Sharing information on loan rejections

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Objective of the paper

We present the first study of loan searching strategies and lending policies in a context where a bank observes whether a borrower applying for a loan has been formerly rejected by other lenders.

Alternatively stated,

How does the information on a borrower's previous loan rejections impact his search for credit and of the outcome of it?

To do so, we study the case of Italy, where intermediaries evaluating a new applicant learn from the Credit Register whether he was rejected by other banks in the six months preceding the loan application

Literature

Crossing with

- **winners' curse in credit markets**:
  - *existence of winner's curse*: Broeker, 1990, Nakamura, 1993
  - *procyclicality of winner's curse*: Ruckes 2004, Dell'Ariccia and Marquez, 2006
- **informational spillover**: Shaffer 1998
- **job search**: Lockwood, 1991

  Scant empirical literature, due to lack of available data

Plan of the talk

- A stylized model
- Data
- Empirical Strategy
- Results

A stylized model of loan search with observable past rejections

Model description

- two-period economy; two banks, a continuum of competitive firms, which need to borrow 1 unit of funds for their investment project

- firms can be of two types (private information), high Θ and low θ

- Θ-type investment pay-offs $1 + g$; θ-type investment pay-offs 0

- if a loan is approved, entrepreneurs enjoy a private benefit $B > 0$

- banks observe a costless informative signal of borrower quality (precision $\gamma > 0$)

- sequential search for credit: if rejected, a borrower can subsequently apply with another bank (period 2)

- application is costly $k_i > 0$

- bank 2 si aware that its applicant has been rejected by bank 1

The equilibrium characterization

Proposition Under some regularity assumptions, there exists a *Perfect Bayesian Equilibrium with separation* where beliefs are updated based on Bayes' rule and equilibrim strategies and where:

Period 1   all borrowers apply and Bank 1 grants credit if and only if it receives a good signal

Period 2   low type borrowers are (partly) discouraged from applying and Bank 2 funds borrowers only upon receiving a good signal, but with a probability strictly lower than 1

The relationship between prob. of approval and past rejections

How does the equilibrium probability of approval in period 2 compare with that in period 1?

Eventually, it depends on the quality of Period 2 pool of applicants (relative to Period 1). Two forces:

- Period 2 potential applicants are those rejected in Period 1, more likely to be bad-types (**stigma** of being a Bank-1 left-over)
- Within this group, low-types apply less frequently, as Bank-2 lending standards are tighter (**self-selection** or discouragment of low types)

Testable implications

- some firms (low type) are discouraged from applying as they receive rejections (self-selection)
- ...the more so in opaque segments of the credit market (e.g. SMEs)
- the effect of past rejections on the probability of approval compounds a negative effect (stigma) and a positive effect (self-selection)
- ...the former is more important for firm/bank matches characterised by higher degree of asymmetric information.

Data and Empirical Strategy

The data: Credit Register data

When a *new* borrower files a request for credit, the intermediary turns to the CR for a "*preliminary information request*"

- non binding for the lender
- small fee
- array of information regarding the borrower's current exposure vis a vis the Italian banking system, among these → **number of other such requests received by the CR in the six preceding months** (and not followed by an increase in credit grated for that particular borrower/bank match)

We use these data to

- identify a **loan application** (which we classify as approved if we observe an increase in credit granted for that bank/firm match in the subsequent three months)
- identify the **number of past rejections** in the borrower's records visible by the perspective lender at the moment of the new credit application

Main variables: definition

We track the outcome of a large sample of loan applications filed by Italian firms to banks that they are not already engaged with at the moment of the application

Main dependent variables:

- *approval$_{ijt}$* dummy that takes value one if the application placed by firm i with bank j in period t is approved (within the next three months)
- *search end$_{ijt}$* dummy that takes value one if the application placed by firm i wiht bank j in period t represents the interruption of a loan-search (rejected and no applications in the following 6-months)

Main regressor:

- *past rejections$_{it}$* number of rejections that borrower i has received in the six months preceding the date t of the new application

The data: bank and firm balance sheet data

Using bank and firm identifiers in the CR, we match:

- bank balance sheet data, drawn from the Supervisory Records
- firm balance sheet data, drawn from the private register Cerved (which also computes a synthetic indicator of the firm's creditworthiness, the z-score)

Dataset is at monthly frequency; information on banks and firms is matched to recreate the situation faced by the bank when receiving the application (i.e. data on banks and macro variables correspond to the preceding quarter; data on firms' balance sheet to the preceding year)

The data: summary statistics

Table 1. Summary statistics

variable name	description	Obs	Mean	25p	Median	75p
approval	Dummy=1 if the loan application by firm i is approved and the loan is granted. Frequency: monthly	3334318	0.21	0	0	0
past rejections	Number of past rejections received by firm i in the 6 months preceding the application; it corresponds to the number of requests for information advanced during that time period to the Credit Register by intermediaries different from that currently enquiring the Register. Frequency: monthly	3334318	0.91	0	0	1
small	Dummy=1 if the applying firm i's assets fall below the 10th percentile of the distribution. It is missing if information on assets is not available for that firm. Frequency: firm*year	1475400	0.12	0	0	0
opacity	Dummy=1 if firm i's ratio of intangible over total assets is above the 50th percentile of the distribution. Frequency: firm*year	1917661	0.68	0	1	1
no rating	Dummy=1 if there is no rating available for the applying firm i at the moment of the request for information. Frequency: firm*year	1917661	0.13	0	0	0
same province	Dummy=1 if the applying firm i is located in the same province of the perspective bank's headquarters (at the banking group level). Frequency: firm*year	1874267	0.13	0	0	0
profitability incentive	Dummy=1 if the incentive schemes for the loan officer at the persepctive bank reward branch profitability. Frequency: bank	330	0.12	0	0	0
risk minimization incentive	Dummy=1 if the incentive schemes for the loan officer at the persepctive bank penalize the amount of bad loans. Frequency: bank	330	0.20	0	0	0
statistical evaluation	Dummy=1 if the perspective bank decides only based on statistics criteria. Frequency: bank	330	0.09	0	0	0
large bank	Dummy=1 if the perspective banks belong to the 5 largest banking groups. Frequency: bank	842	0.10	0	0	0
small cooperative bank	Dummy=1 if the perspective banks is a small cooperative bank. Frequency: bank	842	0.54	0	1	1
foreign bank	Dummy=1 if the perspective banks is a branch of a foreign bank operating in Italy. Frequency: bank	842	0.06	0	0	0
number of incumbent banks	Number of banks lending to firm i at month t-1. Frequency: firm*year	1917661	3.12	1	2	4
deteriorated credit	Percentage of the applicant firm i's outstanding credit that is deteriorated. Frequency: firm*year	1917661	5.38	0	0	0
GDP growth	Italian real GDP growth in corresponding quarter, annualized (% change). Frequency: quarterly	38	1.89	0.50	2.06	2.81
interest rate	Quarterly change in the Euribor rate. Frequency: quarterly	38	-0.03	-0.311	0.16	2.81

Empirical strategy - baseline model

To estimate the effect of past rejections on loan search strategy and its outcome, we regress

$$
\begin{aligned}
search\ end_{ijt} &= \alpha_0 + \alpha_1 past\ rejections_{it} + \alpha_2 small_i + \\
&\quad + \alpha_3 (small_i * past\ rejections_{it}) + b_{jt} + f_{it} + u_{ijt} \quad (1) \\
approval_{ijt} &= \beta_0 + \beta_1 past\ rejections_{it} + \beta_2 small_i + \\
&\quad + \beta_3 (small_i * past\ rejections_{it}) + b_{jt} + f_{it} + v_{ijt} \quad (2)
\end{aligned}
$$

where: $small_i$ is the dummy for small firms; f_{it} controls for firms' quality (dummy for bad rating or firm/time f.e.); b_{jt} are bank/time f.e.
In terms of the model described above

- Signs for (1): $\alpha_1 > 0$; $\alpha_3 > 0$
- Signs for (2): sign of β_1 depends on relative importance of self-selection vs stigma; $\beta_3 < 0$

Estimation results
Baseline estimates

Probability to interrupt the search

Table 2. Past requests and search interruption

	probability to interrupt the search	
	(1)	(2)
past rejections	0.010***	0.173***
small	-0.079***	
small#past rejections	0.057***	0.082***
Observations	2281409	2040979
Prob $> F$	0.000	0.000
bank-quarter FE	yes	yes
firms' controls	firm FE	firm/quarter FE
Estimation	panel FE	panel FE

Probability of approval

Table 3. Baseline estimation

	approval		
	(1)	(2)	(3)
past rejections	-0.007***	-0.007***	0.013***
small	0.076***	0.079***	
small#past rejections	-0.032***	-0.033***	-0.023***
Observations	2603049	2599464	2603049
Prob > F	0.000	0.000	0.003
bank-quarter FE	yes	yes	yes
firms' controls	no	rating	quarter FE
Estimation	panel FE	panel FE	panel FE

Estimation results: Heterogeneity across banks and firms

Table 6. Distance of the intermediary from the applicant

	approval	
	(1)	(2)
past rejections	-0.007***	0.013***
small	0.079***	
small#past rejections	-0.033***	-0.026***
same province	0.029***	0.032***
same province#past rejections	-0.004***	-0.002**
Observations	2551601	2555116
Prob > F	0.000	0.000
bank-quarter FE	yes	yes
firms' controls	rating	quarter FE
Estimation methodology	Panel FE	Panel FE

Table A4. The geographical pattern of new applications

Number of past rejections	in the same province (a)	in different provinces (b)	total (c)=(a)+(b)	percentage (a)/(c)
0	232.396	1.512.339	1.744.735	13.3%
1	95.261	709.173	804.434	11.8%
2	40.057	322.549	362.606	11.0%
3	17.594	150.543	168.137	10.5%
>= 4	17.352	160.277	177.629	9.8%

Size of the intermediary

Table 7. Size of the intermediary

	approval	
	(1)	(2)
past rejections	-0.009***	0.012***
small	0.079***	
small#past rejections	-0.033***	-0.023***
large banks#past rejections	0.003***	0.003***
cooperative banks#past rejections	-0.006***	-0.001
foreign banks#past rejections	0.007***	0.003**
Observations	2599464	2940871
Prob $> F$	0.000	0.000
bank-quarter FE	yes	yes
firms' controls	rating	quarter FE
Estimation methodology	Panel FE	Panel FE

Applicant firm's characteristics

Table 8. Applicant firm's characteristics

	approval	
	(1)	(2)
past rejections	-0.010***	0.018***
small	0.092***	
small#past rejections	-0.032***	-0.026***
deteriorated credit	-0.001***	
deteriorated credit#past rejections	0.000	-0.0007*
number of current lenders	0.006***	-0.007**
number of current lenders#past rejections	-0.000***	-0.001***
Observations	2599464	2603049
Prob > F	0.000	0.000
bank/quarter FE	yes	yes
firms' controls	rating	quarter FE
Estimation methodology	Panel FE	Panel FE

- Definition of opacity
- Control for "shopping around effects"
- Length of periods to define search interruption and loan application approval
- Effect of past rejections across different business cycle conditions
- Effect of past rejections across different bank business models
- Alternative empirical strategy

Conclusions

- we investigate lending standards in a context where each bank observes whether a borrower applying for a loan has previously applied with other lenders and has been rejected

- we find that disclosing information on past rejections has
  - a direct discouragement effect on the probability of continuing a loan search
  - at the same time, continuing the search despite former rejections has a positive effect on the probability of being funded, provided that the borrower is not opaque.

- we argue that banks interpret the information on previous rejections as signalling unobservable quality for the average borrower, while not for more opaque borrowers, for whom the negative informational content of past rejections spills over to latter applications

Thanks!