Targeting micro-credits to poor household enterprises in Ecuador

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Abstract

In 2007 the government of Ecuador launched a micro-credit program for enterprises
run by poor households. The program was targeted to households at the bottom two
quintiles in the wealth distribution. This paper uses data collected prior to the start
of the program to examine whether the government's targeting strategy reaches all
households that are constrained in their access to loans of the type provided by
the program. We find that the program excludes households in the third quintile
of the wealth distribution that are equally credit constrained and have very similar
demands for credit as households served by the program.

1 Introduction

Credit constraints are regarded as an important obstacle for firms to grow or survive. This is especially true for enterprises run by poor households in developing countries. Recognizing this, the government of Ecuador recently decided to launch a micro-credit program targeted at households in the bottom two quintiles of the wealth distribution. The program basically entails that all households receiving cash transfers of US$30 per month from the government, are eligible to a micro-credit up to an amount of US$341. This micro-credit is then repaid in (at most) a year through monthly instalments of US$30 (including 5% interest).

The simple yet relevant question we address in this paper is whether restricting this micro-credit program to the 40 percent poorest households in Ecuador serves all household enterprises that are constrained in their access to loans with characteristics provided by the program.

Our main conclusion is that the program excludes a substantial number of households' enterprises in the third quintile of the wealth distribution that have very similar needs for credit as enterprises served by the program. The loans are of very similar sizes, and so are the interest rates, the repayment periods, their' uses of the credit and the sources of the credit. Moreover the firms that are credit constrained report very similar reasons for this being the case. Given that the interest rate charged by the program is far below the market interest rate and will thus attract inefficient investors, these results suggest that the available budget can be spend more efficiently by increasing the interest rate and extending the share of (poor) households served by the program.

The remainder of this paper is organized as follows. The next section describes in detail the program's current targeting strategy. Section 3 then describes the data. Section 4 presents and discusses the empirical results. Section 5 summarizes and concludes.

2 Ecuador's micro-credit program

Since 1998 the Ecuadorian government provides unconditional cash transfers to poor households. Initially the program used a self-targeting strategy directed at mothers with earnings below US$40, people with disabilities and elderly people. The transfer was modest, but non-trivial by Ecuadorian standards. At the time that the program started, mothers received about US$15 per month, and senior citizens and people with disabilities received US$7.50.

In 2003 the targeting strategy was changed. Beneficiaries were selected based on

their score on a wealth index (known as the "Selben" score). This index identifies potential beneficiaries of social programs by classifying families according to their unmet basic needs. The index is computed using non-linear principal components analysis. Households belonging to the poorest two quintiles would all receive an identical cash transfer of US$15 per month. Households (even slightly) above the program's cutoff are not intended to receive any cash payment.

In 2007 the amount of the cash transfer was doubled to US$30 per household per month. At the same time the government introduced the possibility for households that are entitled to the cash transfer and that for at least six months have been running some productive activity to convert (at most) twelve monthly payments of US$30 into one upfront payment of (at most) US$341.

This upfront payment can be regarded as a micro-credit program in which not receiving the twelve monthly payments of the cash transfers is equivalent to paying twelve monthly installments of US$30 to repay the debt plus an annual interest rate of 5%. Due to this automatic repayment, the risk of default is minimal, and actually only occurs when people die during the year of the repayment. Given that the cash transfer program is only directed to households in the lowest two quintiles of the wealth distribution, only these households have (provided they run a household enterprise) access to this form of micro-credit. Until May 2008 the program has served approximately 120,000 households, which is around 10 percent of the beneficiaries of the cash transfer.

3 Data

The data used in this paper come from the Survey of Life Conditions (ECV) in Ecuador. This dataset was collected in 2006 among 55,666 individuals in 12,832 households in Ecuador. We restrict the analyses to households in which at least one member engages in a household enterprise. This gives 5,978 household observations.

The share of household enterprises that received a loan during the 12 months prior to the interview equals 18%. A vast majority of the loans is small. The average loan equals US$3,166 with a standard deviation of US$7,565. The median equals US$1,000, the 25th percentile US$300, the 75th percentile US$3,000 and the 90th percentile US$7,200. The average annual interest rate on loans is rather high: 51%. Especially firms that obtain loans from moneylenders are charged very high interest rates: on average 177% annually. Firms that have collateral when they borrow are charged on average an interest rate of 33%, while this is 127% for firms that are

unable to provide collateral.[1]

Rationing is a frequent phenomenon; 36% of the firms in the dataset (two thirds of the firms that wanted a loan), report that they couldn't get a loan. These firms were also asked why they didn't obtain a loan. By far the most frequent reason given is that "household income is not high enough" (52%). The second important reason is "interest rate is too high" (24%). All the other possible reasons are reported by 10% or less of the firms.

For the purpose of our analysis of the targeting strategy of the government's micro-credit program, we divided the sample of household enterprises into five (almost equally sized) quintiles.[2] Table 1 provides descriptive statistics of various background variables for all observations together and separately for each quintile. Some of the variables reveal a clear pattern with the wealth index. More wealthy households tend to live in urban instead of rural areas. Indigenous people are over-represented in the low wealth categories. Age, education and household income all increase when we move to higher wealth categories. In contrast, household size decreases when wealth increases.

In the analysis of credit constraints and loan characteristics we will focus our attention on the quintiles just below and just above the threshold of the cash transfer/micro-credit program. With the exception of age, the mean values of all of the aforementioned variables differ significantly between these two groups. In the sample of households that run an enterprise, those between the 40th and 60th percentile of the wealth index live more often in an urban area, are less often indigenous, have fewer household members, have a more highly educated household head and have higher household income than households between the 20th and 40th percentile.

4   Determinants of being credit constrained and loan characteristics

This section reports the main results of the paper. It first presents marginal effects from probit equations of the probability of a household enterprise being credit constrained. It then continues reporting the reasons households claim for being credit

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[1]In these statistics we exclude the cases (223 out of 1048) that report a non-positive interest rate. Such should either not be regarded as loans, or the information provided to calculate the interest rate contain reporting errors. Because we consider the last case explanation more likely, we do include these observations in the other analyses.

[2]As threshold between the second and third quintile we use the official value of the wealth index below which households receive the cash transfer. For the other quintiles we use the values in our dataset of household enterprises.

Table 1. Descriptive statistics by wealth quintile; means and standard deviations

Variable	All	1st	2nd	3rd	4th	5th	Diff 2nd vs 3rd
Urban	0.74	0.46	0.68	0.80	0.84	0.92	0.000
	(0.44)	(0.50)	(0.47)	(0.40)	(0.37)	(0.27)	
Sierra	0.43	0.37	0.45	0.46	0.43	0.43	0.452
	(0.49)	(0.48)	(0.50)	(0.50)	(0.50)	(0.49)	
Coast	0.51	0.55	0.50	0.48	0.51	0.53	0.481
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	
Jungle	0.06	0.08	0.05	0.05	0.06	0.04	0.922
	(0.24)	(0.27)	(0.22)	(0.22)	(0.24)	(0.20)	
Mestizo	0.80	0.65	0.81	0.82	0.85	0.86	0.364
	(0.40)	(0.48)	(0.39)	(0.38)	(0.36)	(0.34)	
White	0.07	0.06	0.06	0.08	0.08	0.09	0.058
	(0.26)	(0.24)	(0.23)	(0.27)	(0.27)	(0.29)	
Black	0.06	0.09	0.06	0.05	0.05	0.03	0.204
	(0.23)	(0.29)	(0.25)	(0.22)	(0.21)	(0.18)	
Indigenous	0.07	0.20	0.07	0.05	0.03	0.01	0.022
	(0.26)	(0.40)	(0.26)	(0.22)	(0.17)	(0.10)	
Agehead	47.2	44.0	45.6	46.4	48.6	51.3	0.214
	(14.2)	(13.7)	(14.2)	((14.2)	(14.5)	(13.0)	
Marriedhead	0.76	0.76	0.74	0.75	0.77	0.76	0.648
	(0.43)	(0.43)	(0.44)	(0.43)	(0.42)	(0.43)	
Femalehead	0.19	0.22	0.20	0.20	0.18	0.16	0.926
	(0.39)	(0.42)	(0.40)	(0.40)	(0.38)	(0.37)	
Hhsize	2.32	3.23	2.48	2.24	2.03	1.63	0.001
	(1.88)	2.27	(1.95)	(1.69)	(1.55)	(1.43)	
Primary ed	0.19	0.40	0.24	0.15	0.12	0.04	0.000
	(0.39)	(0.49)	(0.43)	(0.36)	(0.32)	(0.20)	
Secondary ed	0.47	0.55	0.61	0.56	0.42	0.23	0.015
	(0.50)	(0.50)	(0.49)	(0.50)	(0.49)	(0.42)	
Tertiary ed	0.34	0.05	0.15	0.36	0.46	0.73	0.000
	(0.47)	(0.22)	(0.36)	(0.48)	(0.50)	(0.43)	
Yrs education	11.1	7.9	9.6	11.0	12.4	14.8	0.000
	(4.3)	(3.1)	(3.6)	(3.9)	(4.0)	(3.5)	
Ln(income)	1.32	0.72	1.03	1.22	1.56	2.06	0.000
	(1.21)	(1.09)	(1.11)	(1.17)	(1.07)	(1.10)	
Homeowner	0.82	0.86	0.82	0.80	0.80	0.83	0.180
	(0.38)	(0.35)	(0.39)	(0.40)	(0.40)	(0.38)	
Unemphead	0.05	0.03	0.04	0.05	0.05	0.06	0.439
	(0.21)	(0.18)	(0.20)	(0.21)	(0.22)	(0.24)	
N	5978	1194	1251	1143	1195	1195	

Note: mean values. ***/**/* indicate that the difference is significant at the 1/5/10%-level

constrained. Next we describe the amounts of the loans, the repayment periods, interest rates, the uses of the loans and the providers of the loans, based on the information of households that took up a loan.[3] In all these cases we focus on differences between households in different quintiles of the wealth distribution, especially on those in the second quintile and the third quintile. In the descriptive analyses we use the characteristics of the government's micro-credit program (a maximum amount of US\$340, a one year repayment period, and an interest rate equal to 5%) as point of reference.

Determinants of household enterprises being credit constraint

Table 2 shows marginal effects obtained from different specifications of probit equations in which the dependent variable equals 1 if the firm is constrained in its access to credit and 0 when it is not constrained. The first specification only includes dummies for different quintiles of the wealth distribution as explanatory variables. The reference group are households in the top quintile. Relative to this group, households in the first, second and third quintiles (but not in the fourth) are significantly more likely to be credit constrained. The pattern is monotonic; the lower the wealth quintile, the more likely it is that a household enterprise is credit constrained. Households in quintile just below the threshold of the micro-credit program are 42 percentage points more likely to be credit constrained than the wealthiest households. Equally important, the difference is also substantial (31 percentage points) between households in the third quintile (who are just above the program's threshold) and the top quintile.

The specifications in columns (2) to (6) successively add different sets of explanatory variables to the equation. The second specification adds only dummies for urban areas and regions, the third also adds dummies for ethnicity, while the fourth adds demographic variables, while the fifth also includes education variables. The final column also contains income and employment status. Adding these control variables hardly changes the effects and significance levels of the dummies for the various quintiles of the wealth distribution. Only when household income is added, the effects become somewhat smaller and are not always significant.

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[3]The questionnaire doesn't ask households that are credit constrained about the characteristics of the loans they wanted to have but didn't receive. Since there is no obvious way to retrieve this missing information from the information given by households that did obtain a loan, we take the information of the households with a loan as representative for the loan demands for all households in the same quintile of the wealth distribution that wanted a credit. (We experimented with selection-type models but this either gives many negative predictions for households that actually received a loan or a much lower average predicted loan for constrained households than for unconstrained households.)

Table 2. Probit equations credit constrained, marginal effects

Variable	(1)	(2)	(3)	(4)	(5)	(6)
1st quintile	0.666***	0.604***	0.595***	0.709***	0.533***	0.400***
	(0.078)	(0.082)	(0.084)	(0.090)	(0.102)	(0.106)
2nd quintile	0.417***	0.372***	0.375***	0.461***	0.320***	0.214*
	(0.074)	(0.076)	(0.076)	(0.079)	(0.087)	(0.091)
3rd quintile	0.310***	0.281***	0.282***	0.339***	0.230**	0.155
	(0.075)	(0.076)	(0.076)	(0.078)	(0.083)	(0.086)
4th quintile	0.077	0.058	0.059	0.099	0.039	-0.010
	(0.075)	(0.076)	(0.076)	(0.077)	(0.079)	(0.080)
5th quintile	Reference	Reference	Reference	Reference	Reference	Reference
Urban		-0.194**	-0.185**	-0.156*	-0.122*	-0.119
		(0.060)	(0.060)	(0.061)	(0.062)	(0.064)
Sierra		0.376***	0.403***	0.399***	0.396***	0.375***
		(0.103)	(0.103)	(0.104)	(0.104)	(0.105)
Coast		0.009	0.021	0.009	0.016	0.006
		(0.101)	(0.101)	(0.102)	(0.101)	(0.102)
Mestizo			-0.125	-0.190*	-0.152	-0.146
			(0.096)	(0.096)	(0.097)	(0.097)
White			0.027	-0.050	-0.022	-0.009
			(0.130)	(0.131)	(0.131)	(0.132)
Black			-0.278*	-0.350*	-0.327*	-0.324*
			(0.136)	(0.137)	(0.138)	(0.138)
Age head				-0.011	-0.009	-0.003
				(0.011)	(0.011)	(0.011)
Age squared				0.000*	0.000*	0.000
				(0.000)	(0.000)	(0.000)
Married head				0.049	0.077	0.112
				(0.086)	(0.087)	(0.088)
Female head				0.258**	0.266**	0.204*
				(0.092)	(0.093)	(0.094)
Hh size				-0.019	-0.010	0.008
				(0.014)	(0.014)	(0.015)
Primary ed					0.049	0.040
					(0.160)	(0.161)
Secondary ed					0.077	0.076
					(0.092)	(0.092)
Yrs education					-0.022	-0.012
					(0.014)	(0.014)
Lnincome						-0.148***
						(0.029)
Homeowner						-0.031
						(0.066)
Unemp head						-0.011
						(0.138)

Note: robust standard errors in parentheses. ***/**/* indicates significance at the 1/5/10% level.
Number of observations equals 3,186 of which 2,138 are credit constrained.

Table 3. Reasons for rationing, by wealth quintile

	1st	2nd	3rd	4th	5th	All
Interest too high	0.18	0.22	0.25	0.32	0.31	0.24
Doesn't meet requirements	0.11	0.10	0.10	0.09	0.10	0.10
Not enough assets	0.06	0.05	0.04	0.03	0.03	0.04
Income not high enough	0.57	0.54	0.53	0.46	0.43	0.51
Complicated procedure	0.07	0.07	0.08	0.08	0.09	0.07
No person as collateral	0.01	0.01	0.00	0.01	0.02	0.01
Other	0.00	0.01	0.01	0.01	0.01	0.01
Total	528	514	449	356	291	2,138

Note: test for the difference between second and third quintile: Pearson Chi2(6)=2.9203, Pr=0.819

Interestingly, given the wealth quintiles, the other variables have almost no impact on the probability to be credit constrained. The only significant effects are that living in an urban area is associated with a lower probability to be credit constrained, while living in the Sierra (highlands) part of the country and having a female head of the family make it more likely that a household enterprise is credit constrained. Unsurprisingly, higher household income reduces the likelihood of being constrained.

Reasons for being credit constrained

Table 3 reports by wealth quintile, the reasons why household enterprises are credit constrained. The main reasons mentioned in all quintiles are that the household's income is not high enough and that the interest rate is too high. The fractions of households in each quintile that mention these reasons are not very different. Although overall the frequencies of the different reasons household report are significantly different across quintiles, this is not the case for households in the second and the third quintile (p=0.819). This indicates that the reasons for being credit constrained are not different for households in the quintile just below the threshold of the government's micro-credit program and for households in the quintile just above that threshold.

Size of the loans

Table 4 reports summary statistics of the sizes of the loans household enterprises borrow. The mean and median amounts borrowed increase monotonically with wealth quintiles; more wealthy households demand larger loans. Mean loans go up from US$1000 for households in the bottom quintile to over US$5000 in the top quintile. Median loans in all quintiles exceed the amount of US$341 provided by the

Table 4. Loan sizes, by wealth quintile

Wealth quintile	Mean	Median	Loan < US$342 (share)	Loan < US$683 (share)	N
1st	1000	350	0.49	0.66	140
2nd	1961	700	0.35	0.49	208
3rd	3147	1000	0.25	0.40	217
4th	3326	1500	0.18	0.30	251
5th	5411	2000	0.17	0.25	232

Note: test for the difference in means between second and third quintile: t-test, p=0.011.

government's micro-credit program. This is also true for households in the lowest two quintiles of the wealth distribution, implying that the program serves the credit requirements of less than half of the target group. The third column of table 4 reports the exact shares in each quintile having a loan smaller than US$341. In the first quintile this share is 0.49, while it drops to 0.35 in the second quintile. The final column in table 4 reports the shares in each group having a loan smaller than twice the size of the maximum micro-credit provided by the government program.

Doubling the maximum loan would serve 66% of the household enterprises in the first quintile and 49% in the second. The sizes of the loans taken up in the quintiles just below the threshold of the wealth index are significantly smaller than the loans taken up in the quintile just above that threshold. Yet, also in the quintile just above the program's threshold, a substantial share of enterprise households take loans smaller than (twice) the maximum of the program's credit (0.25 and 0.40 respectively).

Repayment periods

The results of the repayment periods by wealth quintile are shown in table 5. On average the repayment period is 1.18 years. Poorer households tend to have shorter repayment periods that the richer households. The median repayment period in most quintiles equals one year. The share of household enterprises having a loan with a repayment period less than one year is in most of the quintiles larger than 0.50. We tested for differences in the mean repayment periods between the quintiles just below and just above the threshold of the government's micro-credit program, and cannot reject that these are equal.

Table 5. Repayment period, by wealth quintile

Wealth quintile	Mean	Median	Repayment period < 1 year (share)	N
1st	0.81	0.50	0.77	109
2nd	1.05	0.90	0.66	169
3rd	1.11	1.00	0.56	176
4th	1.23	1.00	0.48	203
5th	1.49	1.00	0.45	193

Note: test for the difference in n means between second and third quintile: t-test, p=0.642.

Interest rates

Table 6 reports summary statistics of the interest rates household enterprises pay on their loans.[4] The overall average equals 51%, and the overall median equals 19%, both tend to decrease with wealth quintiles. Household enterprises owned by wealthier households face lower interest rates. The interest rates paid by enterprises in the second and third quintiles (just below and just above the program's threshold) are, however, not significantly different.

Compared to the interest rates household enterprises actually pay, the 5% interest rate charged by the government's program is extremely low. It is even less than half the return on long-term government bonds (equal to 10.67%, while inflation is around 9% on an annual basis). The third column in table 6 shows that in every quintile even the households on the 10th percentile pay interest rates that exceed 5%, while the fourth column shows that only very small fractions in each quintile pay interest rates of 5% or less. This all indicates that the interest rate charged by the government's program is far below the market interest rate. The common wisdom is that such a low (subsidized) interest rate attracts inefficient investors (Armendariz de Aghion and Morduch, 2005), the ones that have a return on their investment between the market rate and the rate charged in the government's program. The final column in table 6 shows that only a quarter of the household enterprises have a loan on which they pay an interest rate less than double the amount charged by the government's program.

Use of the loans

The survey also includes a question about the use of the loan. Results are reported in table 7. Almost 50 percent of the respondents mention that they use the loan to

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[4]Recall that the statistics on interest rates exclude observations with a non-positive interest rate.

Table 6. Interest rates (r), by wealth quintile

Wealth quintile	Mean	Median	10th percentile	$r < 0.05$ (share)	$r < 0.10$ (share)	N
1st	71.9	30.0	8.0	0.03	0.14	97
2nd	56.3	25.4	7.3	0.04	0.20	160
3rd	46.7	18.3	8.0	0.03	0.22	172
4th	59.5	19.0	6.7	0.07	0.25	211
5th	28.6	14.6	5.6	0.07	0.31	185

Note: test for the difference in n means between second and third quintile: t-test, p=0.206

Table 7. Use of loan, by wealth quintile

Use	1st	2nd	3rd	4th	5th	All
Merchandise	0.47	0.47	0.51	0.48	0.43	0.47
Inputs	0.24	0.18	0.12	0.17	0.08	0.15
Pay debt	0.06	0.08	0.06	0.06	0.12	7.73
Vehicle	0.07	0.09	0.12	0.10	0.09	0.10
Equipment	0.07	0.06	0.05	0.06	0.06	0.06
Tools	0.04	0.02	0.03	0.02	0.03	0.03
Maintenance	0.03	0.08	0.07	0.07	0.13	0.08
Furniture	0.01	0.01	0.03	0.02	0.02	0.02
Land/offices	0.00	0.01	0.00	0.02	0.03	0.01
Other	0.00	0.00	0.00	0.00	0.01	0.00
Total	140	208	217	251	232	1,048

Note: test for the difference between second and third quintile: Pearson Chi2(9)=7.31, Pr=0.605

purchase merchandise. This is very similar across all quintiles. The next frequent use of the loan is the purchase of inputs. The overall frequency of it equals 15% and this tends to decrease with the wealth quintiles. None of the other uses of the loan has an overall frequency exceeding 10%. (Notice that repayment of another debt has an overall frequency of 8% and that this tends to increase with the wealth quintiles.) We tested whether the uses of the loans are significantly different between the two quintiles just below and just above the micro-credit program's threshold, and this turns out not to be the case (p=0.605).

Lenders

Table 8 reports from which financial institutions the household enterprises received their loans. Important providers are private banks, cooperatives and family or friends. Private banks are more important for wealthier households, while family or friends are more important for poorer households. Cooperatives are equally important across all quintiles. The overall role for moneylenders is not so prominent,

Table 8. Loan provider, by wealth quintile

Lender	1st	2nd	3rd	4th	5th	All
Public banks	0.03	0.05	0.04	0.07	0.11	0.06
Private bank	0.16	0.25	0.33	0.39	0.38	0.32
Cooperatives	0.24	0.24	0.24	0.23	0.22	0.24
NGO	0.01	0.04	0.04	0.02	0.02	0.03
Moneylenders	0.17	0.15	0.16	0.12	0.05	0.13
Family/friends	0.38	0.26	0.19	0.16	0.21	0.23
Other	0.00	0.00	0.00	0.01	0.01	0.00
Total	140	208	217	251	232	1,048

Note: test for the difference between second and third quintile: Pearson Chi2(5)=5.40, Pr=0.369

but they are more important among poor household enterprises. The role of public banks is minor. Again we tested for differences between the two quintiles below and above the threshold of the government's micro-credit program, and cannot reject that they are equal (p=0.369).

5 Summary and conclusion

In 2007 the government of Ecuador launched a micro-credit program allowing households in the bottom two quintiles of the wealth distribution to convert up to a year's worth of cash transfers into an upfront payment provided that it is used for some productive activity.

In this paper we use data collected in the year prior to the start of this program, to examine the effectiveness of the program's targeting strategy. Our main conclusion is that households in the third quintile of the wealth distribution (who are excluded from the program) face very similar credit constraints as households in the second quintile (who have access to the program) and also exhibit very similar demand for loans. Given that the program charges an interest rate far below the market interest rate, it is questionable that the budget available for the micro-credit program is allocated efficiently. It seems very likely that doubling the interest rate and extending the program to the third quintile of the wealth distribution, will serve more household enterprises with a reasonable return to their investment. Obviously, including households in the third quintile is likely to come with an increase in the default rate since these households are not entitled to the government's cash transfer program and their repayment will thus not be automatic. The increase in the interest rate should, however, be sufficient to cover this increased risk.

References

Armendariz de Aghion, B. and Morduch, J. (2005). *The Economics of Microfinance.* MIT Press.