

**Credit elasticities in less-developed
economies:
Implications for microfinance.**

Karlan, D. S., & Zinman, J.
The American Economic Review, 2008.

Verveiko Anastasia

Structure

2

- The Market Setting
- Experiment
- Model
- Elasticities of Demand
- Conclusion

The Market Setting

3

- South Africa
- „Cash loan“ industry

- Risky sector

High
30% 1 month

Lender
7,75%-11,75%
1,4,6,12 month

Low
3% 12+ month

The Market Setting

4

- Incentives to repay

Carrots

- ↓ future price
- ↑ future loan size

Sticks

- Reports to credit bureaus
- Collection agents' calls
- Court summons
- Wage garnishment

- No interest rate ceiling (fall 2003).

Experiment

5

- 53'810 past clients
- Rates $\in [3,25\%; 14,75\%]$
- $96\% < \text{standart rate}$
- $1\% > \text{standart rate}$

TABLE 2—EXPERIMENTAL VALIDATION REGRESSIONS

Dependent variable:	Estimator:	OLS	Probit	Probit
		Interest rate (00s of basis points)	1 = Borrowed after deadline, and not before deadline	1 = Rejected
Mean (dependent variable):		8.03 (1)	0.15 (2)	0.14 (3)
Monthly interest in percentage points (e.g., 8.2)			-0.0001 (0.0007)	0.002 (0.002)
Number of months since last loan with lender		0.001 (0.003)		
Number of prior loans with lender, log		0.00 (0.01)		
Female		0.02 (0.02)		
Number of dependents		0.00 (0.01)		
Married		0.02 (0.02)		
Age, log		-0.00 (0.05)		
Rural		0.02 (0.03)		
More educated		-0.01 (0.02)		
External credit bureau score, log		0.01 (0.01)		
Record exists in external credit bureau		0.04 (0.10)		
Internal credit score, log		-0.06 (0.13)		
(Pseudo-) <i>R</i> -squared		0.11	0.05	0.05
	Sample:	All with nonmissing	All	Applicants
Number of observations		53,554	53,810	4,540

The offer and loan application process

6

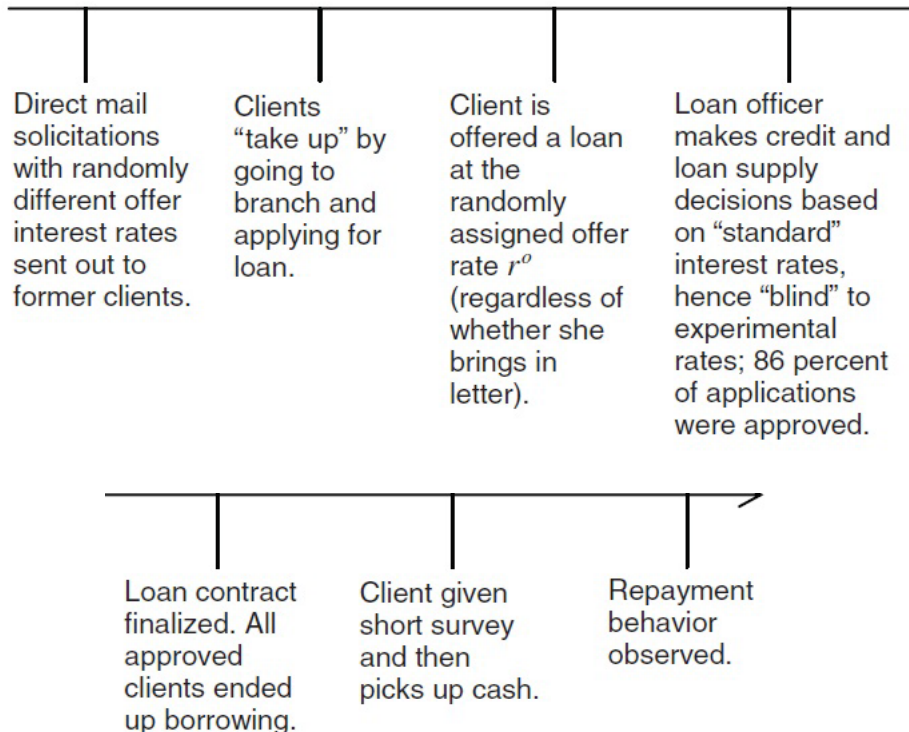


FIGURE 2. OPERATIONAL STEPS OF EXPERIMENT

the trusted way
to borrow cash

30 October 2003

Shop 8
12 Market Street
Krugersdorp 1736
Tel: 011 650 2044

BUSINESS HOURS
MON - FRI 10:30 - 18:00
SAT 10:00 - 12:00

A low rate for you.

Congratulations! As a valued client, you are now eligible for a low interest rate on your next cash loan from . This is a limited time offer, so please come in by 30 November 2003 to take advantage of this offer.

You can use this cash to pay for school, or for anything else you want.

Enjoy low monthly repayments with this offer! Here is one example of a loan you can get under this offer:

Interest Rate	Loan Amount	Loan Term	Monthly Repayment
10.50%	R2000.00	4 Months	R710.00

LOAN AVAILABILITY SUBJECT TO TERMS & CONDITIONS

Loans available in other amounts. There are no hidden costs. What you see is what you pay.

If you borrow elsewhere you will pay R360.00 more in total on a R2000.00, 4 month loan.

How to apply:

Bring your ID book and latest payslip to your usual branch, by **30 November 2003** and ask for **Mrs. Veno Naidoo**.

Mrs. Veno Naidoo
Area Manager

P.S. Unfortunately, if you have already taken a loan since the date this offer was issued, you do not qualify for this offer. Comparison based on a competitor's interest rate of 15% per month.

Model

7

$$y_i = f(C_i, X_i),$$

where:

- i - potential borrowers;
- y_i - measure of take-up or loan size demand for debt
- C_i - a vector of loan contract terms (offer rate (r_i) and/or the maturity (m_i));
- X_i includes the two variables: pre-approved credit risk (low/medium/high), and the mailer wave (July, September, or October).

$$a_i = \alpha + \beta r_i + \delta X_i + \varepsilon_{ib}.$$

where:

- $a = 1$ if the client applied for a loan;
- β - unbiased estimate of the price sensitivity of loan take-up

Price Elasticity Results

8

TABLE 3—THE EXTENSIVE MARGIN: PRICE SENSITIVITIES OF LOAN TAKE-UP

Dependent variable: Mean (dependent variable)	1 = Applied			1 = (Take-up with outside lender, not with our Lender)			1 = (Take-up with Lender after deadline, not before deadline)		
	0.08	0.08	0.07	0.22	0.22	0.28	0.15	0.15	0.18
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Interest rate in pp terms (e.g., 8.2)	−0.00289*** (0.00047)		−0.01723*** (0.00160)	0.00106 (0.00083)		−0.00958 (0.00660)	0.00042 (0.00064)		−0.01239** (0.00622)
1 = (rate > standard for client's risk category)		−0.02996*** (0.00398)			0.00539 (0.00512)			−0.03630*** (0.00869)	
Pseudo R-squared	0.045	0.044	0.055	0.002	0.002	0.003	0.048	0.049	0.056
Sample:	Offer4 ≤ standard	Full	Offer4 > standard	Offer4 ≤ standard	Full	Offer4 > standard	Offer4 ≤ standard	Full	Offer4 > standard
Number of observations	53,178	53,810	632	53,178	53,810	632	53,178	53,810	632

Notes: Each column presents marginal effects from a single probit of a measure of loan take-up on the interest rate offered to the client, and risk category and mailer wave (not shown in table). Robust standard errors reported in parentheses and are clustered within branch. Interest rate coefficients show the change in the proportion taking up from a 100-basis-point increase in the monthly interest rate.

Price Elasticity Results

9

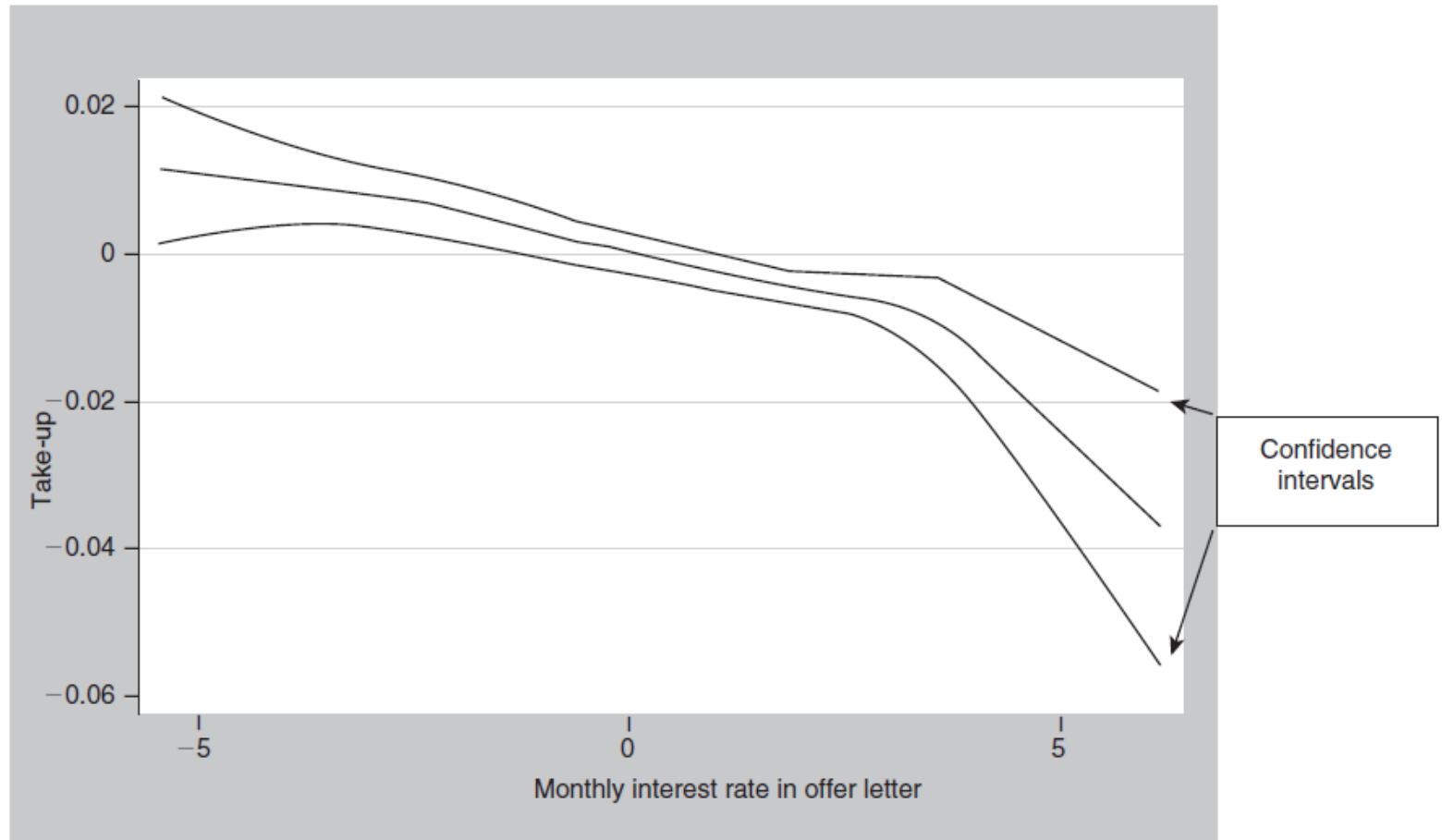


FIGURE 3. REGRESSION-ADJUSTED DEMAND CURVE FOR TAKE-UP WITH RESPECT TO PRICE

Price Elasticity Results

10

TABLE 4—PRICE SENSITIVITIES OF LOAN SIZE

Estimator:	OLS	OLS	OLS	OLS	Tobit	OLS	OLS	Tobit
Dependent variable:			Loan Size				Log(Loan Size)	
Mean (dependent variable):	106	104	1,428	1,428	1,428			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interest rate in pp terms (e.g., 8.2)	-4.368*** (1.093)	-4.394*** (1.146)	-25.876** (12.994)	-33.715*** (11.392)	-32.812*** (11.366)			
Log (interest rate)						-0.113** (0.049)	-0.143*** (0.041)	-0.141*** (0.041)
(Pseudo) <i>R</i> -squared	0.03	0.06	0.07	0.29	0.02	0.06	0.34	0.15
Additional controls for demos and credit risk?	No	Yes	No	Yes	Yes	No	Yes	Yes
Branch fixed effects?	No	Yes	No	Yes	No	No	Yes	No
Conditional on borrowing?	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	31,231	28,197	2,325	2,304	2,304	2,325	2,304	2,304

Notes: Loan size in rand; 7 rand \cong US\$1 at the time of the experiment. Robust standard errors clustered on branch in all but tobit specifications. All specifications include controls for risk category and mailer. Additional controls added to unconditional specifications include: quadratics in internal credit score, external credit score, and gross income at time of pre-approval (but not net income at time of pre-approval, since this is available only for wave 3 individuals), months since last loan with Lender, number of prior loans with Lender, gender, number of dependents, marital status, quadratic in age, rural residence, education, and province. Controls for conditional specifications use income measured at the time of loan approval, and include net income at the time of loan approval as well. Sample size falls for loan size demand models, relative to take-up models (Table 3), because with loan size we include only applicants who were not randomly assigned a surprise rate reduction upon applying for a loan—see footnote 17 for details.

Price Elasticity Results

11

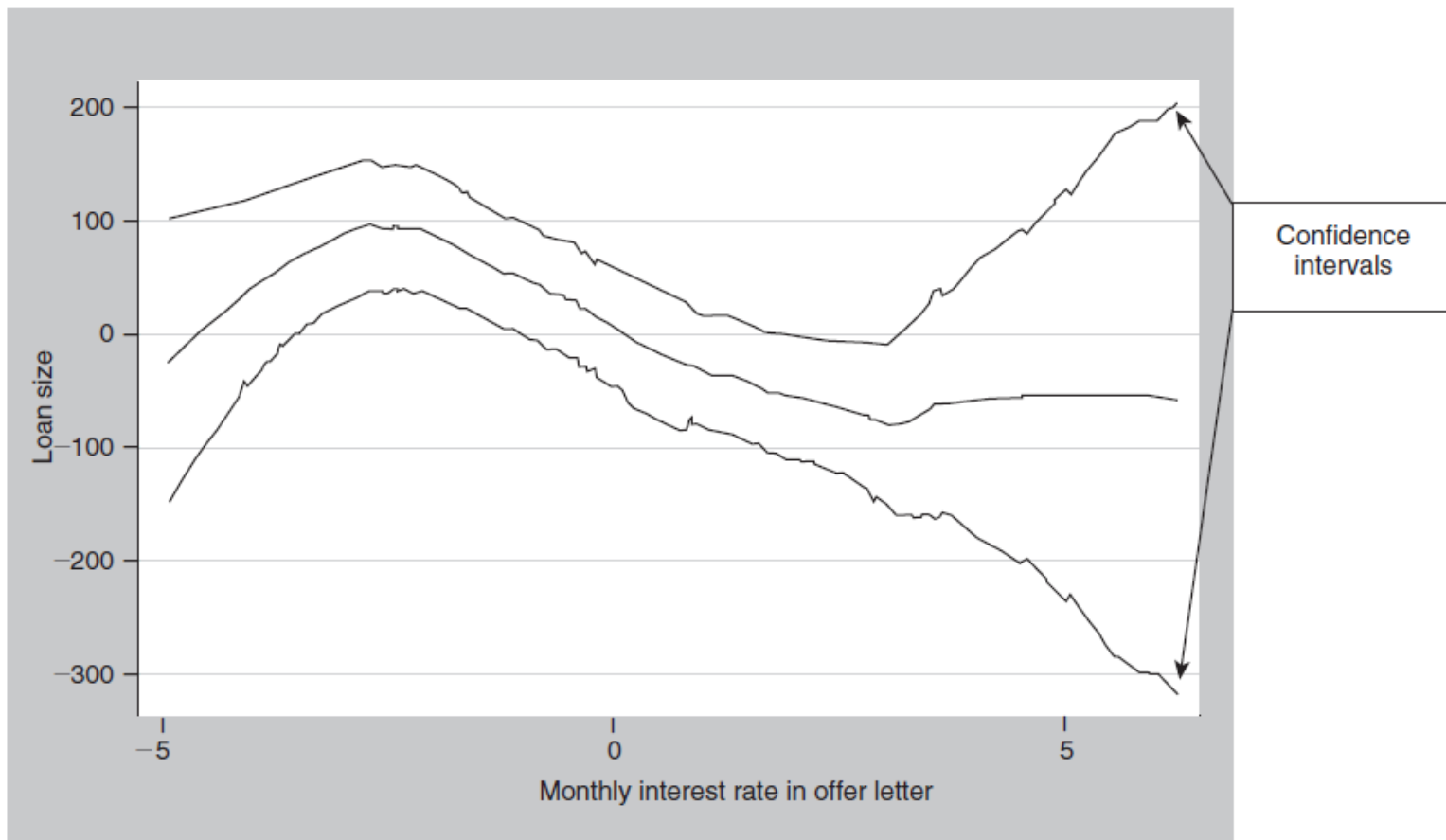


FIGURE 4. REGRESSION-ADJUSTED DEMAND CURVE FOR LOAN SIZE,
CONDITIONAL ON BORROWING, WITH RESPECT TO PRICE

Pricing Strategy for Profitability and Access

12

TABLE 5—GROSS REVENUE AND REPAYMENT SENSITIVITIES TO INTEREST RATES

Estimator: Dependent variable:	OLS Gross interest revenue (1)	OLS Average past due (2)	Tobit Average past due (2)
Interest rate in pp terms (e.g., 8.2)	2.553*** (0.438)	12.161*** (3.523)	18.064*** (5.934)
Additional controls?	No	No	No
Conditional on borrowing	No	Yes	Yes
R-squared	0.02	0.05	0.01
Number of observations	31,231	2,325	2,325

Notes: All dependent variables in rand; 7 rand \cong US\$1 at the time of the experiment. Robust standard errors reported in parentheses and clustered within branch for OLS specifications. Average past due over the first 7–12 months of the loan (this is all the we observe, hence the motivation for tobit). Controls included for risk category and wave of experiment.

Pricing Strategy for Profitability and Access

13

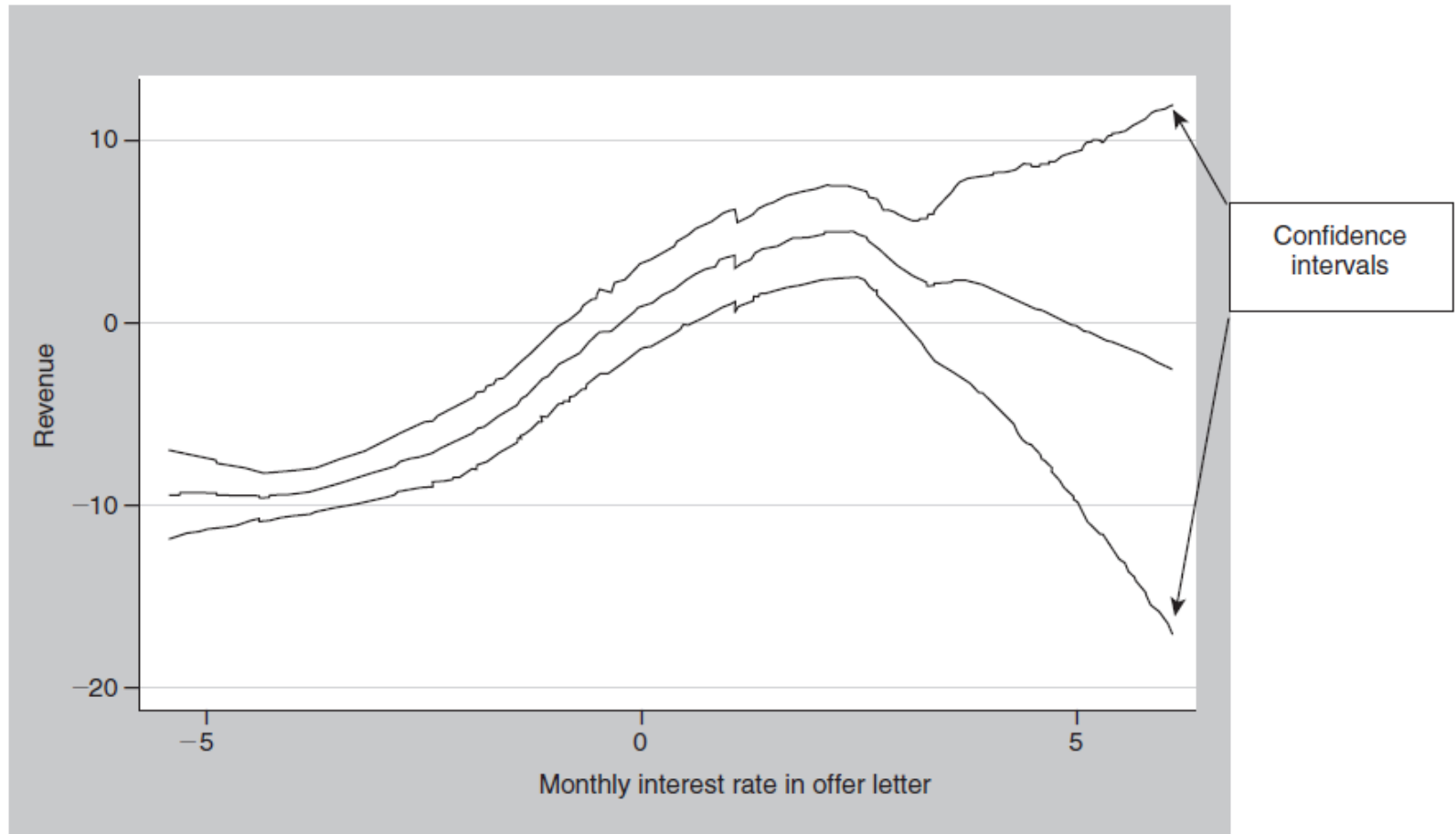


FIGURE 5. REGRESSION-ADJUSTED DEMAND CURVE FOR REVENUE WITH RESPECT TO PRICE

Maturity Elasticities of Demand

14

$$m_i = \alpha + \beta S_i + \chi R_i + \delta X_i + \varepsilon_{ib},$$

where:

- *m* - the maturity chosen (parameterized linearly)
- *S* - the maturity suggestion
- *R* - vector of the randomly assigned offer and contract interest rates
- *X*- vector of risk and loan size presented in the offer letter's example loan

Maturity Elasticities of Demand

15

TABLE 8B—MATURITY ELASTICITIES OF LOAN DEMAND: OLS AND IV ESTIMATES

	OLS				IV	
	(1)	(2)	(3)	(4)	(5)	(6)
Maturity (linear)	0.161*** (0.011)	0.168*** (0.009)	0.155*** (0.018)	0.157** (0.062)	0.214*** (0.072)	0.050 (0.126)
Interest rate	−0.035 (0.027)	−0.053** (0.026)	0.011 (0.038)	−0.036 (0.029)	−0.041 (0.038)	0.011 (0.038)
Log (loan amount shown)	0.443*** (0.047)	0.390*** (0.056)	0.369*** (0.069)	0.445*** (0.061)	0.356*** (0.076)	0.408*** (0.113)
Income split?	No	Low income	High income	No	Low income	High income
R-squared	0.52	0.59	0.45	0.52	0.56	0.32
Number of observations	493	239	254	493	239	254

Notes: Robust standard errors clustered on branch. Log (loan size) is the dependent variable; results are similar for level loan size. IV specifications use the categorical measures of suggested maturity as the instrument; results are similar if we use the linear instrument

Conclusion

16

- Downward-sloping but relatively flat demand;
- Lender, which had no social targeting objectives, had no incentive to cut rates;
- Maturity elasticities are significant only among relatively low-income borrowers;
- Female and low-income borrowers are more sensitive to interest rates;
- The methodology can be adapted to other MFIs marketing approaches and strategic considerations.