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ExPost

Poverty, Access to Credit and the Determinants of Participation in a New Micro-credit Program in Rural Areas of Morocco

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Foreword

The “Impact Analyses” series aims to comprise works resulting from impact evaluations, and more largely, retrospective analyses of final results obtained in the framework of development policies or interventions.

This study was carried out in the framework of a scientific partnership between the AFD, the Al Amana Association and the Abdul Latif Jameel - Poverty Action Lab.

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Introduction

This paper describes the economic living conditions of the population in dispersed rural areas of Morocco and analyses their response to the introduction of a new micro-credit program. It is extracted as a first working paper in a series based on the results of a randomised impact evaluation of a micro-credit program currently jointly conducted in Morocco's rural areas by Al Amana, the largest microfinance institution in Morocco, Agence Française de Développement (AFD) and Jameel Poverty Action Lab (J-PAL)[1].

The first section of this paper closely follows the papers of Banerjee and Duflo (2007). It focuses on the comparison of the lives of people of different wealth levels (the poor, the lower- and upper-middle class) in rural areas of Morocco in terms of consumption, income generation, access to credit and insurance markets, as well as on the environment in which the decisions relatives to these issues are made. This paper differs from the aforementioned papers in the sense that the fraction of people considered extremely poor is not significant in Morocco. It focuses on analysing the economic conditions of the poor; i.e. those living on less than $2 a day. The methodology of the above-mentioned papers by Banerjee and Duflo leads us to look at poverty from the standpoint of individuals considered as units, as opposed to households. We also compare their situation to that of comparable populations in other low- and middle- income countries for which similar data are available.

The second section of this paper focuses on the determinants of access to micro-credit. We observe households' response to the new micro-credit program in rural dispersed areas and, as households self-select at different points in time, we estimate a duration model with unobserved heterogeneity and look at the observable factors that predict participation such as wealth, the need for capital or the type of activity of the households.

Finally, in a third section, we assess the role of micro-credit in expanding access to credit, by comparing realised credit transactions in treatment and control villages.

Data and methodology

This paper uses data from a household survey conducted in dispersed rural areas of Morocco which constitutes the first round of the baseline survey on which the randomised experiment mentioned earlier relies. It was conducted in May 2006 and included a total of 1,550 households in 16 rural villages. The survey provides information on demographics, migration, households and productive assets, production, consumption, revenues, access to finance and women's activities.

The "extremely poor" were identified as those living in households with consumption per capita levels of less than 1.08 dollars a day and the "poor" as those living with less than 2.16 dollars a day, measured at the 1993 purchasing power parity (PPP) exchange rate[2]. These definitions follow the methodology of the 1990 World Development Report from the World Bank[3].

1 The project is called "Impact Evaluation of a Micro-credit Program in Rural Areas of Morocco'' and is financed by AFD

2 Current per capita consumption levels were adjusted to 1993 Purchasing Parity Power (PPP) dollars by dividing them for 1993 PPP exchange rate multiplied by Moroccan's inflation (should this be: "dividing them by 1993 PPP exchange rates and multiplying them by Morocco's inflation rates"between 1993 and 2006.

3 1990 World Development Report defined the 'extremely poor' as those living on less than 1 dollar a day and the 'poor' as those living on less than 2 dollars a day, measured at 1985 PPP dollars. In 1993, the poverty line level was updated to 1.08 dollars a day per person and 2.16 dollars a day per person respectively. The update resulted from data collected by the World Bank in 1993 on 110 countries' price and consumption baskets. However, in order to respect conventions, in this paper we will call the updated poverty lines 1 and 2 dollars a day respectively.

Consumption aggregates were deflated to 1993 prices by the consumer price index (CPI) and then converted into dollars using 1993 PPP exchange rates for Morocco. Thus, the 1.08 poverty line equals a daily per capita consumption level of 4.5 Moroccan dirhams (Dhs), measured at 2006 current prices, while the 2.16 dollar poverty line equals 9 Dhs. Annual per capita poverty line levels are therefore equivalent to 1,647 Dhs for the 'extremely poor' and of 3,294 Dhs for the 'poor', at 2006 current prices. The 1990 World Development Report shows that countries with higher consumption per capita levels tend to set their poverty lines at higher levels than the poorer countries. The 1 dollar a day poverty line was chosen because of its proximity to the poverty lines set by many low-income countries[4]. For the higher limit, the 2 dollars a day poverty line was set to comprise the range of poverty line levels estimated for a group of low-income and low-middle income countries, including Morocco. Morocco being a low-middle income country, its national poverty line level was set close to the 2 dollars a day poverty line[5].

This methodology has a number of drawbacks[6]; however, for the purpose of this paper, it allows for comparability with other low- and middle-income countries. This comparison is based on household surveys conducted in 18 developing countries. Most of them consist of 'Living Standard Measurements Surveys' (LSMS) conducted by the World Bank. There are also some 'Family Life Surveys' conducted by the Rand Corporation and surveys that were conducted by one of the authors as part of a randomised evaluation[7]. All these surveys collected data on households' consumption, both expenditures and auto-consumption, and the micro-credit survey did also[8].

The "lower-middle class" is defined as those living in households with consumption per capita between 2 and 4 dollars a day[9]. In our survey, this group comprises those whose consumption is between the 19th and 64th percentile of the population. In order to use a more comprehensive definition of the middle class[10], to which we will refer as the "upper-middle class", we also analyse the group whose consumption lies between 6 and 10 dollars a day[11], i.e. those between the 85th and 96th percentile of the population[12].

4 The lower poverty line coincides with the level of the poverty line of India.

5 For a detailed analysis, see Appendix 3.

6 See Banerjee and Duflo (2007) for a discussion on the drawbacks of this methodology.

7 Appendix 2 presents a description on the methodology utilised in each survey to compute consumption.

8 For a detailed analysis on data collection on consumption, see also Appendix 2.

9 It is equivalent to a daily per capita consumption of between 9 and 16.7 Moroccan Dhs at 2006 current prices.

10 See Banerjee and Duflo (2007) for a discussion on the "middle-class" definition.

11 It is equivalent to a daily per capita consumption of between 25.1 and 41.8 Moroccan Dhs at 2006 current prices.

12 See Appendix 3 for more details on consumption distribution.

1. Descriptive analysis of wealth in rural Morocco

People living on less than 2 dollars (p0) a day represent 19%[13] of the population in dispersed rural areas of Morocco; while the extremely poor, i.e. those living on less than 1 dollar a day (p0), only represent 1.9% of the population. The relatively small size of the latter group does not warrant a separate analysis and, therefore, when we refer to the poor, we will be referring to those living on less than 2 dollars a day. The last available official estimates, published by the National Statistics Office of Morocco in 2005, also show that the group of people living on less than 1 dollar a day was not significant[14]. Regarding the population living on less than 2 dollars a day, our estimates are slightly higher. Their report indicates that 16.4% of the rural population are poor. However, their estimates refer to the whole rural population, while our survey only comprises the population living in dispersed rural areas of Morocco.

The poverty gap measure[15] shows that the average consumption of the poor population falls short of the poverty line consumption level by 4.7% (p1). This means that the people living on less than 2 dollars a day have a level of consumption that is on average 0.1 PPP dollars (or 0.4 Dhs) lower than the poverty line consumption level.

1.1 Wealth and demographics: the households of the poor and middle classes

Living arrangements in rural areas significantly differ with households' wealth. Poor people tend to live in relatively larger and younger families than the lower- and upper-middle classes. Poor people belong to families with an average size of 9 members; while for the lower- and upper-middle classes, average family size decreases to 7 and between 6 and 7 members respectively.

Table 1. FGT poverty indicators

People living on less than $1 a day				
Indicator	Estimate	Std. Err.	(95% Conf. Interval)	
p0	1.9%	0.004	0.011	0.027
p1	0.4%	0.001	0.002	0.006

People living on less than $2 a day				
Indicator	Estimate	Std. Err.	(95% Conf. Interval)	
p0	19.0%	0.012	0.166	214
p1	4.7%	0.004	0.040	0.055

13 This result is slightly higher than the one published by the National Statistics Office in 2005. See Appendix 3 for a detailed comparison to the figures published by the National Statistics Office in 2005.

14 2005 Millennium Development Goals report, Morocco's "Haut Commissariat au Plan"

15 The FGT index is defined as follows: $P_\alpha = \frac{1}{N}\sum\left(1-\frac{y_i}{z}\right)^\alpha 1(y_i<z)$.

Where: ?: degree of aversion to poverty; z: poverty line level; Yi: measure of welfare or, in our case, consumption per capita of the household; N: number of individuals in the population. For the headcount index ? equals 0, while for the poverty gap, ? equals 1.

Table 2. Household Demographics I

Average number per household of :	children aged 0-12	children aged 13-18	household members	children per woman
Group living with :				
less than $2 a day	2.91	1.50	9.01	2.70
between $2 and $4 a day	1.91	1.19	7.23	1.97
between $6 and $10 a day	1.60	0.91	6.65	1.559

We observe in Table 3 that the proportion of children younger than 18 years old decreases from 50% for the people living on less than 2 dollars a day to 34% for those living on between 6 and 10 dollars a day. Moreover, richer families tend to have a larger proportion of members over 51.

These differences in the demographic structure between the poor and middle-class families is similar to those in other countries (13) previously analysed by Banerjee and Duflo (2007). However, when we compare Morocco to these countries, one feature becomes more accentuated: poor families in Morocco have the largest average size among the six lower-middle income countries and the highest among all countries (figure 3, Appendix 3). But, interestingly, the large sizes are more explained by the relatively large proportion of older household members than younger ones, suggesting that Morocco's demographic structure will become closer to that of middle-income countries in the future.

Table 3. Household Demographics II

Per cent in total population of people aged:	0-18	18-50	51 and more
Group living with :			
less than $2 a day	49.9%	36.3%	11.2%
between $2 and $4 a day	42.6%	42.2%	14.9%
between $6 and $10 a day	34.4%	44.8%	20.7%

1.2 Wealth and budget allocation: how the poor and middle classes spend their money

Food and festivity expenses

The first marked differences on household budget allocation[16] among wealth levels is that food consumption falls sharply as a share of the total budget as wealth increases. As expected, poor people spend the biggest share of their budget on food, which represents around half of their total budget, while it decreases to 39% of the total expenses for the upper-middle class. Although the middle classes spend a smaller portion of their budget on food, the fact that they have a higher level of consumption and fewer household members results in higher per capita food expenditure than the poor in nominal terms. The level of per capita food expenditure of the lower-middle class is fifty percent larger than that of the poor, while that of the upper-middle class is two and a half times higher. After having fulfilled their basic nutrition needs, the poor still have a large share of the budget to allocate to various expenses.

16 This section includes the analysis of household expenses. Auto-consumption is not included since the household survey administered in pilot villages did not collect precise data on it, as it is explained in Appendix 3.

Spending on festivals and family celebrations accounts for the second consumption item of the poor and the low middle class, and for the third one of the richest. Festivals refer mostly to Ramadan and the Aid el Kabir[17]; which are the two most important celebrations in Morocco. Expenses on these two occasions also consist mostly of food; with some specific items traditionally consumed in each of these celebrations. It also includes engagements, weddings, births, pilgrimages and funerals. It is also remarkable that almost every poor family spends money on festivals and family celebrations: 96% of people belong to families that declare having engaged in such spending.

Table 4: How the Poor and the Middle Classes spend their money I

	% of total expenditure spent on:					
Group living with:	Food	Tobacco	Education	Health	Festivals	Entertainment
less than $2 a day	50.6%	0.4%	2.6%	4.5%	16.0%	0.1%
between $2 and $4 a day	46.9%	0.6%	1.9%	7.5%	14.4%	0.5%
between $6 and $10 a day	39.2%	0.6%	1.3%	13.6%	13.4%	0.5%

Table 4: How the Poor and the Middle Classes spend their money I (cont.)

	% of total expenditure spent on:			
Group living with:	Clothes	Gas, water & electricity	Communications	Transport
less than $2 a day	5.4%	8.0%	0.7%	3.1%
between $2 and $4 a day	6.7%	7.2%	0.5%	2.9%
between $6 and $10 a day	7.5%	6.8%	1.0%	2.4%

Table 5: How the Poor and the Middle Classes spend their money II

	% of People Living in Households with Any Expenditure on:				
Group living with:	Tobacco	Education	Health	Festivals	Entertainment
less than $2 a day	17.7%	71.5%	53.3%	95.7%	2.8%
between $2 and $4 a day	26.9%	65.6%	65.6%	99.1%	10.6%
between $6 and $10 a day	34.9%	57.8%	81.4%	98.1%	11.1%

Education

Households spend overall a limited proportion of their budget on education. This is more explained by the fact that, in rural areas of Morocco, available schools are public and free and less because children are not sent to school.

Although the differences between wealth groups are tenuous, richer households are more likely to send their children to school than poorer ones (75.3% compared to 72.8% and 60.2% to 54.5 for the 7-12 and 13-15 groups respectively). If two of the main motivations for not sending children to school are related to cost and to obligation to work, the distribution of these motivations is strikingly different among wealth groups. Cost represents 56% and 32%, for the two age groups respectively, of the reasons for not sending children to school for the poorest, compared to 24% and 26% for the upper-middle class. For the poorest, 15% and 19% of children of the two age groups are not going to school because they are needed for some type of work compared to 46 and 58% for the wealthiest.

17 It is called “Fête du mouton” in French and its literal translation in English is the “Sheep Festival”.

Table 6. Education

	Percentage of :		Average number per household of :	
	children in school aged 7-12	children in school aged 13-15	children in school aged 7-12	children in school aged 13-15
Group living with :				
less than $2 a day	72.8%	54.5%	0.88	0.39
between $2 and $4 a day	78.5%	53.8%	0.62	0.27
between $6 and $10 a day	75.3%	60.2%	0.53	0.20

Expenditures related to primary education mostly consist of books and school supplies. Indirect expenses can be significant at the secondary level since not every commune has its own college (secondary school), obliging some children to move to another village where a secondary school is available.

As for food consumption, the share of education expenses on the total budget also falls as wealth increases. Although it is surprising at first glance, the middle classes have lower investment in education as a share of the budget compared to the poor. We would expect richer people to spend less on education because they have fewer children, but, at the same time, their children are more likely to go to school, especially those of secondary school age, and we would expect larger expenses per child, pulling expenses in the opposite direction. Given their consumption level, which is between 1.5 and 2.5 times higher on average than that of the poor, and the number of children they have in school, they would have to invest between 2 and 5 times more per child in order to spend as much as the poor do (as a share of the budget). We observe that the lower- and upper-middle classes do actually spend more per child in school, 0.5 and 2 times more, respectively. This clearly explains the fall in education investment, together with the lack of private schools in the studied rural areas where richer people could spend much more per child.

Health

Contrary to food consumption and education expenses, richer people clearly spend more money on health services. The share of health expenses on the household budget augments from 5% to 14% between the poor and the upper-middle class.

Nevertheless, even if poor households spend small amounts on health, half of them have had some health-related expenses in the year before the survey. It is also relevant to point out that rural populations in Morocco mostly attend public healthcare centres. Our survey did not collect detailed information on healthcare-related expenses, and thus does not allow for an in-depth analysis of healthcare expenditures.

Other expenses

Expenditures on gas, water and electricity represent almost one tenth of the poor's budget (8%), which makes it the third consumption group. Additionally, clothes represent a 5.4% share of the poor's budget, while transport takes 3.1%. The poor allocate very small shares of their budget to the remaining consumption areas: 0.7% to the telephone, 0.4% to tobacco and 0.1% to entertainment.

The comparison of the budget allocation to other countries shows that the way the poor allocate their budget in Morocco is very close to the average choice made by other poor populations. The only distinctive feature is the relative high consumption for festivals; which is the second highest as a share of budget after India (Figure 4, Appendix 3). The median of festival consumption as a share of total consumption is 1.4%, while in Morocco it surpasses 10% of total consumption.

1.3 Wealth and infrastructure: to which basic services do the poor and the middle classes have access?

Half of the studied villages do not yet have access to household tap water, the entire village population being served by alternative water sources such as public taps, protected wells, and others. There is no obvious correlation between the degree of poverty of the village and the existence of water infrastructure. However, access to tap water within the village is related to wealth, as the richer households are more likely to have access to it than the poor (21% and 14% respectively).

The proportion of people having access to electricity also augments as standards of living increase (from 39% for the poor, to 44% and 49% for the lower- and upper-middle class groups respectively). There is an even more marked increase for latrines: only 2% of poor people live in a house with a latrine, while 7% and 18% of people belonging to the lower-middle and upper-middle class respectively have one at home.

Table 7: Utilities

	Percentage of people living in a Household with:			Average # of rooms
Group living with:	tap water	electricity	a toilet	
less than $2 a day	13.8%	38.5%	2.2%	4,2
between $2 and $4 a day	12.5%	44.1%	7.3%	3,9
between $6 and $10 a day	21.0%	49.1%	17.9%	4,6

1.4 Wealth and economic activities: how the poor and middle classes earn their money

Poor populations in dispersed rural areas of Morocco usually belong to a household that owns a plot of land, on which they mostly run agricultural and livestock activities (70% of the poor live in a family that has its own agricultural business and 54% its own livestock business).

Most poor farmers exploit their own land, but around one fourth of them (26%) complement this by using other farmers' land that is generally rented through a crop-sharing arrangement whereby an average 50% of the harvest is given in exchange for land utilisation. A smaller portion of poor farmers rent their land out (10%) under the same arrangements.

Furthermore, only a small proportion of the poor run a non-agricultural business, i.e. shops, handicrafts, services, etc. (17%). For the poor, income is predominantly generated from agriculture and livestock activities.

Table 8: Agricultural and Non-agricultural business

	Percentage of people living in households that own land	Average amount land owned (in hectares)	Percentage of people living in a households with :		
Group living with:			an agricultural activity	a livestock activity	a non-agricultural business
less than $2 a day	64.0%	3.9	70.3%	54.1%	16.7%
between $2 and $4 a day	77.3%	4.5	82.3%	73.1%	21.3%
between $6 and $10 a day	84.9%	6.6	87.1%	80.7%	22.9%

Another characteristic of the poor households is that they are likely to complement their own activity income with paid work. At least one member of the household usually works as a daily labourer in agriculture or livestock sectors for someone that does not belong to the household (54% of the poor), and much less frequently, a household member is formally employed (public servant, serviceman, formal employee, etc.) (10% of the poor population).

Table 9: Wage, salary and pension income

	Percentage of people living in households in which at least one member		
	works for a wage or salary in:		receives a pension
Group living with:	agriculture / livestock	other	
less than $2 a day	53.7%	9.9%	1.0%
between $2 and $4 a day	38.4%	6.1%	3.0%
between $6 and $10 a day	26.4%	9.1%	2.8%

These findings show that the poor try to spread risks which stem from their own agricultural activities, in which they are self-employed. They complement the income generated from their own activities with income from other sources, i.e. wage labour.

The richer population is more likely to be running an agricultural, livestock or non-agricultural activity than the poor, and, therefore, to generate their income from multiple sectors (78%).

Another salient characteristic of wealthier households is that they tend to complement less their own activity income with paid work, and, if they do, fewer of them work as daily labourers. Richer people are half as likely as the poor to receive income from daily paid work, and only 34% generate their income from both self-owned activity and paid work.

What is the size of poor and middle-class businesses? The small number of paid workers and of productive assets utilised in production suggests that businesses (agricultural and non-agricultural) are operated on a small scale; this feature being quite general for both the poor and the richer populations. Family members tend to work almost exclusively in the household business, and the number of family members involved in production does not seem to be related to wealth.

Table 10. Agricultural and livestock business

	Agriculture			Livestock	
	Average number of			Average number of	
	non-household	total		non-household	total
Group living with :	workers	workers	vehicles	workers	workers
less than $2 a day	0.1	2.6	0.8	0.0	1.8
between $2 and $4 a day	0.1	2.6	0.8	0.0	2.1
between $6 and $10 a day	0.1	2.4	1.0	0.1	2.2

We do observe a difference in scale depending on the type of activity: around two and a half members generally work in agricultural activities, around 2 in livestock and 1.4 in the non-agricultural business. Agricultural activities utilise one vehicle on average; while in the off- farm activities, machines are more frequent: there is one machine for every 5 businesses carried out by the poor and 2 machines for every 5 businesses belonging to the middle class groups.

Table 11. Non-Agricultural business

	In each Business Average number of :			
	non-household	total		
Group living with :	workers	workers	vehicle	machine
less than $2 a day	0.0	1.2	0.0	0.2
between $2 and $4 a day	0.0	1.5	0.1	0.4
between $6 and $10 a day	0.0	1.4	0.0	0.4

Compared to the rural areas of other countries (Figure 5, Appendix 3), the poor in Morocco are among those with the lowest likelihood of running their own non-agricultural business. Only 16% of Morocco's poor live in a household with a non-agricultural business compared to around 25% for the other countries.

Finally, the structure of income flows follows the patterns of the households' activities.

Table 12[18]: Income

	Agriculture	Livestock	Salary	Pension	Remittances	Other Income
Less than $2 a day	0.28	0.26	0.28	0.00	0.16	0.01
Between $2 and $4 a day	0.38	0.31	0.20	0.01	0.13	0.02
Between $6 and $10 a day	0.29	0.44	0.14	0.01	0.11	0.01

Poor households get the majority of their income from agriculture, either by cultivating and selling their own crops or by salaries derived from their work on other people's land (53.7% of the poorest work as day labourers). They are also the ones that benefit the most from income remittances from Morocco or abroad.

The size of revenues derived from livestock activities is strongly correlated with wealth. For the wealthier, 44% of their income comes from livestock activity while the proportion falls to 26% for the poorest.

Finally, the share of pensions as income is insignificant for all wealth groups.

1.5 Wealth and Access to financial services

1.5.1 Use of credit by the poor and the middle class

The population in Morocco's dispersed rural areas is using several forms of credit but overall has low access to formal credit. At the time of the survey, about 36% of households had an outstanding debt, and out of these, only 9% were borrowing from a bank – essentially from an agricultural bank providing large loans with a land collateral guarantee– and 2.7% from a micro-credit institution.

As in many developing countries, rural households rely mainly on the informal financial sector. The largest sources of credit come from suppliers (42.5) followed by relatives and friends (16.4 and 14.4).

18 Revenues from small businesses are not included in the income analysis as they were not extensively collected during the household survey in the pilot villages.

Table 13. Access to credit

	Less than $2	$2-4	$6-10	All sample
Outstanding debt (%)	34	34.9	37.4	36.5
Type of credit used				
Bank	1.7	5.8	18.8	9.1
Micro-credit	0	2.4	3.8	2.7
Cooperative	0	1.4	3	1.5
Shopkeeper	3.1	6.1	3.3	5.7
Relatives	16.5	17.3	19.1	16.4
Friends	17.6	13.7	15	14.4
Villagers	5.2	4.1	3.6	4.7
Suppliers	54.8	46.8	30.7	42.5
Other	1.1	3.0	1.7	2.9
Outstanding debt (median in Dhs)	800	2000	3000	2000

Having an outstanding debt does not appear to be significantly related to households' wealth, as opposed to the type of financial source. Access to formal credit naturally increases with wealth, as the ownership of collateralisable assets is one of the eligibility criteria to access a bank loan.

For instance, if 33% of households living on less than 2 dollars a day have an outstanding debt, only 2.5 of them borrow from the formal sector. They mainly rely on credit from suppliers (54.8%), friends (17.6%) and relatives (16.5%). The large differences in terms of credit from suppliers between the poor and the upper-middle class– around 24 pp – suggest greater interlinked credit transactions for the poorest households. Because of a lack of available liquidity, poorer households have to purchase agricultural inputs on credit, directly from suppliers.

For the lower-middle class, the situation does not differ much, as 35% of them had an outstanding debt at the moment of the survey. They use slightly more bank loans (5.8%) and rely less on suppliers than the poorest do. In contrast, households from the upper-middle class clearly have more access to formal lending (22.6% of borrowers) than the poorest segments of the population and their reliance on suppliers also decreases.

Two effects are plausibly playing in the same direction: the capacity to seize investment opportunities increases with wealth, as well as the ability to provide the collateral required to access bank loans.

Even though micro-credit is present in some of the villages, albeit only superficially (2.7%), it is interesting to see that none of the poor have beneficiated from it.

Collateral

Having access to formal credit is significantly determined by the capacity to provide collateralisable assets, credit from formal banks being mainly guaranteed by land. In this regard, the difference among wealth groups is also considerable: around 64% of people living with under 2 dollars a day own some land, compared to 85% for people living in households with 6 to 10 dollars a day. This difference is also illustrated by the size of the owned land (around 3.9 hectares for the poor that own land and 6.6 hectares for the upper-middle class that own land). Moreover, the land market in Morocco is thin due to the lack of a precise definition of property rights. For instance, only 36% of agricultural households that own land have a clearly defined private ownership status, and this proportion increases with wealth (from 26.3 for the poorest to 42.2 for the upper-middle class).

As a result, poor households that are engaged in credit transactions have much less access to bank credit guaran-

Table 14. Collateral

	Less than $2	$2-4	$6-10
Land	64	77.4	84.9
Land size (In hectares)	3.9	4.5	6.6
Own house	72.6	80.2	83
Car	0.6	2.9	9.0

teed by collateral (1.7%) than the lower-middle class (5.8%) and the upper- middle class (18.8%).

Loan size

Access to formal credit not only increases with wealth, so does the capacity to secure larger loan sizes. For households having active loans, households with less than 2 dollars a day had a median outstanding debt of 800 Dhs ($105), 2-4 one of 2000 Dhs ($260) and 6-10 of 3000 Dhs ($395).

The question is whether poor households have less credit because they have a low demand – and have no productive activities in which to invest– or because they are constrained on the credit market (or a combination of the two).

Looking at the characteristics of the activities of the poorest may provide part of the answer. Firstly, poor people are much more likely to be working as daily labourers on other people's land than the non-poor (this proportion is respectively 54.6, 38.8 and 27.8 for the less than 2, 2 to 4 and 6 to10 dollar groups); secondly, they are less likely to be engaged in rural non-agricultural activities such as cattle raising (this proportion is of 44, 68 and 74% respectively) and, finally, they are also less likely to run a small business such as a small shop, service or handicraft (14.3% of the poor compared to 19.4 for the middle class and 22.9 for the upper-middle class and this proportion goes up to 31.8 for the wealthiest).

Thus, the occupational choice seems significantly affected by household wealth. If there were no financial constraints, one would expect that poor people could borrow to start up an activity. But, of course, access to capital is not the only determinant in starting up a business; there are also important factors such as the propensity to take risks, the degree of entrepreneurship, etc…

In a different context (rural and semi-urban areas of Thailand), Paulson and Townsend (2004) evaluate the role of household wealth in the decision to start up a business. They use data from a comprehensive survey and are able to calculate an estimate of the households' wealth before they started a business. Holding entrepreneurial skills fixed (they use the degree of education as a proxy of entrepreneurship), they show that wealth has indeed a major influence on the decision to start a business, suggesting the existence of financial constraints.

Although we do not have data on households' wealth before they started their businesses, we find similar results for households whose head has no education (60% of the sample). Among them, only 8% of the poorest have a business as opposed to 20% and 35.5% for the upper-middle class and the richest. However, for households whose head has some

Table 15. Education, wealth and business

Education of the head of the household:	Less than $2	$2-4	$6-10	more than $10	All sample
None	8.4	17.1	20.2	35.5	17.2
Any education	23.8	23.1	27.1	27.1	24.4

degree of education, wealth appears to have a much smaller influence, with only 3 pp differences between the poorest and the richest households in the sample.

But wealth also has an impact on the nature of credit transactions that might affect investment efforts. It is striking that the poor in rural Morocco use much more supplier credit and less bank credit than the upper-middle class. Although we cannot rigorously capture the interest rates charged by informal lenders in our survey, some evidence (Mourji, 2002) reports that the interest rate charged by suppliers in Morocco, often provided at very short term, can be up to 10% per month (through the increase of sale prices.) Poorer borrowers, who do not own any collateral, have access to more expensive credit which is probably less adapted to their productive needs. They may thus have less incentive to invest efforts in their project and are likely to remain in a poverty trap.

Latent demand

However, access to credit is not only measured by the proportion of households having an outstanding debt, as some rural households ask for some credit and are refused, whereas others are self-excluding themselves from the credit market because they fear being turned down, while their demand for credit is different from zero.

While only a small proportion of households have tried to obtain a loan in the year before the survey – and this proportion increases with wealth – a large proportion of households report a need for credit that they did not ask for - and this proportion decreases with wealth.

Looking at the reasons of why the majority of households did not ask for credit is very informative on the role that wealth can play.

Table 16. Latent demand issues

	Less than $2	$2-4	$6-10
Need of credit in the past year, did not ask	56	51.8	48.9
Tried to obtain some credit	16.6	24.6	25.5
Reason for no demand			
No need	15.9	19.6	26.2
Fear of being turned down	9.4	10.1	6.8
Fear of not being able to repay	24.3	20.5	17.6
Not having appropriate collateral	18.4	21.7	14.3
Credit demand refused	7.2	9.1	13.7

The non-demand for credit is motivated by the lack of need, self-exclusion from the credit market and by the fear of not being able to repay the loan. Although the differences are only slight, latent demand issues show that poorer households are more likely to have a low demand because they are risk averse (afraid of not being able to repay) and not because they have less need.

In terms of self-exclusion from the credit market, the difference is only visible between the poor and the upper-middle class, the latter being less likely to be afraid of being turned down or not owning appropriate collateral to be eligible for a loan.

The information on realised credit transactions and latent demand variables demonstrates that there is a significant need of credit that is currently not addressed by existing credit sources. Around 50% of the households of the sample expressed a need for credit that they did not ask for in the past year.

A significant proportion of poorer households have access to some credit (34%) but only very few of them have access to formal credit. They mainly borrow from informal sources, especially by using supplier credit, which is characterised by relatively small loan sizes (around 800 Dhs).

Households of the middle class have access to credit in the same proportion but secure larger loan sizes (respectively 2,000 Dhs and 3,000 Dhs in median for the $2-4 and $6-10 groups) and rely less on suppliers. Their indebtedness capacity actually well matches with the loan sizes provided by some microfinance institutions (such as Al Amana), especially for their first loan cycle (from 2000 Dhs to 5000 Dhs).

Table 17: Savings

Percentage of people living in a household that owns :	Less than $2	$2-4	$6-10	All sample
Savings account	5.1	9.8	16.4	11.1
Monetary savings (not in an account)	27.4	34.5	46.7	38.2
Stock – agricultural crops	26.2	33.7	36	35.7

The combination of a significant need for credit and overall low access to formal credit would demonstrate the need for and potential of some intervention in the credit market.

Section 2 of this paper actually shows the response of rural households to the introduction of a new micro-credit program in rural areas of Morocco.

1.5.2 Savings of the poor and the middle classes

Households in rural households also have limited access to bank accounts (11.1%). One of the reasons is, of course, the lack of banking infrastructure at proximity; but wealth also seems to have an influence, as only 5% of the poor have a bank account as opposed to more than 16% of the upper-middle class.

But households do not only save in a safe place at the bank; they also keep some money at home or in some informal savings group. The proportion of households who report saving is significant in all wealth groups, but increases with respect to wealth (while 27% of the poor save, 48% of the richer do).

Together with monetary savings that are kept either in a bank account (a minority of households), at home, or in a savings institution, there are some forms of in-kind savings. A significant proportion of households keep part of their harvest, mainly wheat, in stock to sell later during the year when they need cash or have to face some income shock. These stocks are fairly liquid and households who can store them are often able to sell them at a higher price later during the year. Some other assets, such as livestock, are also playing the role of in-kind savings.

2. Determinants of becoming a micro-credit client: a duration analysis

2.1 Al Amana and the surveyed villages

Microcredit activities started in Morocco in the mid-1990s. After a very fast expansion, 12 micro-credit institutions were reaching more than 1 million clients at the end of 2006[19]. In their development phase and efforts to reach financial sustainability[20], the main target for microfinance institution (MFI) interventions was small informal businesses in urban or semi-urban areas. Most MFIs replicated the Grameen Bank model using the group lending methodology; a group guarantee as a substitute of individual collateral normally used in conventional credit contracts.

Following its rapid expansion, the micro-credit sector has significantly diversified its products (individual credit, housing) and clientele and is now more and more involved in rural districts and dispersed rural areas.

One of the measures of success of micro-credit in Morocco lies in its capacity to reach a large population excluded from classical financial institutions. If this success has been attested in accessible areas, the specificities of dispersed rural areas make the intervention more difficult: agricultural activities are by essence exposed to covariant risks, populations are not familiar with formal credit schemes and there are important transaction costs associated with lending. As described in section 2, these rural areas are indeed characterised by a lack of formal credit and an informal sector that generally provides small loans that are not addressing the needs of productive activities. Thus, agricultural households are likely to be financially constrained.

Al Amana, Morocco's largest micro-finance institution, is significantly expanding its activities to rural areas by opening, between 2006 and 2008, more than 100 branches in rural districts. The rural districts in Morocco are generally organised with a small centre and between 10 and 40 villages (douar) around it, often difficult to reach. Al Amana provides credit with loan sizes ranging from 2,000 to 7,000 Dhs ($260 to $920) at the beginning, that can increase up to 20,000 Dhs ($2,600) upon satisfactory repayments in the next loan cycles, of a duration of around one year with monthly repayment schedules.

As previously explained, our baseline data was collected in May 2006 on households of 16 villages in 7 rural districts just before the intervention of Al Amana (at the end of May 2006). This design provides an original framework in which we are able to measure the situation of households before the implementation of the program and look at their "response" to such a program in an environment that is relatively scarce in formal credit (see section 2). Such analysis is generally carried out after the implementation of the program, which means that some variables explaining participation might have been influenced by the participation itself.

Moreover, since the start of the intervention in May 2006, we have been keeping a weekly record on the households that are joining the micro-credit program in treatment villages. After one year of intervention, the Al Amana's penetration level is on average 17 % of households, making reference to the households that have had at least one member joining the program. Thus, even if households are probably significantly credit constrained, they do not rush to a new credit program. It is noteworthy that the proportion of households' clients is similar in treatment villages (17%) to the rest

19 Data available at the Federation Nationale des Associations de Microcredit (FNAM) http://www.fnam.ma/article.php3?id_article=180.

20 The law requires MFIs to be financially sustainable 5 years after the start of their operations.

of the rural districts (18%). The low penetration is thus not due to the specificities of these villages, selected far away from the centre of the rural districts (see Appendix 1 for a description of the randomisation methodology).

By keeping a record of who is joining the program on a weekly basis, we are able to measure the effect of time (over more than a year, from May 2006 to June 2007) on participation and also to understand what the observable characteristics of households are that make some join the program and others not: is it the need for credit and the importance of expected returns, are some households more risk averse or is there a "social capital" issue in the capacity to form a solidarity group? Of course, Al Amana also has some eligibility criteria, such as having an existing activity, forming a group guarantee and not depending exclusively on agricultural income. Participation is consequently a result of supply and demand factors.

2.2 Explaining participation using a duration model

The distribution of credit is observed in the treatment villages. The available information is the elapsed duration between the date at which the intervention of micro-credit started in the villages and the date at which micro-credit was provided. We explain borrowing through the explanation of this duration.

If we look at the evolution of microcredit take-up over time, we observe that the likelihood for a given household of becoming a client decreases as time goes by. Figure 1 (Appendix 4) describes the instantaneous proportion of individuals becoming clients among the individuals not already clients, that is the estimation of the "hazard rate" of this duration (in days). The maximum value of the hazard rate is around 5.10-4, meaning that individuals not already clients have at this point in time a probability of becoming a client during the next day of 0.05%. As it can be seen, the duration dependence exhibits a significant decline through time and falls to the level of 0.02% a day. This very small probability after more than a year means that it would be necessary to wait 3,450 days (more than nine years...) for the participation rate to reach 50%.

This significant decline may correspond to a pure time effect or to an effect related to the characteristics of the households (heterogeneity). To assess this issue, we use a Proportional Hazard Model to explain the duration (see (1) in Appendix 4 for a full description of the model).

The model explains the hazard through three components. The first one is the duration dependence which accounts for the fact that, for a given individual, the chance of obtaining micro-credit changes over time. In this case, it is obviously an important aspect that we have to account for, as it may take time, at the beginning, to start providing micro-credit in new villages. The distribution of micro–credit is also related to the efforts of Al Amana's credit officers and the intensity of their activity in the villages (and their ability to "market" Al Amana's products). It is important to know whether the distribution of micro-credit over time decreases, increases or remains constant.

The second and third components are associated with the heterogeneity of individuals. Some of them are more likely to become clients of Al Amana than others, because their situation is not the same; they do not have the same needs and they do not equally fulfil the eligibility criteria. This heterogeneity is a key aspect in understanding and forecasting participation. The heterogeneity term is broken down into two terms. The first corresponds to the observed heterogeneity and is directly associated to the information available through covariates; the second term is related to unobserved heterogeneity. Not all the relevant information is available, and omitting to account for this is an signicant source of bias.

The heterogeneity is examined along various dimensions that are regrouped in several categories. The characteristics of the household: the number of individuals in the household, the age of the head of the household, his education level, whether or not he receives a pension, the household's main type of activity. The regional characteristics are taken into account by introducing dummy variables of the villages. The survey was conducted in eight pairs of villages, corresponding to the seven new branches opened by Al Amana. Some variables are intending to proxy the wealth of households, such as consumption, physical assets, financial assets and the value of the stock of agricultural production. The measure of physical assets is based on an index constructed on the basis of the different durable goods owned by the household[21]. Financial assets regroup household liquidity, savings and stock of liquid production. We also consider additional financial variables such as the household's monthly repayment capacity (since Al Amana's loans require monthly repayment). All these are dummy variables constructed from the distribution of the underlying variable. We usually introduce a dummy variable indicating that the continuous underlying variable is above the median. Lastly, we introduce variables related to production factors. We consider the average number of days of work of household members and define the household as having potential labour supply when the average number of days of work is below the median. Similarly, we have a dummy variable indicating whether or not the household has some productive assets. We also introduce the interaction of these two variables.

Results are displayed in table 2 in Appendix 4. The first column provides estimates of the model with unobserved heterogeneity, the second column gives the associated standard error. Columns three and four provide results for the model without unobserved heterogeneity. The first four coefficients are related to the dependence duration. Figure 2 (Appendix 4) reproduces the shape of the underlying hazard rate for the two specifications, with and without unobserved heterogeneity.

It can be seen that the two profiles are strongly different. The profile without unobserved heterogeneity decreases strongly while the profile with unobserved heterogeneity remains roughly constant. In fact, only the heterogeneity among households is responsible for the declining shape of the distribution. Not accounting for unobserved heterogeneity would thus provide misleading results. This is why we select the model with unobserved heterogeneity to analyse the effects of duration and the role of observable household and village characteristics (see (2) in Appendix 4). The first two coefficients are related to unobserved heterogeneity, while the remaining coefficients are related to explained heterogeneity. Before commenting on these coefficients, it is interesting to examine the total heterogeneity and its breakdown into an observed and unobserved component (see (3) in Appendix 4). The first component of the variance is related to unobserved heterogeneity and the second to observed heterogeneity. We find that the mean value of the hazard function is 0.003, meaning that, on average, an individual has an instantaneous probability of becoming a client of 0.003. The variance indicates how this hazard function is distributed among individuals. We find a standard error of 0.024, suggesting that the hazard function is strongly dispersed among households: some households have a very low probability of becoming a client while some of the others have a very high probability. It is interesting to note that this variability is strongly related to unobserved heterogeneity, the share of the variance related to unobserved heterogeneity is 82%.

Observable characteristics determining participation

Considerable differences exist among households. The coefficients are, however, sometimes difficult to interpret because they are proxy measures of some variables and they are only correlations and not causations. On the whole, we find that: 1/ there is no strong evidence that wealthier households have wider access to micro-credit, 2/ the repayment capacity and other financial variables are an important

21 Following Filmer and Pritchett (2001), the index is constructed with the first principal component of a set of indicators of ownership of durable assets.

determinant of participation, and; 3/ there is some, but not strong, evidence that there is a demand for micro-credit originated in a demand for capital.

Household characteristics

Results report that the age of the household head is negatively correlated (although only significant at the 10% level) to participation. This is in a context where the average age (51) of the household head is relatively high. Demand for credit is linked to the productive experience of the household which is expected to increase and then to decrease with the age.

Household size is also positively linked to participation. There are more households eligible as there are more members eligible to the credit program and the demand for credit for consumption purposes might also increase with household size (although micro-credit is normally used for productive purposes, it is assumed to be fungible).

The household head's level of education does not appear to have a significant influence on participation, although educated household heads may be more entrepreneurial or more informed on the market and application procedures to access credit.

In terms of the impact of wealth on participation, results do not report clear evidence. If the amount of physical assets owned by the household influences participation positively, household consumption has no significant correlation.

Moreover, independently from the duration model, the distribution of wealth of Al Amana's clients is quite similar to the rest of the population (see table 1 Appendix 4). There are no differences in the proportion of individuals below the poverty line of $2 a day (18 % of Al Amana clients versus 18% in the population) and for the $2 to $4 a day group (43.2 versus 45%) and there are only marginal differences in the $6 to $10 group (14.2 % versus 10.3%). As with many studies on the outreach of microfinance (see for example Navajas et al (2000) in Bolivia, Amin et al (2001) and Evan et al (1999) in Bangladesh.), these figures show that Al Amana is not particularly targeting the poorest (only 18% of clients are considered as poor, under the $2 a day level, see table 1. Appendix 4) but is equally reaching all wealth levels. Wealth does not seem to be a strong determinant of participation.

Activity

Having an agricultural activity and holding land are not positive determinants of participation, this is also the case for land size. Most households are involved in agricultural production in one way or another (so it does not really play as a differential factor). Moreover, Al Amana does not finance individuals whose household's income only depends on agricultural production (considered as too risky). On the demand side, micro-credit loan sizes and repayment schedules are, possibly, not adapted to agricultural production cycles and do not allow long-term investments.

As such, micro-credit is used more for investments in rural non-agricultural activities, such as livestock farming, and off-farm businesses, such as small shops and trade activities (trade and livestock farming are both significantly correlated to participation). The loan sizes provided by Al Amana are also adapted to the purchase of cattle, small machinery and working capital.

Credit constraint, need of capital

The presence of micro-credit, in a context where very few formal lenders are available, is likely to increase the credit limit of households and reduce their credit or liquidity constraints. But there is no evidence that having some liquidity either in cash (credit or savings) or in agricultural stock has an influence on participation. Two effects may be working in different directions. Households which already have some credit or other liquid assets might have already met their financial needs or, on the contrary, households might have a positive demand of capital for investments or consumption purposes that is not entirely currently satisfied (as seen in the access to credit section, households' outstanding debts are

rather small). The coefficient associated with this variable, although not significant, would favour the latter option.

The amount of livestock owned has a negative influence on participation as households have purchased them by other means and may not need more capital. The combination of a negative coefficient associated with the amount of livestock and the positive one associated to livestock activity actually suggests that micro-credit is used to a certain extent to purchase cattle (this is also confirmed by Al Amana data on credit allocation).

Lastly, although the fact of not having a machine in itself does not influence participation, we find a significant and positive effect when the variable "no machine" is interacted with the available household labour. This result suggests that for individuals without capital, the probability of becoming a client is higher when the household has available workforce.

Financial variables

On the supply side, participation is determined by repayment capacity and also by the regularity of revenues, since loans must be repaid on a monthly basis. As such, the declared repayment capacity is a strong determinant of participation in the program. Households that are able to repay more than 200 Dhs a month ($26) are much more likely to take out micro-credit loans than the rest of the population. This is consistent with the average repayment scheme proposed by Al Amana – around 300 Dhs – a month.

Other financial variables are also significant determinants of the probability of becoming a client. For instance, prior credit experience in the formal market also seems to have a positive impact on loan requests to and allocations Al Amana. Another interesting effect is also the fact that having access to some credit with another villager positively affects participation. This variable might reflect the good reputation or the social network of the household's member, increasing his capacity to form a group with other villagers.

Regional differences

There are also considerable differences among villages. It would be interesting to learn more about the village effects and whether they are related to the dispersion of households, to the distance between the villages or to other characteristics. Unfortunately we do not have enough villages here to try to disentangle the various possible effects.

Some information on these first villages surveyed, which cannot be generalised, shows that villages in which the participation is higher than the other villages are more condensed (the typology of villages in rural areas of Morocco is condensed, dispersed or fragmented) than the other villages and their distance to the branch is also significantly lower (7.7 km for the three villages that are positively linked with participation and 13.2 for the others).

Prediction of uptake for 2 years

Data on take-up shows that the penetration of micro-credit in new villages is relatively low and that there are considerable differences in the probability of taking up the program among households. In terms of program development, it is interesting to evaluate the potential penetration of micro-credit in time.

The results of the duration model can be used to compute the conditional probability of each individual becoming a client of Al Amana within a year or within two years. (see (4) Appendix 4 for the formula used to compute these probabilities).

As can be seen in figure 3 (Appendix 4), the distribution of these probabilities is strongly dispersed. A considerable proportion of households have small probabilities of becoming a client even within two years. The median values are respectively 14.2 and 9.9 per cent. The upper quartiles are respectively 27.2 and 19.4% suggesting also that the highest probabilities are still small. The average values are 20.3 and 14.9 on the whole population and 44.9 and 34.2 for probabilities above the upper quartile.

3. Access to credit and the role of micro-credit

In section 2, we analysed the response of households to the implementation of a new micro-credit program and showed a relatively low demand for micro-credit in dispersed rural areas in Morocco. While the low response to micro-credit cannot be considered as evidence of rural households not being credit constrained (for instance if micro-credit is not adapted to rural households' credit demand), the participation to the micro-credit program does not mean either that households were credit constrained before the implementation of the program, and have the program as their only source of credit. Baseline data indeed showed a low overall use of financial services, but, at the same time, that there was some access to some type of credit.

Thus, it is interesting to look at the causal effect of the micro-credit program on credit access. This last section of the paper intends to show the causal impact of micro-credit on expanding access to credit and to detect the existence of credit constraints in dispersed rural areas. This is analysed with the exploitation of the preliminary data one year after the implementation of micro-credit in only half of the villages randomly selected (8 "treatment" villages and 8 "control" villages).

The causal impact of micro-credit on credit access is simply measured by comparing realised credit transactions of households that are most likely to borrow from the micro-credit organization (identified with the model) in treatment and control villages one year after the implementation of the program in treatment villages.

Whether or not households in the control group have access to loans compared to treatment group households would provide evidence of the extent of credit constraint and the nature of expansion of credit access in the treatment group. Indeed, the underlying assumption is that if micro-credit really improves access, households with a positive demand in control villages (i.e. that are likely to borrow according to the model) are unlikely to have access to other credit schemes.

Table 18 below shows the differential access to credit by village status.

Table 18: access to credit and village status

	Villages	
	Treatment	Control
% of households with credit***	33	10
% of households with microcredit***	30	3
Median outstanding loan size ***	4	100

Comparison in treatment and control villages of credit transactions from households that have the highest propensity to become micro-credit client reports clear and significant differences. Indeed, access to credit is much larger in treatment than in control villages. When micro-credit is not available (in control villages), demand from households is only partially substituted with other credit sources. The fraction of households with credit is 33% in treatment villages versus 10% in control villages and the fraction of households with micro-credit is 30% in treatment villages versus 3% in control villages (from micro-credit institutions other than the program evaluated). Thus, rural households with a positive demand in control villages are significantly constrained. In terms of the outstanding loan size borrowed by rural households, the median loan size is 4000 Dhs for households of the treatment group and only 100 Dhs for households from the control group.

Conclusion

The poor in rural Morocco tend to live in relatively large and young families and spend the biggest share of their budget on food, while their expenses for health and education only account for a small part.

The poor are not specialised in one activity because they need to diversify in order to bear agricultural risk (no access to insurance markets), and even if they tried to specialise, they would lack access to formal credit markets. They mainly have access to informal credit sources from suppliers (characterised by very short-term repayment and loan sizes).

We saw that the richer still have multiple occupations but they spread risk more efficiently: they are more specialised in their own activities and less dependent on agriculture. They also have more access to formal credit sources and are more likely to accumulate wealth.

Thus, the introduction of a new credit program is likely to expand households' credit limits. If there is a significant credit constraint and numerous worthy investment projects remain unfunded, one would expect the uptake to a new credit program to be considerable.

Analysis of participation shows that take-up in this new micro-credit program is relatively low, and that probability of participation remains quite constant over time when unobserved heterogeneity is taken into account. There is also significant (observed and unobserved) heterogeneity among households, the distribution of the individual probabilities in the same villages being strongly dispersed. Unlike other development programs that are directed to an entire population, micro-credit is characterised by self-selection and also by the screening of the microfinance institution. There are several observable factors that influence participation into micro-credit programs. Loan structures are more adapted to non-agricultural activities such as livestock farming or off-farm businesses (small shops, trades or service activities) than agricultural activities. Households with some credit experience and repayment capacity are also more likely to join the program. Even though there are too few villages to test any village effect, it seems that concentrated villages have more credit than very dispersed ones (where it might be more difficult to create a solidarity group).

Assuming that worthy investment projects exist in these areas, there are several factors that are potentially hampering the outreach of micro-credit. The specificities of micro-credit products – small loan sizes, monthly repayment schedules, group guarantees – are, possibly, not adapted to agricultural activities. Furthermore, specific eligibility criteria (no financing of households whose income depend exclusively on agriculture and no financing of start-up businesses) may be screening out a sizeable proportion of households that have a positive demand.

Almost half of the poorest segment of the households (those living under $2 a day) do not have a livestock activity and 83% of them live in households that do not have a non-agricultural business. A considerable part of this population is not eligible for micro-credit. Most households of the middle class have some livestock activities but a minority (22%) run a non-agricultural business.

Thus, micro-credit institutions might adapt their products to answer the specific needs of the population in these

rural areas, by developing individual lending schemes (in order to facilitate access in areas where it might be difficult for households to create solidarity groups), and by developing repayment modalities that are more adapted to the production cycle.

Even though the program can have direct benefits, some lack of familiarity and risk aversion from households toward a new institution may also be at play.

Although demand is relatively limited in treatment villages where the micro-credit program is available, rural households with a corresponding positive demand in control villages do not substitute micro-credit with other existing sources: this is salient evidence of the existence of credit constraints and of the impact of micro-credit on expanding credit access.

From a methodological standpoint, the analysis in dispersed rural areas of the determinants of participation using a duration model shows that the selection into the micro-credit program is more explained by some unobservable characteristics than observable ones, which were collected during the household surveys. Thus, explaining self-selection into a micro-credit program remains difficult, reinforcing the justification for using randomised evaluation methodologies.

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APPENDICES

Appendix 1. Impact evaluation of a Micro-credit Program in Rural Areas of Morocco: summary of the randomised evaluation design.

The evaluation takes advantage of the expansion of Al Amana, the largest micro-credit organisation in Morocco, to dispersed rural areas. Al Amana will open 60 new branches between 2006 and mid-2007 reaching 80 rural districts, each district including between 10 and 40 villages. The principle of the evaluation is to work on two villages at the periphery of each district. Two similar villages are selected in each district, based on a set of observables: number of households, distance to Al Amana branch, existing infrastructure, type of economic activities, income, etc. Starting with the second portion of the baseline survey, a village survey is being conducted in order to collect this information systematically. In general it is the local authority which is interviewed.

One village, randomly assigned to a treatment group, will be served rapidly and in priority while the other one, control, will be served only two years later. A two-round household survey will be conducted in treatment and control villages: before the program start (baseline) and one year later. The project will evaluate the impact of micro-credit on agricultural and non-agricultural activities, income, consumption, poverty and household security.

The first phase of the evaluation project consisted in the selection and survey of 16 villages, half control and half treatment. It resulted from the opening by Al Amana of 6 branches, covering 7 different districts. These first villages were extensively surveyed with the goal of estimating an econometric model in order to identify households with a higher probability of becoming micro-credit clients. Starting on the next group of selected villages, only 25% of households were surveyed: those with a higher probability of asking for credit.

The first 16 surveyed villages, those belonging to the fist group of openings, are the following:

Province	District	Code village	Village or village group	# households
KEHMISET	Ezziliga	1	Ait akka	110
		2	Jbiliyin	120
MEKNES	Ain Jamaa	3	Ait abdi + Ait Imsir	159
		4	Ait akka + Ait krat + Jaawna	119
SIDI KACEM	Sidi Bousber	5	Menouala	164
		6	Mezaourou	150
		7	Baynou	156
		8	Mahlil	127
SAFI	Ras el Ain	9	Dahmna + Bdadgha	144
		10	Blilat + Oulad Ali	94
AL HAOUZ	Ouazguita	11	Frass + Azib Frass	201
		12	Ezzi + Tamzzart + Aguergour	102
AL HAOUZ	Asni	13	Ouassa + Tintine	100
		14	Aguersioul + Matate + Taddert	99
CHEFCHAOUEN	Zoumi	15	Taghit + Azarif	204
		16	Assara + Dar el Ghaba	192

Appendix 2. Data set description

The consumption aggregate is built up from households' expenditures for goods and services and the consumption derived from home production (auto-consumption).

Data was collected in a single visit in which the household was asked how much it spent on an extensive list of goods and services during the 12 months prior to the visit, with different periods of reference depending on the consumption item. The level of disaggregation at which data is collected was pretested in order to adapt it to the level at which households remember expenditures. Food expenditures are recorded for a recall period of 7 days, while utilities (water, electricity and telephone), cleaning products, regular health and drugs, and other regular monthly expenses are recorded for a 30-day recall period. Then the survey uses a 12-month period for expenses such us festivals, school-related expenses, house construction or repairs and trips. A module on unregular and unexpected annual expenses is also included in the survey, comprising marriages, births, engagements, etc., in the first group and health-related and other expenditures in the second.

In this first round of the baseline survey (8 sites out of the 80 the evaluation comprises), auto-consumption data was exclusively collected as part of the household production module. The survey asks households which type of home production they have practised in the last 12 months, and then for each item (crops, livestock and food production) it asks for the quantity produced during the last 12 months, the quantity sold, consumed and still in stock. Consumption quantities were valued by the median sale price of the good. Starting in the second round of the baseline survey, a specific module to register auto-consumption was included. For an extensive list of food items, the survey asks the quantities consumed from home production in the last 7 days and, in order to value it, how much this quantity would cost in the local market. This will allow us to count with a precise estimate of the consumption aggregate in the following surveys.

The next table presents the methodology utilised by other country surveys for collecting consumption data.

Country	Type of consumption	Collection Period: Asked once only?	Collection Period: Visited Several times?	Collection Period: Diary Left?	Type of Data: Value	Type of Data: Quantities	Type of Data: Price
Bangladesh	Food	X			X	only for sugar	only for sugar
	Non-food	X			X	only for sugar	
Brazil	Food	X			X	X	
	Non-food	X			X		
Ecuador	Food	X			X	X	
	Non-food	X			X		
Ghana	Food		X	X	X		
	Non-food		X	X		X	X
Guatemala	Food	X			X		
	Non-food	X			X		
India Udaipur	Food	X			X		
	Non-food	X			X		
India Hyderabad	Food	X			X		
	Non-food	X			X		
Indonesia	Food	X			X		
	Non-food	X			X		
Côte d'Ivoire	Food	X			X		
	Non-food	X			X		
Mexico	Food	X			X		
	Non-food	X			X		
Morocco	Food	X			X		
	Non-food	X			X		
Nicaragua	Food	X			X	X	
	Non-food	X			X		
Pakistan	Food	X				X	X
	Non-food	X			X		
Panama	Food	X			X	X	
	Non-food	X			X		
Papua New Guinea	Food	X			X	X	
	Non-food	X			X		
Peru	Food	X			X		
	Non-food	X			X		
South Africa	Food	X			X	X	
	Non-food	X			X		
Tanzania	Food	X					
	Non-food	X			X		
Timor Leste	Food	X					
	Non-food	X			X		

Except for the surveys of India Udaipur and Guatemala, which are 10% rural, other countries' surveys are both rural and urban. On average, 52% of households interviewed by these surveys belong to rural areas.

Appendix 3. Poverty estimates and consumption distribution

Most recent poverty statistics, estimated by the Haut Commissariat au Plan (HCP), are published in the 2005 Millennium Development Goals Report. They are based on the latest household survey conducted in Morocco, the 2000/01 National Survey on Household Consumption and Expenses[22] (NSHCE) and 2004 Population Census. According to this report, poverty under 1 PPP dollar a day was not significant, with a headcount rate of only 0.6%. People living on less than 2 PPP dollars a day reached 9.7% in 2004 at the national level and 16.4% in rural areas.

The MDG Report also estimates poverty figures based on national poverty lines, updated on the basis of the 2000/01 NSHCE. The headcount index was 14.2% in 2004 at the national level, with considerable regional disparities: 7.9% of the urban population was poor, while in rural areas poverty reached 22% of the population.

Table 1.Headcount index: national estimates

Less than 2 dollars a day

	1990	2004	% change
National	16.8	9.7	-42.3
Rural	24.8	16.4	-33.9

HCP poverty line

	1985	2004	% change
Urban	13.3	7.9	-40.6
Rural	26.8	22	-17.9
National	21.0	14.2	-32.4

Source: 2005 MDG Report

Updated poverty lines computed on the basis of 2000/01 NSHCE are not yet available[23]. Therefore, the analysis presented here draws from most recent poverty lines; the ones estimated on the basis of 1998/99 household survey[24]. In 1998, the poverty line for rural areas corresponded to 3,037 Dhs per person per year, while the one for urban areas was set at 3,922 Dhs per year per person. The equivalent of these poverty lines in 1993 PPP dollars is 826 and 1,067 per person per year respectively, which results in 2.26 dollars a day in rural areas and 2.92 dollars a day in urban areas. Therefore, the level of the official poverty line for rural areas expressed in 1993 PPP dollars is close to the 2.18 dollars a day poverty line defined by the World Bank. Moreover, this level was chosen because it was the average level poverty line (expressed in PPP dollars) set by middle-income countries; the group to which Morocco belongs according to the World Bank's gross national income classification[25].

Table 2. Rural poverty by methodology

Micro-credit database

Criteria	Headcount index (%)
< $1 a day	1.9
< $2 a day	19.0
HCP poverty line	21.6

When we look at the distribution of consumption per capita we find that the median is of around 3.50 dollars a day. One fourth of the population consumes less than 2.4 dollars a day, while one fourth more than 5 dollars a day.

22 Enquête National de la consommation et dépenses des ménages 2000/2001.

23 Poverty rates were published in the 2005 Millennium Development Goals Report, but not yet the corresponding poverty lines.

24 However, if we update 1998 poverty lines with 1998-2004 CPI, we get levels almost identical to the ones published in newspaper articles for the updated 2004 poverty lines. Therefore, the figures computed here should be fairly comparable to those published in the 2005 MDG Report.

25 World Bank webpage:

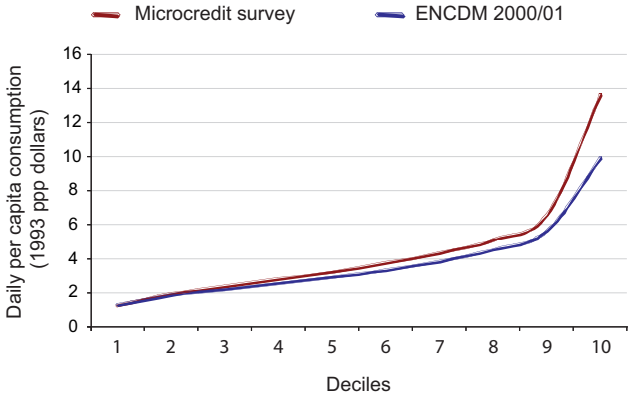
"http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html#Lower_middle_income"

Table 3. Daily per capita consumption, in 1993 PPP dollars

Mean	**4.50**
Std. Dev.	**4.66**
Percentiles	
1%	0.93
5%	1.37
10%	1.70
25%	2.43
50%	3.48
75%	5.08
90%	7.98
95%	10.14
99%	18.63

If we compare the distribution of consumption from our survey to that published by the Haut Commissariat au Plan based on the 2000/01 NSHCE, we find that our survey registers higher levels, and this difference increases for the higher deciles, but the distributions have similar shapes.

Figure 1. Consumption by deciles



This paper also analyses the lower- and upper-middle classes defined as those individuals with per capita consumption between 2 and 4 dollars and between 6 and 10 dollars a day respectively. Figure 2 shows that the lower-middle class comprises 45% of the population, while the upper-middle class includes 11% of the total interviewed individuals. Those 'in between', i.e. those living on between 4 and 6 dollars a day represent 21% of total population, and, at the top end, there is 4% of the population with per capita consumption levels of more than 10 dollars a day. Since the results of studied variables are linear for the three middle-class groups, the body of this paper only includes the figures belonging to the lower- and upper-middle classes.

Figure 2. Percentage of people by consumption group

People living on :	Percent in total population	Cumulative percent in total population
less than $2 a day	19.0	19.0
between $2 and $4 a day	44.8	63.8
between $4 and $6 a day	20.7	84.6
between $6 and $10 a day	11.2	95.7
more than $10 a day	4.3	100.0

Figure 3. International comparisons: demographic indicators

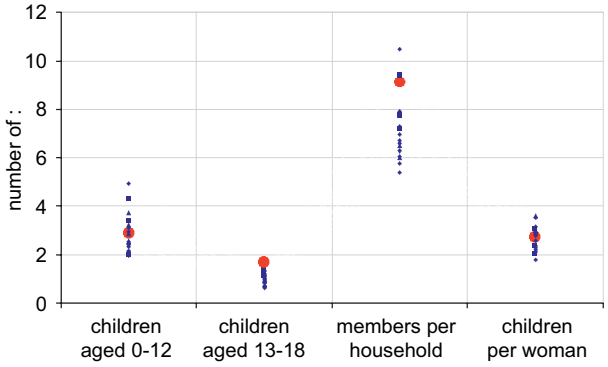


Figure 4. International comparisons: consumption

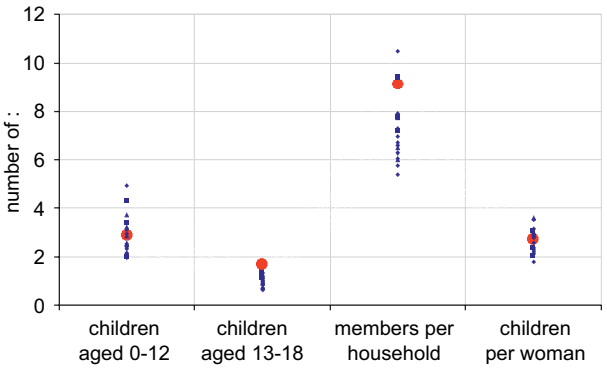
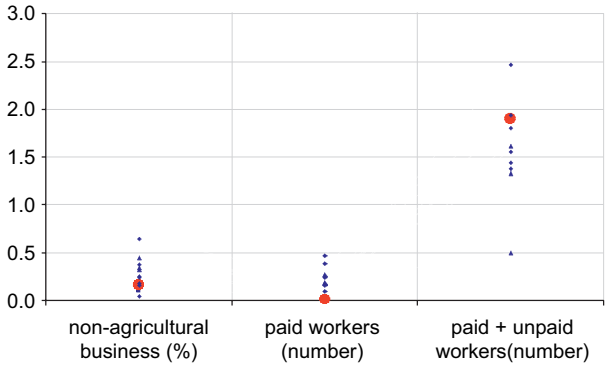


Figure 5. International comparisons: non-agricultural business



Appendix 4. Estimating the Duration model

(1) The Duration model, used to explain the duration, explains the hazard through three components:

$$\eta(t|x,u) = Z(t)\exp(Xb + u)$$

The first one, $Z(t)$, is the duration dependence, representing that, for a given individual, the chance of obtaining micro-credit changes over time. In this case, it is obviously an important aspect that we have to account for, as it may take time, at the beginning, to start providing micro-credit in new villages. The distribution of micro–credit is also related to the efforts of Al Amana credit officers and the intensity of their activity in the villages (and their ability to "market" Al Amana's products). It is important to know whether the distribution of micro-credit over time decreases, increases or remains constant. To model this part of the hazard, we use a step-wise function:

$$Z(t) = 1(t<30) + \theta_1 1(t\in[30,60]) + \theta_2 1(t\in[60,120]) + \theta_3 1(t\in[120,240]) + \theta_4 1(t>240)$$

The second and third terms $\exp(xb)$ and $+\theta_2 1(t\in[60,120])$ are associated with the heterogeneity of individuals. Some of them are more likely to become clients of Al Amana than others because their situation is not the same; they do not have the same needs and they do not equally fulfil the eligibility criteria. This heterogeneity is a key aspect in understanding and forecasting participation. The heterogeneity term is broken down into two terms. The first corresponds to the observed heterogeneity and is directly associated with the information available through covariates, the second is related to unobserved heterogeneity. Not all the relevant information is available, and omitting to account for this is an important source of bias. In order to model the heterogeneity term, we adopt a flexible specification and assume that the unobserved term is distributed as a variable taking either the value –M or the value M with probability p and 1-p.

(2) We could formally test and would accept the assumption that all coefficients are equal to one for the specification with unobserved heterogeneity, meaning that the appropriate model is a constant hazard rate model, suggesting that there is no slowdown in the distribution of micro-credit.

(3) The hazard function takes two possible values conditional on the explanatory variables:

$$\begin{aligned} &\exp(Xb - M) \quad \text{with probability} \quad p \\ &\exp(Xb + M) \quad \text{with probability} \quad 1-p \end{aligned}$$

following this, the mean value and variance of the hazard rate are written as:

$$E(\eta) = \left(pe^{-M} + (1-p)e^{M}\right)E[\exp(Xb)]$$

$$V(\eta) = p(1-p)\left(e^{M} - e^{-M}\right)^2 E[\exp(2Xb)] + \left(pe^{-M} + (1-p)e^{M}\right)^2 V[\exp(Xb)]$$

(4) The formula to compute these probabilities is:

$$P(T<t|X) = 1 - E\left(\exp(-\exp(Xb+u)\int_0^t Z(\tau)d\tau|X\right)$$

Figure 1. Simple duration dependence

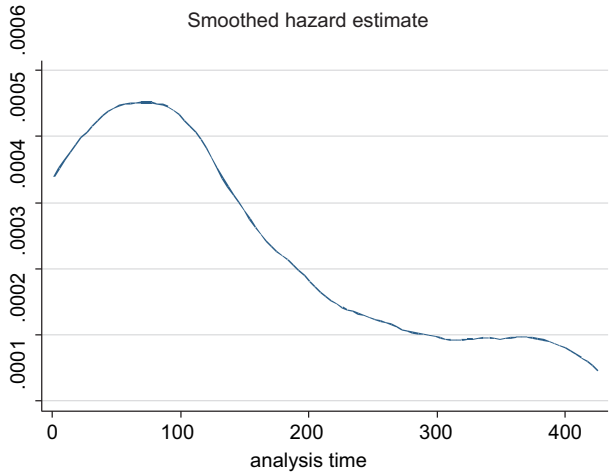


Figure 2.

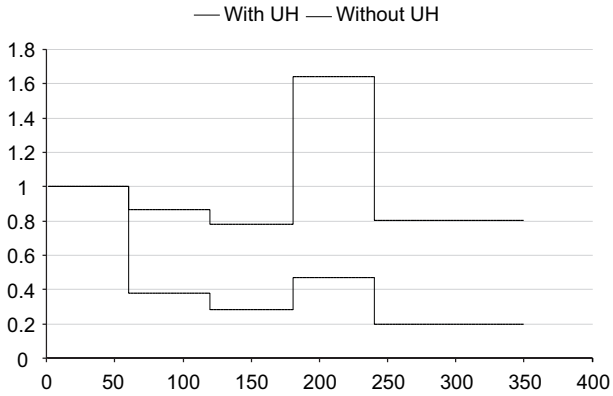


Figure 3. Average individuel probability of becoming a client within two years

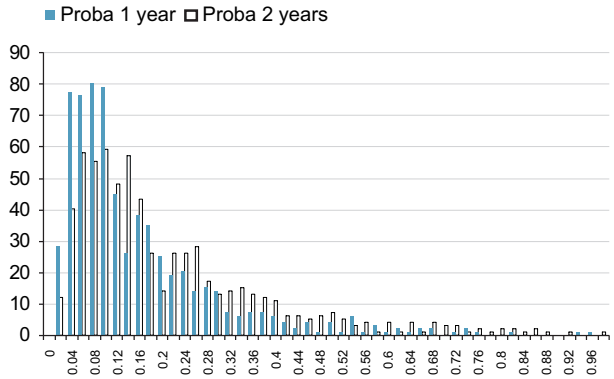


Table 1

	Clients (%)	Population
Less than $2	18.1	17.9
$2 to 4	43.2	44.9
$6 to 10	14.2	10.3

Table 2.

	With UH		Without UH	
0-60	1.000		1	
60-120	0.864	(0.470)	0.377	(0.150)
120-180	0.779	(0.395)	0.282	(0.119)
180-240	1.640	(0.807)	0.468	(0.192)
>240	0.803	(0.395)	0.196	(0.064)
M	2.171	(0.081) **		
p	0.834	(0.034)		
Intercept	-10.544	(1.680) **	-8.509	(0.954) **
Size of household	0.238	(0.077) **	0.117	(0.052) **
Education	0.240	(0.197)	0.059	(0.116)
Age	-0.028	(0.015) *	-0.022	(0.009) **
Pension	0.694	(0.618)	0.640	(0.405)
Agricultural	-0.058	(0.522)	-0.005	(0.328)
Breeding	0.682	(0.407) *	0.464	(0.268) *
Trade	1.733	(0.508) **	1.028	(0.291) **
Village 1	2.408	(0.858) **	1.166	(0.472) *
Village 2	2.156	(0.814) **	0.671	(0.492)
Village 3	-0.185	(1.040)	-0.150	(0.660)
Village 4	0.392	(0.758)	-0.028	(0.454)
Village 5	0.160	(0.816)	-0.258	(0.440)
Village 6	1.531	(0.768) **	0.720	(0.438) *
Consumption	0.283	(0.364)	0.009	(0.225)
Physical Assets	1.189	(0.586) **	0.631	(0.324) *
Liquidity	0.204	(0.389)	0.157	(0.235)
Livestock	-1.300	(0.468) **	-0.640	(0.270) **
Formal Credit	0.768	(0.447) *	0.475	(0.244) *
loan_vil	2.126	(0.787) **	1.213	(0.464) **
Capacity of Reimbursment	1.380	(0.433) **	0.713	(0.264) **
Land	0.089	(0.469)	0.357	(0.272)
No Machine	-1.221	(1.070)	-0.263	(0.640)
No machine but work	0.944	(0.458) **	0.466	(0.282) *
Machine and work	-0.495	(1.310)	0.070	(0.737)