

Chapter 9.2.1

Identifying company types through collateral

# Collateral use

- ▶ Banks do not always know the risks companies are taking, but companies might be more aware of their own risks
- ▶ Setting loan rates too high to account for high-risk companies, might crowd out low-risk companies due to the lower return they obtain from their investment
- ▶ Collateral can be used to distinguish between the two types of companies, allowing for loan rates to be set according to the risk of the company

# Company profits

- ▶ Companies obtain their investment return and repay the loan if they are successful, if they are unsuccessful they lose their collateral
  - ▶  $\Pi_C^i = \pi_i \left( (1 + R) L - (1 + r_L^i) L \right) - (1 - \pi_i) C_i$
  - ▶ The isoprofit curve of companies is given by  $d\Pi_C^i = -\pi_i L dr_L^i - (1 - \pi_i) dC_i = 0$
- $\Rightarrow \frac{dr_L^i}{dC_i} = -\frac{1 - \pi_i}{\pi_i L}$
- ▶ We find a negative trade-off between the loan rate and the size of the collateral

# Bank profits

- ▶ Banks obtain collateral, but they can only sell this with a discount  $\lambda$
  - ▶ If the investment of the company is successful, the loan is repaid, if the investment is not successful, the bank obtains the value of the collateral
  - ▶ Loans are fully financed by deposits
  - ▶  $\Pi_B^i = \pi_i (1 + r_L^i) L + (1 - \pi_i) \lambda C_i - (1 + r_D) L$
  - ▶ The isoprofit curve of banks is given by  $d\Pi_B^i = \pi_i L dr_L^i + \lambda (1 - \pi_i) dC_i = 0$
- $\Rightarrow \frac{dr_L^i}{dC_i} = -\lambda \frac{1 - \pi_i}{\pi_i L}$
- ▶ The slope is negative, but flatter than the isoprofit curve for companies

## Bank offering a single contract only

- ▶ Banks know the composition of low-risk and high-risk companies, the average success rate is  $\pi = p\pi_H + (1 - p)\pi_L$

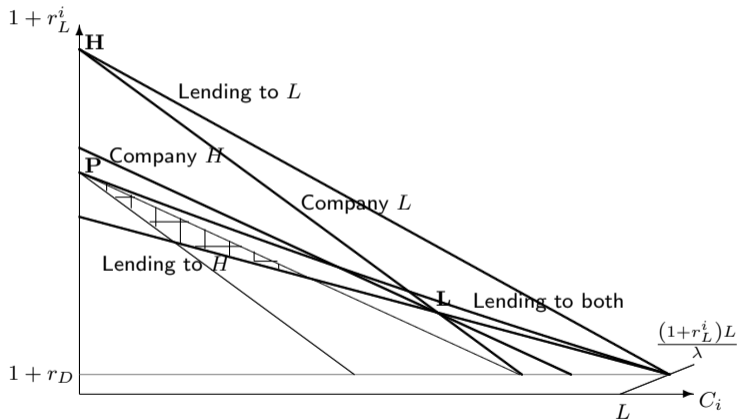
$$\Rightarrow \Pi_B^P = \pi(1 + r_L)L + (1 - \pi)\lambda C - (1 + r_D)L$$

$$\Rightarrow \frac{dr_L}{dC} = -\lambda \frac{1 - \pi}{\pi L}$$

- ▶ This slope is between banks only lending to high-risk and low-risk companies
- ▶ If this bank is competitive then we require  $\Pi_B^P = 0$

$$\Rightarrow 1 + r_L = \frac{1 + r_D}{\pi} - \frac{1 - \pi}{\pi} \frac{C}{L}$$

# Separating equilibrium with collateral



# Banks offering distinct contracts

- ▶ If banks are competitive, they make zero profits as long as they follow the same strategy: all offer two contracts (separating) or all offer one contract (pooling)
  - ▶ If a bank offers a single contract, another bank can offer a marginally better contract near  $\mathbf{P}$
  - ▶ This bank would obtain all low-risk companies, but no high-risk companies
- $$\Rightarrow \Pi_B^* = \pi_H (1 + r_L) L - (1 + r_D) L = (1 - p) \frac{\pi_H - \pi_L}{\pi} (1 + r_D) L$$
- ▶ The other bank would be left with high-risk companies only
- $$\Rightarrow \Pi_B^{**} = \pi_L (1 + r_L) L - (1 + r_D) L = -p \frac{\pi_H - \pi_L}{\pi} (1 + r_D) L$$

# Strategic choice of loan contracts

		Bank 1	
		pooling	separating
Bank 2	pooling	0, 0	$\Pi_B^*, \Pi_B^{**}$
	separating	$\Pi_B^{**}, \Pi_B^*$	0, 0

$\Pi_B^* > 0 > \Pi_B^{**}$        $\Pi_B^* > 0 > \Pi_B^{**}$        $\Pi_B^* > 0 > \Pi_B^{**}$

# Summary

- ▶ Collateral can be used to separate companies taking different risks
- ▶ Low-risk companies will offer collateral in exchange for a lower loan rate
- ▶ High-risk companies will not offer collateral, but pay a higher loan rate
- ▶ Banks will offer contracts with and without collateral for companies to choose



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