



Chapter 9.3  
Rehypothecation

# Outline

- Problem and model assumptions
- Borrowing without rehypothecation
- Allowing rehypothecation
- Summary

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# Re-using collateral

- ▶ Companies pledge collateral to the bank to cover the bank against losses if the loan cannot be repaid
- ▶ The bank can use this collateral as their own collateral to obtain a loan
- ▶ This process is called rehypothecation

# Effort costs

- ▶ Companies use loans to make an investment that is successful with probability  $\pi_L$
- ▶ If they exert effort, the success rate increases to  $\pi_H$
- ▶ This effort imposes additional costs of  $E$  on companies
- ▶ Banks require this additional effort to make lending profitable

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# Uncollateralized borrowing

- ▶ Companies obtain their investment return, less the repayment of the loan, if successful
  - ▶ If exerting effort, they also bear the effort costs
  - ▶  $\Pi_C^H = \pi_H ((1 + R) L - (1 + r_L) L) - E$   
 $\Pi_C^L = \pi_L ((1 + R) L - (1 + r_L) L)$
  - ▶ Companies exert effort if  $\Pi_C^H \geq \Pi_C^L$
- $\Rightarrow L \geq L^* = \frac{E}{(\pi_H - \pi_L)(R - r_L)}$
- ▶ Effort is only exerted if the loan is sufficiently large or effort costs sufficiently small

# Collateralized borrowing

- ▶ Companies providing collateral will lose this if the company does not succeed

- ▶  $\hat{\Pi}_C^H = \pi_H ((1 + R) L - (1 + r_L) L) - (1 - \pi_H) C - E$

$$\hat{\Pi}_C^L = \pi_L ((1 + R) L - (1 + r_L) L) - (1 - \pi_L) C$$

- ▶ Companies exert effort if  $\hat{\Pi}_C^H \geq \hat{\Pi}_C^L$

$$\Rightarrow L \geq L^{**} = \frac{E - (\pi_H - \pi_L) C}{(\pi_H - \pi_L)(R - r_L)}$$

- ▶ This is less restrictive than without collateral as the loss of collateral provides additional incentives to exert effort

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# Bank incentives to rehypothecate

- ▶ The bank will invest the monies raised and be able to repay this loan only if their investment is successful
  - ▶ They also obtain the repaid loan or collateral and repay depositors
  - ▶  $\hat{\Pi}_B = \hat{\pi} \left( \left(1 + \hat{R}\right) \hat{L} - (1 + \hat{r}_L) \hat{L} + \pi_H (1 + r_L) L + (1 - \pi_H) C \right) - (1 + r_D) L$
  - ▶ Without rehypothecation the bank only receives repayment of the loan or collateral and repay depositors
  - ▶  $\Pi_B = \pi_H (1 + r_L) L + (1 - \pi_H) C - (1 + r_D) L$
  - ▶ Rehypothecation is optimal if  $\hat{\Pi}_B \geq \Pi_B$
- $\Rightarrow \hat{\pi} \geq \hat{\pi}^* = \frac{\pi_H(1+r_L)L + (1-\pi_H)C}{(\hat{R}-\hat{r}_L)\hat{L} + \pi_H(1+r_L)L + (1-\pi_H)C}$

# Risk of bank investment

- ▶ If the bank investment is not too risky, rehypothecation is optimal
- ▶ If the loan is very safe,  $\pi_H \approx 1$ , the investment can be riskier
- ▶ If the loan is more risky,  $\pi_H \ll 1$ , the investment needs to be less risky

# Company incentives

- ▶ Companies only obtain their investment return and have to repay their loan if they are successful
- ▶ If the bank is not successful, it will lose the collateral and the company does not have to repay its loan
- ▶ The company loses the collateral if it itself is not successful or the bank is not successful, and has to pay effort costs

$$\hat{\Pi}_C^H = \pi_H ((1 + R) L - \hat{\pi}(1 + r_L) L) - (1 - \pi_H \hat{\pi}) C - E$$

$$\hat{\Pi}_C^L = \pi_L ((1 + R) L - \hat{\pi}(1 + r_L) L) - (1 - \pi_L \hat{\pi}) C$$

- ▶ Companies exert effort if  $\hat{\Pi}_C^H \geq \hat{\Pi}_C^L$

$$\Rightarrow L \geq L^{***} = \frac{E - \hat{\pi}(\pi_H - \pi_L)C}{(\pi_H - \pi_L)((1 + R) - \hat{\pi}(1 + r_L))}$$

# Minimum loan size to exert effort

- ▶ Minimum loan size with rehypothecation is smaller if  $L^{***} \leq L^{**}$
- ⇒  $E \geq E^* = (\pi_H - \pi_L)(1 + r_L)C$
- ▶ If effort costs are sufficiently high, smaller loans are sustainable
- ▶ The possibility that the loan does not need to be repaid provides additional incentives to exert effort, unless effort costs are too high
- ▶ This is not fully compensated for by losing the collateral more frequently

# Company preferences

- ▶ Companies prefer rehypothecation if  $\hat{\Pi}_C^H \geq \hat{\Pi}_C^H$
- ⇒  $(1 + r_L) L \geq C$
- ▶ If loans are not under-collateralised, companies would agree to rehypothecation
- ▶ The loss of collateral weighs less than the possibility of not having to repay the loan

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# The optimality of rehypothecation

- ▶ Rehypothecation is optimal if banks have a not-too-risky investment opportunity and loans are not over-collateralised
- ▶ Rehypothecation provides stronger incentives for companies to exert effort
- ▶ Banks can increase their profits from additional investments
- ▶ If competition erodes loan rates, the benefits to companies would be even stronger

# Limits to rehypothecation

- ▶ Collateral is difficult to value, handing on collateral removed the lender further from the originator of the collateral and increases this difficulty
- ▶ In principle the collateral can be continued to be handed to ever more remote lenders in a collateral chain
- ▶ This is most likely only to happen if the collateral consists of securities or real estate



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