Skin in the Game in the Originate-to-Distribute Model: Evidence from the Online Social Lending Market

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Motivation

- Matching of demand and supply crucial for
  - Functioning of markets
  - Financial markets such as the lending market

- Information asymmetries may lead to market breakdown
  - Akerlof (1970) and Stiglitz and Weiss (1981)

- Traditionally: Banks as financial intermediaries
  - Use public and private information
  - Screen and monitor borrowers
  - Skin in the game: Holmstrom (1979) and Holmstrom and Tirole (1997)

- More recently: Less skin in the game –accompanying financial disintermediation
  - Widespread use of loan securitization and originate-to-distribute model
  - New lending platforms with recent advances in information technology

Analysis

Open Questions

- How does the originate-to-distribute model with reduced skin in the game change the incentives, the kind of loans originated, and their performance?

- How do new online lending platforms match demand and supply, what mechanisms work?

Data and Setting

- Online peer-to-peer lending prosper.com
- Creation of groups with group leaders and members
- Natural Experiment:
  - Loan origination fees (rewards) charged by some groups but not all groups.
  - Loan origination fees eliminated for *all* groups during sample period.
- Can see differences not just cross-sectionally but also in behavior of the same groups before and after elimination of loan origination fees.

Preview of Results

- Groups help markets function better, by operating as informal intermediaries.
  - Group leaders signal borrower quality by endorsing and submitting bids
  - Borrowers in groups
    - Have higher likelihood of receiving a loan
    - Pay lower interest rates
    - Default less often
- However, detrimental effects of group leader origination fees
  - Adverse incentives: Loans originated by group leaders with rewards have higher default rates, despite bids and endorsements
  - Group leaders more careful when they have skin in the game
    - after reward elimination
    - if their loan participation is high

Related Work

Market Functioning and Skin in the Game

- Akerlof (1970)
- Stiglitz and Weiss (1981)
- Holmstrom (1979), Holmstrom and Tirole (1997)
- Sufi (2007)

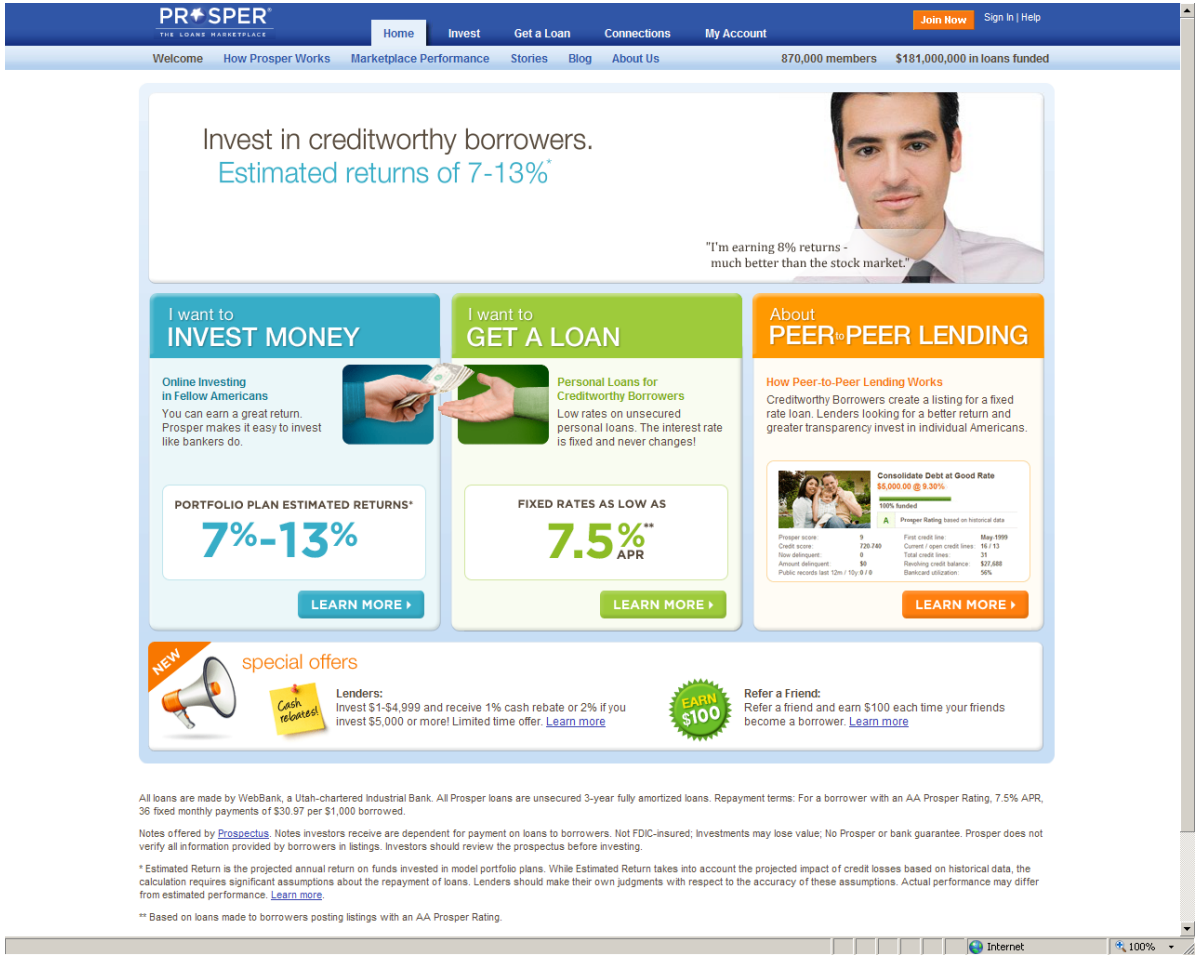
Traditional Banking Literature

- Stein (2002), Petersen (2004), Berger, Miller, Petersen, Rajan, and Stein (2005)
- Bolton and Scharfstein (1996)

Literature on Prosper

- Ravina (2008)
- Lin, Prabhala, and Viswanathan (2009)
- Iyer, Khwaja, Luttmer, and Shue (2009)

Screenshot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* Estimated Return is the projected annual return on funds invested in model portfolio plans. While Estimated Return takes into account the projected impact of credit losses based on historical data, the calculation requires significant assumptions about the repayment of loans. Lenders should make their own judgments with respect to the accuracy of these assumptions. Actual performance may differ from estimated performance. Learn more.
** Based on loans made to borrowers posting listings with an AA Prosper Rating.
Internet
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General Setup: Listings, Bids, and Loans

Borrowers Create Listings

- Amount requested (≤ $25,000)
- Maximum interest rate
- Duration
- Financial information
- Personal information

Lenders Place Bids

- Amount bid (≥ $50)
- Minimum interest rate

Possible Outcomes (Once Listing Duration Is Over)

- Amount Bid ≥ Amount Requested → Listing becomes a **Loan**, bids with the highest interest rates are outbid
- Amount Bid < Amount Requested → Listing expires

General Setup: The Group System

- Creation of self-organized groups
  - Headed by a group leader
  - Joined voluntarily by further members

- Group leaders allowed to
  - Define the purpose of their groups
  - Grant or deny access to their groups / Ask for verification of information
  - Bid on and endorse loan listings

- Group leader origination fees (rewards)
  - Group leaders allowed to request rewards for successful listings
  - Eliminated on 09/12/2007

→ Natural experiment: Analyze behavior of the same groups before and after
  - Differences in kinds of loans originated
  - Differences in loan performance

Data

Data Source

- Prosper.com, the largest online social lending platform
- Snapshot of the data available for download on website

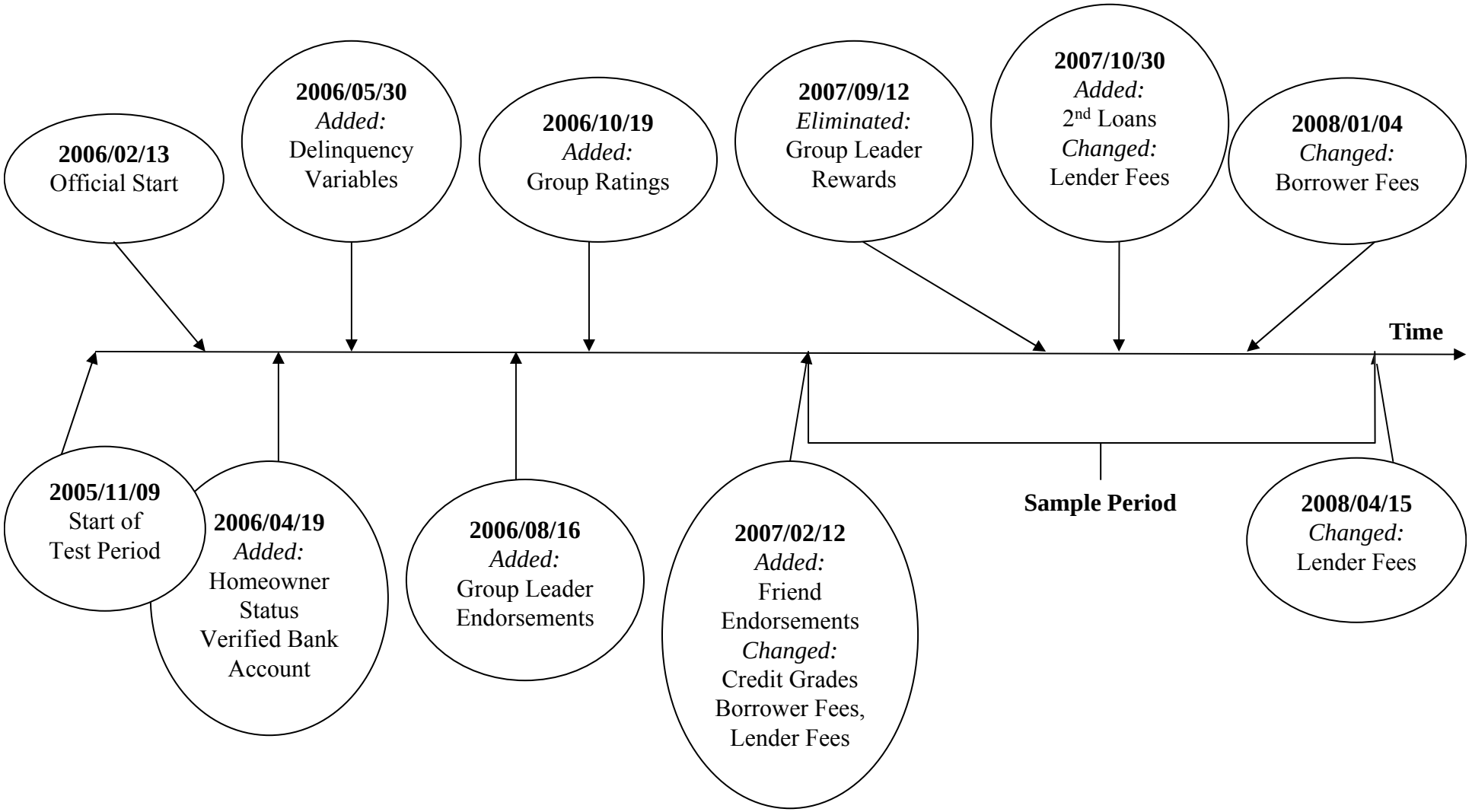
Data Composition

- Borrower listings and loans
- Group structure
- Bids and endorsements
- Interest rates and subsequent loan performance

Sample Period and Size

- 12 February, 2007 to 15 April, 2008
- 153,541 listings and 12,183 loans
- Average amount requested: $8,164, average amount funded: $7,097
- Total amount funded: $86,463,712

Timeline and Sample Period



Descriptive Statistics

	No Group	No-Reward Groups	Reward Groups	Overall
PANEL A: DISTRIBUTION OF LISTINGS (I.E. OF REQUESTS FOR BORROWING MONEY)				
AA / A	7,641	301	1,641	**9,583**
B	6,532	146	1,839	**8,517**
C	12,572	293	3,648	**16,513**
D	18,896	346	5,529	**24,771**
E	21,005	261	6,157	**27,423**
HR	52,037	545	14,152	**66,734**
Total Number of Listings	**118,683**	**1,892**	**32,966**	**153,541**
PANEL B: DISTRIBUTION OF LOANS (I.E. OF SUCCESSFULLY AND COMPLETELY FUNDED REQUESTS FOR BORROWING MONEY)				
AA / A	2,303	181	659	**3,143**
B	1,366	73	540	**1,979**
C	1,572	119	839	**2,530**
D	1,258	130	904	**2,292**
E	514	63	495	**1,072**
HR	432	88	647	**1,167**
Total Number of Loans	**7,445**	**654**	**4,084**	**12,183**
PANEL C: GROUP-SPECIFIC INFORMATION				
Share of Listings with at Least One Group Leader Bid		45.8%	32.0%	**32.7%**
Share of Listings with a Group Leader Endorsement		32.8%	12.4%	**13.5%**
Share of Listings with "Vetting"		28.6%	9.4%	**10.4%**
Share of Listings with Listing Review Requirement		66.0%	40.7%	**42.1%**
Share of Listings where Group Leader Offers Help		18.1%	7.8%	**8.3%**

Functioning of Different Group Types

Panel A: Listing Success

Credit Grade	No Group (N=118,683)	No-Reward Groups (N=1,892)		Reward Groups (N=32,966)		Comparison No-Reward vs. Reward Groups t-statistic
AA/A	30.1%	60.1%	(-10.43)***	40.2%	(-7.59)***	(6.50)***
B	20.9%	50.0%	(-6.95)***	29.4%	(-7.19)***	(4.81)***
C	12.5%	40.6%	(-9.73)***	23.0%	(-13.87)***	(5.96)***
D	6.7%	37.6%	(-11.83)***	16.4%	(-18.31)***	(7.99)***
E	2.4%	24.1%	(-8.17)***	8.0%	(-15.42)***	(6.02)***
HR	0.8%	16.1%	(-9.71)***	4.6%	(-20.78)***	(7.29)***
Total	**6.3%**	**34.6%**	**(-25.80)*** **	**12.4%**	**(-31.42)*** **	**(20.01)*** **

Panel B: Interest Rates

Credit Grade	No Group (N=7,445)	No-Reward Groups (N=654)		Reward Groups (N=4,084)		Comparison No-Reward vs. Reward Groups t-statistic
AA/A	10.9%	9.3%	(7.67)***	11.3%	(-2.82)***	(-8.69)***
B	15.1%	12.9%	(6.25)***	15.0%	(0.50)	(-5.64)***
C	17.5%	15.6%	(4.38)***	17.5%	(-0.14)	(-4.37)***
D	21.1%	17.7%	(8.37)***	20.1%	(5.01)***	(-6.03)***
E	26.3%	20.9%	(8.32)***	24.0%	(7.72)***	(-4.95)***
HR	25.5%	20.5%	(6.54)***	24.9%	(1.70)*	(-6.27)***
Total	**16.7%**	**15.1%**	**(6.34)*** **	**18.7%**	**(-16.25)*** **	**(-14.10)*** **

Panel C: Loan Performance

Credit Grade	No Group (N=7,445)	No-Reward Groups (N=654)		Reward Groups (N=4,084)		Comparison No-Reward vs. Reward Groups t-statistic
AA/A	7.1	4.6	(-11.17)***	8.8	(11.28)***	(16.76)***
B	11.2	7.3	(-10.30)***	14.8	(16.49)***	(18.16)***
C	12.4	9.7	(-8.01)***	16.8	(23.72)***	(19.92)***
D	14.6	10.2	(-13.33)***	17.1	(12.51)***	(20.01)***
E	19.1	14.1	(-8.91)***	21.6	(8.08)***	(13.41)***
HR	20.7	22.8	(3.43)***	25.7	(14.85)***	(4.92)***
Total	**12.1**	**11.0**	**(-7.12)*** **	**17.6**	**(62.13)*** **	**(39.13)*** **

Functioning of Different Group Types

- No-reward groups work best
  - Highest listing success
  - Lowest interest rates
  - Best loan performance

- Reward groups do not work well
  - Higher listing success than outside groups
  - Lower interest rates than outside groups (for bad credit grades)
  - But: Higher default rates than other loans

- Why do reward groups not work in comparison to no-reward groups?

Group Leader Bids and Endorsements

Panel A: Listing Success

Credit Grade	No-Reward Groups (N=1,892)					Reward Groups (N=32,966)				
	None	With GL-Bid		With GL-Endorsement		None	With GL-Bid		With GL-Endorsement	
AA/A	39.5%	78.1%	(-6.81)***	81.9%	(-7.54)***	31.2%	50.0%	(-7.56)***	69.6%	(-13.29)***
B	34.3%	64.6%	(-3.67)***	76.6%	(-5.00)***	20.8%	38.5%	(-8.06)***	60.7%	(-13.87)***
C	21.3%	60.6%	(-7.31)***	70.8%	(-8.31)***	14.9%	33.2%	(-12.21)***	54.0%	(-17.61)***
D	13.2%	56.0%	(-9.37)***	68.9%	(-10.97)***	9.7%	26.4%	(-15.04)***	45.5%	(-19.43)***
E	9.5%	42.5%	(-6.22)***	55.4%	(-7.25)***	3.4%	18.0%	(-15.49)***	31.2%	(-15.28)***
HR	4.3%	32.4%	(-8.38)***	33.1%	(-7.58)***	2.0%	11.1%	(-17.54)***	19.6%	(-16.03)***
Total	**16.6%**	**52.8%**	**(-17.22)*** **	**60.6%**	**(-18.97)*** **	**6.9%**	**22.4%**	**(-35.17)*** **	**39.3%**	**(-41.37)*** **

Panel B: Interest Rates

Credit Grade	No-Reward Groups (N=654)					Reward Groups (N=4,084)				
	None	With GL-Bid		With GL-Endorsement		None	With GL-Bid		With GL-Endorsement	
AA/A	9.3%	9.3%	(-0.11)	9.5%	(-0.37)	11.0%	11.4%	(-2.10)**	11.7%	(-2.79)***
B	13.4%	12.4%	(1.34)	12.9%	(0.61)	15.2%	14.6%	(1.65)*	14.9%	(0.85)
C	15.8%	15.6%	(0.22)	15.6%	(0.17)	18.2%	16.8%	(4.73)***	17.1%	(3.49)***
D	19.2%	17.4%	(1.94)*	17.1%	(2.10)**	20.9%	19.7%	(3.97)***	19.6%	(4.22)***
E	21.5%	20.6%	(0.62)	20.4%	(0.72)	24.8%	23.8%	(2.24)**	23.5%	(2.58)***
HR	24.7%	19.7%	(2.37)**	20.7%	(1.89)*	26.1%	24.2%	(4.50)***	24.3%	(4.06)***
Total	**14.8%**	**15.5%**	**(-1.20)**	**15.4%**	**(-1.03)**	**18.7%**	**18.8%**	**(-0.53)**	**18.5%**	**(0.77)**

Panel C: Loan Performance

Credit Grade	No-Reward Groups (N=654)					Reward Groups (N=4,084)				
	None	With GL-Bid		With GL-Endorsement		None	With GL-Bid		With GL-Endorsement	
AA/A	2.8	6.3	(7.70)***	4.5	(3.97)**	6.6	10.6	(14.16)***	11.0	(14.26)***
B	7.7	3.5	(-5.54)***	7.0	(-0.81)	13.3	15.8	(6.42)***	15.5	(5.27)***
C	8.8	10.3	(2.04)**	8.7	(-0.09)	16.7	16.8	(0.34)	16.3	(-1.21)
D	9.6	10.5	(1.02)	9.5	(-0.13)	16.8	17.5	(2.05)**	16.9	(0.21)
E	19.4	13.2	(-4.33)***	12.4	(-4.79)***	18.5	22.9	(9.21)***	25.5	(12.89)***
HR	31.4	21.1	(-5.66)***	22.9	(-4.62)***	23.7	26.4	(5.70)***	29.1	(10.26)***
Total	**10.6**	**11.4**	**(2.10)** **	**10.9**	**(0.87)**	**15.7**	**18.9**	**(20.79)*** **	**19.0**	**(19.98)*** **

Group Leader Bids and Endorsements

- Success rates much higher for listings with than for listings without group leader bids and endorsements, in both reward and no-reward groups

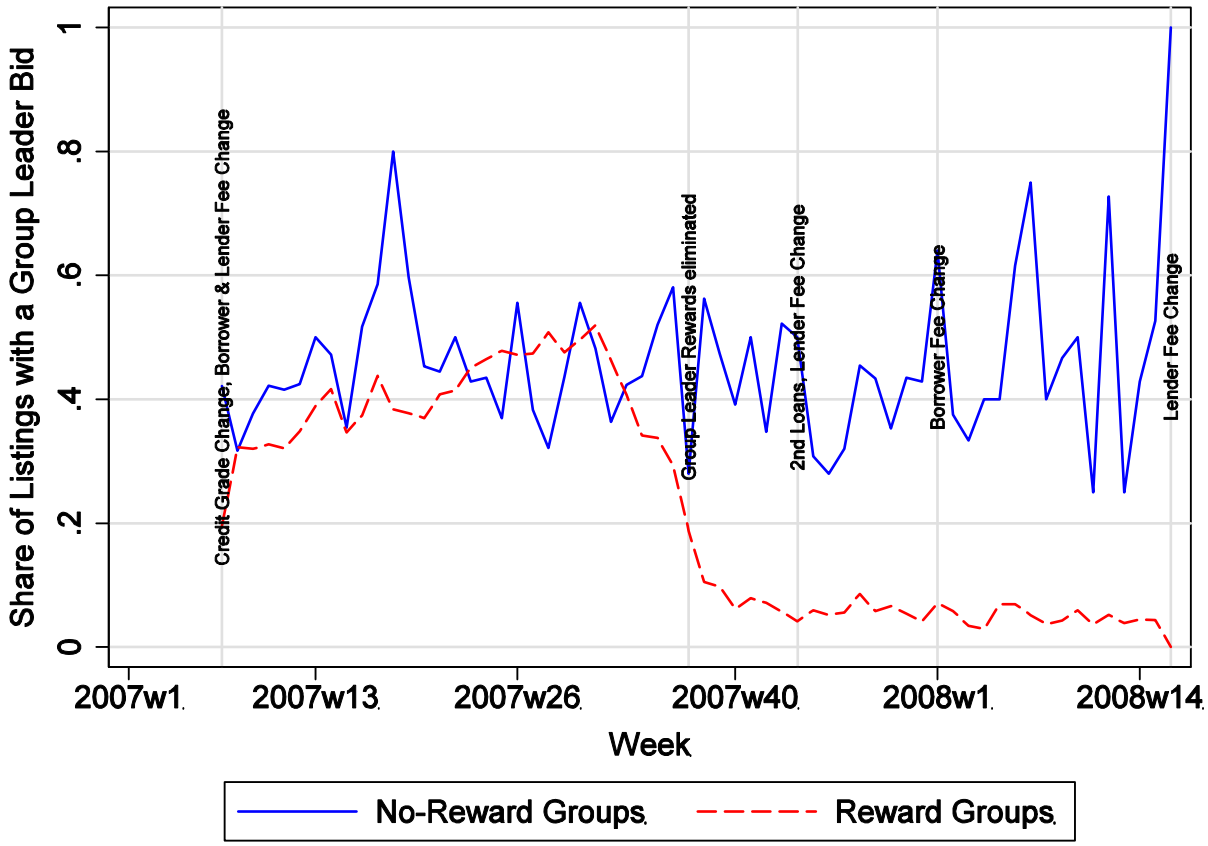
- No-reward groups: Two promotion mechanisms associated with listings of good quality even for bad credit grades E or HR

- Reward groups: Default rates are systematically increased for listings with a group leader bid or a group leader endorsement

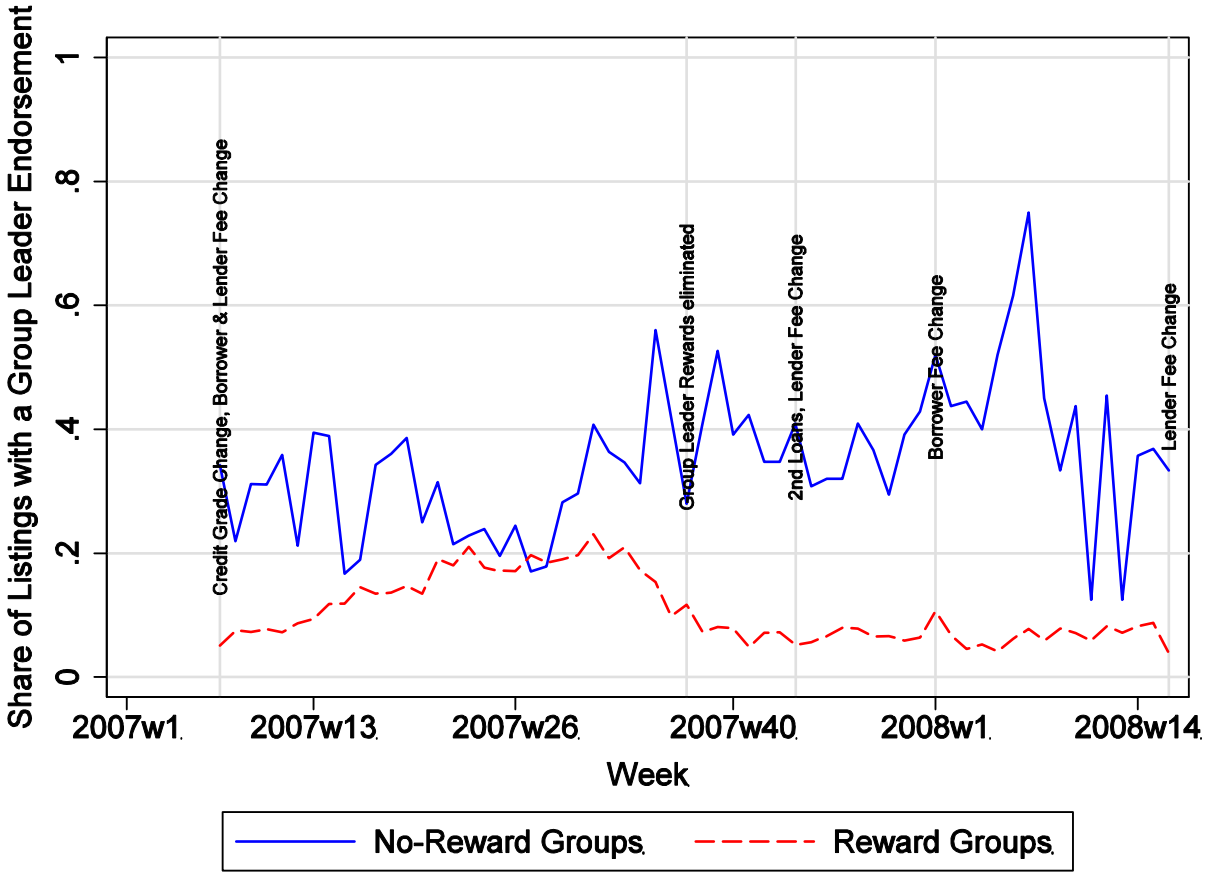
→ Group leader bids and endorsements lead to adverse outcomes in reward groups

- If this is due to adverse incentives for group leaders, then we should expect to see a change in behavior with a change in reward structure.

Group Leader Bids Before and After



Group Leader Endorsements Before and After



Group Leader Behavior Before and After

	No-Reward Groups (N=1,892)			Reward Groups (N=32,966)		
Credit Grade	**Before**	**After**	**t-statistic**	**Before**	**After**	**t-statistic**
Panel A: Share of Listings with a Group Leader Bid						
AA/A	42.6%	42.4%	(0.02)	43.3%	24.0%	(6.70)***
B	44.2%	45.0%	(-0.10)	45.4%	15.1%	(12.37)***
C	52.2%	42.5%	(1.63)	42.7%	10.4%	(21.67)***
D	57.3%	52.0%	(0.90)	44.2%	5.9%	(37.25)***
E	45.0%	39.5%	(0.83)	37.6%	5.2%	(35.45)***
HR	40.1%	44.0%	(-0.84)	34.7%	3.9%	(54.03)***
Total	**46.5%**	**44.3%**	**(0.92)**	**38.8%**	**6.4%**	**(77.10)*** **
Panel B: Share of Listings with a Group Leader Endorsement						
AA/A	40.6%	34.3%	(1.06)	22.0%	19.8%	(0.85)
B	26.7%	40.0%	(-1.66)	20.1%	16.4%	(1.53)
C	27.8%	34.5%	(-1.20)	17.0%	9.9%	(5.26)***
D	30.5%	47.0%	(-2.84)***	16.4%	6.2%	(11.25)***
E	23.9%	38.3%	(-2.28)**	12.2%	6.3%	(7.46)***
HR	25.9%	44.6%	(-4.18)***	10.8%	4.6%	(12.93)***
Total	**29.1%**	**40.2%**	**(-4.72)*** **	**13.9%**	**6.8%**	**(18.97)*** **

Group Leader Behavior Before and After

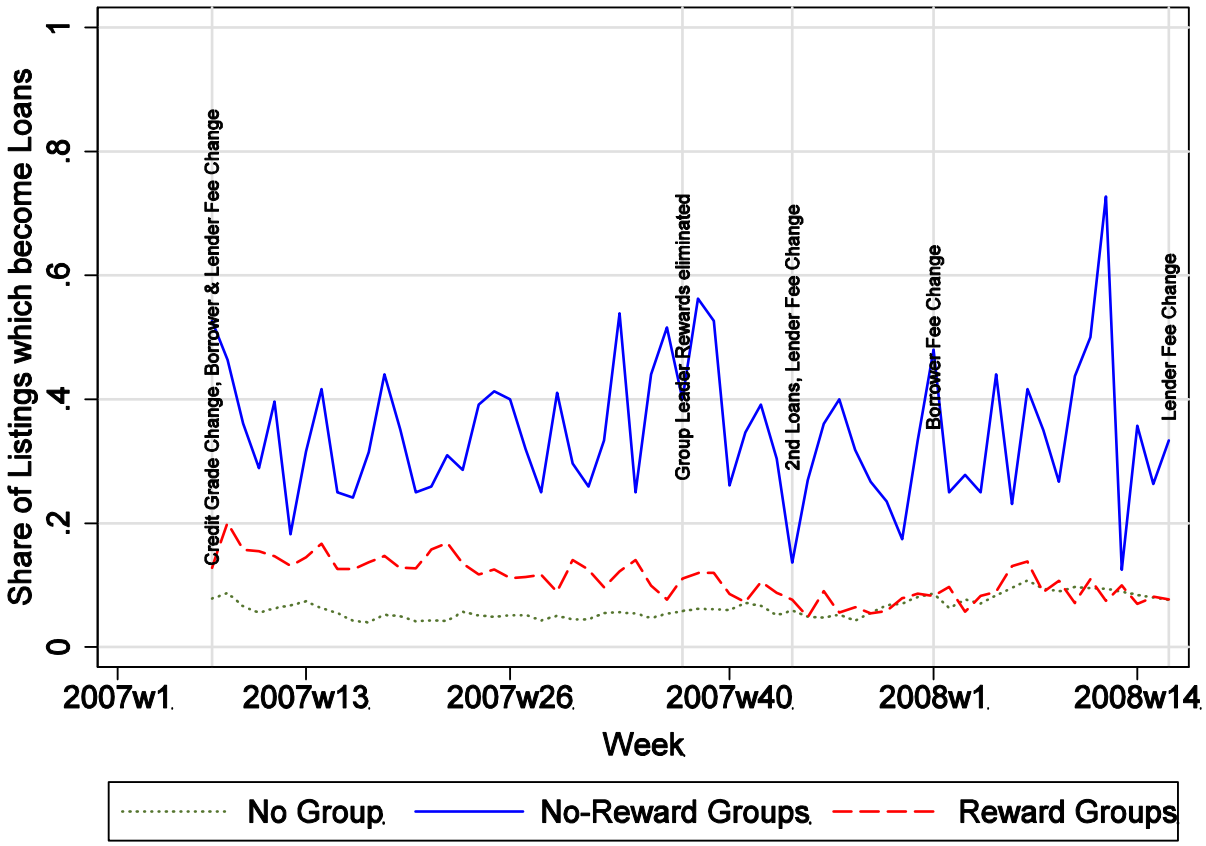
<u>After the Elimination of Group Leader Rewards</u>

- Group leaders of reward groups significantly lower the effort they put into listings (in particular risky ones)

- Group leaders of no-reward groups do not change their behavior

→ How does this change in behavior affect outcomes?

Listing Success Before and After



Effect of Change in Group Leader Behavior

Panel A: Listing Success

	No-Reward Groups (N=1,892)			Reward Groups (N=32,966)		
Credit Grade	**Before**	**After**	**t-statistic**	**Before**	**After**	**t-statistic**
AA/A	59.9%	60.6%	(-0.12)	40.0%	41.0%	(-0.31)
B	47.7%	53.3%	(-0.67)	29.4%	29.1%	(0.10)
C	40.6%	40.7%	(-0.03)	24.1%	18.0%	(3.64)***
D	36.6%	40.0%	(-0.59)	17.7%	11.0%	(6.16)***
E	23.3%	25.9%	(-0.44)	9.2%	4.2%	(7.37)***
HR	19.3%	9.0%	(3.39)***	5.0%	3.0%	(5.31)***
Total	**34.6%**	**34.6%**	**(0.00)**	**13.4%**	**8.6%**	**(12.06)*** **

Panel B: Interest Rates

	No-Reward Groups (N=654)			Reward Groups (N=4,084)		
Credit Grade	**Before**	**After**	**t-statistic**	**Before**	**After**	**t-statistic**
AA/A	9.1%	9.7%	(-1.16)	11.3%	11.2%	(0.36)
B	12.5%	13.6%	(-1.70)*	14.9%	15.3%	(-0.90)
C	15.1%	16.3%	(-1.30)	17.4%	18.1%	(-1.52)
D	17.4%	18.4%	(-1.24)	20.1%	20.1%	(0.17)
E	21.3%	20.0%	(0.91)	23.9%	25.4%	(-1.79)*
HR	20.2%	21.7%	(-0.72)	24.5%	26.8%	(-3.07)***
Total	**15.1%**	**15.2%**	**(-0.09)**	**18.7%**	**18.9%**	**(-0.78)**

Panel C: Loan Performance

	No-Reward Groups (N=654)			Reward Groups (N=4,084)		
Credit Grade	**Before**	**After**	**t-statistic**	**Before**	**After**	**t-statistic**
AA/A	3.5	6.7	(6.37)***	9.0	8.0	(-2.56)**
B	7.3	7.3	(-0.06)	14.9	13.8	(-2.22)**
C	9.6	9.8	(0.25)	17.3	13.4	(-9.08)***
D	10.2	10.1	(-0.11)	17.9	11.2	(-17.32)***
E	14.2	13.7	(-0.42)	22.2	17.1	(-7.75)***
HR	24.3	14.2	(-7.80)***	26.2	22.5	(-6.12)***
Total	**11.6**	**9.5**	**(-6.61)*** **	**18.1**	**14.0**	**(-20.43)*** **

Effect of Change in Group Leader Behavior

<u>After the elimination of group leader rewards</u>

- No-reward groups work the same way before and
- Reward groups work much better: Default rates are substantially lower

<u>Decrease in Listing Success and Decrease in Defaults</u>

- Group leaders much more carefully screen listings that are funded

Multivariate Results: Listing Success

	All Listings		Only Listings in Groups					
	(1)		(2)		(3)		(4)	
Group Leader Bids and Group Leader Endorsements								
Only GL Bid			1.829***	(12.64)				
Only GL Bid: No-Reward					2.192***	(4.85)	2.172***	(4.80)
Only GL Bid: Reward					1.796***	(11.82)	1.772***	(11.53)
Only GL Endorsement			2.919***	(12.06)				
Only GL Endorsement: No-Reward					1.913**	(2.56)	1.916**	(2.56)
Only GL Endorsement: Reward					3.149***	(12.22)	3.157***	(12.24)
GL Bid & GL Endorsement			7.739***	(38.53)				
GL Bid & GL Endorsement: No-Reward					11.584***	(16.11)	11.580***	(16.11)
GL Bid & GL Endorsement: Reward					7.368***	(35.86)		
GL Bid & GL Endorsement: Reward, Before							7.038***	(33.89)
GL Bid & GL Endorsement: Reward, After							11.801***	(15.27)
Group Characteristics								
No Group	0.162***	(-29.83)						
Reward Group	0.414***	(-14.18)	0.573***	(-8.56)	0.669***	(-3.76)	0.661***	(-3.87)
Vetting			1.085	(1.40)	1.099	(1.61)	1.071	(1.15)
Listing Review Requirement			1.492***	(9.64)	1.494***	(9.65)	1.491***	(9.61)
Group Leader Offers Help			1.375***	(5.08)	1.336***	(4.56)	1.334***	(4.53)
Listing Charcteristics								
After Elimination of Group Leader Rewards	0.857***	(-6.09)	0.790***	(-4.50)	0.781***	(-4.70)	0.740***	(-5.41)
Amount Requested (in $1,000)	0.887***	(-57.39)	0.894***	(-29.83)	0.893***	(-29.82)	0.893***	(-29.90)
Duration	1.063***	(11.67)	1.036***	(3.70)	1.038***	(3.82)	1.038***	(3.82)
Listing Closed As Soon As Funded	1.140***	(5.13)	0.939	(-1.38)	0.938	(-1.40)	0.938	(-1.40)
Borrower Characteristics								
Credit Grade: B	0.612***	(-12.81)	0.663***	(-5.20)	0.656***	(-5.33)	0.658***	(-5.29)
Credit Grade: C	0.302***	(-32.71)	0.426***	(-11.91)	0.419***	(-12.10)	0.422***	(-11.99)
Credit Grade: D	0.153***	(-47.83)	0.237***	(-19.44)	0.234***	(-19.61)	0.236***	(-19.48)
Credit Grade: E	0.060***	(-56.96)	0.102***	(-26.60)	0.100***	(-26.73)	0.101***	(-26.61)
Credit Grade: HR	0.027***	(-71.02)	0.055***	(-33.19)	0.055***	(-33.29)	0.055***	(-33.21)
Debt-to-Income Ratio	0.900***	(-9.89)	0.967**	(-2.48)	0.967**	(-2.52)	0.966***	(-2.60)
Is Borrower Home Owner	1.167***	(6.22)	1.160***	(3.45)	1.163***	(3.52)	1.164***	(3.53)
$1-24,999	1.316***	(2.70)	0.827	(-1.20)	0.830	(-1.17)	0.830	(-1.18)
$25,000-49,999	1.895***	(6.35)	1.233	(1.32)	1.231	(1.31)	1.234	(1.33)
$50,000-74,999	2.391***	(8.54)	1.658***	(3.14)	1.657***	(3.14)	1.661***	(3.15)
$75,000-99,999	3.000***	(10.42)	2.038***	(4.23)	2.040***	(4.23)	2.049***	(4.26)
$100,000	3.409***	(11.42)	2.432***	(5.12)	2.434***	(5.12)	2.451***	(5.16)
Part-Time	1.000	(0.00)	0.864	(-1.40)	0.854	(-1.50)	0.853	(-1.51)
Self-Employed	0.924*	(-1.86)	1.074	(1.00)	1.070	(0.94)	1.071	(0.96)
Retired	0.643***	(-5.72)	0.692***	(-2.84)	0.686***	(-2.90)	0.688***	(-2.88)
Not Employed	0.632***	(-3.18)	0.597**	(-2.38)	0.591**	(-2.43)	0.593**	(-2.41)
Current Delinquencies	0.917***	(-14.53)	0.961***	(-4.91)	0.961***	(-4.91)	0.962***	(-4.86)
Delinquencies Last 7 Years	0.995***	(-5.07)	0.997	(-1.63)	0.997	(-1.62)	0.997	(-1.59)
Public Records Last 10 Years	0.970**	(-2.38)	0.959**	(-1.97)	0.959**	(-1.97)	0.958**	(-2.00)
Total Credit Lines	0.993***	(-5.57)	0.994***	(-3.22)	0.993***	(-3.30)	0.993***	(-3.31)
Inquiries Last 6 Months	0.974***	(-8.93)	0.986***	(-3.29)	0.986***	(-3.24)	0.986***	(-3.19)
Amount Delinquent (in $1,000)	0.993***	(-2.89)	0.991**	(-2.46)	0.991**	(-2.46)	0.990**	(-2.51)
Public Records Last 12 Months	1.084*	(1.88)	1.087	(1.21)	1.089	(1.24)	1.091	(1.27)
Current Credit Lines	1.004	(0.59)	1.034***	(3.34)	1.033***	(3.31)	1.033***	(3.29)
Open Credit Lines	0.973***	(-4.25)	0.957***	(-4.09)	0.957***	(-4.04)	0.958***	(-4.02)
Revolving Credit Balance (in $1,000)	1.000	(1.09)	0.999	(-1.31)	0.999	(-1.40)	0.999	(-1.40)
Bankcard Utilization	1.081**	(2.43)	1.005	(0.09)	1.003	(0.06)	1.005	(0.10)
Months in Current Occupation	1.000***	(-2.62)	0.999**	(-2.34)	0.999**	(-2.28)	0.999**	(-2.31)
N	153,541		34,858		34,858		34,858	
pseudo R^2	0.258		0.275		0.276		0.276	

Listing Success

	All Listings	Only Listings in Groups		
	(1)	(2)	(3)	(4)
Group Leader Bids and Group Leader Endorsements				
Only GL Bid		1.829*** (12.64)		
Only GL Bid: No-Reward			2.192*** (4.85)	2.172*** (4.80)
Only GL Bid: Reward			1.796*** (11.82)	1.772*** (11.53)
Only GL Endorsement		2.919*** (12.06)		
Only GL Endorsement: No-Reward			1.913** (2.56)	1.916** (2.56)
Only GL Endorsement: Reward			3.149*** (12.22)	3.157*** (12.24)
GL Bid & GL Endorsement		7.739*** (38.53)		
GL Bid & GL Endorsement: No-Reward			11.584*** (16.11)	11.580*** (16.11)
GL Bid & GL Endorsement: Reward			7.368*** (35.86)	
GL Bid & GL Endorsement: Reward, Before				7.038*** (33.89)
GL Bid & GL Endorsement: Reward, After				11.801*** (15.27)
N	153,541	34,858	34,858	34,858
pseudo R^2	0.258	0.275	0.276	0.276

Listing Success

- Listing success in no-reward groups highest (not shown)
- Listing success in reward groups higher than outside groups (not shown)
- Group leader bids and group leader endorsements (and in particular the combination of both) increase listing success
- Group leader endorsements work particularly well in reward groups, group leader bids work better in no-reward groups
- After the elimination of group leader rewards
  - The influence of group leader bid and endorsement increase in reward groups
  - Lenders trust more the correctness of the group leader's signal
  - Lenders less concerned about the group leader behaving opportunistically and promoting listings only for his own benefit

Multivariate Results: Interest Rates

	All Loans		Only Loans in Groups					
	(1)		(2)		(3)		(4)	
Group Leader Bids and Group Leader Endorsements								
Only GL Bid			-0.713***	(-5.07)				
Only GL Bid: No-Reward					-1.320***	(-3.22)	-1.285***	(-3.14)
Only GL Bid: Reward					-0.642***	(-4.35)	-0.595***	(-4.01)
Only GL Endorsement			0.213	(0.95)				
Only GL Endorsement: No-Reward					-0.067	(-0.12)	-0.052	(-0.09)
Only GL Endorsement: Reward					0.242	(0.99)	0.261	(1.07)
GL Bid & GL Endorsement			-0.886***	(-6.27)				
GL Bid & GL Endorsement: No-Reward					-1.076***	(-3.11)	-1.061***	(-3.06)
GL Bid & GL Endorsement: Reward					-0.878***	(-5.90)		
GL Bid & GL Endorsement: Reward, Before							-0.755***	(-4.90)
GL Bid & GL Endorsement: Reward, After							-1.807***	(-5.24)
Group Characteristics								
No Group	2.060***	(12.76)						
Reward Group	1.342***	(8.14)	1.263***	(8.41)	1.010***	(3.45)	1.052***	(3.60)
Vetting			-0.501***	(-3.50)	-0.496***	(-3.44)	-0.421***	(-2.88)
Listing Review Requirement			0.118	(0.98)	0.128	(1.07)	0.130	(1.09)
Group Leader Offers Help			-0.721***	(-4.72)	-0.712***	(-4.62)	-0.713***	(-4.63)
Listing Charcteristics								
After Elimination of Group Leader Rewards	1.345***	(15.42)	1.499***	(10.59)	1.500***	(10.58)	1.691***	(10.88)
Amount Requested (in $1,000)	0.253***	(36.49)	0.290***	(29.02)	0.290***	(29.03)	0.291***	(29.18)
Duration	-0.007	(-0.39)	0.009	(0.37)	0.008	(0.32)	0.009	(0.36)
Listing Closed As Soon As Funded	3.286***	(37.07)	2.961***	(22.85)	2.971***	(22.90)	2.977***	(22.96)
Borrower Characteristics								
Credit Grade: B	3.619***	(31.20)	2.896***	(15.69)	2.895***	(15.67)	2.880***	(15.60)
Credit Grade: C	6.299***	(54.49)	5.732***	(33.47)	5.729***	(33.36)	5.706***	(33.23)
Credit Grade: D	9.586***	(74.34)	8.634***	(47.41)	8.635***	(47.36)	8.611***	(47.23)
Credit Grade: E	13.580***	(80.37)	12.249***	(54.57)	12.241***	(54.51)	12.206***	(54.33)
Credit Grade: HR	13.420***	(75.66)	12.917***	(55.77)	12.916***	(55.76)	12.892***	(55.67)
Debt-to-Income Ratio	0.157***	(4.70)	0.162***	(4.45)	0.161***	(4.43)	0.166***	(4.57)
Is Borrower Home Owner	-0.152*	(-1.82)	-0.500***	(-4.35)	-0.499***	(-4.34)	-0.502***	(-4.37)
$1-24,999	0.220	(0.64)	0.971**	(2.27)	0.966**	(2.26)	0.956**	(2.24)
$25,000-49,999	-0.340	(-1.00)	0.455	(1.08)	0.456	(1.08)	0.449	(1.06)
$50,000-74,999	-0.473	(-1.38)	0.232	(0.54)	0.235	(0.55)	0.226	(0.53)
$75,000-99,999	-0.733**	(-2.08)	-0.180	(-0.41)	-0.181	(-0.41)	-0.194	(-0.44)
$100,000	-1.132***	(-3.16)	-0.579	(-1.27)	-0.580	(-1.27)	-0.594	(-1.31)
Part-Time	-0.423**	(-2.19)	-0.034	(-0.12)	-0.041	(-0.15)	-0.047	(-0.17)
Self-Employed	0.221	(1.55)	0.145	(0.75)	0.136	(0.71)	0.132	(0.69)
Retired	0.129	(0.49)	-0.258	(-0.72)	-0.246	(-0.68)	-0.248	(-0.69)
Not Employed	0.605	(1.18)	1.125*	(1.81)	1.123*	(1.81)	1.095*	(1.76)
Current Delinquencies	0.072***	(4.15)	0.069***	(3.28)	0.068***	(3.28)	0.068***	(3.28)
Delinquencies Last 7 Years	0.025***	(7.07)	0.021***	(4.57)	0.020***	(4.54)	0.020***	(4.55)
Public Records Last 10 Years	0.203***	(4.70)	0.224***	(3.70)	0.224***	(3.70)	0.226***	(3.74)
Total Credit Lines	0.019***	(4.83)	0.013**	(2.48)	0.014**	(2.53)	0.014**	(2.53)
Inquiries Last 6 Months	0.141***	(14.18)	0.076***	(6.16)	0.076***	(6.14)	0.075***	(6.09)
Amount Delinquent (in $1,000)	0.018***	(3.14)	0.015	(1.55)	0.015	(1.58)	0.016	(1.63)
Public Records Last 12 Months	0.445***	(2.83)	0.179	(0.83)	0.177	(0.82)	0.171	(0.79)
Current Credit Lines	-0.054***	(-2.59)	-0.028	(-1.02)	-0.029	(-1.06)	-0.028	(-1.02)
Open Credit Lines	0.054**	(2.40)	0.023	(0.80)	0.024	(0.81)	0.022	(0.76)
Revolving Credit Balance (in $1,000)	0.001	(1.29)	0.004**	(2.00)	0.004**	(1.98)	0.004*	(1.95)
Bankcard Utilization	0.416***	(3.73)	0.449***	(3.09)	0.445***	(3.07)	0.443***	(3.05)
Months in Current Occupation	0.001	(0.97)	0.001	(0.91)	0.001	(0.93)	0.001	(0.98)
Constant	5.087***	(12.68)	5.817***	(11.73)	6.053***	(10.99)	5.957***	(10.81)
N	12,183		4,738		4,738		4,738	
pseudo R^2	0.160		0.180		0.180		0.180	

Interest Rates

	All Loans	Only Loans in Groups		
	(1)	(2)	(3)	(4)
Group Leader Bids and Group Leader Endorsements				
Only GL Bid		-0.713*** (-5.07)		
Only GL Bid: No-Reward			-1.320*** (-3.22)	-1.285*** (-3.14)
Only GL Bid: Reward			-0.642*** (-4.35)	-0.595*** (-4.01)
Only GL Endorsement		0.213 (0.95)		
Only GL Endorsement: No-Reward			-0.067 (-0.12)	-0.052 (-0.09)
Only GL Endorsement: Reward			0.242 (0.99)	0.261 (1.07)
GL Bid & GL Endorsement		-0.886*** (-6.27)		
GL Bid & GL Endorsement: No-Reward			-1.076*** (-3.11)	-1.061*** (-3.06)
GL Bid & GL Endorsement: Reward			-0.878*** (-5.90)	
GL Bid & GL Endorsement: Reward, Before				-0.755*** (-4.90)
GL Bid & GL Endorsement: Reward, After				-1.807*** (-5.24)
N	12,183	4,738	4,738	4,738
pseudo R^2	0.160	0.180	0.180	0.180

Interest Rates

- Interest rates in no-reward groups lowest (not shown)
- Interest rates in reward groups lower than outside groups (not shown)
- A group leader bid alone or together with a group leader endorsement decreases the interest rate; a group leader endorsement alone has no significant effect
- After the elimination of group leader rewards:
  - The interest rate of loans with both a group leader bid and a group leader endorsement in reward groups is about 1% smaller than before
  - Signal of group leader bid and endorsement becomes more credible

Multivariate Results: Loan Performance

	All Loans		Only Loans in Groups					
	(1)		(2)		(3)		(4)		(5)	
Group Leader Bids and Group Leader Endorsements										
Only GL Bid			0.998	(-0.14)						
Only GL Bid: No-Reward					0.906*	(-1.85)	0.914*	(-1.68)	0.951	(-0.94)
Only GL Bid: Reward					1.001	(0.05)	1.013	(0.90)	1.014	(0.97)
Only GL Endorsement			1.106***	(4.25)						
Only GL Endorsement: No-Reward					0.814**	(-2.35)	0.816**	(-2.33)	0.847*	(-1.89)
Only GL Endorsement: Reward					1.124***	(4.79)	1.128***	(4.94)	1.134***	(5.16)
GL Bid & GL Endorsement			1.105***	(7.23)						
GL Bid & GL Endorsement: No-Reward					0.841***	(-3.80)	0.845***	(-3.71)		
GL Bid & GL Endorsement: No-Reward, Participation ≤ 33%									0.950	(-1.12)
GL Bid & GL Endorsement: No-Reward, Participation > 33%									0.337***	(-8.73)
GL Bid & GL Endorsement: Reward					1.125***	(8.39)				
GL Bid & GL Endorsement: Reward, Before							1.154***	(9.94)		
GL Bid & GL Endorsement: Reward, Before, Participation ≤ 33%									1.172***	(10.92)
GL Bid & GL Endorsement: Reward, Before, Participation > 33%									0.821***	(-3.85)
GL Bid & GL Endorsement: Reward, After							0.823***	(-4.60)		
GL Bid & GL Endorsement: Reward, After, Participation ≤ 33%									0.869***	(-3.30)
GL Bid & GL Endorsement: Reward, After, Participation > 33%									0.084***	(-4.95)
Group Characteristics										
No Group	1.307***	(15.12)								
Reward Group	1.419***	(20.02)	1.425***	(19.34)	1.172***	(4.04)	1.182***	(4.26)	1.225***	(5.10)
Vetting			0.865***	(-9.61)	0.856***	(-10.23)	0.874***	(-8.84)	0.882***	(-8.23)
Listing Review Requirement			0.994	(-0.51)	0.997	(-0.24)	0.997	(-0.26)	0.993	(-0.64)
Group Leader Offers Help			0.947***	(-3.53)	0.957***	(-2.82)	0.957***	(-2.83)	0.941***	(-3.91)
Listing Charcteristics										
After Elimination of Group Leader Rewards	0.836***	(-20.37)	0.825***	(-11.83)	0.830***	(-11.48)	0.883***	(-6.96)	0.884***	(-6.93)
Amount Requested (in $1,000)	1.062***	(89.84)	1.061***	(60.08)	1.061***	(60.10)	1.062***	(60.38)	1.061***	(59.57)
Duration	0.983***	(-10.81)	0.979***	(-8.73)	0.978***	(-8.97)	0.979***	(-8.87)	0.979***	(-8.82)
Listing Closed As Soon As Funded	1.357***	(40.29)	1.171***	(13.44)	1.172***	(13.47)	1.173***	(13.51)	1.174***	(13.62)
Borrower Characteristics										
Credit Grade: B	1.747***	(40.83)	1.774***	(24.59)	1.773***	(24.57)	1.770***	(24.51)	1.764***	(24.35)
Credit Grade: C	2.305***	(62.86)	2.330***	(39.21)	2.333***	(39.23)	2.318***	(38.92)	2.305***	(38.65)
Credit Grade: D	2.792***	(72.11)	2.627***	(43.00)	2.633***	(43.08)	2.621***	(42.87)	2.604***	(42.56)
Credit Grade: E	3.812***	(81.09)	3.757***	(52.53)	3.760***	(52.54)	3.729***	(52.20)	3.717***	(52.06)
Credit Grade: HR	4.741***	(92.24)	5.019***	(63.39)	5.030***	(63.46)	4.992***	(63.14)	4.977***	(62.99)
Debt-to-Income Ratio	1.017***	(6.43)	1.022***	(6.48)	1.022***	(6.64)	1.023***	(6.82)	1.024***	(7.13)
Is Borrower Home Owner	1.151***	(17.70)	1.109***	(9.32)	1.110***	(9.36)	1.111***	(9.48)	1.108***	(9.20)
$1-24,999	1.126***	(3.76)	1.122**	(2.50)	1.118**	(2.42)	1.117**	(2.39)	1.107**	(2.21)
$25,000-49,999	1.074**	(2.29)	1.050	(1.08)	1.051	(1.09)	1.050	(1.06)	1.036	(0.77)
$50,000-74,999	0.939**	(-2.01)	0.938	(-1.40)	0.937	(-1.40)	0.935	(-1.45)	0.928	(-1.62)
$75,000-99,999	0.935**	(-2.08)	0.986	(-0.31)	0.985	(-0.31)	0.984	(-0.33)	0.971	(-0.63)
$100,000	0.827***	(-5.74)	0.855***	(-3.23)	0.852***	(-3.29)	0.847***	(-3.40)	0.840***	(-3.58)
Part-Time	0.991	(-0.48)	1.122***	(4.04)	1.131***	(4.30)	1.132***	(4.35)	1.120***	(3.98)
Self-Employed	1.106***	(7.82)	0.952***	(-2.68)	0.952***	(-2.63)	0.951***	(-2.69)	0.948***	(-2.85)
Retired	1.119***	(4.71)	1.315***	(8.79)	1.315***	(8.78)	1.317***	(8.83)	1.324***	(9.00)
Not Employed	1.333***	(6.58)	1.326***	(4.54)	1.324***	(4.50)	1.319***	(4.44)	1.351***	(4.81)
Current Delinquencies	1.023***	(20.59)	1.025***	(17.85)	1.025***	(18.02)	1.025***	(17.98)	1.025***	(17.83)
Delinquencies Last 7 Years	0.998***	(-7.21)	0.998***	(-5.25)	0.998***	(-5.41)	0.998***	(-5.43)	0.998***	(-4.99)
Public Records Last 10 Years	1.046***	(14.87)	1.074***	(15.05)	1.075***	(15.14)	1.076***	(15.35)	1.076***	(15.28)
Total Credit Lines	1.006***	(16.79)	1.005***	(11.05)	1.005***	(11.02)	1.005***	(11.14)	1.005***	(11.19)
Inquiries Last 6 Months	1.047***	(71.17)	1.043***	(49.79)	1.043***	(49.76)	1.043***	(49.76)	1.043***	(49.91)
Amount Delinquent (in $1,000)	1.000	(-0.31)	1.003***	(4.43)	1.003***	(4.45)	1.003***	(4.56)	1.003***	(4.44)
Public Records Last 12 Months	0.962***	(-3.09)	0.947***	(-2.98)	0.948***	(-2.96)	0.945***	(-3.08)	0.946***	(-3.07)
Current Credit Lines	1.002	(1.17)	1.005**	(1.99)	1.006**	(2.18)	1.005**	(2.10)	1.005**	(1.98)
Open Credit Lines	0.986***	(-6.79)	0.987***	(-4.45)	0.987***	(-4.61)	0.987***	(-4.59)	0.988***	(-4.41)
Revolving Credit Balance (in $1,000)	1.000***	(5.24)	1.001***	(6.11)	1.001***	(6.16)	1.001***	(6.05)	1.001***	(6.11)
Bankcard Utilization	0.935***	(-6.83)	0.924***	(-5.95)	0.924***	(-5.92)	0.923***	(-5.99)	0.924***	(-5.93)
Months in Current Occupation	1.000***	(-2.80)	1.000	(-1.61)	1.000*	(-1.77)	1.000*	(-1.81)	1.000**	(-1.99)
N	374,235		161,000		161,000		161,000		161,000	

Loan Performance

	All Loans	Only Loans in Groups							
	(1)	(2)		(3)		(4)		(5)	
Group Leader Bids and Group Leader Endorsements									
Only GL Bid		0.998	(-0.14)						
Only GL Bid: No-Reward				0.906*	(-1.85)	0.914*	(-1.68)	0.951	(-0.94)
Only GL Bid: Reward				1.001	(0.05)	1.013	(0.90)	1.014	(0.97)
Only GL Endorsement		1.106***	(4.25)						
Only GL Endorsement: No-Reward				0.814**	(-2.35)	0.816**	(-2.33)	0.847*	(-1.89)
Only GL Endorsement: Reward				1.124***	(4.79)	1.128***	(4.94)	1.134***	(5.16)
GL Bid & GL Endorsement		1.105***	(7.23)						
GL Bid & GL Endorsement: No-Reward				0.841***	(-3.80)	0.845***	(-3.71)		
GL Bid & GL Endorsement: No-Reward, Participation ≤ 33%								0.950	(-1.12)
GL Bid & GL Endorsement: No-Reward, Participation > 33%								0.337***	(-8.73)
GL Bid & GL Endorsement: Reward				1.125***	(8.39)				
GL Bid & GL Endorsement: Reward, Before						1.154***	(9.94)		
GL Bid & GL Endorsement: Reward, Before, Participation ≤ 33%								1.172***	(10.92)
GL Bid & GL Endorsement: Reward, Before, Participation > 33%								0.821***	(-3.85)
GL Bid & GL Endorsement: Reward, After						0.823***	(-4.60)		
GL Bid & GL Endorsement: Reward, After, Participation ≤ 33%								0.869***	(-3.30)
GL Bid & GL Endorsement: Reward, After, Participation > 33%								0.084***	(-4.95)
N	374,235	161,000		161,000		161,000		161,000	

Loan Performance

- Hazard rates lowest (highest) in no-reward (reward) groups (not shown)
- Group leader bids do not significantly influence loan performance, group leader endorsements increase hazard rates → not good signals of listing quality
- Only a problem in reward groups: In no-reward groups, group leader bids and group leader endorsements significantly decrease hazard rates
- Before the elimination of group leader rewards
  - Combination of group leader bids and group leader endorsements increases the hazard rate in reward groups
- After the elimination of group leader rewards
  - The hazard rate is significantly smaller than before and smaller than 1
- If leaders of reward groups have enough skin in the game, then they provide credible signals even before the elimination of rewards

Conclusion

Loan origination fees create adverse incentives

- Group functioning severely impaired when group leaders receive rewards
- Before reward elimination: Groups work well only if the group leader puts his money where his mouth is
- After reward elimination: Groups work relatively well.
  - Information asymmetries in online lending markets can be alleviated by careful design of group system
  - Group leaders credibly signal borrower quality to other lenders by endorsing and submitting bids for carefully screened borrower listings

Importance of Proper Mechanism and Group Design

- Evidence that considerable fraction of loan retained induces groups leaders to do their work
- Relevance for originate-to-distribute model, online social lending platforms, traditional financial and lending industry, micro lending