Gender Differences In Reaction To Enforcement Mechanisms: A Large-Scale Natural Field Experiment

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Background

- Healthy financial markets rely on compliance with contracts and commitments
- Violations are common. Bad debt in the Chinese banking system exceeded CNY1.5 T (USD 212 B)
- Limited attention and moral hazard are two drives

Research Questions

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- risk-averse,
- prone to competitive environments,
- respond to incentives differently,
- people may exercise double standards in the assessment of men and women's successes and failures.
- Females and males may react differently to some enforcement mechanisms

Research Questions

- Q2: Are there gender differences in reaction to enforcement mechanisms?

Research Questions

- Q3: If yes, how can we use these differences to improve the enforcement of rules and regulations?

Experimental Design

Experimental design– P2P lending platform

- The experiment was run on borrowers from a P2P lending platform in China
- Financial intermediary, important channel to provide credit
- 65.4 M active users nationwide and a transaction volume of CNY 17.6 B (USD 2.63 B) in 2017
- We experiment on the borrowers taking credit loans with the principal and interest paid at maturity.

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- Large sample size.
- Gender-specific mechanism to deter late repayment.

Experimental design– P2P lending

How to borrow money?

- Register with personal information + five endorsers (friends/family)
- Submit an application to borrow money (Amount, Duration)
- Negotiate an interest with the P2P platform
- Investors receive information about the application and decide whether to invest
- Successfully receive the money if any investor decide to invest

Experimental design– P2P lending

- Interest is accumulated on a daily basis
- Principal and interest must be paid back in full to the platform before the due date
- No partial repayment was allowed
- If the loan is overdue, then a daily penalty applies
- If the loan is more than 29 days overdue, then the loan is considered a default
- Cannot borrow a second loan without repaying the first one

Experimental design– treatments

- **Baseline** (n=3768: 1585 females and 2183 males): no message was sent.
- **Reminder** (n=2823: 1165 females and 1658 males): a simple reminder message was sent asking the participant to repay on time.
- **Norm** (n=2807: 1166 females and 1641 males): a message stated that most borrowers made their repayment on time and asked the participant to do the same.
- **Shame** (n=2789: 1161 females and 1628 males): a message stated that her/his endorsers would be notified if the participant did not make the repayment on time.
- **Reward** (n=2815: 1172 females and 1643 males): a message to reduce the interest rate for the future loan if the participant makes the repayment on time.
- **Punishment** (n=2543: 1022 females and 1521 males): a message to increase the interest rate for the future loan if the participant fails to make the repayment on time.

Procedures

- The experiment was conducted between January 2017 and March 2017.
- We recruit borrowers that
  - have no overdue record
  - have not participated in the experiment before
  - have a loan due *next day*
- In practice, on 1st January 2017, we identified 58,345 borrowers with no overdue record and due dates between 2nd January and 31st March.
- In total, 17,545 borrowers participated. Each participant was randomized into one treatment and receive the corresponding text message and incentives

Experiment distribution

Yearly distribution

Hypotheses / Mechanism

- Standard: only reward and punishment work
- Behavioral: all treatments reduce the overdue rate.

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- Behavioral: all treatments reduce the overdue rate.
- H1: *All of the treatments reduce the overdue rate as compared with the baseline.*

Hypotheses / Mechanism

- Women are more sensitive to social cues in determining appropriate behavior (Chen et al. 2019; Gilligan 1993)
- Women nominate more family members than males as endorsers (3.15 v.s. 2.2, $p < 0.001$)

Hypotheses / Mechanism

- Women are more sensitive to social cues in determining appropriate behavior (Chen et al. 2019; Gilligan 1993)
- Women nominate more family members than males as endorsers (3.15 v.s. 2.2, $p < 0.001$)
- H2: *Women respond more to social incentives, especially in Shame.*

Hypotheses / Mechanism

- Loss aversion (Kahneman and Tversky 1979)
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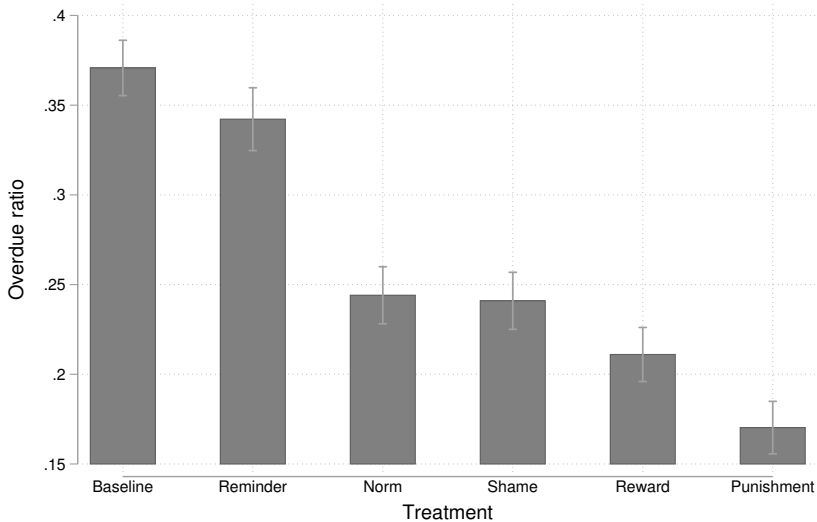
- Women borrow more
- H3: *Both genders respond more to Punishment compared with Reward. Gender difference is unclear.*

Results

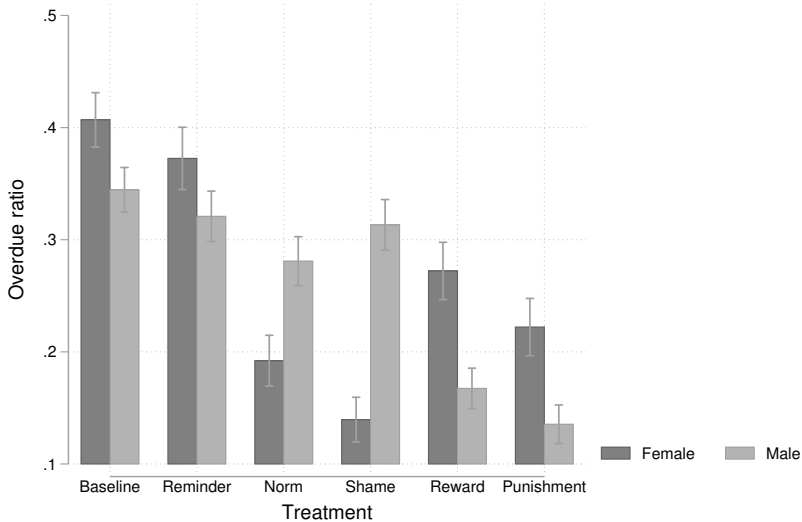
Overdue Rate

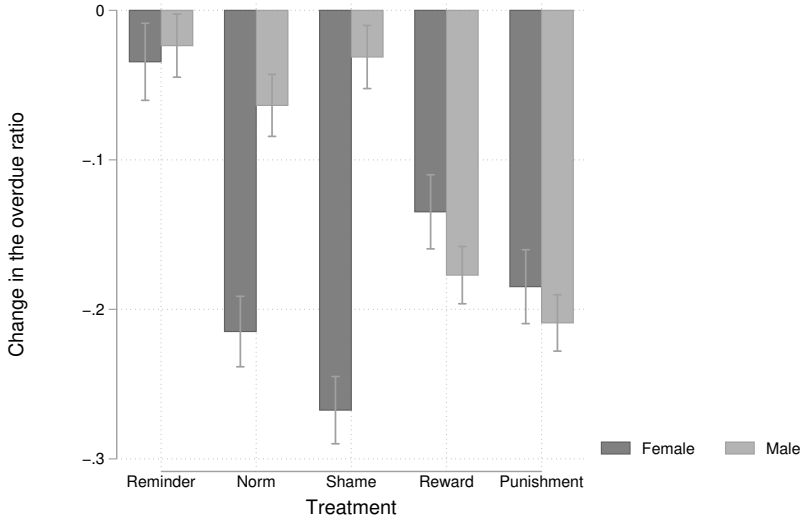
- First, all of our treatments create incentives based on the repayment due date.
- Second, having a low overdue rate is crucial to the development of the platform.
- Third, as mentioned earlier, due to the phone calls made to experimental participants, incentives after the deadline may be contaminated.

Overdue rate in each treatment



Gender differences in the overdue rate




0
−.1
−.2
−.3
Change in the overdue ratio
Reminder
Norm
Shame
Reward
Punishment
Treatment
Female
Male

Robustness

	Dependent Variable: Overdue Rate		
	(1)	(2)	(3)
Male baseline	-0.0667***	-0.298***	-0.181***
	(-4.12)	(-4.14)	(-4.11)
Male reminder	-0.0911***	-0.414***	-0.253***
	(-5.39)	(-5.40)	(-5.42)
Male norm	-0.133***	-0.619***	-0.377***
	(-7.98)	(-7.91)	(-7.94)
Male shame	-0.103***	-0.470***	-0.289***
	(-6.09)	(-6.09)	(-6.14)
Male reward	-0.246***	-1.290***	-0.762***
	(-15.71)	(-14.81)	(-15.07)
Male punish	-0.274***	-1.521***	-0.888***
	(-17.80)	(-16.20)	(-16.67)

Robustness

	Dependent Variable: Overdue Rate		
	(1)	(2)	(3)
Female reminder	-0.0245	-0.0978	-0.0616
	(-1.33)	(-1.22)	(-1.24)
Female norm	-0.202***	-1.019***	-0.605***
	(-12.02)	(-11.11)	(-11.30)
Female shame	-0.255***	-1.409***	-0.829***
	(-16.16)	(-14.18)	(-14.76)
Female reward	-0.126***	-0.578***	-0.350***
	(-7.12)	(-6.83)	(-6.86)
Female punish	-0.181***	-0.875***	-0.526***
	(-10.20)	(-9.51)	(-9.65)

Robustness

	Dependent Variable: Overdue Rate		
	(1)	(2)	(3)
DID reminder	$p = 0.9955$	$p = 0.8643$	$p = 0.8740$
DID norm	$p = 0.0000$	$p = 0.0000$	$p = 0.0000$
DID shame	$p = 0.0000$	$p = 0.0000$	$p = 0.0000$
DID reward	$p = 0.0188$	$p = 0.0004$	$p = 0.0008$
DID punish	$p = 0.2298$	$p = 0.0062$	$p = 0.0140$

Whether such differences are mainly driven by borrowers who are more likely to overdue?

$$\begin{aligned}\mathbb{E}(Overdue_i) = \Phi(&0.483 - 0.256Male_i + 0.007Age_i - 0.014Income_i \\ &- 0.215Employ_i - 0.374HighEdu_i + 0.244Married_i + 0.245Credit_i \\ &- 0.101Car_i - 0.189House_i - 0.121OtherLoan_i - 0.008HistIncidence_i \\ &- 0.115LoanAmount_i - 0.006LoanTerm_i - 0.007IR_i - 0.027Family_i).\end{aligned}$$

High Risk and Low Risk

	Baseline		Reminder		Norm	
	Men	Women	Men	Women	Men	Women
High risk	0.415	0.441	0.357	0.427	0.333	0.200
Low risk	0.305	0.338	0.297	0.278	0.247	0.187
	Shame		Reward		Punish	
	Men	Women	Men	Women	Men	Women
High risk	0.387	0.159	0.181	0.289	0.156	0.222
Low risk	0.260	0.106	0.158	0.242	0.123	0.222

Potential Channels

Endorser Choice and Shame

Gender is conjectured to interact with the number of family members each borrower chooses as endorsers.

- whether the endogenous choice of endorsers is strategic,

- whether the choice of endorsers interacts with the shame message we sent out and able to explain the gender difference.

	Overdue Rate		
	(1)	(2)	(3)
Family	-0.017***	-0.080***	-0.049***
	(-3.58)	(-3.60)	(-3.60)
Male	-0.074***	-0.345***	-0.209***
	(-4.03)	(-4.03)	(-4.03)
Family*Male	0.006	0.022	0.014
	(1.06)	(0.80)	(0.85)
Shame	-0.090***	-0.293	-0.173
	(-2.62)	(-1.43)	(-1.43)
Shame*Family	-0.023**	-0.234***	-0.131***
	(-2.43)	(-3.71)	(-3.58)
Shame*Male	0.158***	0.606***	0.364***
	(3.85)	(2.65)	(2.68)
Shame*Male*Family	0.0170	0.213***	0.118***
	(1.37)	(2.86)	(2.69)

- First, the choice of endorsers is strategic (Family).
- Second, the possibility of contacting endorsers magnifies the impact of family endorsers on the overdue rate (Shame*Family).
- Third, men respond less to the shame message per se, holding the number of family endorsers constant (Shame*Male).
- Fourth, men may view the relative strength of kinship and friendship differently as women (Family*Male and Shame*Family*Male).

Expectation and financial incentives

The effectiveness of the financial incentives may be influenced by the borrowers' expectation of the credit needs from the platform henceforth.

- borrowers may form backward-looking expectations, that is, the expectation of future borrowing is positively related to past borrowing incidences

- they may have forward-looking expectations, that is, the prediction of the future borrowing is close to the true value in expectation

	Dependent Variable: Overdue Rate		
	(1)	(2)	(3)
FinInctv	0.142*	0.721*	0.427*
	(1.77)	(1.75)	(1.75)
IR	0.007***	0.033***	0.020***
	(2.77)	(2.71)	(2.72)
Male	0.119**	0.596**	0.357**
	(2.29)	(2.30)	(2.30)
FinInctv*IR	-0.011**	-0.058**	-0.034**
	(-2.53)	(-2.50)	(-2.51)
FinInctv*Male	-0.305***	-1.730***	-1.005***
	(-3.33)	(-3.40)	(-3.41)
IR*Male	-0.005*	-0.026*	-0.016*
	(-1.74)	(-1.79)	(-1.79)

	Dependent Variable: Overdue Rate		
	(1)	(2)	(3)
FinInctv*Male*IR	0.011**	0.058**	0.034**
	(2.08)	(2.02)	(2.04)
FutureIncdnc	0.000	0.001	0.001
	(0.03)	(0.03)	(0.03)
FinInctv*FutureIncdnc	0.007	0.038	0.022
	(0.66)	(0.68)	(0.67)
Male*FutureIncdnc	0.004	0.016	0.010
	(0.42)	(0.41)	(0.41)
FinInctv*Male*FutureIncdnc	-0.004	-0.006	-0.006
	(-0.31)	(-0.07)	(-0.12)

	Dependent Variable: Overdue Rate		
	(1)	(2)	(3)
PastIncdnc	-0.002	-0.009	-0.006
	(-0.57)	(-0.57)	(-0.57)
FinInctv*PastIncdnc	0.003	0.014	0.009
	(0.48)	(0.47)	(0.47)
Male*PastIncdnc	-0.002	-0.010	-0.006
	(-0.50)	(-0.45)	(-0.46)
FinInctv*Male*PastIncdnc	-0.001	-0.011	-0.006
	(-0.12)	(-0.26)	(-0.23)

- First, only women borrowers exhibit a negative relationship between interest rate and overdue. However, this channel does not explain why men respond more to financial incentives.

- Second, none of the terms that interacted with past borrowing incidences or future borrowing incidences is statistically significant.

- The gender difference is likely to be caused by psychological explanations.

Discussion

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- If we send the same message to both male and female borrowers, we can decrease the overdue rate to 17.0% at best. However, if we tailor the message according to the borrower's gender, we can further cut the overdue rate to 13.7%— a 20% improvement.
- representative sample, no attrition, participants make decisions in a natural environment
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- Is it fair to treat everyone the same way?
- Using the same enforcement mechanism to both genders can cause biases.

Conclusions

- We study how male and female borrowers respond to different messages urging for timely repayment in a P2P context

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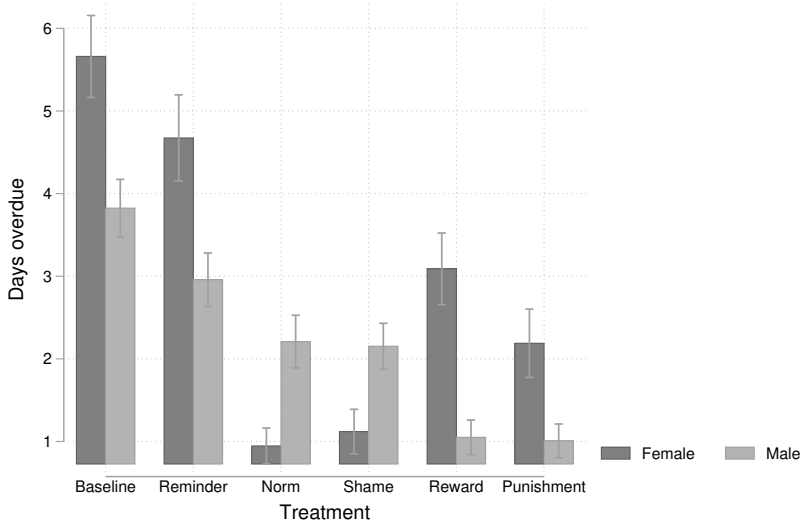
- The mechanisms successfully deter non-compliance of financial commitment
- There are significant gender differences

Thank You!

Gender difference in the interest rate

	Dependent Variable:					
	IR	Credit	IR	Credit	IR	Credit
	Yearly first-time		Experiment first-time		Yearly all	
	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.297***	-0.160***	-0.378***	-0.069***	-0.237***	-0.105***
	(-8.89)	(-15.62)	(-6.21)	(-3.40)	(-14.37)	(-20.52)
Overdue					0.668***	0.0164
					(12.36)	(0.84)
Male*Overdue					0.685***	0.281***
					(17.15)	(21.00)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	58,228	58,228	16,533	16,533	222,967	222,967

Days overdue



Default rate