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## **Sectoral choice Model for Rural Credit Market**

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### **Flow of Presentation**

- Credit Market And Its Properties
- Credit Market In India
- Agricultural Household Model
- The Nature And Basic Properties Of Data Set
- Household Sectoral Choice Model
- Effective Demand Model
- Results Of These Models
- Policy Implication In Indian Rural Credit Market



## Credit Market

- Functioning of a credit market (Milgrom and Roberts, 1992)
  - Not an instant market
  - The balance between demand and supply does not necessarily take place through the adjustment in the price of credit (interest rate)



## Credit Market

### Point credit is given


- **Pre-contractual problems**
  - Problems of adverse selection
  - Credit worthiness have to be signed by the borrowers
  - Lender must screen borrowers

### Point credit is repaid

- **Post-contractual problems**
  - Problem of moral hazard due to willful default
  - Problems of hold-up to unforeseen contingencies and consequent safety clauses should be built into the contract

Samar K.Datta and M.S. Sriram.2002. "Flow of credit to small and marginal Farmers in india"  
Oxford & IBH publishing Co. PVT. LTD

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**Table1: Common Problems of a Credit Contract**

<i>Pre-contractual problems</i>	<i>Post-contractual problems</i>	<i>Steps taken by lender</i>	<i>End result</i>
1. Adverse selection of borrower	-	(i) ration credit, (ii) ask for more documents & visits from borrower, (iii) discourage consumption loan, (iv) ask for marketable collateral, (v) insist on upfront interest payments.	(i) less credit use, especially on consumption loan, (ii) larger demand-supply gap, (iii) higher borrower transaction cost, (iv) higher willful default, (v) higher lender transaction cost ( $\Rightarrow$ higher interest rate).
-	2. Moral hazard of borrower	(i) monitor & counsel the borrower.	(i) higher lender transaction cost ( $\Rightarrow$ higher interest rate), (ii) higher willful default.
-	3. Asset-specificity problem	(i) monitor & counsel the borrower, (ii) impart greater flexibility in loan repayment.	(i) higher lender transaction cost ( $\Rightarrow$ higher interest rate), (ii) higher non-willful default.

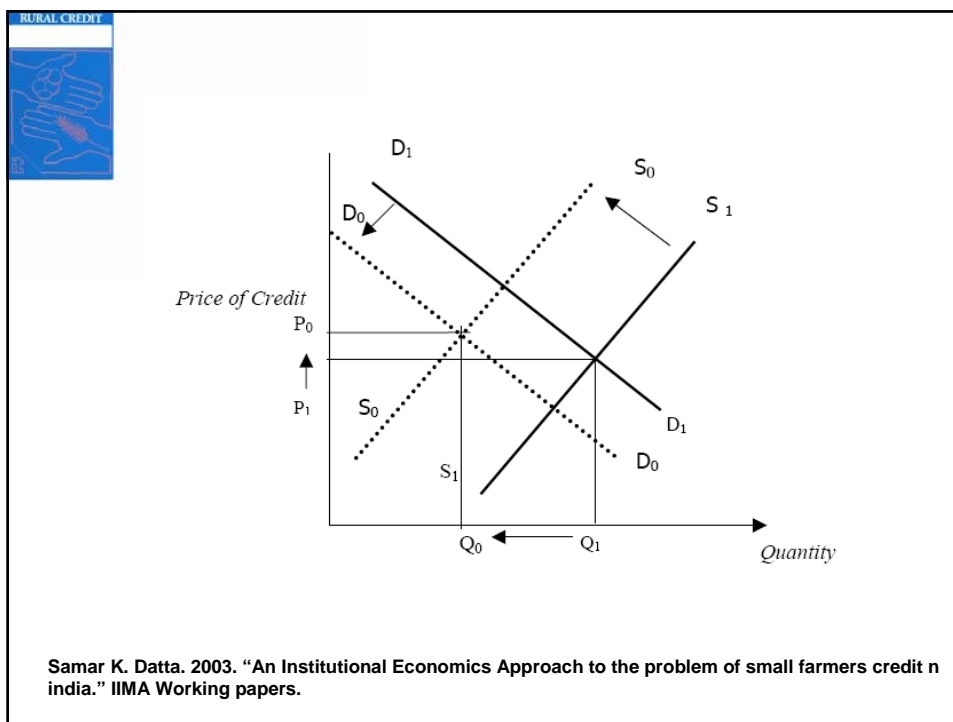
Samar K. Datta. 2003. "An Institutional Economics Approach to the problem of small farmers credit in india." IIMA Working paper series.

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## Credit Market

- Collateral: tangible or intangible
- Because of moral hazard and adverse selection problem, the lender may charge less amount to attract good borrowers and use good screening device.
- Other complimentary activities are also important for sustainability of credit market
- Transaction cost in getting loan



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## Credit Market in India-Issues

The formal rural financial system in India

- trapped in a vicious circle of stagnant or even declining credit-deposit ratio
- abnormally high cost of credit and default rate.
- the borrowers are confronting high interest rates, high transaction costs and other impediments to access credit,
- the banks and other formal lending institutions are complaining of low
- credit through self-help groups (SHGs) constitutes a small and insignificant part of the total credit system.



# Credit Market in India

**Table 8.14 : Agency-wise Ground Level Credit Flow for Agriculture and Allied Activities**

(Rs. crore)

Agency	2002-03	2003-04	2004-05	2005-06	2006-07*
Cooperative Banks	23,716	26,959	31,424	39,404	33,174
RRB's	6,070	7,581	12,404	15,223	15,170
Commercial Banks	39,774	52,441	81,481	1,25,859	1,00,999
Total	69,560	86,981	1,25,309	1,80,486	1,49,343

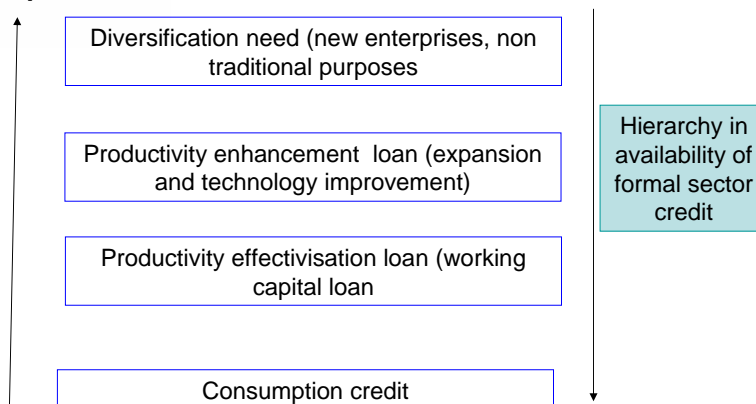
\* Upto December 31, 2006

Source : NABARD.



# Hierarchies Of Credit Need And Credit Availability

## Consumption credit



Samar K.Datta and M.S. Sriram.2002. "Flow of credit to small and marginal Farmers in India"  
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## Problem Of Credit In India

- Severe for small farmers (inclusive of marginal farmers) and other vulnerable sections (especially, the landless people)
  - lack marketable collateral
  - credit-worthy projects
  - political clout to access formal sources of credit.
- Formal lenders are often not too keen to lend to the large number of borrowers belonging to the landless and small farming communities.
- Small and Marginal farmers approach to informal sources for meeting their credit needs.



## Model

- In frame work of agricultural household model Iqbal (1986)
  - Two period model
  - Utility function
  - Two period constrained
  - Formal and informal borrowings
  - Modeling of informal as well as informal borrowing behavior



- Utility function

$$U = U[C_1, C_2, L_1, L_2]$$

- Two period constrained systems are as follows:

$$p_1 f[K_1, H_1] + w_1 M_1 + B = C_1 + I$$

$$p_2 \alpha f[K_2, H_2] + w_2 M_2 = C_2 + B(1 + r)$$

$$M_1 = T - H_1 - L_1$$

$$M_2 = T - H_2 - L_2$$

- Formal and informal borrowings

$$B = B_{\text{formal}} + B_{\text{informal}}$$



## Stylized Facts About The Formal And Informal Sector Lending

- High interest rate (Bhaduri 1973)
- Credit rationing because of high transaction cost (Datta, 2003).
- Probability of default (Basu, 1983; Hoff and Stiglitz 1990)
- Less collateral required (small and marginal farmers)
- Rationing in the supply of formal sector but not so for informal sector (Pal, 2002)



## Demand For Formal And Informal Loans

$$B_{formal} = B(p_1, p_2, \alpha, f, w, D_{formal}, C_{formal}, r_{formal}, T_{formal}) \dots$$

similarly

$$B_{informal} = B(p_1, p_2, \alpha, f, w, D_{informal}, C_{informal}, r_{informal}, T_{informal})$$



## Methodology

- Multinomial logit model
  - The probability of particular sector choice

$$\Pr ob [Y = j] = \frac{e^{\beta_j x_i}}{\sum_{k=1}^4 e^{\beta_k x_i}} \dots \dots \text{ where } j = 0, 1, 2, 3$$

$$\Pr ob [Y = 0] = \frac{1}{1 + \sum_{k=1}^4 e^{\beta_k x_i}}$$

$$\Pr ob [Y = j] = \frac{e^{\beta_j x_i}}{1 + \sum_{k=1}^4 e^{\beta_k x_i}}$$

**Y = 0 is taken as the benchmark case.**

$$\frac{\Pr ob [Y = j]}{\Pr ob [Y = 0]} = e^{\beta_j x_i}$$



## Sample Selection Models

- The standard Heckman selection model

- ✓ Selection is based on single variable

$$z_i^* = w_i' \gamma + u_i$$

$$z_i = \begin{cases} 1 & \text{if } z_i^* > 0 \\ 0 & \text{if } z_i^* \leq 0 \end{cases}$$

$$y_i = x_i' \beta + \varepsilon_i \quad \text{if } z_i = 1$$

- ✓ Selection is based on several variable

$$z_i = \begin{cases} 1 & \text{if } z_i^* > 0 \\ 0 & \text{if } z_i^* \leq 0 \end{cases}$$

$$y_{1i} = x_{1i}' \beta_1 + \varepsilon_{1i} \quad \text{if } z_i = 0$$

$$y_{2i} = x_{2i}' \beta_2 + \varepsilon_{2i} \quad \text{if } z_i = 1$$



## Natures and Features of Dataset Used

Source of credit	Frequency
Both formal and informal sector	246
No Loan	74
Only Formal sector	262
Only informal sector	118

Formal sector loan (source)	Frequency
SHG Only	76
Cooperative and SHG Only	18
Cooperative Only	202
Band and SHG Only	15
Bank Only	89
Band and Cooperative Only	82
ALL	24

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## Modeling Informal Interest Rate

	Estimate	Pr>ChiSq
<b>Intercept</b>	21.974	<.0001
<b>village attributes</b>		
<b>MICRO</b>	-0.142	0.868
<b>PCNBS</b>	-0.093	0.076
<b>MARKET</b>	1.12	<.0001
<b>PANCH</b>	-0.567	0.05
<b>CINST</b>	-0.086	0.901
<b>PBOVINE</b>	-1.368	0.032
<b>UCASTE</b>	-0.024	0.258
<b>MLIT</b>	0.117	0
<b>loan attributes</b>		
<b>FORINT</b>	-0.058	0.356
<b>FLEXI</b>	-1.11	0.062
<b>NFORUP</b>	15.501	<.0001
<b>NFOREX</b>	4.676	0.02
<b>PCDEF</b>	0.001	0.949

Household Attributes	Estimate	Pr>ChiSq
<b>PAREA</b>	-0.456	0.773
<b>FEDU</b>	-5.877	0.025
<b>PCCLD</b>	0.02	0.085
<b>PCIR</b>	-0.001	0.93
<b>PCCASH</b>	-0.039	0.017
<b>SOWN</b>	-2.85	0.004
<b>DEPO</b>	1.18	0.226
<b>pani</b>	-0.115	0.741
<b>INTAN</b>	2.134	0.013
<b>PCOUT</b>	0.013	0.502
<b>EXTEN</b>	3.873	0.002
<b>FAM</b>	0.026	0.551
<b>small</b>	0.754	0.367
<b>large</b>	1.608	0.356

<b>Adj R<sup>2</sup></b>	<b>0.3604</b>
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## Maximum Likelihood Logit Estimates

	BL		OF		ON	
	Estimate	Pr>ChiSq	Estimate	Pr>ChiSq	Estimate	Pr>ChiSq
<b>Intercept</b>	-10.255	<.0001	-7.321	0.003	-3.758	0.133
<b>village attributes</b>						
<b>MICRO</b>	2.805	<.0001	3.129	<.0001	1.921	0.004
<b>PCNBS</b>	-0.025	0.429	0.032	0.289	-0.057	0.074
<b>MARKET</b>	0.821	0.001	0.951	0	0.567	0.025
<b>PANCH</b>	2.077	<.0001	2.257	<.0001	2.299	<.0001
<b>CINST</b>	0.91	0.103	0.638	0.241	1.424	0.017
<b>PBOVINE</b>	6.92	<.0001	5.478	0	5.4	0
<b>UCASTE</b>	0.016	0.247	0.052	0	-0.008	0.6
<b>loan attributes</b>						
<b>FORINT</b>	-0.066	0.343	-0.117	0.097	-0.032	0.649
<b>NFORINT</b>	0.258	0.002	0.039	0.646	0.116	0.161

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Maximum Likelihood Logit Estimates						
Household attributes	BL		OF		ON	
	Estimate	Pr>ChiSq	Estimate	Pr>ChiSq	Estimate	Pr>ChiSq
PAREA	0.855	0.345	0.948	0.285	0.335	0.768
PCCLD	0.018	0.027	0.005	0.576	0.008	0.367
PCIR	0.016	0.017	0.015	0.015	-0.004	0.596
PCCASH	0.047	<.0001	0.036	0	0.046	<.0001
SOWN	-2.336	0.01	-4.049	<.0001	-1.987	0.029
DEPO	0.985	0.117	1.643	0.009	-1.187	0.055
pani	-0.061	0.833	0.116	0.679	-0.517	0.096
INTAN	0.199	0.691	-0.13	0.786	0.922	0.084
FAM	0.01	0.956	0.678	0.001	-0.057	0.775
small	-1.044	0.125	-0.313	0.628	-1.549	0.023
large	-2.025	0.034	-1.63	0.074	-2.943	0.006

**Log-Likelihood = -1744.93**  
**LR= 879.5474**

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Effective demand of formal sector loan				
	NFOR (FOR=1)		NFOR (FOR=0)	
	Estimate	Pr >  t	Estimate	Pr >  t
Intercept	-0.408	0.007	0.082	0.801
PCNBS	-0.003	0.118	-0.011	0.024
MARKET	0.026	0.000	0.012	0.466
PANCH	-0.028	0.089	0.082	<.0001
CINST	0.008	0.779	0.377	<.0001
PBOVINE	0.255	<.0001	0.485	<.0001
UCASTE	-0.001	0.349	-0.006	0.001
PAREA	0.075	0.159	-0.160	0.151
PCCLD	0.002	<.0001	0.001	0.450
PCIR	0.001	0.014	-0.001	0.391
CASTE	-0.072	0.079	-0.075	0.336
DEPO	0.017	0.749	-0.242	0.002
pani	-0.013	0.399	-0.044	0.223
INTAN	0.091	0.011	0.097	0.130
FAM	-0.078	<.0001	-0.013	0.607
FORINT	0.003	0.262	-	-
PNFORINT	0.029	<.0001	0.001	0.934
_Sigma.nfor	0.402	<.0001	0.348	<.0001
_Rho	0.899	<.0001	-0.075	0.7535

**Effective Demand Of Formal Sector Loan**

	FOR (NFOR=1)		FOR (NFOR=0)	
	Estimate	Pr >  t	Estimate	Pr >  t
Intercept	-0.202	0.179	0.382	0.087
MICRO	0.089	0.049	0.201	<.0001
PCNBS	0.007	0.027	0.005	0.010
MARKET	0.029	<.0001	0.095	<.0001
PBOVINE	0.080	0.017	0.036	0.557
UCASTE	0.003	0.008	0.007	<.0001
PAREA	0.000	0.999	0.162	0.017
PCWORK	-0.001	0.108	-0.001	0.098
PCIR	0.002	<.0001	0.002	0.001
PCCLD	0.001	0.026	0.001	0.313
SOWN	-0.093	0.079	-0.393	<.0001
DEPO	0.214	<.0001	0.214	0.001
pani	0.050	0.043	0.018	0.205
FAM	-0.010	0.547	0.111	<.0001
Small	0.106	0.061	0.025	0.651
large	0.137	0.119	-0.062	0.418
FORINT	-0.002	0.480	-0.012	0.001
PNFORINT	0.013	0.000	-0.023	0.010
_Sigma.nfor	0.335	<.0001	0.325	<.0001
_Rho	0.061	0.745	-0.354	0.039

- Conclusions**
- Methodologically, more supplicated or sophisticated models (multinomial as well as switching regression)
  - Endogeneity of interest rate
  - informal suppliers play a big role
  - As a further extension of this work,
    - a generalized agricultural household model approach with much better understanding of demand and supply side
    - In analysis side more simultaneity of endogenous variables and inclusion of purpose of loan in the model.



THANK YOU

Questions!!!!