Chapter 17.2.1 The optimality of deposit insurance limits

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Andreas Krause

		Summary 0000
Outline		

- Problem and model assumptions
  - No deposit insurance
  - Full deposit coverage
  - Partial deposit coverage



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Problem and model assumptions ●୦୦		Summary 0000

#### Problem and model assumptions

No deposit insurance

Full deposit coverage

Partial deposit coverage



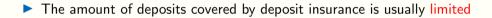
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Problem and model assumptions ○●○		Summary 0000

# Dividing deposits

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Problem and model assumptions ○●○		Summary 0000
Dividing deposits		



Problem and model assumptions $\circ \bullet \circ$		Summary 0000
Dividing deposits		

- > The amount of deposits covered by deposit insurance is usually limited
- Depositors may divide their deposits between banks to increase their coverage

Problem and model assumptions $\circ \bullet \circ$		Summary 0000
Dividing deposits		

- > The amount of deposits covered by deposit insurance is usually limited
- Depositors may divide their deposits between banks to increase their coverage
- Banks compete with deposit rates

Problem and model assumptions $\circ \bullet \circ$		Summary 0000
Dividing deposits		

- ▶ The amount of deposits covered by deposit insurance is usually limited
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- Banks compete with deposit rates and might retain larger deposits if these are sufficiently attractive

Problem and model assumptions $\circ ullet \circ$		Summary 0000
Dividing deposits		

- The amount of deposits covered by deposit insurance is usually limited
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- Banks might find it optimal to limit deposit insurance to attract parts of larger deposits

Problem and model assumptions $\circ \bullet \circ$		Summary 0000
Dividing deposits		

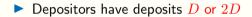
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Problem and model assumptions		Summary 0000

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Problem and model assumptions		Summary 0000



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Problem and model assumptions			Summary 0000
Differentiated accou	nts		

#### **>** Depositors have deposits D or 2D and deposit insurance might be limited to D

Problem and model assumptions 00●			Summary 0000
Differentiated accour	nts		

- Depositors have deposits D or 2D and deposit insurance might be limited to D
- Banks offer differentiated accounts

Problem and model assumptions		Summary 0000

- Depositors have deposits D or 2D and deposit insurance might be limited to D
- Banks offer differentiated accounts and moving deposits to another bank involves costs depending on these differences

Problem and model assumptions		Summary 0000

- Depositors have deposits D or 2D and deposit insurance might be limited to D
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- Banks are one unit apart

Problem and model assumptions 00●		Summary 0000

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- Banks offer differentiated accounts and moving deposits to another bank involves costs depending on these differences
- Banks are one unit apart and depositors are uniformly distributed on this line with distance d<sub>i</sub>

Problem and model assumptions ○○●		Summary 0000

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No insurance ●00		Summary 0000

Problem and model assumptions

No deposit insurance

Full deposit coverage

Partial deposit coverage

Summary

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No insurance ○●○		Summary 0000

## Switching banks

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	No insurance ○●○		
Switching banks			

Depositors staying with bank j are repaid deposits if the loans are repaid to the bank

 $\blacktriangleright \ \Pi_D^{jj} = \pi \left( 1 + r_D^j \right) \hat{D} - \hat{D}$ 

	No insurance ○●○		
Switching banks			

• 
$$\Pi_D^{jj} = \pi \left( 1 + r_D^j \right) \hat{D} - \hat{D} - (1 - \pi) \hat{D}$$

Problem and model assumptions	No insurance ○●○		
Switching banks			

$$\Pi_D^{jj} = \pi \left( 1 + r_D^j \right) \hat{D} - \hat{D} - (1 - \pi) \, \hat{D}$$

Depositors switching banks to bank i are repaid deposits if the loans are repaid to the bank

$$\blacktriangleright \ \Pi_D^{ji} = \pi \left( 1 + r_D^i \right) \hat{D} - \hat{D}$$

Problem and model assumptions	No insurance ○●○		
Switching banks			

$$\Pi_D^{jj} = \pi \left( 1 + r_D^j \right) \hat{D} - \hat{D} - (1 - \pi) \, \hat{D}$$

Depositors switching banks to bank i are repaid deposits if the loans are repaid to the bank and lose their deposits otherwise

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$$\Pi_D^{ji} = \pi \left( 1 + r_D^i \right) \hat{D} - \hat{D} - (1 - \pi) \hat{D}$$

Problem and model assumptions	No insurance ○●○		
Switching banks			

$$\Pi_D^{jj} = \pi \left( 1 + r_D^j \right) \hat{D} - \hat{D} - (1 - \pi) \, \hat{D}$$

Depositors switching banks to bank i are repaid deposits if the loans are repaid to the bank and lose their deposits otherwise, and they face switching costs

$$\Pi_D^{ji} = \pi \left( 1 + r_D^i \right) \hat{D} - \hat{D} - (1 - \pi) \, \hat{D} - c d_i$$

Problem and model assumptions	No insurance ○●○		
Switching banks			

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$$\Pi_D^{ji} = \pi \left( 1 + r_D^i \right) \hat{D} - \hat{D} - (1 - \pi) \hat{D} - cd_i$$

▶ Depositors switch if this is profitable:  $\Pi_D^{ij} \ge \Pi_D^{ii}$ 

Problem and model assumptions	No insurance ○●○		
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 $\Rightarrow d_i \le d_i^* = \pi \frac{(1+r_D^i) - (1+r_D^j)}{c} \hat{D}$ 

Problem and model assumptions	No insurance ○●○		
Switching banks			

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	No insurance ○○●		Summary 0000
Bank profits			

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	No insurance ○○●		
Bank profits			

Deposits a bank holds will consist of existing large and small deposits

$$\blacktriangleright D_i = \lambda \left( 1 \right) 2D + (1 - \lambda) \left( 1 \right) D$$

	No insurance ○○●		
Bank profits			

$$D_i = \lambda \left( 1 + 2\pi \frac{(1+r_D^i) - (1+r_D^i)}{c} \right) 2D + (1-\lambda) \left( 1 + \pi \frac{(1+r_D^i) - (1+r_D^i)}{c} D \right) D$$

	No insurance ○○●		Summary 0000
Bank profits			

$$D_i = \lambda \left( 1 + 2\pi \frac{(1+r_D^j) - (1+r_D^i)}{c} \right) 2D + (1-\lambda) \left( 1 + \pi \frac{(1+r_D^j) - (1+r_D^i)}{c} D \right) D$$

Banks profits are generated if loans are repaid, consisting of these repaid loans after deposits are repaid

$$\blacktriangleright \ \Pi_B^i = \pi \left( (1 + r_L) - \left( 1 + r_D^i \right) \right) D_i$$

	No insurance ○○●		Summary 0000
Bank profits			

$$D_i = \lambda \left( 1 + 2\pi \frac{(1+r_D^j) - (1+r_D^i)}{c} \right) 2D + (1-\lambda) \left( 1 + \pi \frac{(1+r_D^j) - (1+r_D^i)}{c} D \right) D$$

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• The optimal deposit rate is obtained if  $\frac{\partial \Pi_B^i}{\partial (1+r_D^i)} = 0$ 

	No insurance ○○●		Summary 0000
Bank profits			

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	No insurance ○○●		Summary 0000
Bank profits			

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$$\Rightarrow \Pi_B^* = \frac{(1 + \lambda)^2}{1 + 3\lambda} D$$

	No insurance ○○●		Summary 0000
Bank profits			

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	Full insurance ●00	Summary 0000

Problem and model assumptions

No deposit insurance

Full deposit coverage

Partial deposit coverage



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	Full insurance ○●○	Summary 0000

# Switching banks

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	Full insurance ○●○	Summary 0000
Switching banks		

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	Full insurance ○●○	
Switching banks		

Deposits are always repaid and if switching, the switching costs are to be paid
Π<sup>jj</sup><sub>D</sub> = (1 + r<sup>j</sup><sub>D</sub>) D̂ - D̂
Π<sup>ji</sup><sub>D</sub> = (1 + r<sup>i</sup><sub>D</sub>) D̂ - D̂ - cd<sub>i</sub>

	Full insurance ○●○	
Switching banks		

Deposits are always repaid and if switching, the switching costs are to be paid

  $\Pi_D^{jj} = \left( 1 + r_D^j \right) \hat{D} - \hat{D}$ 

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 $\Rightarrow d_i \leq d_i^{**} = \frac{\left(1+r_D^i\right) - \left(1+r_D^j\right)}{c}\hat{D}$ 

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	Full insurance ○●○	
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	Full insurance 00●	Summary 0000
Bank profits		

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	Full insurance ○○●	
Bank profits		

• Deposits at the bank are 
$$D_i = (1 + \lambda) D + \frac{(1+r_D^i) - (1+r_D^j)}{c} (1 + 3\lambda) D^2$$

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	Full insurance 00●	
Bank profits		

• Deposits at the bank are  $D_i = (1 + \lambda) D + \frac{(1+r_D^i) - (1+r_D^j)}{c} (1 + 3\lambda) D^2$ 

• Maximizing bank profits gives  $1 + r_D^{**} = (1 + r_L) - \frac{1+\lambda}{3+\lambda} \frac{c}{D}$ 

	Full insurance 00●	
Bank profits		

- Deposits at the bank are  $D_i = (1 + \lambda) D + \frac{(1+r_D^i) (1+r_D^j)}{c} (1 + 3\lambda) D^2$
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- $\Rightarrow \Pi_B^{**} = \pi \frac{(1+\lambda)^2}{1+3\lambda} D = \pi \Pi_B^*$

	Full insurance ○○●	
Bank profits		

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Full deposit coverage gives banks less profits than no deposit insurance

	Full insurance 00●	
Bank profits		

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- $\Rightarrow \Pi_B^{**} = \pi \frac{(1+\lambda)^2}{1+3\lambda} D = \pi \Pi_B^*$
- Full deposit coverage gives banks less profits than no deposit insurance
- Competition for deposits has increased as the profits of depositors have increased and more can switch

	Full insurance 00●	
Bank profits		

- Deposits at the bank are  $D_i = (1 + \lambda) D + \frac{(1+r_D^i) (1+r_D^j)}{c} (1 + 3\lambda) D^2$
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- $\Rightarrow \Pi_B^{**} = \pi \frac{(1+\lambda)^2}{1+3\lambda} D = \pi \Pi_B^*$
- ▶ Full deposit coverage gives banks less profits than no deposit insurance
- Competition for deposits has increased as the profits of depositors have increased and more can switch
- The lower deposit rate due to the absence of risk does not compensate for this sufficiently

	Full insurance ○○●	
Bank profits		

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	Partial insurance ●000	Summary 0000

Problem and model assumptions

No deposit insurance

Full deposit coverage

Partial deposit coverage



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		Partial insurance ○●○○	Summary 0000
Switching opportuni	ities		

 $\blacktriangleright$  Large depositors will only be covered for their deposits up to D

		Partial insurance 0●00	Summary 0000
Switching opportunit	ies		

- $\blacktriangleright$  Large depositors will only be covered for their deposits up to D
- $\blacktriangleright$  They can stay with bank j and have D repaid for sure

$$\blacktriangleright \ \Pi_D^{jj} = \left(1 + r_D^j\right) D - D$$

	Partial insurance ○●○○	Summary 0000

- Switching opportunities
  - Large depositors will only be covered for their deposits up to D
  - They can stay with bank j and have D repaid for sure and D only repaid if the loan is repaid to the bank

• 
$$\Pi_D^{jj} = \left(1 + r_D^j\right) D - D + \pi \left(1 + r_D^j\right) D - D - (1 - \pi) D$$

	Partial insurance ○●○○	Summary 0000

- Large depositors will only be covered for their deposits up to D
- They can stay with bank j and have D repaid for sure and D only repaid if the loan is repaid to the bank

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$$\Pi_D^{jj} = \left(1 + r_D^j\right) D - D + \pi \left(1 + r_D^j\right) D - D - (1 - \pi) D$$

They can stay switch entirely to bank i and have D repaid for sure

$$\blacktriangleright \ \Pi_D^{ji} = \left(1 + r_D^i\right) D - D$$

	Partial insurance ○●○○	Summary 0000

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	Partial insurance 0●00	

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They can stay switch entirely to bank i and have D repaid for sure and D only repaid if the loan is repaid to the bank, and bear switching costs

$$\Pi_D^{ji} = \left(1 + r_D^i\right) D - D + \pi \left(1 + r_d^i\right) D - D - (1 - \pi) D - cd_j$$

	Partial insurance 0●00	Summary 0000

- Large depositors will only be covered for their deposits up to D
- They can stay with bank j and have D repaid for sure and D only repaid if the loan is repaid to the bank

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They can stay switch entirely to bank i and have D repaid for sure and D only repaid if the loan is repaid to the bank, and bear switching costs

$$\Pi_D^{ji} = (1 + r_D^i) D - D + \pi (1 + r_d^i) D - D - (1 - \pi) D - cd_j$$

They can switch D to bank i and have the full deposits insured

$$\blacktriangleright \ \Pi_D^{jij} = \left(1 + r_D^j\right) D - D + \left(1 + r_D^i\right) D - D$$

	Partial insurance 0●00	

- Large depositors will only be covered for their deposits up to D
- They can stay with bank j and have D repaid for sure and D only repaid if the loan is repaid to the bank

• 
$$\Pi_D^{jj} = \left(1 + r_D^j\right) D - D + \pi \left(1 + r_D^j\right) D - D - (1 - \pi) D$$

They can stay switch entirely to bank i and have D repaid for sure and D only repaid if the loan is repaid to the bank, and bear switching costs

$$\Pi_D^{ji} = (1 + r_D^i) D - D + \pi (1 + r_d^i) D - D - (1 - \pi) D - cd_j$$

They can switch D to bank i and have the full deposits insured, bearing switching costs

$$\square \Pi_D^{jij} = \left(1 + r_D^j\right) D - D + \left(1 + r_D^i\right) D - D - cd_j$$

	Partial insurance 0●00	

- Large depositors will only be covered for their deposits up to D
- They can stay with bank j and have D repaid for sure and D only repaid if the loan is repaid to the bank

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$$\Pi_D^{jij} = (1 + r_D^j) D - D + (1 + r_D^i) D - D - cd_j$$

	Partial insurance 00●0	Summary 0000

# Switching decision

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			Partial insurance 00●0	Summary 0000
Switching decision				
Large depositors s	witch parts of th	heir deposits if $\Pi_D^{jij}$ :	$\geq \Pi_D^{jj}$	

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		Partial insurance 00●0	Summary 0000
Switching decision			
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► Large depositors switch parts of their deposits if  $\Pi_D^{jij} \ge \Pi_D^{jj}$ 

 $\Rightarrow d_i \leq d_i^{***} = \frac{\left(1 + r_D^j\right) - \pi\left(1 + r_D^i\right) + (1 - \pi)}{c} D$ 

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		Partial insurance 00●0	
Switching decision			

• Large depositors switch parts of their deposits if  $\Pi_D^{jij} \ge \Pi_D^{jj}$ 

$$\Rightarrow d_i \le d_i^{***} = \frac{(1+r_D^i) - \pi(1+r_D^i) + (1-\pi)}{c} D$$

Large depositors are attracted from other banks seeking to increase their deposit insurance coverage

$$\blacktriangleright D_i = \lambda \left( 2D - \right)$$

$$\frac{\left(1+r_D^i\right)-\pi\left(1+r_D^j\right)+(1-\pi)}{c}D^2\right)$$

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		Partial insurance 00●0	Summary 0000
Switching decision			

▶ Large depositors switch parts of their deposits if  $\Pi_D^{jij} \ge \Pi_D^{jj}$ 

$$\Rightarrow d_i \le d_i^{***} = \frac{(1+r_D^i) - \pi(1+r_D^i) + (1-\pi)}{c} D$$

- Large depositors are attracted from other banks seeking to increase their deposit insurance coverage
- Large depositors are lost to other banks seeking to increase their deposit insurance coverage

$$D_i = \lambda \left( 2D - \frac{(1+r_D^j) - \pi (1+r_D^i) + (1-\pi)}{c} D^2 + \frac{(1+r_D^i) - \pi (1+r_D^j) + (1-\pi)}{c} D^2 \right)$$

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		Partial insurance 00●0	Summary 0000
Switching decision			

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- Large depositors are attracted from other banks seeking to increase their deposit insurance coverage
- Large depositors are lost to other banks seeking to increase their deposit insurance coverage
- Small depositors will be fully insured and behave as indicated above

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		Partial insurance 00●0	
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		Partial insurance 000●	Summary 0000
Bank profits			

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		Partial insurance 000●	Summary 0000
Bank profits			

• Maximizing bank profits gives  $1 + r_D^{***} = (1 + r_L) - \frac{1+\lambda}{1+\pi\lambda} \frac{c}{D}$ 

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	Partial insurance 000●	Summary 0000

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	Partial insurance 000●	Summary 0000

Bank profits

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• These profits are higher than no deposit insurance if  $\pi > \frac{1}{1+2\lambda}$ 

	Partial insurance 000●	

Bank profits

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- In this case competition for large deposits is not too strong to negate the effect of the lower deposit rate due to them not being exposed to risk

	Partial insurance 000●	Summary 0000

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		Summary ●000

Problem and model assumptions

No deposit insurance

Full deposit coverage

Partial deposit coverage



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		Summary 0000

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If banks are not too risky they prefer deposit insurance to be limited to smaller deposits



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		Summary 00●0

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			Summary 00●0
Optimal limited cov	erage		

Deposit insurance is not provided to large deposits unless banks are highly risky

		Summary 00●0

- Deposit insurance is not provided to large deposits unless banks are highly risky
- If deposit insurance is not provided free, this will make the benefits of partial insurance coverage over full coverage more pronounced

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		Summary ○○●○

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