

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

- Problem and model assumptions

Problem and model assumptions

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- Borrowing without rehypothecation

No rehypothecation ○●○

► Companies obtain their investment return

$$\Pi_C^H = ((1+R)L)$$

$$\Pi_C^L = ((1+R)L)$$

Companies obtain their investment return, less the repayment of the loan

$$\Pi_C^H = ((1+R)L - (1+r_L)L)$$

$$\Pi_C^L = ((1+R)L - (1+r_L)L)$$

Companies obtain their investment return, less the repayment of the loan, if successful

$$\Pi_C^H = \pi_H ((1+R) L - (1+r_L) L)$$
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- Companies obtain their investment return, less the repayment of the loan, if successful
- ▶ If exerting effort, they also bear the effort costs
- $\Pi_C^H = \pi_H ((1+R)L (1+r_L)L) E$ $\Pi_C^L = \pi_L ((1+R)L - (1+r_L)L)$

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$$\Pi_C^H = \pi_H ((1+R)L - (1+r_L)L) - E$$

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

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- Companies providing collateral will lose this if the company does not succeed
- $\hat{\Pi}_C^H = \pi_H ((1+R)L (1+r_L)L) (1-\pi_H)C E$ $\hat{\Pi}_C^L = \pi_L ((1+R) L - (1+r_L) L) - (1-\pi_L) C$

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- Problem and model assumptions
- Allowing rehypothecation

Bank incentives to rehypothecate

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► The bank will invest the monies raised

$$\qquad \qquad \hat{\Pi}_B = \quad \left(\left(1 + \hat{R} \right) \hat{L} \right)$$

Allowing rehypothecation

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► The bank will invest the monies raised and be able to repay this loan

$$\hat{\Pi}_B = \left(\left(1 + \hat{R} \right) \hat{L} - \left(1 + \hat{r}_L \right) \hat{L} \right)$$

► The bank will invest the monies raised and be able to repay this loan only if their investment is successful

$$\hat{\Pi}_B = \hat{\pi} \left(\left(1 + \hat{R} \right) \hat{L} - \left(1 + \hat{r}_L \right) \hat{L} \right)$$

► The bank will invest the monies raised and be able to repay this loan only if their investment is successful

Allowing rehypothecation

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► They also obtain the repaid loan

$$\hat{\Pi}_{B} = \hat{\pi} \left(\left(1 + \hat{R} \right) \hat{L} - (1 + \hat{r}_{L}) \hat{L} + \pi_{H} (1 + r_{L}) L \right)$$

- ► 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

$$\qquad \qquad \hat{\Pi}_{B} = \hat{\pi} \left(\left(1 + \hat{R} \right) \hat{L} - \left(1 + \hat{r}_{L} \right) \hat{L} + \pi_{H} \left(1 + r_{L} \right) L + \left(1 - \pi_{H} \right) C \right)$$

- 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

$$\hat{\Pi}_{B} = \hat{\pi} \left(\left(1 + \hat{R} \right) \hat{L} - \left(1 + \hat{r}_{L} \right) \hat{L} + \pi_{H} \left(1 + r_{L} \right) L + \left(1 - \pi_{H} \right) C \right) - \left(1 + r_{D} \right) L$$

Allowing rehypothecation

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- Without rehypothecation the bank only receives repayment of the loan
- $\blacksquare \Pi_B = \pi_H \left(1 + r_L \right) L$

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- Without rehypothecation the bank only receives repayment of the loan or collateral and repay depositors
- \blacksquare $\Pi_R = \pi_H (1 + r_L) L + (1 \pi_H) C (1 + r_D) L$

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$$\hat{\Pi}_{B} = \hat{\pi} \left(\left(1 + \hat{R} \right) \hat{L} - \left(1 + \hat{r}_{L} \right) \hat{L} + \pi_{H} \left(1 + r_{L} \right) L + \left(1 - \pi_{H} \right) C \right) - \left(1 + r_{D} \right) L$$

- ▶ Without rehypothecation the bank only receives repayment of the loan or collateral and repay depositors
- \blacksquare $\Pi_B = \pi_H (1 + r_L) L + (1 \pi_H) C (1 + r_D) L$
- Rehypothecation is optimal if $\hat{\Pi}_B > \Pi_B$

The bank will invest the monies raised and be able to repay this loan only if their investment is successful

Allowing rehypothecation

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Allowing rehypothecation

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Company incentives

Companies only obtain their investment return

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

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

Companies only obtain their investment return and have to repay their loan

$$\hat{\Pi}_{C}^{H} = ((1+R)L - (1+r_{L})L)$$

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Companies only obtain their investment return and have to repay their loan if they are successful

Allowing rehypothecation

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

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

- 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

$$\hat{\Pi}_{C}^{H} = \pi_{H} ((1+R)L - \hat{\pi}(1+r_{L})L)$$
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- 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
- $\hat{\Pi}_C^H = \pi_H \left((1+R) L \hat{\pi} (1+r_L) L \right) (1-\pi_H \hat{\pi}) C$ $\hat{\Pi}_{C}^{L} = \pi_{L} \left((1 + R) L - \hat{\pi} (1 + r_{L}) L \right) - (1 - \pi_{L} \hat{\pi}) C$

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

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Minimum loan size to exert effort

Minimum loan size with rehypothecation is smaller if $L^{***} \leq L^{**}$

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Rehypothecation is optimal if banks have a not-too-risky investment opportunity

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