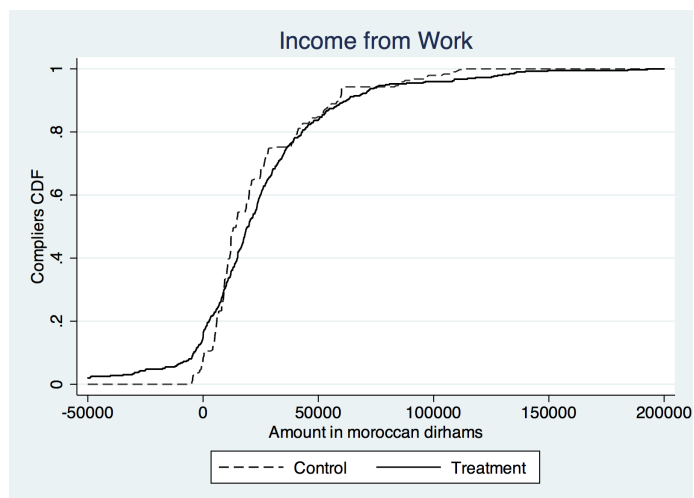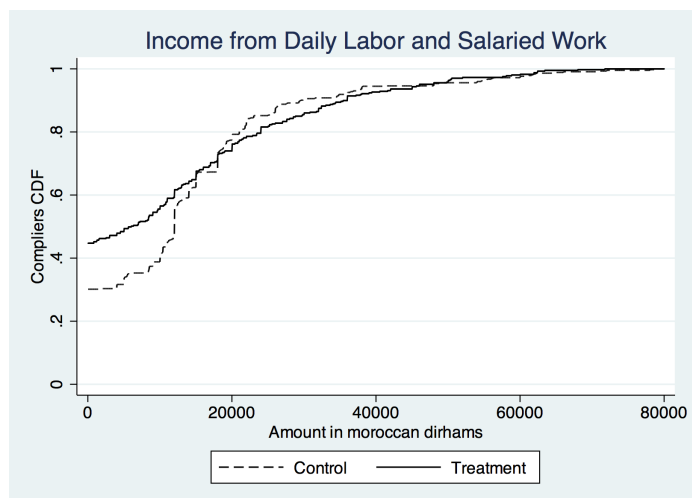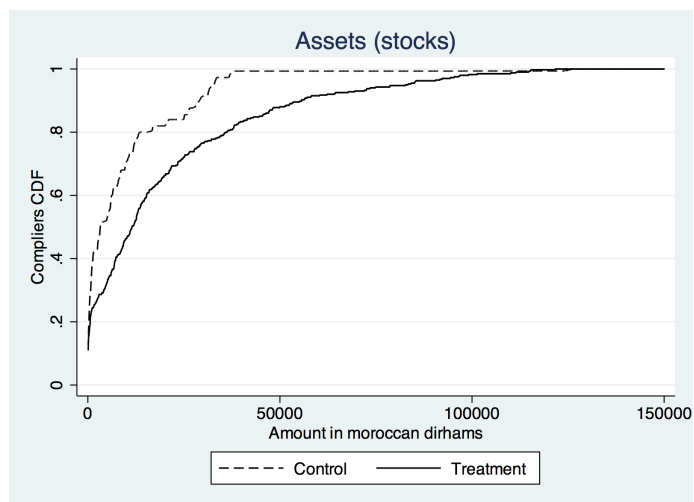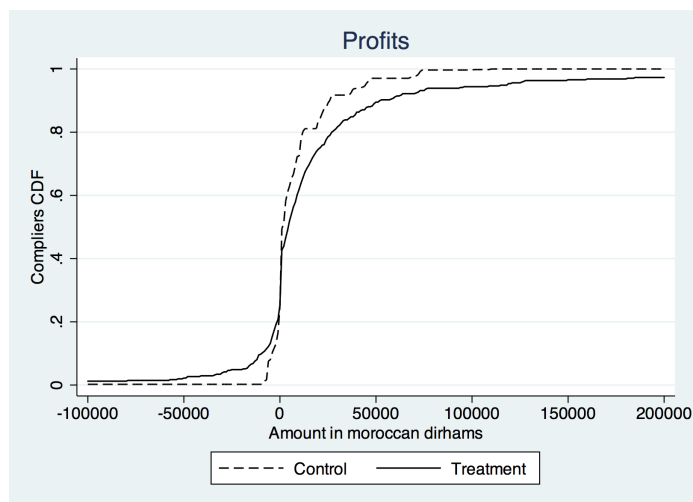
**Table 1. Summary Statistics**

| | Obs | Control Group | | | Treatment - Control | | |
|---|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | | p-value |
| **_Panel A. Baseline Household Sample_** | | | | | | | |
| _Household composition_ | | | | | | | |
| # members | 4,465 | 2,266 | 5.13 | 2.69 | 0.04 | | 0.573 |
| # adults (>=16 years old) | 4,465 | 2,266 | 3.45 | 1.99 | 0.03 | | 0.529 |
| # children (<16 years old) | 4,465 | 2,266 | 1.68 | 1.64 | 0.01 | | 0.842 |
| Male head | 4,465 | 2,266 | 0.935 | 0.246 | 0.001 | | 0.813 |
| Head age | 4,465 | 2,266 | 48 | 16 | 1 | *** | 0.007 |
| Head with no education | 4,465 | 2,266 | 0.615 | 0.487 | -0.013 | | 0.353 |
| _Access to credit:_ | | | | | | | |
| Loan from Al Amana | 4,465 | 2,266 | 0.007 | 0.084 | -0.003 | | 0.425 |
| Loan from other formal institution | 4,465 | 2,266 | 0.060 | 0.238 | 0.030 | ** | 0.023 |
| Informal loan | 4,465 | 2,266 | 0.068 | 0.251 | 0.023 | *** | 0.006 |
| Electricity or water connection loan | 4,465 | 2,266 | 0.156 | 0.363 | 0.013 | | 0.523 |
| _Amount borrowed from (in MAD):_ | | | | | | | |
| Al Amana | 4,465 | 2,266 | 43 | 622 | -21 | | 0.317 |
| Other formal institution | 4,465 | 2,266 | 1,040 | 18,301 | -373 | | 0.230 |
| Informal loan | 4,465 | 2,266 | 292 | 3,073 | 140 | | 0.179 |
| Electricity or water entities | 4,465 | 2,266 | 582 | 2,097 | -10 | | 0.893 |
| _Self-employment activities_ | | | | | | | |
| # activities | 4,465 | 2,266 | 1.5 | 1.2 | 0.0 | | 0.512 |
| Farms | 4,465 | 2,266 | 0.599 | 0.490 | 0.017 | | 0.321 |
|     Investment | 4,465 | 2,266 | 191 | 4,152 | 133 | | 0.154 |
|     Sales | 4,465 | 2,266 | 7,569 | 21,229 | 339 | | 0.551 |
|     Expenses | 4,465 | 2,266 | 3,581 | 9,482 | 263 | | 0.279 |
|     Savings | 4,465 | 2,266 | 1,284 | 3,568 | -62 | | 0.523 |
|     Employment | 4,465 | 2,266 | 33 | 272 | 42 | | 0.166 |
|     Self-employment | 4,465 | 2,266 | 73 | 171 | 8 | | 0.133 |
| Does animal husbandry | 4,465 | 2,266 | 0.533 | 0.499 | 0.042 | ** | 0.027 |
|     Investment | 4,465 | 2,266 | 468 | 2,926 | 156 | | 0.157 |
|     Sales | 4,465 | 2,266 | 3,456 | 9,312 | 567 | * | 0.077 |
|     Expenses | 4,465 | 2,266 | 4,163 | 10,562 | 469 | | 0.111 |
|     Savings | 4,465 | 2,266 | 10,161 | 16,731 | 1,087 | ** | 0.045 |
|     Employment | 4,465 | 2,266 | 270 | 4,844 | 13 | | 0.930 |
|     Self-employment | 4,465 | 2,266 | 206 | 3,033 | -67 | | 0.15 |
| Runs a non-farm business | 4,465 | 2,266 | 0.216 | 0.411 | -0.034 | ** | 0.012 |
| # activities managed by women | 4,465 | 2,266 | 0.218 | 0.585 | 0.004 | | 0.750 |
| Share of HH activities managed by women | 4,465 | 2,266 | 0.160 | 0.367 | 0.007 | | 0.466 |
| Distance to souk | 4,465 | 2,266 | 25.2 | 32.4 | 0.7 | | 0.679 |
| _Has income from:_ | | | | | | | |
| Self-employment activity | 4,465 | 2,266 | 0.780 | 0.414 | -0.016 | | 0.176 |
| Day labor/salaried | 4,465 | 2,266 | 0.583 | 0.493 | -0.016 | | 0.192 |
| _Risks:_ | | | | | | | |
| Lost more than 50% of the harvest | 4,125 | 2,077 | 0.106 | 0.308 | 0.004 | | 0.642 |
| Lost more than 50% of the livestock | 4,125 | 2,077 | 0.030 | 0.172 | 0.003 | | 0.606 |
| Lost any livestock over the past 12 months | 4,465 | 2,266 | 0.190 | 0.393 | 0.028 | ** | 0.014 |
| HH member illness, death and/or house sinister | 4,465 | 2,266 | 0.218 | 0.413 | 0.013 | | 0.168 |
| _Consumption_ | | | | | | | |
| Consumption (in MAD) | 4,465 | 2,266 | 2,251 | 1,266 | 32 | | 0.317 |
| Non-durables consumption (in MAD) | 4,465 | 2,266 | 2,098 | 1,156 | 36 | | 0.233 |
| Durables consumption (in MAD) | 4,465 | 2,266 | 45 | 236 | 2 | | 0.696 |
| HH is poor | 4,465 | 2,266 | 0.246 | 0.431 | 0.005 | | 0.686 |
| | | | | | | | |
| **_Panel B. Attrition_** | | | | | | | |
| Not surveyed at endline | 4,465 | 2,266 | 0.068 | 0.252 | 0.018 | ** | 0.018 |

_Notes:_ Data source: Baseline household survey. Unit of observation: household. Panel A & B: sample includes all households surveyed at baseline. ***, **, * indicate significance at 1, 5 and 10%.

**Table 2. Credit**

| | (1) Al Amana - Admin data | (2) Al Amana - Survey data | (3) Other MFI | (4) Other Formal | (5) Utility company | (6) Informal | (7) Total | (8) Loan repayment | (9) Index of dependent variables |
|---|---|---|---|---|---|---|---|---|---|
| **Panel A. Credit access†** | | | | | | | | | |
| Treated village | 0.167 | 0.090 | -0.006 | 0.007 | 0.017 | -0.003 | 0.077 | | 0.129 |
| | (0.012)*** | (0.010)*** | (0.004) | (0.003)** | (0.017) | (0.007) | (0.017)*** | | (0.017)*** |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | | 4,934 |
| Control mean | 0.000 | 0.022 | 0.023 | 0.016 | 0.157 | 0.059 | 0.247 | | 0.000 |
| Hochberg-corrected p-value | | | | | | | | | 0.000 |
| | | | | | | | | | |
| **Panel B. Loan amounts (in MAD) ††** | | | | | | | | | |
| Treated village | | 796 | -13 | 341 | 181 | -113 | 1,193 | 33 | |
| | | (103)*** | (34) | (172)** | (89)** | (168) | (284)*** | (13)** | |
| Observations | | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | |
| Control mean | | 180 | 124 | 519 | 566 | 493 | 1,882 | 42 | |

*Notes:* Data source: Column1: Al Amana administrative data. Columns 2-9: Endline household survey. Observation unit: household. Sample includes households with high probability-to-borrow score surveyed at endline, after trimming 0.5% of observations (3,525 who got both a full baseline and endline household survey administered, plus an additional 1,409 households who got only the full endline survey administered). (see Section 3 for an explanation of sample strategy). Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Controls include: number of household members, number of adults, head age, does animal husbandry, does other non-agricultural activity, had an outstanding loan over the past 12 months, HH spouse responded the survey, and other HH member (excluding the HH head) responded the survey.
† Column 1-8: dummy variable equal to 1 if the households had an outstanding loan over the 12 months prior to the survey. †† Sum of outstanding loans (in MAD) over the 12 months prior to the survey.

Column 9: the dependent variable consists of an index of z-scores of the outcome variables in columns 2-8 (including both credit access and loan amounts) following Kling, Liebman, and Katz (2007). P-values for this regression are reported using Hochberg's correction method.

**Table 3. Self-employment activities: revenues, assets and profits**

| | (1) Assets | (2) Sales + home consumption | (3) Expenses | (4) *Of which:* Investment | (5) Profit | (6) Has a self-employment activity | (7) Index of dependent variables |
|---|---|---|---|---|---|---|---|
| Treated village | 1,454 | 6,090 | 4,079 | -224 | 2,011 | -0.016 | 0.029 |
| | (659)** | (2,166)*** | (1,720)** | (224) | (1,211)* | (0.010) | (0.015)** |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 |
| Control mean | 15,982 | 30,450 | 21,394 | 1,529 | 9,056 | 0.831 | 0.000 |
| Hochberg-corrected p-value | | | | | | | 0.235 |

*Notes:* Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

*Definitions:*

(1) Sum of assets owned in the three activities, including the stock of livestock.

(2) Total Production = sum of agricultural, livestock and non-agricultural business production over the 12 months prior to the survey. Production includes both sales and self-consumption. Agricultural production also includes stock.

(3) Sum of labor, inputs, rent and investment in all three activities, purchased over the 12 months prior to the survey.

(4) Sum of productive assets purchased over the 12 months prior to the survey. Animal husbandry assets include the purchases of livestock.

(5) Profit =(2)-(3)

(6) Variable equals 1 if the HH ran a self-employment activity over the 12 months prior to the survey.

(7) The dependent variable consists of an index of z-scores of the outcome variables in columns 1-6 following Kling, Liebman, and Katz (2007). P-values for this regression are reported using Hochberg's correction method.

**Table 4. Income**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | HH income, over the past 12 months, from: | | | | | |
| | Total | Self-employment, daily labor & salaried | Self-employment activities | Day labor & salaried | Household asset sales | Other | Index of dependent variables |
| Panel A. Income (in MAD) | | | | | | | |
| Treated village | 447 | 960 | 2,011 | -1,052 | -679 | 166 | 0.000 |
| | (1,345) | (1,269) | (1,211)* | (477)** | (262)** | (233) | (0.017) |
| | | | | | | | |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 |
| Control mean | 27,670 | 24,805 | 9,056 | 15,748 | 709 | 2,157 | 0.000 |
| Hochberg-corrected p-value | | | | | | | 0.978 |

*Notes:* Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

*Definitions:*

(3): income equals total profit from the self-employment activity.

(7): the dependent variable consists of an index of z-scores of the outcome variables in columns 1-6 following Kling, Liebman, and Katz (2007). P-values for this regression are reported using Hochberg's correction method.

**Table 5. Time worked by HH members**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Hours worked by household members over the past 7 days† | | | | # of HH members | Index of dependent variables |
| | Total | *of which:* | | | | |
| | | self-employment activities | outside activities | chores | | |
| **Household members 6-65 years old** | | | | | | |
| Treated village | -3.3 | 1.1 | -2.8 | -1.6 | | |
| | (2.5) | (1.5) | (1.1)*** | (1.0)* | | |
| Control mean | 143.1 | 46.9 | 33.8 | 62.3 | 5.2 | |
| **Household members 6-15 years old** | | | | | | |
| Treated village | -0.5 | 0.6 | 0.2 | -1.3 | | |
| | (0.7) | (0.4) | (0.3) | (0.4)*** | | |
| Control mean | 19.2 | 6.3 | 3.4 | 9.4 | 1.4 | |
| **Household members 16-20 years old** | | | | | | |
| Treated village | -1.4 | -0.2 | -1.3 | 0.1 | | |
| | (0.8)* | (0.4) | (0.4)*** | (0.4) | | |
| Control mean | 21.6 | 6.6 | 5.5 | 9.6 | 0.8 | |
| **Household members 21-50 years old** | | | | | | |
| Treated village | -0.5 | 1.1 | -1.5 | 0.0 | | |
| | (1.5) | (0.8) | (0.8)** | (0.6) | | |
| Control mean | 84.4 | 26.3 | 21.9 | 36.3 | 2.5 | |
| **Household members 51-65 years old** | | | | | | |
| Treated village | -1.2 | -0.5 | -0.3 | -0.4 | | |
| | (0.6)** | (0.3) | (0.3) | (0.3) | | |
| Observations | 4,918 | 4,918 | 4,918 | 4,918 | 4,918 | |
| Control mean | 18.2 | 8.1 | 3.1 | 7.0 | 0.6 | |
| Observations | 4,918 | 4,918 | 4,918 | 4,918 | 4,918 | |
| **Index** | | | | | | |
| Treated village | | | | | | -0.017 |
| | | | | | | (0.010)* |
| Observations | | | | | | 4,918 |
| Control mean | | | | | | 0.000 |
| Hochberg-corrected p-value | | | | | | 0.318 |

*Notes:* Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

† Sum of hours worked by household members over the past 7 days in self-employment, outside activities and housework. Households were asked at endline survey about the # of hours worked by each HH member over the past 7 days.

(6) The dependent variable consists of an index of z-scores of the outcome variables in all panels of columns 1-4 following Kling, Liebman, and Katz (2007). P-values for this regression are reported using Hochberg's correction method.

**Table 6. Consumption**

| | (1) Monthly per capita consumption (in MAD) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) Index of dependent variables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Monthly household consumption (in MAD) in: | | | | | | | | |
| | | Total | Durables | Non-durable | Food | Health | Education | Temptation & entertainment | Festivals & celebrations | |
| Treated village | -1 | -45 | 18 | -60 | 3 | 3 | -1 | -6 | -39 | -0.013 |
| | (9) | (47) | (16) | (41) | (23) | (5) | (1) | (6) | (12)*** | (0.015) |
| Observations | 4,919 | 4,924 | 4,924 | 4,924 | 4,924 | 4,924 | 4,924 | 4,924 | 4,924 | 4,924 |
| Control mean | 557 | 3,057 | 64 | 2,841 | 1,784 | 46 | 24 | 298 | 429 | 0.000 |
| Hochberg-corrected p-value | | | | | | | | | | >0.999 |

*Notes:* Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

*Definitions:*

(1): Monthly household per capita expenditures, including food self-consumption.

(2)-(9): Monthly household expenditures, including food self-consumption.

(10): the dependent variable consists of an index of z-scores of the outcome variables in columns 1-9 following Kling, Liebman, and Katz (2007). P-values for this regression are reported using Hochberg's correction method.

**Table 7. Social effects**

| | (1) Share of kids aged 6-15 in school | (2) Share of teenagers (aged 16-20) in school | (3) Index of women independence† | (4) % household self-employment activities managed by women | (5) Number of self-employment activities managed by women | (6) Index of dependent variables |
|---|---|---|---|---|---|---|
| Treated village | 0.006 | -0.004 | 0.173 | -0.014 | -0.02 | -0.007 |
| | (0.008) | (0.006) | (0.205) | (0.009) | (0.01) | (0.012) |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 |
| Control mean | 0.455 | 0.088 | -0.071 | 0.248 | 0.39 | 0.000 |
| Hochberg-corrected p-value | | | | | | >0.999 |

*Notes:* Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

† Effect on the sum of 14 standardized measures (measures include: at least one woman in the household has currently an own activity, decides by herself on activity assets, buys activity assets herself, decides by herself on activity inputs, buys inputs herself, decides what to produce, commercializes production, decides by herself on commercialization, makes sales herself, had an own activity in the past 5 years, is allowed to go to the market by herself, is allowed to take public transportation by herself, is allowed to visit family by herself, is allowed to visit friends by herself). Each measure is coded so that 1 reflects independence and 0 reflects lack of independence.

(6): the dependent variable consists of an index of z-scores of the outcome variables in columns 1-5 following Kling, Liebman, and Katz (2007). P-values for this regression are reported using Hochberg's correction method.

**Table 8: Externalities**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Client Al Amana - Admin data | Assets (stock) | Sales + home consumption | Expenses | Profit | Has a self-employment activity | Income from day labor/ salaried | Weekly hours worked by HH members aged 16-65 | | Monthly HH consumption (in MAD) | Festivals & celebrations expenses (in MAD) |
| | | | | | | | | self-employment | outside | | |
| **Panel A: Borrowers** | | | | | | | | | | | |
| Treated village | 0.167 | 1,454 | 6,090 | 4,079 | 2,011 | -0.016 | -1,052 | 0.6 | -3.0 | -45 | -39 |
| | (0.012)*** | (659)** | (2,166)*** | (1,720)** | (1,211)* | (0.010) | (477)** | (1.30) | (1.0)*** | (47) | (12)*** |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,918 | 4,918 | 4,924 | 4,924 |
| Control mean | 0.000 | 15,982 | 30,450 | 21,394 | 9,056 | 0.831 | 15,748 | 40.6 | 30.4 | 3,057 | 429 |
| **Panel B: All sample weighted** | | | | | | | | | | | |
| Treated village | 0.132 | 1,002 | 3,707 | 4,186 | -479 | -0.021 | -1,234 | 0.5 | -2.0 | -45.0 | -8 |
| | (0.011)*** | (705) | (1,943)* | (1,334)*** | (1,254) | (0.010)** | (558)** | (1.1) | (1.1)* | (36.0) | (11) |
| Observations | 5,524 | 5,524 | 5,524 | 5,524 | 5,524 | 5,524 | 5,524 | 5,508 | 5,508 | 5,513 | 5,513 |
| Control mean | 0.000 | 15,490 | 26,376 | 17,263 | 9,113 | 0.824 | 15,911 | 38.6 | 30.0 | 2,927 | 401 |
| **Panel C: Top and bottom 30% unweighted** | | | | | | | | | | | |
| Treated village  X High Predicted Propensity to Borrow | 0.364 | 1,049 | 15,903 | 10,270 | 5,633 | -0.023 | -2,112 | 2.90 | -7.00 | -92 | -40 |
| | (0.011)*** | (1,298) | (4,155)*** | (3,560)*** | (2,453)** | (0.014) | (694)*** | (2.30) | (1.8)*** | (94) | (18)** |
| Treated village  X Low Predicted Propensity to Borrow | 0.015 | 1,598 | 563 | 946 | -383 | -0.002 | -2,467 | -1.40 | -6.20 | 80 | -18 |
| | (0.003)*** | (1,132) | (2,683) | (1,727) | (1,733) | (0.013) | (794)*** | (1.30) | (1.6)*** | (62) | (18) |
| Observations | 3,315 | 3,315 | 3,315 | 3,315 | 3,315 | 3,315 | 3,315 | 3,303 | 3,303 | 3,307 | 3,307 |
| Control mean | 0.000 | 17,608 | 31,667 | 22,343 | 9,325 | 0.823 | 16,119 | 40.02 | 31.88 | 3,063 | 427 |
| Control mean, hight PTB | 0.000 | 21,687 | 37,988 | 27,073 | 10,915 | 0.832 | 15,652 | 45.8 | 32.4 | 3,253 | 460 |
| Control mean, low PTB | 0.000 | 13,690 | 25,595 | 17,798 | 7,796 | 0.815 | 16,567 | 34.4 | 31.4 | 2,881 | 395 |
| p-value: T X Low PTB = T X High PTB | 0.000 | 0.748 | 0.002 | 0.019 | 0.047 | 0.277 | 0.735 | 0.105 | 0.737 | 0.120 | 0.375 |

*Notes:* Data source: Endline household survey. Observation unit: household. Panel A: sample includes households with high probability-to-borrow score. Panel B: sample includes both households with high probability-to-borrow score and households picked at random. Observations are weighted by the inverse probability of being sampled. Panel C: sample includes both households with high probability-to-borrow score and households picked at random, but only those in the top 30% and in the bottom 30% of the predicted propensity to borrow (PTB) distribution. All panels include sample after 0.5% trimming of observations. Panel A & B: coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Panel C: coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy interacted with a dummy equal to 1 if HH predicted propensity to borrow is in the 0-30th percentile of the PTB distribution (Low Predicted PTB), on a treated village dummy interacted with a dummy equal to 1 if HH predicted PTB is in the 70-100th percentile of the PTB distribution (High Predicted PTB) and on a dummy equal to 1 if HH predicted PTB is in the 0-30th percentile of the PTB distribution (not shown), controlling for strata dummies (paired villages) and variables specified below. All panels: standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

**Table 9: The impact of borrowing**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Weekly hours worked by HH members aged 16-65 | | |
| | Assets (stock) | Sales + home consumption | Expenses | Profit | Has a self-employment activity | Income from day labor/salaried | self-employment | outside | Monthly HH consumption (in MAD) |
| **Panel A: OLS** | | | | | | | | | |
| | 4,690 | 19,703 | 11,848 | 7,855 | 0.019 | -1,239 | 6.7 | -3.1 | 481 |
| | (1,868)** | (7,772)** | (5,588)** | (4,134)* | (0.016) | (1,128) | (3.0)** | (3.1) | (191)** |
| | 2,448 | 2,448 | 2,448 | 2,448 | 2,448 | 2,448 | 2,440 | 2,440 | 2,444 |
| | 16,523 | 31,182 | 21,574 | 9,608 | 0.815 | 15,127 | 39.2 | 27.8 | 2,947 |
| **Panel B: IV** | | | | | | | | | |
| Client | 8,684 | 36,365 | 24,355 | 12,010 | -0.093 | -6,279 | 3.4 | -18.2 | -267 |
| | (4,004)** | (12,466)*** | (9,920)** | (7,199)* | (0.060) | (2,860)** | (8.0) | (5.8)*** | (278) |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,918 | 4,918 | 4,924 |
| Control mean | 15,982 | 30,450 | 21,394 | 9,056 | 0.831 | 15,748 | 40.6 | 30.4 | 3,057 |
| Control complier mean† | 13,563 | 23,703 | 16,548 | 7,155 | 0.903 | 18,530 | 43.5 | 42.1 | 3,421 |

Note : Data source: Endline household survey. Observation unit: household. Panel A: Sample includes households with high probability-to-borrow score in treated villages. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a client dummy, controlling for strata dummies (paired villages) and variables specified below. Client is a dummy variable equal to 1 if the household has borrowed from Al Amana. Panel B: Sample includes households with high probability-to-borrow score in treated and control villages. Coefficients and standard errors (in parentheses) from an instrumental variable regression of the variable on the variable *client* , controlling for strata dummies (paired villages) and variables specified below. *Client* is a dummy variable equal to 1 if the household has borrowed from Al Amana and is instrumented with *treated village* , a dummy equal to 1 if the household lives in a treatment village. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.
† The complier mean in the control group is calculated as E(Y0|C)=[E(Y|Z=0)-E(Y|Z=1,T=0)*(1-P(T=1))]/P(T=1), where Z indicates treatment assignment, T indicates being a microcredit client and P(T=1) the proportion of clients in Z=1

PAPER APPENDIX

**Table A1. Propensity to borrow**

**Propensity to borrow, all** households interviewed at **baseline in wave 1** treatment villages

|  | Coef. |
|---|---|
| Does more than 3 self-employment activities | 2.365 |
|  | (0.734)*** |
| Does trading as self-employment activity | 0.846 |
|  | (0.501)* |
| Share # members with trading, services or handicraft as main activity to # members | 3.125 |
|  | (1.756)* |
| Owns land | -1.588 |
|  | (0.443)*** |
| Rents land | -1.992 |
|  | (0.575)*** |
| Have not bought agriculture productive assets over the past 12 months | -1.048 |
|  | (0.476)** |
| Uses sickle & rake (in agriculture) | -0.979 |
|  | (0.338)*** |
| ln(# of olive and argan trees) | 0.518 |
|  | (0.096)*** |
| # of cows bought over the past 12 months | -2.010 |
|  | (1.020)** |
| Gets a pension | 2.021 |
|  | (0.539)*** |
| Has a radio | 1.066 |
|  | (0.403)*** |
| Has a fiber mat | 1.574 |
|  | (0.650)** |
| Phone expenses over the past month (in MAD) | -0.019 |
|  | (0.006)*** |
| Clothes expenses over the past month (in MAD) | 0.001 |
|  | (0.001)* |
| Had an outstanding formal loan over the past 12 months | 0.869 |
|  | (0.330)*** |
| ln(amount that would be able to reimburse monthly (in MAD)) | 0.250 |
|  | (0.109)** |
| Would be ready to form a 4-person group and guarantee a loan mutually | 0.570 |
|  | (0.321)* |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 0.593 |
|  | (0.338)* |
| Observations | 665 |
| Mean dependent variable | 0.104 |
| Pseudo R2 | 0.280 |
| Number of villages | 7 |

*Notes:* Data source: Mini survey. Unit of observation: household. Sample includes all households surveyed at baseline in phase 1 pilot treatment villages (i.e. wave 1). Coefficients and standard errors (in parenthesis) from a logit regression of the variable client on variables specified in the table. Client is a dummy variable equal to 1 if the household had taken up a microcredit within the first 6 months of the intervention. ***, **, * indicate significance at 1, 5 and 10%.

ON-LINE APPENDIX

**Table B1. Summary Statistics**

| | Obs | Control Group | | | Treatment - Control | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Obs | Mean | St. Dev. | Coeff. | | p-value |
| **_Panel A. Endline sample_** | | | | | | | |
| # members | 5,898 | 2,965 | 6.13 | 3.07 | 0.05 | | 0.627 |
| # members older than 18 | 5,898 | 2,965 | 3.60 | 2.10 | 0.04 | | 0.570 |
| # self-employment activities | 5,898 | 2,965 | 1.41 | 0.99 | 0.02 | | 0.573 |
| # members with trading, services or handicraft as main activity | 5,898 | 2,965 | 0.299 | 0.627 | -0.037 | * | 0.061 |
| Gets a pension | 5,898 | 2,965 | 0.15 | 0.35 | 0.00 | | 0.833 |
| Distance to souk (in km) | 5,898 | 2,965 | 11 | 9 | 0 | | 0.398 |
| Does trading as self-employment activity | 5,898 | 2,965 | 0.139 | 0.346 | -0.045 | *** | 0.003 |
| Has a fiber mat | 5,898 | 2,965 | 0.817 | 0.387 | -0.012 | | 0.290 |
| Has a radio | 5,898 | 2,965 | 0.778 | 0.415 | 0.020 | * | 0.090 |
| Owns land | 5,898 | 2,965 | 0.623 | 0.485 | 0.010 | | 0.540 |
| Rents land | 5,898 | 2,965 | 0.171 | 0.376 | 0.002 | | 0.828 |
| Does crop-sharing | 5,898 | 2,965 | 0.137 | 0.344 | -0.008 | | 0.435 |
| # of olive and argan trees | 5,898 | 2,965 | 36 | 131 | -4 | | 0.154 |
| Bought agriculture productive assets over the past 12 months | 5,898 | 2,965 | 0.240 | 0.427 | 0.034 | ** | 0.029 |
| Uses sickle (in agriculture) | 5,898 | 2,965 | 0.626 | 0.484 | -0.006 | | 0.739 |
| Uses rake  (in agriculture) | 5,898 | 2,965 | 0.556 | 0.497 | -0.009 | | 0.587 |
| # of cows bought over the past 12 months | 5,898 | 2,965 | 0.2 | 5.7 | 0.2 | | 0.112 |
| Phone expenses over the past month (in MAD) | 5,898 | 2,965 | 40 | 100 | -1 | | 0.780 |
| Clothes expenses over the past month (in MAD) | 5,898 | 2,965 | 512 | 925 | -36 | | 0.131 |
| Had an outstanding formal loan over the past 12 months | 5,898 | 2,965 | 0.227 | 0.419 | 0.012 | | 0.604 |
| Would be ready to form a 4-person group and guarantee a loan mutually | 5,898 | 2,965 | 0.644 | 0.479 | 0.040 | *** | 0.009 |
| Amount that would be able to reimburse monthly (in MAD) | 5,898 | 2,965 | 181 | 433 | 0 | | 0.994 |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 5,898 | 2,965 | 0.139 | 0.346 | 0.012 | | 0.270 |
| **_Panel B. Attrition_** | | | | | | | |
| Not surveyed at endline | 5,898 | 2,965 | 0.052 | 0.223 | 0.013 | ** | 0.017 |
| Not surveyed at endline and trimmed obs | 5,898 | 2,965 | 0.058 | 0.233 | 0.012 | ** | 0.038 |

_Notes:_ Data source: Mini-Survey. Unit of observation: household. Sample includes all households surveyed at baseline, plus all households only surveyed at endline (4,465 households who were surveyed at baseline, plus an additional of 1,433 households surveyed only at endline).  ***, **, * indicate significance at 1, 5 and 10%.

**Table B2. Summary Statistics**

| | Obs | Control Group | | | Treatment - Control | | |
|---|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | | p-value |
| *Post-attrition endline sample: HHs with high probability-to-borrow score* | | | | | | | |
| # members | 4,934 | 2,486 | 6.28 | 3.10 | 0.07 | | 0.512 |
| # members older than 18 | 4,934 | 2,486 | 3.68 | 2.10 | 0.05 | | 0.470 |
| # self-employment activities | 4,934 | 2,486 | 1.42 | 0.98 | 0.02 | | 0.543 |
| # members with trading, services or handicraft as main activity | 4,934 | 2,486 | 0.320 | 0.654 | -0.047 | ** | 0.027 |
| Gets a pension | 4,934 | 2,486 | 0.15 | 0.36 | 0.00 | | 0.995 |
| Distance to souk (in km) | 4,934 | 2,486 | 11 | 9 | -1 | | 0.287 |
| Does trading as self-employment activity | 4,934 | 2,486 | 0.146 | 0.354 | -0.046 | *** | 0.003 |
| Has a fiber mat | 4,934 | 2,486 | 0.830 | 0.375 | -0.015 | | 0.205 |
| Has a radio | 4,934 | 2,486 | 0.798 | 0.402 | 0.023 | * | 0.062 |
| Owns land | 4,934 | 2,486 | 0.623 | 0.485 | 0.017 | | 0.344 |
| Rents land | 4,934 | 2,486 | 0.173 | 0.378 | -0.002 | | 0.870 |
| Does crop-sharing | 4,934 | 2,486 | 0.137 | 0.344 | -0.009 | | 0.406 |
| # of olive and argan trees | 4,934 | 2,486 | 38 | 135 | -3 | | 0.254 |
| Bought agriculture productive assets over the past 12 months | 4,934 | 2,486 | 0.251 | 0.433 | 0.040 | ** | 0.021 |
| Uses sickle (in agriculture) | 4,934 | 2,486 | 0.630 | 0.483 | -0.005 | | 0.781 |
| Uses rake (in agriculture) | 4,934 | 2,486 | 0.558 | 0.497 | -0.001 | | 0.976 |
| # of cows bought over the past 12 months | 4,934 | 2,486 | 0.3 | 6.2 | 0.2 | | 0.249 |
| Phone expenses over the past month (in MAD) | 4,934 | 2,486 | 41 | 102 | -1 | | 0.637 |
| Clothes expenses over the past month (in MAD) | 4,934 | 2,486 | 544 | 960 | -48 | * | 0.063 |
| Had an outstanding formal loan over the past 12 months | 4,934 | 2,486 | 0.236 | 0.425 | 0.012 | | 0.630 |
| Would be ready to form a 4-person group and guarantee a loan mutually | 4,934 | 2,486 | 0.677 | 0.468 | 0.040 | ** | 0.012 |
| Amount that would be able to reimburse monthly (in MAD) | 4,934 | 2,486 | 191 | 428 | 1 | | 0.963 |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 4,934 | 2,486 | 0.152 | 0.360 | 0.004 | | 0.738 |

*Notes:* Data source: Mini-Survey. Unit of observation: households. Sample includes households with high probability-to-borrow score surveyed at endline after trimming 0.5% of observations (3,525 who got both a full baseline and endline household survey administered, plus an additional 1,409 households who got only the full endline survey administered). ***, **, * indicate significance at 1, 5 and 10%.

**Table B3. Attrition**

**Panel A. Attrition rate**

| | Obs | Control Group | | | Treatment - Control | |
|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | p-value |
| Not surveyed at endline | 4,465 | 2,266 | 0.068 | 0.252 | 0.018 ** | 0.018 |

**Panel B. Attrition: household characteristics**

| | Obs | Surveyed at endline | | | Attrited - Surveyed | |
|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | p-value |
| *Household composition* | | | | | | |
| # members | 4,465 | 4,118 | 5.22 | 2.71 | -0.87 *** | 0.000 |
| # adults (>=16 years old) | 4,465 | 4,118 | 3.51 | 2.01 | -0.56 *** | 0.000 |
| # children (<16 years old) | 4,465 | 4,118 | 1.70 | 1.64 | -0.32 *** | 0.000 |
| Male head | 4,465 | 4,118 | 0.942 | 0.233 | -0.076 *** | 0.000 |
| Head age | 4,465 | 4,118 | 48.5 | 15.9 | -2.6 ** | 0.013 |
| Head with no education | 4,465 | 4,118 | 0.615 | 0.487 | -0.086 *** | 0.003 |
| *Access to credit:* | | | | | | |
| Loan from Al Amana | 4,465 | 4,118 | 0.006 | 0.076 | 0.005 | 0.400 |
| Loan from other formal institution | 4,465 | 4,118 | 0.078 | 0.268 | 0.000 | 0.968 |
| Informal loan | 4,465 | 4,118 | 0.077 | 0.266 | 0.004 | 0.718 |
| Electricity or water connection loan | 4,465 | 4,118 | 0.162 | 0.368 | -0.006 | 0.637 |
| *Self-employment activities* | | | | | | |
| # activities | 4,465 | 4,118 | 1.56 | 1.21 | -0.34 *** | 0.000 |
| Farms | 4,465 | 4,118 | 0.614 | 0.487 | -0.140 *** | 0.000 |
| Does animal husbandry | 4,465 | 4,118 | 0.558 | 0.497 | -0.125 *** | 0.000 |
| Runs a non-farm business | 4,465 | 4,118 | 0.196 | 0.397 | -0.012 | 0.558 |
| # activities managed by women | 4,465 | 4,118 | 0.21 | 0.57 | -0.01 | 0.767 |
| Distance to souk | 4,465 | 4,118 | 25.71 | 31.41 | -1.72 | 0.245 |
| *Has income from:* | | | | | | |
| Self-employment activity | 4,465 | 4,118 | 0.778 | 0.416 | -0.097 *** | 0.000 |
| Day labor/salaried | 4,465 | 4,118 | 0.576 | 0.494 | 0.032 | 0.245 |
| *Consumption* | | | | | | |
| Consumption | 4,465 | 4,118 | 2281 | 1281 | -178 *** | 0.003 |
| HH is poor | 4,465 | 4,118 | 0.249 | 0.433 | -0.043 * | 0.056 |

**Panel C. Attrition: household characteristics by treatment group**

| | Obs | Surveyed at endline, control group | | | Attrited X Treated Village | |
|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | p-value |
| *Household composition* | | | | | | |
| # members | 4,465 | 2,111 | 5.17 | 2.68 | 0.06 | 0.854 |
| # adults (>=16 years old) | 4,465 | 2,111 | 3.472 | 1.99 | 0.06 | 0.801 |
| # children (<16 years old) | 4,465 | 2,111 | 1.69 | 1.65 | 0.01 | 0.951 |
| Male head | 4,465 | 2,111 | 0.939 | 0.24 | -0.043 | 0.282 |
| Head age | 4,465 | 2,111 | 48.0 | 16.0 | -0.4 | 0.852 |
| Head with no education | 4,465 | 2,111 | 0.618 | 0.486 | 0.014 | 0.817 |
| *Access to credit:* | | | | | | |
| Loan from Al Amana | 4,465 | 2,111 | 0.006 | 0.078 | -0.014 | 0.280 |
| Loan from other formal institution | 4,465 | 2,111 | 0.060 | 0.237 | -0.067 ** | 0.010 |
| Informal loan | 4,465 | 2,111 | 0.069 | 0.253 | -0.002 | 0.922 |
| Electricity or water connection loan | 4,465 | 2,111 | 0.160 | 0.367 | 0.007 | 0.813 |
| *Self-employment activities* | | | | | | |
| # activities | 4,465 | 2,111 | 1.55 | 1.21 | 0.05 | 0.714 |
| Farms | 4,465 | 2,111 | 0.604 | 0.489 | 0.014 | 0.810 |
| Does animal husbandry | 4,465 | 2,111 | 0.538 | 0.499 | 0.039 | 0.496 |
| Runs a non-farm business | 4,465 | 2,111 | 0.217 | 0.412 | 0.023 | 0.562 |
| # activities managed by women | 4,465 | 2,111 | 0.22 | 0.58 | -0.02 | 0.713 |
| Distance to souk | 4,465 | 2,111 | 25.28 | 32.33 | 3.14 | 0.244 |
| *Has income from:* | | | | | | |
| Self-employment activity | 4,465 | 2,111 | 0.786 | 0.41 | 0.093 * | 0.057 |
| Day labor/salaried | 4,465 | 2,111 | 0.586 | 0.493 | -0.023 | 0.677 |
| *Consumption* | | | | | | |
| Consumption | 4,465 | 2,111 | 2256 | 1278 | -20 | 0.862 |
| HH is poor | 4,465 | 2,111 | 0.250 | 0.433 | 0.018 | 0.694 |

*Notes:* Data source: Baseline household survey. Unit of observation: household. Sample includes all households surveyed at baseline. Panel A: coefficients from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages). Panel B: coefficients from an OLS regression of the variable on an attrited dummy, controlling for strata dummies (paired villages). Panel C: coefficients from an OLS regression of the variable on a treatment village dummy (not shown), attrited dummy (not shown) and a dummy of the interaction of treatment village dummy and attrited dummy, controlling for strata dummies (paired villages). Standard errors are clustered at the village level.***, **, * indicate significance at 1, 5 and 10%.

**Table B4. Attrition**

***Panel A. Attrition rate***

| | Obs | Control Group | | | Treatment - Control | |
|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | p-value |
| Not surveyed at endline | 5,898 | 2,965 | 0.052 | 0.223 | 0.013 ** | 0.017 |

***Panel B. Attrition: household characteristics***

| | Obs | Surveyed at endline | | | Attrited - Surveyed | |
|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | p-value |
| # members | 5,898 | 5,551 | 6.24 | 3.04 | -1.36 *** | 0.000 |
| # members older than 18 | 5,898 | 5,551 | 3.67 | 2.08 | -0.75 *** | 0.000 |
| # self-employment activities | 5,898 | 5,551 | 1.44 | 0.99 | -0.42 *** | 0.000 |
| # members with trading, services or handicraft as main activity | 5,898 | 5,551 | 0.283 | 0.609 | -0.044 | 0.115 |
| Gets a pension | 5,898 | 5,551 | 0.15 | 0.35 | 0.02 | 0.347 |
| Distance to souk (in km) | 5,898 | 5,551 | 11 | 9 | -1 ** | 0.048 |
| Does trading as self-employment activity | 5,898 | 5,551 | 0.117 | 0.321 | -0.045 *** | 0.007 |
| Has a fiber mat | 5,898 | 5,551 | 0.814 | 0.389 | -0.046 ** | 0.042 |
| Has a radio | 5,898 | 5,551 | 0.792 | 0.406 | -0.046 * | 0.081 |
| Owns land | 5,898 | 5,551 | 0.635 | 0.481 | -0.174 *** | 0.000 |
| Rents land | 5,898 | 5,551 | 0.178 | 0.382 | -0.094 *** | 0.000 |
| Does crop-sharing | 5,898 | 5,551 | 0.138 | 0.345 | -0.078 *** | 0.000 |
| # of olive and argan trees | 5,898 | 5,551 | 35 | 124 | -14 *** | 0.007 |
| Bought agriculture productive assets over the past 12 months | 5,898 | 5,551 | 0.259 | 0.438 | -0.062 *** | 0.004 |
| Uses sickle (in agriculture) | 5,898 | 5,551 | 0.631 | 0.483 | -0.187 *** | 0.000 |
| Uses rake (in agriculture) | 5,898 | 5,551 | 0.559 | 0.497 | -0.188 *** | 0.000 |
| # of cows bought over the past 12 months | 5,898 | 5,551 | 0.3 | 6.7 | -0.3 | 0.121 |
| Phone expenses over the past month (in MAD) | 5,898 | 5,551 | 40 | 96 | -13 *** | 0.006 |
| Clothes expenses over the past month (in MAD) | 5,898 | 5,551 | 506 | 857 | -45 | 0.245 |
| Had an outstanding formal loan over the past 12 months | 5,898 | 5,551 | 0.238 | 0.426 | -0.006 | 0.700 |
| Would be ready to form a 4-person group and guarantee a loan mutually | 5,898 | 5,551 | 0.673 | 0.469 | -0.105 *** | 0.000 |
| Amount that would be able to reimburse monthly (in MAD) | 5,898 | 5,551 | 183 | 419 | -26 | 0.197 |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 5,898 | 5,551 | 0.145 | 0.353 | 0.018 | 0.404 |

***Panel C. Attrition: household characteristics by treatment group***

| | Obs | Surveyed at endline, control group | | | Attrited X Treated Village | |
|---|---|---|---|---|---|---|
| | | Obs | Mean | St. Dev. | Coeff. | p-value |
| # members | 5,898 | 2,810 | 6.20 | 3.07 | 0.05 | 0.879 |
| # members older than 18 | 5,898 | 2,810 | 3.64 | 2.08 | 0.19 | 0.507 |
| # self-employment activities | 5,898 | 2,810 | 1.43 | 0.99 | 0.27 ** | 0.039 |
| # members with trading, services or handicraft as main activity | 5,898 | 2,810 | 0.304 | 0.636 | 0.074 | 0.170 |
| Gets a pension | 5,898 | 2,810 | 0.15 | 0.35 | 0.00 | 0.955 |
| Distance to souk (in km) | 5,898 | 2,810 | 11 | 9 | 2 *** | 0.008 |
| Does trading as self-employment activity | 5,898 | 2,810 | 0.139 | 0.346 | -0.013 | 0.707 |
| Has a fiber mat | 5,898 | 2,810 | 0.822 | 0.383 | 0.045 | 0.314 |
| Has a radio | 5,898 | 2,810 | 0.780 | 0.414 | -0.043 | 0.410 |
| Owns land | 5,898 | 2,810 | 0.631 | 0.483 | 0.036 | 0.603 |
| Rents land | 5,898 | 2,810 | 0.177 | 0.382 | 0.073 ** | 0.044 |
| Does crop-sharing | 5,898 | 2,810 | 0.142 | 0.349 | 0.044 | 0.155 |
| # of olive and argan trees | 5,898 | 2,810 | 37 | 133 | 14 | 0.173 |
| Bought agriculture productive assets over the past 12 months | 5,898 | 2,810 | 0.243 | 0.429 | 0.036 | 0.411 |
| Uses sickle (in agriculture) | 5,898 | 2,810 | 0.636 | 0.481 | 0.128 ** | 0.049 |
| Uses rake (in agriculture) | 5,898 | 2,810 | 0.564 | 0.496 | 0.021 | 0.749 |
| # of cows bought over the past 12 months | 5,898 | 2,810 | 0.3 | 5.9 | 0.1 | 0.849 |
| Phone expenses over the past month (in MAD) | 5,898 | 2,810 | 41 | 101 | 0 | 0.988 |
| Clothes expenses over the past month (in MAD) | 5,898 | 2,810 | 521 | 922 | 34 | 0.667 |
| Had an outstanding formal loan over the past 12 months | 5,898 | 2,810 | 0.230 | 0.421 | -0.018 | 0.583 |
| Would be ready to form a 4-person group and guarantee a loan mutually | 5,898 | 2,810 | 0.653 | 0.476 | 0.067 | 0.222 |
| Amount that would be able to reimburse monthly (in MAD) | 5,898 | 2,810 | 183 | 439 | -17 | 0.658 |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 5,898 | 2,810 | 0.140 | 0.347 | 0.057 | 0.183 |

*Notes:* Data source: Mini survey. Unit of observation: household. Sample includes all households surveyed at baseline, plus all households only surveyed at endline. Panel A: coefficients from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages). Panel B: coefficients from an OLS regression of the variable on an attrited dummy, controlling for strata dummies (paired villages). Panel C: coefficients from an OLS regression of the variable on a treatment village dummy (not shown), attrited dummy (not shown) and a dummy of the interaction of treatment village dummy and attrited dummy, controlling for strata dummies (paired villages). Standard errors are clustered at the village level.***, **, * indicate significance at 1, 5 and 10%.

**Table B5. Summary Statistics of Al Amana loans**

| | | Clients | |
|---|---|---|---|
| | Obs | Mean | St. Dev. |
| Time elapsed between start of microcredit distribution in the village and uptake (in months)† | 280 | 5.7 | 6.4 |
| Share of clients who took up their 1st loan within the first 6 months | 280 | 0.679 | 0.468 |
| Share of clients who took up their 1st loan within the 6th and 12th month | 280 | 0.157 | 0.365 |
| Share of clients who took up their 1st loan during the second year | 280 | 0.164 | 0.371 |
| ***All loans*** | | | |
| # of loans | 280 | 1.46 | 0.57 |
| Share of loans, by type: | | | |
|   group-liability | 280 | 0.806 | 0.342 |
|   individual | 280 | 0.177 | 0.337 |
|   housing | 280 | 0.017 | 0.099 |
| Loan amount (in MAD) | 280 | 10,571 | 7,513 |
| Loan amount by type: | | | |
|   group-liability loans (in MAD) | 248 | 8,615 | 5,996 |
|   individual loans (in MAD) | 68 | 10,978 | 7,701 |
|   housing loans (in MAD) | 9 | 8,556 | 1,810 |
| Repayment frequency (in days) | 280 | 30 | 2 |
| Repayment period (in months) | 280 | 16 | 4 |
| Share of loans, by client activity: | | | |
|   Animal husbandry | 280 | 0.680 | 0.457 |
|   Trading | 280 | 0.264 | 0.434 |
|   Services | 280 | 0.032 | 0.172 |
|   Handicraft | 280 | 0.023 | 0.142 |
| ***First loan*** | | | |
| Loan amount (in MAD) | 280 | 5,920 | 3,055 |
| Took a group-liability loan | 280 | 0.886 | 0.319 |
| Took an individual loan | 280 | 0.111 | 0.314 |
| Took a housing loan | 280 | 0.004 | 0.060 |
| ***Loans by year*** | | | |
| Share of clients who borrowed during the 1st year | 280 | 0.836 | 0.371 |
| Share of clients who borrowed during the 2nd year | 280 | 0.525 | 0.500 |
| Amount borrowed during the 1st year (in MAD) | 234 | 6,669 | 4,443 |
| Amount borrowed during the 2nd year (in MAD) | 147 | 9,520 | 6,323 |

Note: Source: Al Amana administrative data. Data corresponds to 68% of total clients in the household sample of borrowers.

**Table B6. Self-employment activities**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Assets | Sales + home consumption | Expenses | *Of which: Investment* | Profit | Does the activity | Activ. Diversif. | Ownes land |
| *Panel A: Agriculture* | | | | | | | | |
| Treated village | 315 | 2,027 | 948 | -478 | 1,078 | 0.009 | 0.122 | 0.000 |
| | (185)* | (1,085)* | (410)** | (145)*** | (952) | (0.013) | (0.076) | (0.010) |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,921 |
| Control mean | 1,138 | 10,938 | 5,526 | 573 | 5,412 | 0.644 | 2.511 | 0.640 |
| *Panel B: Livestock* | | | | | | | | |
| Treated village | 1052 | 1552 | 977 | 289 | 575 | -0.010 | 0.200 | |
| | (619)* | (608)** | (487)** | (196) | (459) | (0.011) | (0.084)** | |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | |
| Control mean | 14,027 | 7,638 | 5,932 | 851 | 1,706 | 0.738 | 3.638 | |
| *Panel C: Non-agricultural businesses* | | | | | | | | |
| Treated village | 87 | 2511 | 2153 | -35 | 358 | -0.006 | -0.006 | |
| | (139) | (1,879) | (1,747) | (63) | (628) | (0.007) | (0.007) | |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | |
| Control mean | 817 | 11,874 | 9,936 | 105 | 1,938 | 0.147 | 0.156 | |

Notes: Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

*Same definitions as in Table3.*

**Table B7. Robustness**

| | (1) Client Al Amana - Admin data | (1) Assets (stock) | (2) Sales + home consumption | (3) Expenses | (4) Profit | (5) Has a self-employment activity | (6) Income from day labor/ salaried | (7) self-employment | (8) outside | (9) Monthly HH consumption (in MAD) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **Weekly hours worked by HH members aged 16-65** | | |
| ***Panel A: without household controls*** | | | | | | | | | | |
| Treated village | 0.167 | 2,086 | 6,232 | 4,015 | 2,218 | -0.004 | -1,079 | 1.5 | -2.9 | -19 |
| | (0.012)*** | (693)*** | (2,362)*** | (1,855)** | (1,234)* | (0.014) | (507)** | (1.5) | (1.0)*** | (49) |
| ***Panel B: same household controls as in Tables 2-9*** | | | | | | | | | | |
| Treated village | 0.167 | 1,454 | 6,090 | 4,079 | 2,011 | -0.016 | -1,052 | 0.6 | -3 | -45 |
| | (0.012)*** | (659)** | (2,166)*** | (1,720)** | (1,211)* | (0.010) | (477)** | (1.3) | (1.0)*** | (47) |
| Unclustered standard errors | (0.007)*** | (730)** | (2,572)** | (2,083)* | (1,377) | (0.009)* | (565)* | (1.2) | (1.1)*** | (58) |
| ***Panel C: with extended set of household controls*** | | | | | | | | | | |
| Treated village | 0.166 | 1,363 | 6,786 | 4,893 | 1,802 | -0.012 | -1,063 | 0.5 | -2.9 | -45 |
| | (0.012)*** | (597)** | (2,155)*** | (1,725)*** | (1,205) | (0.010) | (465)** | (1.3) | (1.0)*** | (45) |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,918 | 4,918 | 4,924 |
| Control mean | 0.000 | 15,982 | 30,450 | 21,394 | 9,056 | 0.831 | 15,748 | 40.6 | 30.4 | 3,057 |

Note: Data source: Endline household survey. Observation unit: household. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages) and variables specified below. Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Panel A: no control variables. Panel B: same controls as in Table 2. Panel C: controls include the lagged value of the dependent variable (at baseline), had a non Al Amana formal loan, had an informal loan, animal husbandry sales, animal husbandry savings, had lost any livestock over the past 12 months, share of self-activity income over total income, share of daily labor/salaried income over total income and ratio of consumption over total income. Same controls as in Table 2 are also included.

**Table B8. Propensity to borrow**

**Propensity to borrow,** all household interviewed **at endline in treatment villages**

| | Coef. |
|---|---|
| # members | 0.056 |
| | (0.030)* |
| # members older than 18 | -0.009 |
| | (0.042) |
| # self-employment activities | 0.187 |
| | (0.096)* |
| # members with trading, services or handicraft as main activity | -0.054 |
| | (0.122) |
| Gets a pension | 0.62 |
| | (0.242)** |
| Distance to souk (in km) | -0.094 |
| | (0.092) |
| Does trading as self-employment activity | 0.265 |
| | (0.231) |
| Has a fiber mat | -0.163 |
| | (0.187) |
| Has a radio | 0.048 |
| | (0.159) |
| Owns land | 0.177 |
| | (0.189) |
| Rents land | 0.346 |
| | (0.253) |
| Does crop-sharing | -0.428 |
| | (0.283) |
| # of olive and argan trees | -0.101 |
| | (0.097) |
| Bought agriculture productive assets over the past 12 months | -0.153 |
| | (0.164) |
| Uses sickle (in agriculture) | -0.304 |
| | (0.187) |
| Uses rake  (in agriculture) | 0.054 |
| | (0.185) |
| Phone expenses over the past month (in MAD) | 0.018 |
| | (0.074) |
| Clothes expenses over the past month (in MAD) | 0.344 |
| | (0.122)*** |
| Had an outstanding formal loan over the past 12 months | 0.028 |
| | (0.176) |
| Would be ready to form a 4-person group and guarantee a loan mutually | -0.173 |
| | (0.161) |
| Amount that would be able to reimburse monthly (in MAD) | 0.25 |
| | (0.071)*** |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 0.186 |
| | (0.176) |
| | |
| Observations | 2,215 |
| Mean dependent variable | 0.158 |
| Pseudo R2 | 0.143 |
| Number of villages | 63 |

*Notes:* Data source: Mini survey. Unit of observation: household. Sample includes all households surveyed at endline in treatment villages. Coefficients and standard errors (in parenthesis) from a logit regression of the variable client on variables specified in the table and on village dummies. Client is a dummy variable equal to 1 if the household had taken up a microcredit within the two-year evaluation time frame. ***, **, * indicate significance at 1, 5 and 10%.

**Table B9. Summary Statistics of borrower households, by sample timing**

*Panel A. Household characteristics of those sampled at endline*

| | Obs | Control Group | | | Treatment-Control | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Obs | Mean | St. Dev. | Coeff. | | p-value |
| # members | 1,409 | 693 | 7.73 | 3.64 | -0.12 | | 0.603 |
| # members older than 18 | 1,409 | 693 | 4.41 | 2.46 | -0.08 | | 0.583 |
| # self-employment activities | 1,409 | 693 | 1.5 | 0.8 | 0.0 | | 0.791 |
| # members with trading, services or handicraft as main activity | 1,409 | 693 | 0.3 | 0.6 | -0.1 | ** | 0.001 |
| Gets a pension | 1,409 | 693 | 0.052 | 0.222 | -0.007 | | 0.534 |
| Distance to souk (in km) | 1,409 | 693 | 11.1 | 8.7 | -1.1 | | 0.196 |
| Does trading as self-employment activity | 1,409 | 693 | 0.152 | 0.359 | -0.058 | ** | 0.002 |
| Has a fiber mat | 1,409 | 693 | 0.711 | 0.453 | -0.025 | | 0.275 |
| Has a radio | 1,409 | 693 | 0.706 | 0.456 | -0.018 | | 0.384 |
| Owns land | 1,409 | 693 | 0.752 | 0.432 | -0.006 | | 0.829 |
| Rents land | 1,409 | 693 | 0.395 | 0.489 | -0.027 | | 0.396 |
| Does crop-sharing | 1,409 | 693 | 0.323 | 0.468 | -0.046 | | 0.138 |
| # of olive and argan trees | 1,409 | 693 | 35.6 | 186.7 | -8.9 | * | 0.070 |
| Bought agriculture productive assets over the past 12 months | 1,409 | 693 | 0.245 | 0.431 | 0.076 | ** | 0.013 |
| Uses sickle (in agriculture) | 1,409 | 693 | 0.786 | 0.410 | -0.036 | | 0.192 |
| Uses rake (in agriculture) | 1,409 | 693 | 0.694 | 0.461 | -0.030 | | 0.236 |
| # of cows bought over the past 12 months | 1,409 | 693 | 0.8 | 11.6 | 0.2 | | 0.709 |
| Phone expenses over the past month (in MAD) | 1,409 | 693 | 87 | 170 | -1 | | 0.896 |
| Clothes expenses over the past month (in MAD) | 1,409 | 693 | 713 | 1,212 | -102 | * | 0.070 |
| Had an outstanding formal loan over the past 12 months | 1,409 | 693 | 0.203 | 0.403 | 0.018 | | 0.567 |
| Would be ready to form a 4-person group and guarantee a loan mutually | 1,409 | 693 | 0.587 | 0.493 | 0.028 | | 0.275 |
| Amount that would be able to reimburse monthly (in MAD) | 1,409 | 693 | 197 | 515 | 0.7 | | 0.972 |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 1,409 | 693 | 0.177 | 0.382 | -0.018 | | 0.336 |

*Panel B. Household characteristics by sample timing*

| | Obs | Sampled at baseline | | | Sampled at endline - baseline | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Obs | Mean | St. Dev. | Coeff. | | p-value |
| # members | 4,934 | 3,525 | 5.80 | 2.67 | 1.88 | ** | 0.000 |
| # members older than 18 | 4,934 | 3,525 | 3.46 | 1.91 | 0.95 | ** | 0.000 |
| # self-employment activities | 4,934 | 3,525 | 1.4 | 1.0 | 0.2 | ** | 0.000 |
| # members with trading, services or handicraft as main activity | 4,934 | 3,525 | 0.3 | 0.7 | -0.1 | ** | 0.000 |
| Gets a pension | 4,934 | 3,525 | 0.184 | 0.387 | -0.043 | ** | 0.000 |
| Distance to souk (in km) | 4,934 | 3,525 | 11.2 | 8.8 | -0.5 | ** | 0.002 |
| Does trading as self-employment activity | 4,934 | 3,525 | 0.124 | 0.330 | 0.010 | | 0.424 |
| Has a fiber mat | 4,934 | 3,525 | 0.869 | 0.338 | -0.155 | ** | 0.000 |
| Has a radio | 4,934 | 3,525 | 0.850 | 0.357 | -0.142 | ** | 0.000 |
| Owns land | 4,934 | 3,525 | 0.586 | 0.493 | 0.196 | ** | 0.000 |
| Rents land | 4,934 | 3,525 | 0.094 | 0.292 | 0.291 | ** | 0.000 |
| Does crop-sharing | 4,934 | 3,525 | 0.070 | 0.254 | 0.225 | ** | 0.000 |
| # of olive and argan trees | 4,934 | 3,525 | 39.3 | 121.2 | -7.0 | | 0.146 |
| Bought agriculture productive assets over the past 12 months | 4,934 | 3,525 | 0.268 | 0.443 | 0.020 | | 0.292 |
| Uses sickle (in agriculture) | 4,934 | 3,525 | 0.577 | 0.494 | 0.175 | ** | 0.000 |
| Uses rake (in agriculture) | 4,934 | 3,525 | 0.512 | 0.500 | 0.173 | ** | 0.000 |
| # of cows bought over the past 12 months | 4,934 | 3,525 | 0.1 | 5.1 | 0.8 | ** | 0.012 |
| Phone expenses over the past month (in MAD) | 4,934 | 3,525 | 24 | 49 | 58 | ** | 0.000 |
| Clothes expenses over the past month (in MAD) | 4,934 | 3,525 | 464 | 778 | 161 | ** | 0.000 |
| Had an outstanding formal loan over the past 12 months | 4,934 | 3,525 | 0.251 | 0.434 | -0.016 | | 0.268 |
| Would be ready to form a 4-person group and guarantee a loan mutually | 4,934 | 3,525 | 0.734 | 0.442 | -0.092 | ** | 0.000 |
| Amount that would be able to reimburse monthly (in MAD) | 4,934 | 3,525 | 190 | 420 | 43.0 | ** | 0.001 |
| Would uptake a loan of 3,000 MAD to be repaid in 9 monthly installments of 400 MAD | 4,934 | 3,525 | 0.153 | 0.360 | 0.026 | * | 0.082 |

*Notes:* Data source: Mini survey. Unit of observation: household. Panel A: Sample includes households with high probability-to-borrow score sampled at endline. Panel B: Sample includes households with high probability-to-borrow score sampled at baseline and at endline. Panel A: coefficients from an OLS regression of the variable on a treated village dummy, controlling for strata dummies (paired villages). Panel B: coefficients from an OLS regression of the variable on a dummy equal to 1 if the borrower household was sampled at endline, controlling for strata dummies (paired villages). Standard errors are clustered at the village level.***, **, * indicate significance at 1, 5 and 10%.

**Table B10: Impacts on borrowers, by sample**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Client Al Amana - Admin data | Assets (stock) | Sales + home consumption | Expenses | Profit | Has a self-employment activity | Income from day labor/ salaried | Weekly hours worked by HH members aged 16-65 | | Monthly HH consumption (in MAD) | Festivals & celebrations expenses (in MAD) |
| | | | | | | | | self-employment | outside | | |
| Treated village  X Endline sampled Borrower | 0.245 | 365 | 6023 | 2,591 | 3432 | -0.011 | -1,448 | 1.80 | -4.90 | -124 | -61 |
| | (0.018)*** | (1,468) | (5,454) | (4,035) | (2,963) | (0.019) | (1,106) | (3.30) | (2.2)** | (112) | (26)** |
| Treated village  X Baseline Sampled Borrower | 0.136 | 1,897 | 6,117 | 4,683 | 1,434 | -0.017 | -890 | 0.10 | -2.30 | -12 | -30 |
| | (0.012)*** | (829)** | (2,836)** | (2,316)** | (1,425) | (0.011) | (668) | (1.40) | (1.2)* | (61) | (15)** |
| Observations | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,934 | 4,918 | 4,918 | 4,924 | 4,924 |
| Control mean | 0.000 | 15,982 | 30,450 | 21,394 | 9,056 | 0.831 | 15,748 | 40.6 | 30.4 | 3,057 | 429 |
| Control mean, endline sampled | 0.000 | 20,933 | 39,395 | 27,280 | 12,115 | 0.86 | 16,937 | 49.7 | 32.7 | 3,444 | 483 |
| Control mean, baseline sampled | 0.000 | 14,069 | 26,993 | 19,119 | 7,874 | 0.82 | 15,289 | 37.1 | 29.5 | 2,907 | 408 |
| F(T X endline = T X baseline) | 33.4 | 0.7 | 0.0 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | 0.9 | 0.6 | 1.0 |
| p > F(T X endline = T X baseline) | 0.000 | 0.401 | 0.989 | 0.688 | 0.569 | 0.764 | 0.705 | 0.650 | 0.338 | 0.430 | 0.326 |

*Notes:* Data source: Endline household survey. Observation unit: household. Sample includes households with high probability-to-borrow score surveyed at endline, after trimming 0.5% of observations. Coefficients and standard errors (in parentheses) from an OLS regression of the variable on a treated village dummy interacted with a dummy equal to 1 if HH was sampled at baseline and on a treated village dummy interacted with a dummy equal to 1 if HH was sampled at endline . Standard errors are clustered at the village level. ***, **, * indicate significance at 1, 5 and 10%. Same controls as in Table 2.

**Figure F1: Geographical distribution of Alamana branches included in the study sample**



Répartition géographique des points de vente d'Al Amana

*Source : Al Amana*