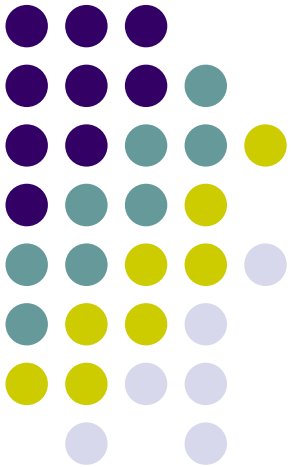
The University of Manchester
Brooks World Poverty Institute

The utility cost of group lending:
A study of urban credit markets in Mexico

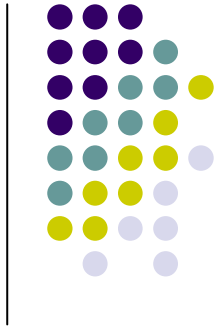
Chronic Poverty Research Centre

Miguel Niño-Zarazúa
Brooks World Poverty Institute
Chronic Poverty Research Centre
The University of Manchester



September 2010

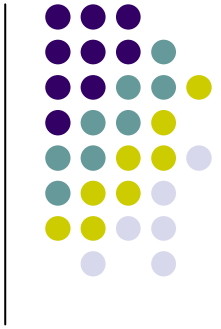
Background



- Informational constraints that generate **moral hazard** and **adverse selection** in credit markets have restricted the ability of institutional lenders (e.g. banks) to reach out to low-income households. This has exacerbated the problem of **credit rationing** in developing countries.

- Group lending contracts, in combination with other **screening**, **incentive** and **enforcement** devices, have enabled lenders to reduce informational costs associated with lending activities and expand their market outreach.

Background

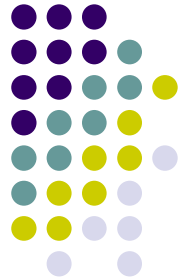


- Since Stiglitz's (1990) seminal paper on **peer monitoring**, there have been important contributions to the field of group lending. Special attention has been paid to the way group lending contracts enable lenders to reduce informational costs. For example:
  - Besley and Coate (1995) analyse a strategic repayment game with **joint liability** and highlight the effect of **social collateral**, which increases the incentives to loan repayment. Banerjee et al (1994) and Giné et al (2009) also link peer monitoring to high repayment rates in group lending.
  - Ghatak (1999, 2000) and Van Tassel (1999) point out the importance of **self-selection** in group lending, which improves peer monitoring and loan repayment.
  - Armendariz de Aghion and Morduch (1998) and Chowdhury (2007) discuss the importance of **progressive lending**, which as an incentive device improves loan repayment *even* in the absence of **joint liability**.

Screening, incentive and enforcement devices in group lending

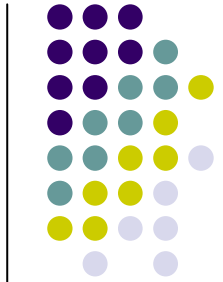
Direct devices		Indirect devices	
Periodical Repayment schedules	Through ***peer monitoring***, deal with moral hazard and reduce informational costs to the lender	**Group Contracts**	Based on ***joint liability***, work as substitute for collateral and act as an enforcement mechanism
Compulsory Savings	Reduce the cost of capital to the lender.	**Progressive Lending**	Acts as stimuli for loan repayment and reduces costs per borrower overtime
Trade-credit linkages	Deal with adverse selection, but create monopolistic practices.	**Targeting at women**	Socio-cultural specific; reduces the adverse selection problem

Background



- Many other studies have focused on assessing the impact of group lending on poverty and well being, e.g. Hulme and Mosley (1996); Pitt and Khandker (1998), Coleman (1999), Nino-Zarazua (2007; 2008); Banerjee and Duflo (2010); Karlan and Zinman (2010). See reviews by Roodman and Morduch (2009); Goldberg (2005), and Weiss et al (2003).
  - Overall, studies **report positive credit impacts**, although the magnitude of the effects are heterogeneous and **only statistically significant** above minimum thresholds of well being: **inconclusive evidence of microcredit impacts on poverty.**
- Although group lending has proved its efficacy in reducing informational costs to the lender, it passes these costs onto the borrower. Stiglitz's acknowledges that:
  - *"The members of borrowing groups [...] bear risks that, in the absence of the monitoring problem, could much better be absorbed by the bank. Indeed, in the case of borrowing groups, the interdependence among the members of the group is artificially created. They have been induced to bear more risks than they otherwise would"* (Stiglitz 1990:362).

Background



- A strong assumption in theoretical work is that **the information members of borrowing groups have about their peers (especially in rural credit markets) is perfect and therefore, costless.**

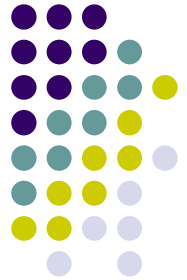
- Some sociological and gender studies have reported non-economic costs associated with e.g. social sanctions, and intra-household cooperative disequilibria (e.g. increased violence).

- Surprisingly, too little attention has been paid in the economics literature to the examination of these costs and their effects on household welfare.

- Assuming welfare gains from group lending, **should we worry about the informational costs to the borrower?** The answer depends on:

  - **The magnitude of these costs**.
  - **The market environment**

Paper's contribution



- This study contributes to the literature of group lending in two important ways:

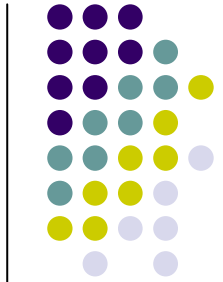
- First, it links the informational costs to the **spatial dimension of urban credit markets**. This is important when considering that, unlike in rural markets, the **poor are highly mobile and often travel long distances in search of livelihoods**.

- Second, the paper investigates the connection between informational costs and borrower welfare.

- The paper's objectives are to:

1. Identify the **determinants of informational costs to the borrower**
2. Estimate their **magnitude**, and
3. Assess their **effects on well being**.

The model



- To begin the discussion, I consider a monopolistic competitive market where a lender discretely operates in an geographical area where a population subgroup resides. The lender concentrates on a market space expecting a process of **self-selection in group formation** that facilitates **peer monitoring**.

- Contrary to the standard theory, I assume that informational costs to the borrower are **non-zero**. Why?

  - **Peer monitoring activities can be *time-intensive*,** as they are undertaken on a periodical (usually weekly) basis.

  - **High spatial mobility in urban markets**. Although group members live within the market area, they often work faraway, where commodity and labour markets are less fragmented.

The model

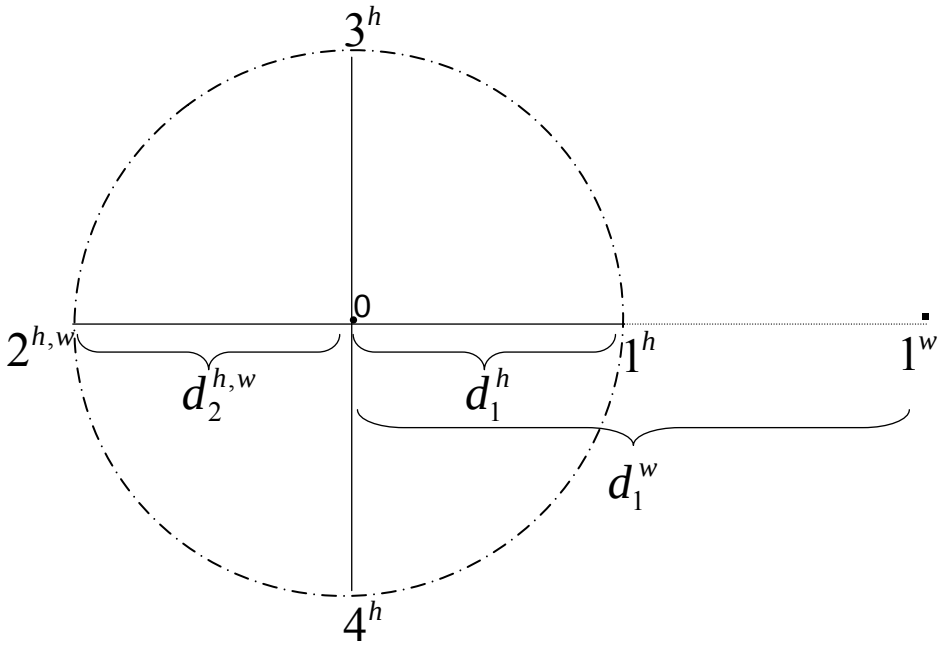
Figure 1 shows group members meeting at zero to undertake peer monitoring activities. The market area is depicted by the interlined circumference.

- Because borrower 1 works beyond the market area, she endures higher costs to attend periodical group meetings than borrowers 2, 3 and 4.

- Note that *distance* (***d***) contains two dimensions: **space and time.**
  - **Space** is captured by ***transactions costs*** incurred by the borrower, e.g. transportation expenses.

  - **Time** is captured by the ***opportunity cost*** of time spent in peer monitoring activities.

Figure 1



The model

Borrower utility can take either of the following functions:

$$U_i \equiv U\left[Y_i(L) - (1+r)L - C_i(L)\right] \quad \textbf{(1)}$$

$$U_{i,q} \equiv U\left[Y_i(L) - (1+r)L - C_i(L) - q(L)\right] \quad \textbf{(2)}$$

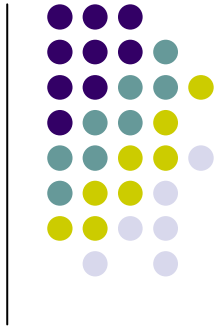
$$U(0) = 0 \quad \textbf{(3)}$$

where U is the utility of income from production (Y), conditional on loan size (L) at the rate of interest r.

C measures the costs (disutility) associated with peer monitoring activities. I refer to C as the *utility cost of credit.*

q is the share of the loan a borrower agrees to collateralise in the event a group member goes into default.

The model



I assume all members repay their share, so $q = 0$**, and** $U_i = U_{i,q}$**. Therefore**

$\max U = U(L)$**,** **subjected to** $(1+r)L + C(L) = Y$

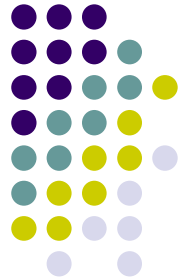
The credit demand function can thus be derived as

$$L = f(r, C, Y) \qquad \textbf{(4)}$$

whereas the utility cost function is obtained as

$$C = f(L, d, Y) \qquad \textbf{(5)}$$

The econometrics



The demand for credit of group member *i* takes the form:

$$L_i = \beta_0 + \beta_1 C_i + \beta_2 r + \beta_3 X_i + u_{1i} \qquad (6)$$

where X is a vector of household characteristics; r is the interest rate paid on loan L, and C measures the utility cost of credit. $\beta's$ and u are the corresponding coefficients and the error term, respectively.

The utility cost for group member *i* is derived as:

$$C_i = \alpha_0 + \alpha_1 L_i + \alpha_2 d + \alpha_3 X_i + u_{2i} \qquad (7)$$

where d captures the spatial dimension of the urban context, by measuring the distance covered by borrower *i* to attend periodical group sessions.

Note there may be a potential simultaneity problem between (6) and (7) if C and L are found to be endogenously (or jointly) determined. If that is the case, the OLS application would be not only *bias* but also *inconsistent*.

In order to test for simultaneity, I adopted a Hausman (1978) specification test.

I substituted equation (6) into (7) to obtain the reduced form equations:

$$C_i = \Pi_0 + \Pi_1 d + \Pi_2 r + \Pi_3 X_i + w_i \qquad \textbf{(8)}$$

and

$$L_i = \mathrm{H}_0 + \mathrm{H}_1 d + \mathrm{H}_2 r + \mathrm{H}_3 X_i + v_i \qquad \textbf{(9)}$$

where $\Pi's$ **and** $\mathrm{H}'s$ **are the associated reduced form coefficients, and** w **and** v**, the linear combinations of the original error terms, respectively, i.e.**

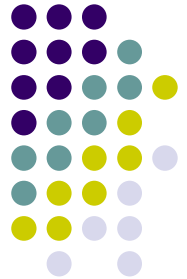
$$\Pi_0 = \frac{\alpha_0 - \beta_0}{1-\beta_1};\ \Pi_1 = \frac{\alpha_2}{1-\beta_1};\ \Pi_2 = \frac{\beta_2}{1-\beta_1};\ \Pi_3 = \frac{\alpha_3 - \beta_3}{1-\beta_1},\ \textbf{and}\ \ w_i = \frac{u_{2i} - u_{1i}}{1-\beta_1}.$$

and

$$\mathrm{H}_0 = \frac{\beta_0 - \alpha_0}{1-\alpha_1};\ \mathrm{H}_1 = \frac{\alpha_2}{1-\alpha_1};\ \mathrm{H}_2 = \frac{\beta_2}{1-\alpha_1};\ \mathrm{H}_3 = \frac{\beta_3 - \alpha_3}{1-\alpha_1},\ \textbf{and}\ \ v_i = \frac{u_{1i} - u_{2i}}{1-\alpha_1}$$

Equations (8) and (9) allow the estimation of the predicted residuals, which can be used to test for simultaneity problems using a standard robust *t* statistic under a 2SLS procedure.

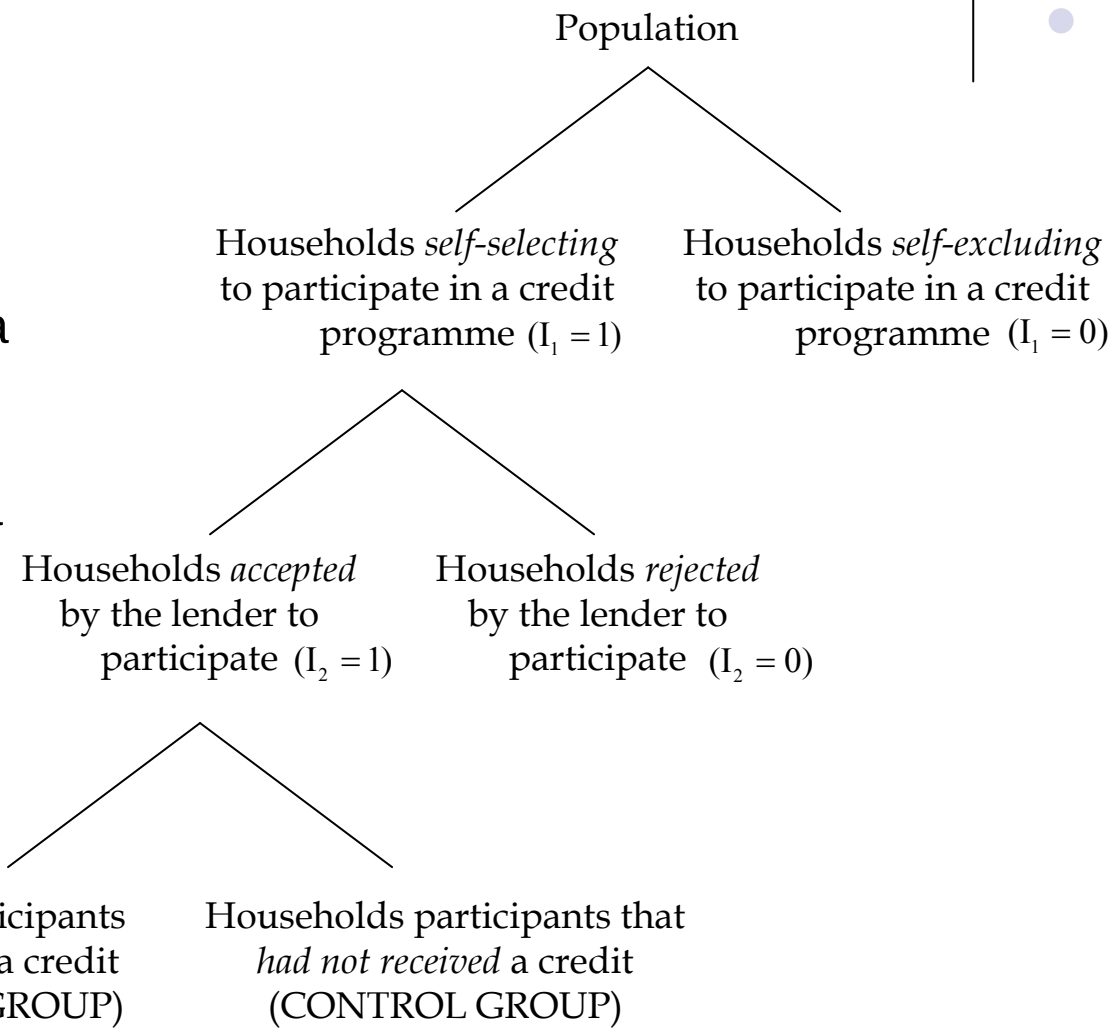
A quasi-experimental study: controlling for selection bias



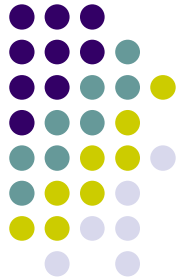
- **The study required data from two groups: 1) treatment and 2) control.**
- **Major problems can emerge from unobservable factors that influence borrowing decisions, e.g.**
  - ***Individual efforts, abilities, preferences and attitudes towards risks*: A demand-related bias.**
  - **But even if we observe a control group willing to borrow from an MFI, we may still encounter *selectivity discrimination* from group members who screen out applicants who e.g. live faraway from the branch. A supply-related bias.**
- **The selection process is thus defined by two factors:**
  1. **Household's decision to participate or not in a microcredit program,**
  2. **The decision of group members of whether or not to accept the applicant.**

The selection process

It was possible to specify the distribution for households that had *self-selected* to participate in a credit programme, and who had been accepted by group members, with a *time-variance* difference that accounts for the length of membership.



A quasi-experimental study: dealing with endogeneity



- In order to reduce other sources of endogeneity, it was important to follow a ***geographical criterion***.
  - To hold constant factors such as infrastructure, costs of inputs, and local prices that could otherwise cause endogeneity. The high population density in urban Mexico made it possible to follow this approach.
- Additionally, a ***temporal criterion*** was followed, i.e. the quasi-experiment was conducted in areas where the MFIs had achieved a certain level of market penetration, and their effects were more likely to be observed.

Participating MFIs in study

Institutional	FINCOMUN	CAME	PROMUJER
Lending methodology	**Individual lending**	**Group lending**	**Group lending**
Interest rate (per annum)	**72%**	**60%**	**72%**
Peer monitoring	**No**	**On weekly basis**	**On weekly basis**
Savings as % of loan	10	10-12	10-12
Physical collateral	**Yes**	**No**	**No**
Guarantees	Yes, two **guarantees**	Yes, through **joint liability**	Yes, through **joint liability**
Borrowers (000)	25.8	40	11.8
Women borrowers (%)	60	80	100
No of participating households in study (148)	55 households	46 households	47 households
Areas under study	Iztapalapa District in Mexico City	The Chalco Valley in the State of Mexico	Tula City in the state of Hidalgo

A study location: The Chalco Valley

Variables	Definition
Endogenous variables	
LGMAXCREDIT	Logarithm of the amount of credit borrowed
LGUTCOSTCREDIT	Logarithm of the utility cost of credit = transaction costs + opportunity cost of time spent in peer monitoring as % of loan size
Exogenous variables	
LGRATE	Logarithm of interest rate on loan
FORMALCREDIT	D=1 if borrower received loans from institutional lenders
MONEYLENDER	D=1 if borrower received loans from moneylenders
DISTANCE	Distance covered to attend group meetings (in minutes), as a proxy of the spatial dimension of urban credit markets
GROUP	D=1 if group lending is adopted by MFI. It captures the effect of group lending on the outcomes of interest
Household characteristics	
AVEDU	Education of household head, as a proxy of human capital endowments
HOWNER	D=1 for housing ownership, as a measure of physical capital endowments in the urban context
DEPENDRATIO	Dependency ratio, as a measure of intra-household liquidity requirements for consumption expenditure
WOMAN	D=1 if borrower is woman

The utility cost function

	OLS		2SLS	
	Demand for credit function	Utility cost function	Reduced form equation	Corrected utility cost function
LGUTCOSTCREDIT	-0.563			
	(8.71)***			
LGRATE	-8.256		-10.255	
	(4.62)***		(4.08)***	
GROUP	**-0.423**	**0.992**	**-1.418**	**1.263**
	(1.77)*	**(6.04)*****	**(7.76)*****	**(5.75)*****
LGMAXCREDIT		**-0.678**		**-0.375**
		(9.90)***		**(1.87)***
DISTANCE		0.008	0.012	0.005
		(3.32)***	(4.52)***	(1.96)*
RESID				**-0.352**
				(1.68)*
CONSTANT	33.619	2.785	41.326	0.112
	(5.87)***	(4.23)***	(5.21)***	(0.06)
Observations	148	148	148	148
R-squared	0.57	0.63	0.35	0.64
F test	32.59	40.53	15.73	44.06
Prob > F	0.0000	0.0000	0.0000	0.0000

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The group coefficient $e^{1.263} = 3.53$ suggests that the median **utility cost of group lending** is 2.5 times higher than that of **individual lending**

The impact of the utility cost on earnings

The impact of the utility cost of credit on household earnings

	OLS		2SLS	
	Utility cost function	Earnings function	Reduced form equation	Corrected earnings function
LGMAXCREDIT	**-0.678**		**-0.727**	
	(9.90)* **		**(9.72)*** **	
DISTANCE	**0.008**		**0.009**	
	(3.32)* **		**(3.42)*** **	
GROUP	**0.992**	**-1.058**	**0.675**	**0.383**
	(6.04)* **	**(3.68)*** **	**(2.94)*** **	**(2.19)** **
LGUTCOSTCREDIT		**0.344**		**-0.501**
		(4.89)* **		**(9.24)*** **
LGRATE		-6.800	-5.126	-4.810
		(3.34)***	(2.28)**	(4.03)***
RESID				**1.433**
				(19.12)* **
CONSTANT	2.785	31.206	19.446	22.194
	(4.23)***	(4.78)***	(2.67)***	(5.81)***
Observations	148	148	148	148
R-squared	0.63	0.28	0.64	0.79
F test	40.53	6.85	37.37	67.73
Prob > F	0.0000	0.0000	0.0000	0.0000

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Results point to a **negative and significant** impact of the utility cost of credit on household earnings.

When the utility cost of credit goes up by 1%, the level of earnings go down by 0.5%.

The impact of the utility cost on earnings

Program participants repeatedly expressed their discontent with the cost of peer monitoring activities.

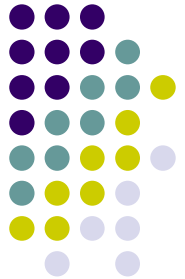
Case 1

Mrs T lives in the Chalco Valley and has been member of CAME´s village banks for almost 7 years. She sells shoes at street markets on particular days of the week. She has to travel from square to square across Mexico City. When asked about CAME, she replayed: *"I cannot make repayments every week, I don't have problems with the interest rate but I don't like when they* [credit officers] *force me to come every week. I have a business to attend, you know, and it is far away…*" (Interview: Int2-11032004).

Case 2:

Mrs C lives in Tula City and has been member of Promujer for more than a year. She sells home products with relatives and friends, and at street markets. She work 2 hours per day because she had small children. When asked about Promujer, she replayed: *"What I don't like from Promujer is that we have to come every week and wait hours for some comrades that come late. I have lots of problems to be sitting here waiting for them. And now because of the meetings I cannot pick up my children from school. To be honest with you, I will leave the group as soon as the* [credit] *cycle ends…"* (Interview: Int5-06042004).

What about the impact on poverty?



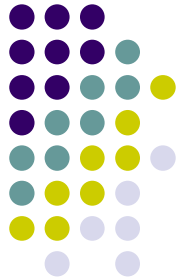
I derived a probability function for the observed determinants of the headcount index, to estimate the effect of the utility cost of credit on the probability of a poor household to remain in poverty.

$$\Pr(z = 1 | C_i) = \int_{-\infty}^{C_i\beta} \phi(t)dt = \Phi(C_i\beta)$$

where *z* is an identified poverty line for urban areas in Mexico, and $\phi(\cdot)$ and $\Phi(\cdot)$ are the density of the distribution function and the cumulative distribution function of the standard normal.

In order to test for endogeneity of C, I adopted a 2S-Probit approach as in Rivers and Voung (1988) to get consistent estimators of the predicted coefficients.

What about the impact on poverty?



I followed Sedesol (2002) criteria to identify:

A food-based poverty line (PL1) that measures the incidence of extreme poverty

A capabilities-based poverty line (PL2) that measures poverty incidence

An asset-based poverty line (PL3) that measures the incidence of moderate poverty

What about the impact on poverty?

Marginal effects of the utility cost of credit on the probability (vulnerability) to poverty

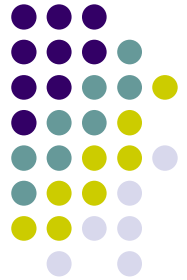
	PL3		PL2		PL1	
	Probit	2S-Probit	Probit	2S-Probit	Probit	2S-probit
GROUP	**0.040**	**-0.772**	**-0.089**	**-0.890**	**-0.109**	**-1.404**
	(0.28)	**(2.11)****	**(0.66)**	**(2.47)****	**(1.35)**	**(2.64)*****
LGUTCOSTCREDIT	**-0.047**	**0.386**	**-0.027**	**0.355**	**-0.004**	**0.334**
	(1.04)	**(2.93)*****	**(0.67)**	**(2.66)*****	**(0.31)**	**(1.62)***
ATHRHO		**-0.731**		**-0.628**		**-0.621**
		(-4.50)***		**(-3.84)*****		**(-2.39)****
LNSIGMA		**-0.240**		**-0.240**		**-0.243**
		(-4.14)***		**(-4.14)*****		**(-4.08)*****
Observations	148	148	148	148	148	148
Wald Chi2	17.71	26.16	14.97	20.84	11.43	13.97
Prob > Chi2	0.0387	0.0019	0.0919	0.013	0.1787	0.082

Robust z statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

The **marginal effect of a *relative* change in the utility cost of credit** endured by a poor borrower increases her probability to stay in poverty**, i.e an increased vulnerability to poverty**

What about the impact on schooling?



- If labour supply is constrained by the effects of intensive peer monitoring, then **children's schooling** could be affected.
- This issue is relevant in the context of long-term human capital accumulation and the poverty trap.
- Since basic instruction in Mexico is free of tuition fees, the use of household expenditure on education would have only accounted for seasonal costs. For that reason, I use a qualitative response model (**2S-Probit**) that captures the determinants of **school dropouts**.
- I consider children aged 5 to 17 at the time the survey was conducted.

What about the impacts on schooling?

	School dropouts	
	Probit	2S-Probit
GROUP	**0.024**	**-0.357**
	(0.21)	**(0.86)**
LGUTCOSTCREDIT	**0.032**	**0.362**
	(0.93)	**(2.35)****
ATHRHO		**-0.368**
		(-2.12)**
LNSIGMA		**-0.240**
		(-4.14)***
Observations	148	148
Wald Chi2	16.10	20.84
Prob > Chi2	0.0648	0.0134

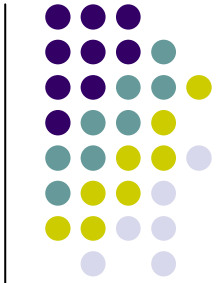
Robust z statistics in parentheses
* significant at 10%; ** significant at 5%;
*** significant at 1%

Results show a **significant marginal effect of a relative change in the utility cost of credit on the propensity of school dropouts**.

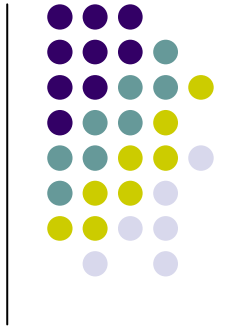
This may reflect a ***substitution effect*** between parents' and children's time used in peer monitoring activities.

If peer monitoring is too time intensive, then **children's time may be used to substitute the time parents' withdraw from child care and productive activities.**

Concluding remarks

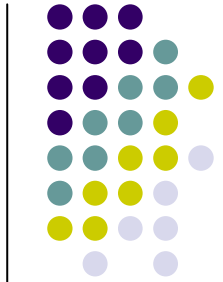


- Empirical evidence suggests that **the assumption of costless informational costs to the borrower cannot be supported, at least in the context of urban credit markets.**
- Although group lending has proved its efficacy in reducing the informational costs to the lender, **the spatial dimension of urban credit markets appear to exacerbate these costs to the borrower**.
- The negative impact of the utility cost of credit on household welfare is **significant.**
- **The '*institutionalisation*' of group lending means that rigid design factors** restrict potential welfare gains from microfinance.
- **Monopolistic competitive conditions** in which MFIs often operate, give **little incentives for innovation and development**.
- Individual lending may offer an alternative under similar market conditions



Thank you for listening!

Global trends in group lending



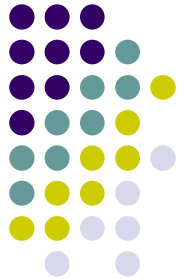
Year	Number of MFIs	Clients (in millions)	Poorest Clients (in millions)
1997	618	13.5	7.6
1998	925	20.9	12.2
1999	1065	23.6	13.8
2000	1567	30.7	19.3
2001	2186	54.9	26.9
2002	2572	67.6	41.6
2003	2931	80.9	54.8
2004	3164	92.3	66.6
2005	3133	113.3	81.9
2006	3316	133.0	92.9
2007	3552	154.8	106.6

Source: Microcredit Summit Report 2009

Group lending has become widely used to improve credit accessibility to the poor.

About 9% of 1.2 billion poor worldwide.

Global trends in group lending



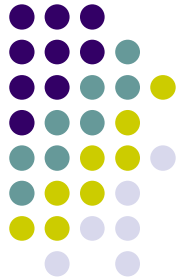
Institutions by Size (2007)

Clients	Number of Institutions	Number of poorest clients	% of total poorest
1 million or more	**10**	**28,098,014**	**26.36**
100,000–999,999	**60**	**17,184,064**	**16.12**
10,000–99,999	310	8,525,154	8.00
2,500–9,999	**533**	**2,608,463**	**2.45**
Fewer than 2,500	**2,633**	**1,454,464**	**1.36**
Networks	6	48,714,520	45.70
Total	**3552**	**106,584,679**	**100.00**

Source: Microcredit Summit Report 2009

Growing but still an immature sector…

The emergence of group lending in Mexico



The microfinance industry in Mexico 2007

	Borrowers	Gross loan portfolio (in million US$)
Compartamos Banco	869,153	412.09
Financiera Independencia	833,902	315.61
Caja Popular Mexicana	778,808	1261.77
Caja Libertad	343,706	635.26
CAME	105,778	20.43
FINCA México	87,428	24.17
FinComún	57,535	47.14
Apoyo Económico	23,347	18.98
Credi-Capital	22,745	8.89
Soluciones Financieras	22,095	6.62
Other 34 MFIs	1,741.60	174.16