Rules versus Discretion in Loan Rate Setting

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Who makes the credit decisions?

The Role of Technology in Banking

«The solution (*LiquidCredit Bank2Business*) also provides a risk-based pricing matrix. Having an objective, suggested price is very helpful»

Tina Reisedge*, 2003

*Small Business Product Manager of First Tennessee Bank

“Rules” vs. “Discretion”

“Rules”

“Discretion”

Loan Rates

Loan Pricing Models and R^2

Study	R^2	# Var.	# Obs.
Petersen & Rajan, JF 1994	0.15	32	1,389
Berger & Udell, JB 1995	0.10	22	371
Brick & Palia, JFI 2007	0.11	80	766
Degryse & Ongena, JF 2005	0.22	83	15,044

Heterogeneity in Pricing Models

- Sample split regressions (by loan size)
  - Degryse & Ongena (JF 2005)

Loan Size ($)	# Obs.	R^2
< 5,000	5,850	0.01
> 50,000	1,850	0.67

Methodology and Main Results

- Our methodological approach:
  - Variance analysis of unexplained component of loan rates (heteroscedastic regression model)
- Our main findings:
  - The importance of “discretion” decreases with:
    - Loan size (Information search costs)
  - And increases with:
    - Borrower opaqueness (Switching costs)

Econometric Model

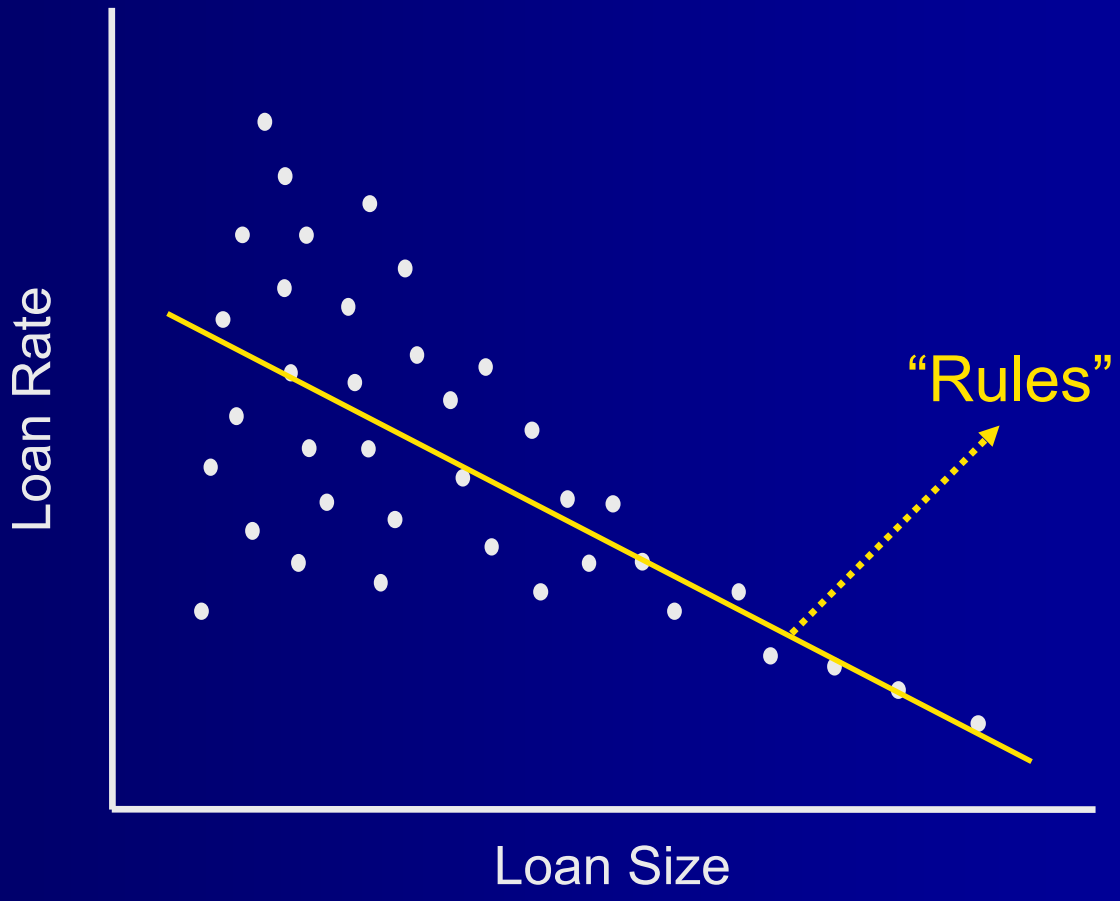
- Heteroscedastic regression model:

  Mean equation: $y_i = \beta' X_i + u_i$

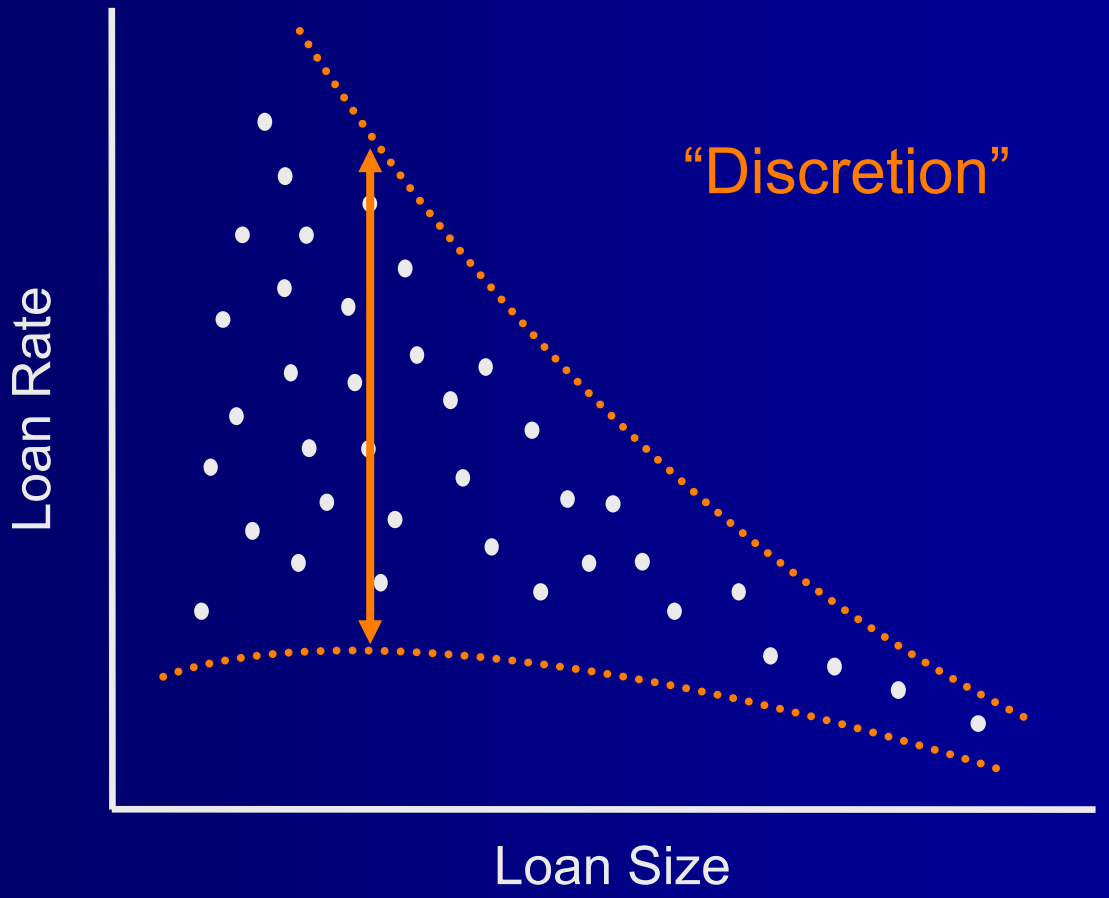
  Variance equation: $\sigma_i = \exp(\gamma' Z_i)$

- Extreme cases:
  - "Rules": R^2 of mean equation $\rightarrow 1$
  - "Discretion": R^2 of mean equation $\rightarrow 0$
- Parameter of interest: γ

Hypothetical Example



Hypothetical Example



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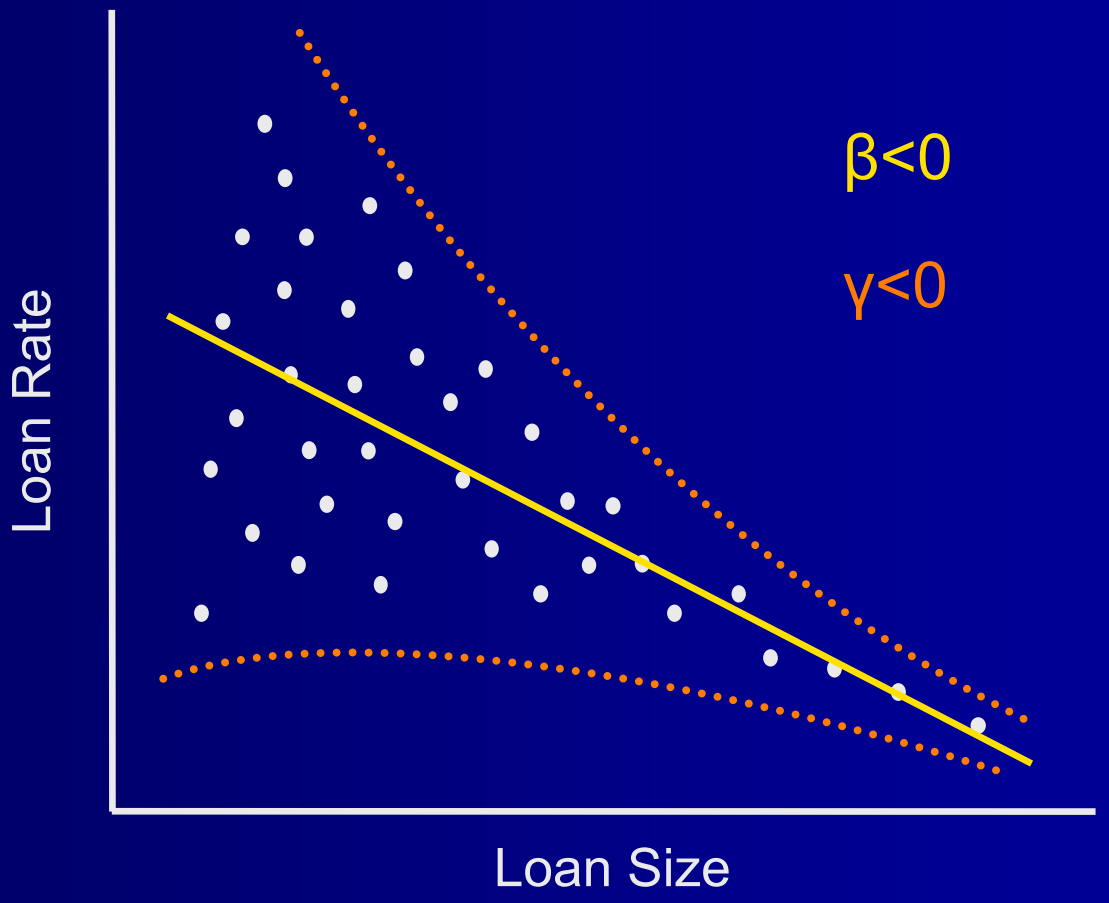
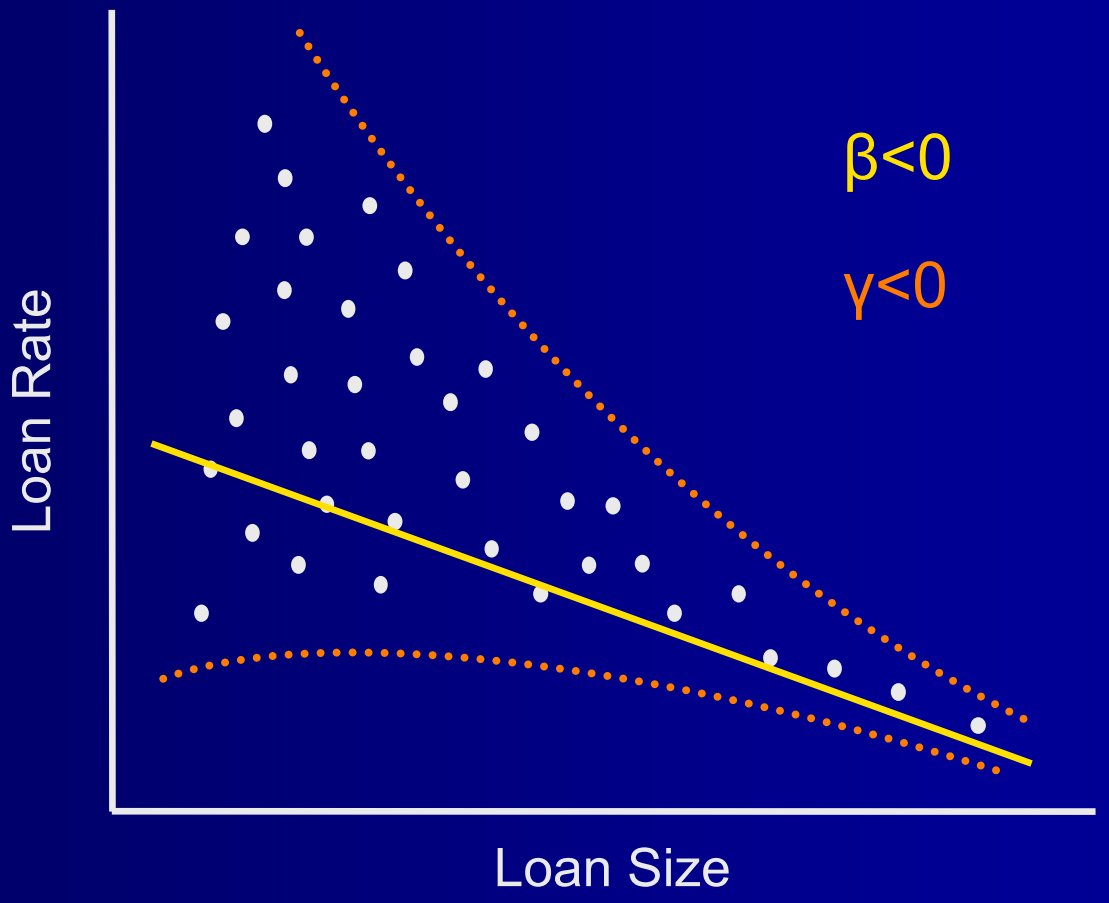
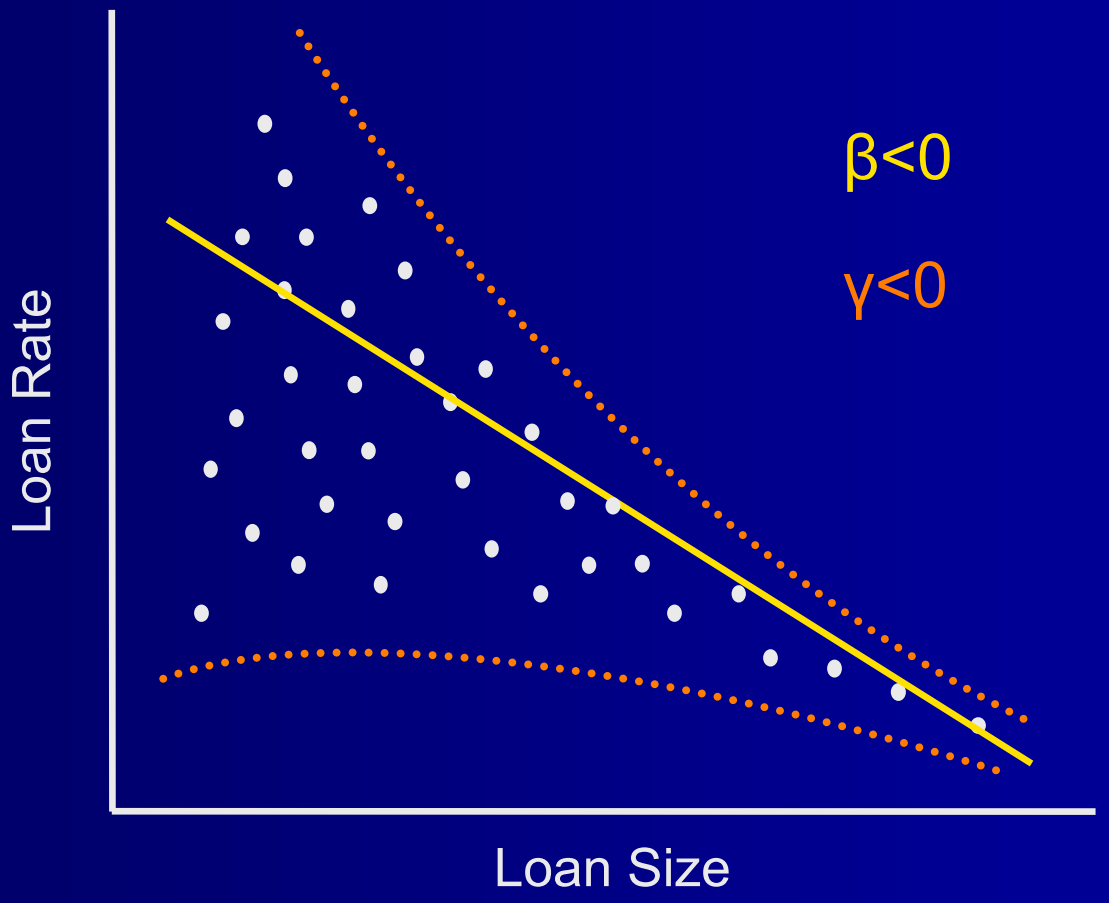


Relation Between β and γ



Relation Between β and γ



Data and Variables in Mean Equation

- Datasets:
  - 1993, 1998 and 2003 SSBF
  - Belgian sample in Degryse & Ongena (JF 2005)
- In the mean equation we control for:
  - Underlying cost of capital
  - Loan characteristics
  - Firm/Owner characteristics
  - Relationship characteristics
  - Competition / Location measures
  - Type of lender

Mean Equation

- Number of predictors: 62
- R^2 of mean equation: 25%
- Robustness checks:
  - Model specification
  - Discontinuous “Rules”
  - Relevance of information
  - Industry heterogeneity
  - Bank heterogeneity

Variables in Variance Equation

- "Discretion" is a product of market imperfections:
  - Information search costs Stigler (JPE 1961)
  - Information asymmetries von Thadden (FRL 2004)
    - Firm opaqueness Petersen & Rajan (QJE 1995)
    - Strength of firm-bank relationsip Petersen & Rajan (JF 1994), Berger & Udell (JB 1995)
    - Firm switching costs Bester (AER 1993)
  - Competitive structure of banking markets
    - Market concentration Hannan (JBF 1991, RIO 1997)
    - Firm-bank distance Hauswald & Marquez (RFS, 2005)

Results of Variance Equation

Variable	γ	S.e. (γ)
Ln(Loan Amount)	-0.27 ***	0.02
Loan is Collateralized (0/1)	-0.18 **	0.08
Firm is a Corporation (0/1)	-0.24 ***	0.09
Ln(Age of the Firm's Owner)	0.39 ***	0.13
Firm Owned by Minority Group (0/1)	0.34 ***	0.13
Firm Has Clean Legal Record (0/1)	-0.25 ***	0.09
Firm Had IRS Problem (0/1)	0.16 **	0.07
Duration of Firm-Bank Relationship	-0.12 **	0.05
Concentrated Banking Market (0/1)	0.10	0.08
Firm Located in MSA (0/1)	0.18 **	0.09
Ln(Firm-Bank Distance)	0.10 ***	0.02
Number of observations	1,425	

Information Search Costs

Variable	γ	S.e. (γ)
Ln(Loan Amount)	**-0.27 *** **	**0.02**
Loan is Collateralized (0/1)	-0.18 **	0.08
Firm is a Corporation (0/1)	-0.24 ***	0.09
Ln(Age of the Firm's Owner)	0.39 ***	0.13
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Firm Opaqueness / Switching Costs

Variable	γ	S.e. (γ)
Ln(Loan Amount)	-0.27 ***	0.02
Loan is Collateralized (0/1)	**-0.18 ** **	**0.08**
Firm is a Corporation (0/1)	**-0.24 *** **	**0.09**
Ln(Age of the Firm's Owner)	0.39 ***	0.13
Firm Owned by Minority Group (0/1)	**0.34 *** **	**0.13**
Firm Has Clean Legal Record (0/1)	**-0.25 *** **	**0.09**
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Firm Located in MSA (0/1)	0.18 **	0.09
Ln(Firm-Bank Distance)	**0.10 *** **	**0.02**
Number of observations	1,425	

Economic Significance

Variable	Loan A	Loan B
Loan Size ($)	$25,000	$550,000
Loan is Collateralized (0/1)	No	Yes
Firm is a Coporation (0/1)	No	Yes
Firm Has Clean Legal Record (0/1)	No	Yes
Duration of Relationship (years)	3	13
Predicted Loan Rate (%)	9.3	8.1
Confidence Interval (95%)	[5.1–13.5]	[6.3–9.9]
Predicted R^2 of Mean Equation	0.01	0.81

Has "Discretion" Varied Over Time?

- Empirical Test:
  - Sample: 1993, 1998 and 2003 SSBF
  - Include in variance equation a time trend and interaction terms
- Results:
  - Discretion decreased for small loans to opaque businesses Berger, Frame & Miller, (JMCB 2005)
  - Evidence of risk-shifting behavior Rajan (EFM 2006)

Conclusions

- Heteroscedastic model identifies determinants of unexplained dispersion of loan rates (“discretion”)
- “Discretion” increases with...
  - Borrower opaqueness (Switching costs)
- and decreases with…
  - Loan size (Information search costs)
- “Discretion” has decreased over the last 15 years for small loans to opaque firms