

REWARDING CALCULATED RISK TAKING:

Evidence from a series of experiments with commercial bank loan officers

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Overview

- In SME setting, making lending decisions is difficult
 - Limited information:
 - Often no credit bureau data, no compelling scoring models
 - Loan officer responsible for aggregating information and making a decision, often based on incomplete (or even intentionally wrong) records
 - Significant effort from loan officers required to evaluate decisions
- Banks have implemented vastly different underwriting models, suggesting best model unknown
 - Origination bonuses
 - Separation of client acquisition and underwriting decisions
 - Flat salaries

Setting incentives is difficult

- Loan officers may be more risk averse than bank shareholders
- Difficult for bank to monitor loan officer
 - Loan officers exist because information is hard to process!
- Performance based incentives must often be deferred
 - Loan officers may have different discount rates than banks
- Loan officers enjoy limited liability

Today's Study

- How important are compensation policies in affecting loan officer performance?
- Study with commercial bank loan officers in India
- Compare three incentive schemes:
 - Origination bonus
 - Low-powered incentives
 - High-powered incentives
- Evaluate effect of:
 - Deferring compensation
 - Relaxing limited liability constraint (making sure loan officers have “skin in the game”)

Existing Literature: Incentives Matter

- **Work Outcomes**

- The importance of incentives in determining work outcomes has long been recognized (see Baker, Jensen and Murphy (1988)).
- Most existing rigorous evidence, however, focuses on simple production tasks (see Lazear (2000); Bandiera, Barankay and Rasul (2007, 2009, 2011); Kremer, Kaur and Mullainathan (2010)).

- **Risk Taking**

- The literature on incentives and risk-taking has focused almost exclusively on top executives (see, for example, Bebchuk and Spamann (2010), Bolton, Mehran and Shapiro (2010), Edmans and Liu (2011) and Fahlenbach and Stulz (2012)).
- During the recent financial crisis, the prevalence of equity-based executive compensation at banks was associated with a higher probability of the bank's default (Balachandran, Kogut and Harnal (2011)).

The evidence shows that incentives matter (II)

- **Production and transmission of information for risk management in commercial lending**
 - Hertzberg, Liberti and Paravisini (2010) demonstrate the presence of moral hazard in information revelation in an Argentinian bank.
 - Liberti and Mian (2009) show that hierarchical separation between loan officers and their supervisors leads to greater reliance on hard information.
 - Non-pecuniary change in loan officer incentives in China led to a significant improvement in the assessment of credit risk. (Qian, Strahan and Yang (2011))
 - When loan approvals are based entirely on hard information, incentives that reward lending volume lead loan officers to strategically manipulate applicant information for borrowers close to the bank's minimum threshold for approval. (Berg, Puri and Rocholl (2012))
 - Volume incentives encourage excessive risk-taking and increase defaults in study at a US bank. (Agarwal and Wang (2009) and Agarwal and Ben-David (2012))

This study's contributions

- Evaluation of loan officers in an emerging market environment with high idiosyncratic risk and opaque borrowers
 - Difficult lending environment
- The first measurement and quantification of two important constraints that prevent first-best contracting in a lending setting: deferred compensation and limited liability.
- New evidence that performance incentives can distort the *perceptions* of risk, beyond lending decisions

Study design: Context

- A **framed field experiment** with commercial bank loan officers in **Gujarat, India**
 - Like other emerging markets, verifiable financial data is not readily available in India with no credit scores
 - Loan officers rely on subjective assessment of applications to make lending decisions
- **Loan Applications**
 - A random sample of actual (historic) small-business loan applications from a large commercial lender in India
- **Loan officers**
 - Recruited 209 experienced loan officers in cooperation with leading Indian commercial banks
 - Each participant **evaluated six actual loan applications with randomly assigned incentive scheme in a session**
 - Performance pay based on decision and actual (historical) loan outcome
 - USD 88m in lending

Summary of loan application data

	Panel A: Entire sample		
	[N=676]		
	Mean	Median	StDev
	(1)	(2)	(3)
Loan characteristics			
Loan amount	6,009	6,383	2,627
Monthly installment	420	208	855
Loan tenure	32.64	36	9.04
Business income			
Monthly revenue	11,680	6,383	18,621
Monthly business expenses	9,818	5,191	17,438
Monthly EBIT	1,844	1,007	6,523
Debt			
Total debt	6,776	0	31,572
Monthly debt service	227	0	733
Personal			
Age of business	11.27	9	7.99
Monthly personal expenses	283	223	304
Credit report, accts overdue	0.2	0	0.4

- Sourced from leading commercial lender
- Average firm has USD 12,000 monthly revenue
- Average firm age 11 years
- Variety of industries: furniture, trading, agricultural processing, textiles, etc.
- Applications “on average” informative: Significant differences in leverage, profitability, between performing and non-performing firms

Representative sample of loan officers

	Experiment participants [N=209]				Bank sample [N=3,111]			
	N	Mean	Median	StdDev	N	Mean	Median	StdDev
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Male	206	0.90	1.00	0.30	3,111	0.9	1.00	0.30
Age	206	37.60	35.00	10.94	3,111	37.9	35.00	12.0
Education [Master's degree]	200	0.33	0.00	0.47	N/A	N/A	N/A	N/A
Experience [Years]	206	12.76	10.00	11.30	3,111	13.90	11.00	13.00
Rank [1 (Lowest) - 5 (Highest)]	206	1.94	2.00	1.00	3,111	1.60	2.00	0.75
Branch Manager Experience	206	0.33	0.00	0.47	N/A	N/A	N/A	N/A
Business Experience Indicator	206	.47	0.00	.50	N/A	N/A	N/A	N/A
Private Sector Banker	206	0.20	0.00	0.40				

- Average age 38 years old, identical to population of loan officers in Gujarat
- Average 13 years experience
- At least 33 percent have worked as branch manager
- Approximately 20% are from private-sector banks (private sector bank market share)

Study design: Treatments and measures

- **Treatments**

- **Origination bonus:** Officers rewarded a commission for every loan issued
- **Low-powered incentive:** Officers receive small rewards for loans that perform well and small penalties for loans that perform badly
- **High-powered incentive:** Officers receive big rewards for issuing loans that perform well, but big penalties for loans that default
- **Additional variations**
 - Deferred vs. immediate compensation
 - Effect of relaxing limited liability constraint
 - Costly Information

- **Outcome Measures**

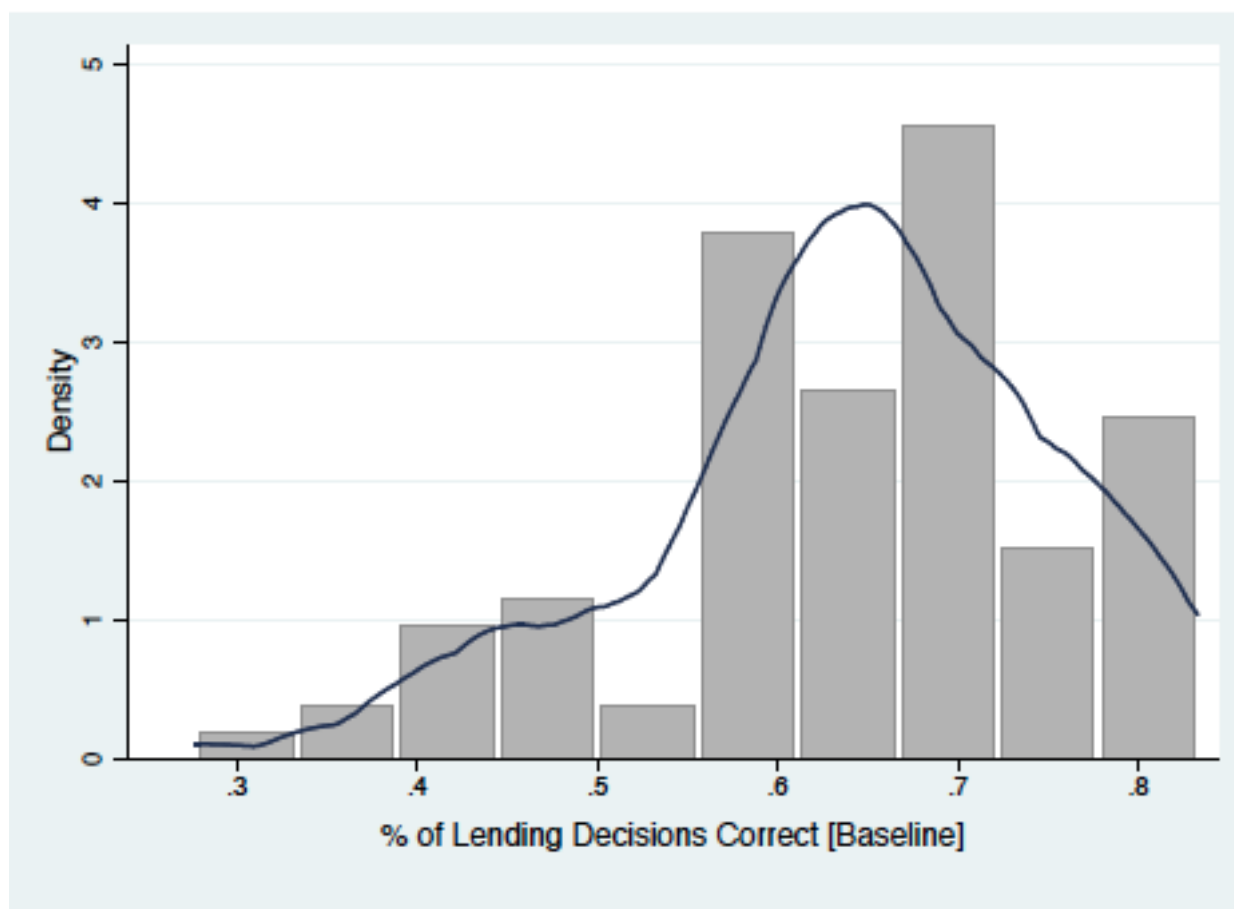
- Quality of decision making
- Screening effort
- Loan officers' personal assessment of an applicant riskiness
- Loan disbursal decision

Summary of Incentive Treatments

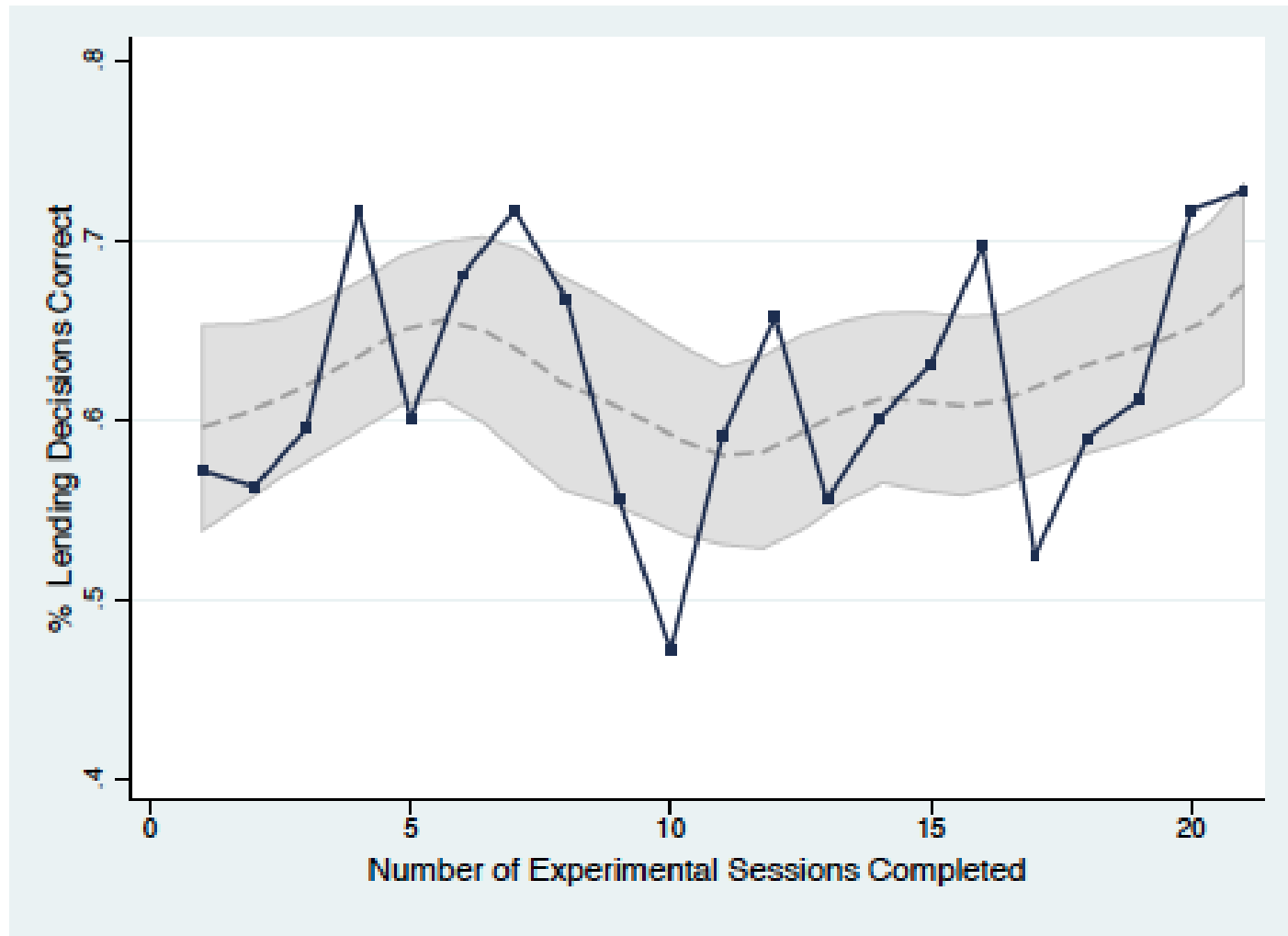
- Strength of Bonus
 - Origination Bonus
 - Rs. 20 bonus for each loan that is made
 - Low-powered incentive
 - Rs. 20 if loan performs, Rs. 0 if it defaults, Rs. 10 if rejected
 - High-powered incentive
 - Rs. 50 if loan performs, Rs. -100 if defaults, Rs. 0 if rejected
- Deferred compensation
 - Bonus paid immediately
 - Bonus paid with 3-month delay
- Limited liability and high-powered incentives
 - Loan officers' incentive payments can be negative
 - Loan officers' incentive payments are at worst zero
- Loan officers earning approximately 2x normal hourly wage

Results: Heterogeneity in skills

- Dramatic variation in skills across loan officers



Results: Little evidence of learning



Loan officer characteristics matter

- Employees of private sector banks
 - Work harder (review 1.5 more tabs in costly information setting, about 15% increase in effort)
 - Approve more loans (3 percent)
 - Increase is exclusively among good loans
 - Make more profitable loans
- Older bankers somewhat more permissive
 - Approve 1% more of loans, mostly performing
- Personality matters
 - Agreeable, extroverted and conscientious individuals work harder
 - Only extroverts make more profitable lending decisions
- Gender makes small difference
 - Women work a little harder, unconditionally
 - Respond in same manner to incentives as men

Study design: Measuring effort

- Number of loan tabs reviewed
- Costly information treatment
 - Loan officers endowed with 18 Rs per loan file
 - Six tabs of costly information (Rs 3 per tab)
 - May choose to view none, any, or all of tabs, by spending credits
 - Represents time and effort cost of performing due diligence (visiting residence, reference check, verifying financial records)
 - Unobservable to bank, incentive payments are not conditioned on these choices
 - If credits are not spent, loan officer collects the cash at the end of the session

Results: Incentives affect effort

- High-powered incentives significantly increase screening effort
 - Moving from low-powered incentives (20/0/10) to high-powered incentives (50/0/-100) increases costly effort by approximately 33 percent
 - No heterogeneity in effect: public and private sector bankers respond equally to incentives

Results: Incentives affect outcomes

- Measuring risk-taking: coefficient of variation of *other* loan officer ratings of a particular loan
- Loans that are more “opaque” get different ratings from different officers
- High-powered incentives lead to less risk-taking
 - Under (50/0/-100) regime, loan officers select loans that are less opaque
 - Lower c.o.v. for overall risk
 - Lower c.o.v. for personal and management risk
 - Lower c.o.v. for business and financial risk
- High-powered incentives lead to more profitable lending
 - Primarily comes from better screening out of bad loans
 - Average effect of \$175 per approved loan
 - (much larger than cost of incentive)

Study design: measuring risk perceptions

- Loan officers required to rate each loan file
 - Personal qualities of applicant
 - Management ability
 - Business/industry risk
 - Financial risk
- Rating from 0 to 100
- Importantly, ratings *not* incentivized
 - Part of assigned task
 - Useful for keeping track of loan application

Result: Incentives and risk-perceptions

- Origination bonus affects loan officers' lending behavior, but also *beliefs* about the quality of the application.
- Evaluating identical applications, loan officers receiving an origination bonus issued higher ratings than those receiving incentives that were tied to a loan's success.
 - .15 standard deviations higher
- Even stronger incentives to originate loans (50/0/0) lead to even greater distortion in beliefs

Result: Deferred compensation dilemma

- Deferred compensation
 - Is necessary for performance-based lending
 - But may mute incentives if loan officers have high discount-rate
- Experiment: defer compensation 90 days
- Outcome
 - High-powered incentives no longer increase effort

Relaxing limited liability

- Treatment: Loan officers given an initial endowment of Rs 200, and assigned high-powered incentives (50,-100,0)
 - Free to take home with them at end of session
 - Unless sum of incentive payments was negative, in which case they could lose some or all of the endowment
- Result: limited liability
 - Increases effort modestly
 - Leads to more conservative lending
 - No detectable effect on profitability

Conclusions

- Loan officer heterogeneity is important
 - “Types” are as important as incentives
 - Future work explores how incentive structures sort types
- Loan incentives matter
 - Even for trained professionals with 14 years experience
 - “High-powered” incentives (predicted by simple theory, rarely seen in practice) lead to best outcomes
- Incentive schemes affect perceptions of risk, not just risk-taking
 - Could lead to banks systematically underestimating riskiness of lending portfolio
- Lending decisions are hard, high-powered incentives yield small, incremental gains
 - High-powered incentives increase detection of bad loans by 11% and profits per originated loan by up to 3% of median loan size
- Deferring compensation 3 months has big effect, even with financially sophisticated individuals
- Limited liability reduces effort, but may be desirable to encourage risk-taking