Andreas Krause

Bank runs and deposit insurance

- We will see how fragile banks are to the sudden withdrawal of deposits, even if no apparent reason for such a development can be identified.
- The effect such bank runs have on the economy can be substantial and for this reason deposit insurance scheme have been introduced, which prevent depositors from making losses if banks fail.
- We will look at the impact such deposit insurance has on banks's behavior and their profits.

Fractional reserve banking

- Banks retain only a small amount of deposit as cash reserves to accommodate deposit withdrawals
- This is known as fractional reserve banking
- If the withdrawals are higher than the cash reserves, a bank may fail
- This is known as a bank run

Fractional reserve banking

→ Banks have the important task of maturity transformation or liquidity insurance and in this role they only retain a small fraction of deposits in cash, lending out the remainder.

- Modern banks are using a small fraction of their deposits as cash reserves to meet any deposit withdrawals and lent out the remainder.
- This is commonly known as fractional reserve banking as only a small fraction of the deposits are at the direct disposal of depositors.
- Withdrawals exceed this small cash reserve can lead to the failure of banks as they cannot meet their obligation to repay deposits on demand.
- A situation in which deposits are withdrawn without any apparent cause is known as a bank run.

→ We will look at banks runs and their causes, but also at a measure introduced to prevent them, namely deposit insurance.

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Causes and prevention of bank runs

- If loans are not repaid, banks may not be able to repay deposits, causing depositors to withdraw if they have this information
- It is not necessary to have such information, we will see how the expectation of others withdrawing will cause a bank run
- Bank runs can be avoided if depositors do not face losses from a failing bank
- Deposit insurance affects the incentives of banks when taking risks and the competition between them

Causes and prevention of bank runs

→ We will discuss the causes of such banks runs as well as measures to avoid them.

- Loans that banks give might not be repaid and these losses might put the ability of banks to repay deposits into question.
  - Depositors knowing about such losses would be expected to withdraw deposits so as to not incur losses themselves. These deposit withdrawals are efficient in that they discipline banks to not take excessive risks.
- However, we can have a bank run without such information being available and we will see how expectations about the behaviour of other depositors can trigger a bank run. It is sufficient that depositors believe that other depositors will withdraw; this belief that they will withdraw might in turn be based on them believing that others will withdraw.
- The key to a bank run emerging is that by not withdrawing deposits, the depositor will suffer a larger loss than when withdrawing deposits. If depositors are not facing any losses from retaining their deposits with the bank, a bank run should not emerge.
- One way to achieve such a situation is through deposit insurance. We will, however, see that introducing deposit insurance has an effect on the risk-taking behaviour of banks.
  - It will also affect the competition between banks.

→ We will look at all of these aspects in turn.

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Expectations about other depositors

- Banks hold cash for some depositors to withdraw
- Banks can obtain additional cash to repay more deposits
- Banks are repaying deposits on a first-come-first-served basis, making expectations about the behaviour of other depositors essential
- If a depositor expects many others to withdraw, it would be beneficial to withdraw yourself

Expectations about other depositors

→ The first model assess the impact the expectations on the behaviour of other depositors have on the decision by a depositor to withdraw.

- Deposits withdrawn consumption should be covered by existing cash reserves.
- If deposit withdrawals are higher, they might obtain additional cash reserves, for example through emergency lending from other banks or the central bank, but also the selling of assets such as loans.
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  - Deposits are repaid as these withdrawals are requested until no more deposits can be repaid.
  - In this case it would be costly to wait for too long until withdrawing deposits as the bank might have no funds left. Anticipating the behaviour of other depositors is therefore essential to not withdraw deposits too late.
- If withdrawals are expected to be high and exceed the resources of the bank, withdrawing early might be beneficial to avoid any losses.

→ We will look at such a model where expectations about the behaviour of other depositors, rather than information about the bank, are an essential element in the cause of bank runs.

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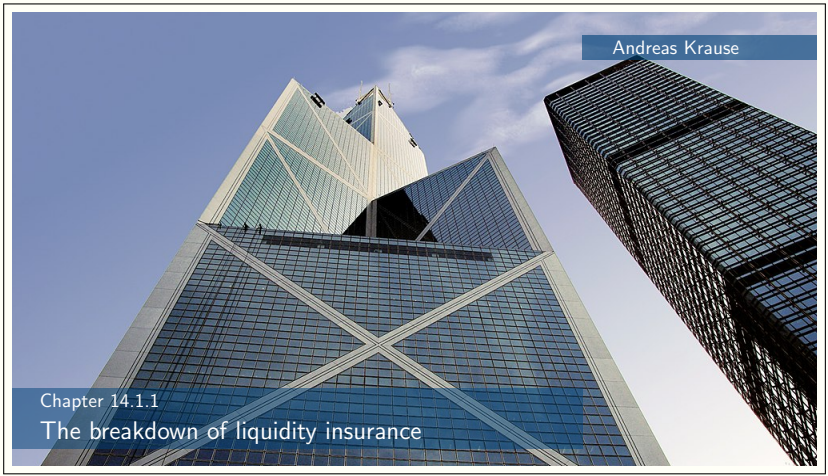
Andreas Krause
Chapter 14.1.1
The breakdown of liquidity insurance

→ The model we are going to discuss is based on Chapter 14.1.1 of the book 'Theoretical Foundations of Banking'. A more detailed description of the model, additional steps for its solution, and a more in-depth discussion of results can be found there.

Discussion of model results

- Bank runs can become self-fulfilling
- Expecting others to withdraw, makes it rational to withdraw
- If a bank faces a liquidity problem from deposit withdrawals, is it always best to withdraw yourself?
- Banks might obtain liquidity support from the central bank or other banks through interbank loans, making staying with the bank more attractive

Discussion of model results

→ Now that we have derived the main results of the model, as far as relevant for us, we will briefly discuss some implications as well as limitations of this model. This will allow us to interpret the model in its context of the initial problem and enables us to apply it appropriately in a realistic context.

- We have seen that a bank run can emerge only because depositors expect a bank run; if the expectation would be that no bank run would e=happen, it would not happen.
  - It is only expectations that matter for this result, the soundness of the bank is irrelevant in this case.
- If other depositors withdraw, or are expected to withdraw, the losses are minimised if a depositor withdraws itself.
- If you expect others to withdraw their deposits, are there ways in which you might be able to retain deposits with the bank without making losses?
- As long as the bank is sound, this is a pure liquidity problem and the bank might be able to get loans from other banks or the central bank. This is comparable to replacement deposits by these lenders and the bank does not need to sell other assets at a loss; it is this sale of assets at a loss that makes a bank run rational.

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Discussion of model results

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  - It is only expectations that matter for this result, the soundness of the bank is irrelevant in this case.
- If other depositors withdraw, or are expected to withdraw, the losses are minimised if a depositor withdraws itself.
- If you expect others to withdraw their deposits, are there ways in which you might be able to retain deposits with the bank without making losses?
- As long as the bank is sound, this is a pure liquidity problem and the bank might be able to get loans from other banks or the central bank. This is comparable to replacement deposits by these lenders and the bank does not need to sell other assets at a loss; it is this sale of assets at a loss that makes a bank run rational.

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Bank risks and withdrawals

- Banks' abilities to repay deposits depend on the risks in their loans and the withdrawal rate of depositors
- Allowing bank to liquidate assets increases their ability to meet withdrawals
- The remaining assets are then used to repay the remaining depositors, each obtaining a larger share
- This trade-off will be investigated

Bank risks and withdrawals

→ Bank runs in the previous model were the result of expectations about other depositors' decisions. We will now look a little bit closer at an interaction of deposit withdrawals and the soundness of the bank, most notably the risks it is taking and how this might affect the emergence of bank failures and bank runs.

- Banks cannot repay deposits of too many loans are not repaid; they would not have the necessary assets to do so. If deposit withdrawals are high, they might not be able to obtain sufficient cash reserves to make payments to depositors as necessary.
- If banks are short of liquidity they can sell assets to increase their liquidity, although often they will incur a loss in doing so.
- The cash generated is used to repay withdrawn deposits and the smaller amount of remaining deposits are then repaid from the assets not sold.
- We look at this trade off between these aspects and when banks fail and how bank runs can emerge in this situation.

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Andreas Krause
Chapter 14.1.2
Coordination of deposit withdrawals

→ The model we are going to discuss is based on Chapter 14.1.2 of the book 'Theoretical Foundations of Banking'. A more detailed description of the model, additional steps for its solution, and a more in-depth discussion of results can be found there.

Discussion of model results

- A bank run may occur even if it is not profitable and not withdrawing deposits would yield a higher profit
- The equilibrium exhibits a coordination problem between depositors whether to withdraw or not
- Can banks easily and quickly sell their assets?
- The market for bank assets will be limited as the valuation of loans is difficult and buyers are subject to adverse selection

Discussion of model results

→ Now that we have derived the main results of the model, as far as relevant for us, we will briefly discuss some implications as well as limitations of this model. This will allow us to interpret the model in its context of the initial problem and enables us to apply it appropriately in a realistic context.

- We might observe a bank run even if not withdrawing deposits would yield a higher outcome. It is more profitable to retain deposits, as long as everyone does so, than to withdraw deposits. However, for each depositor individually it is more profitable to withdraw deposits than to retain them with the bank.
- This situation is akin to the Prisoner's dilemma and we face a coordination problem where if all depositors agreed to not withdraw, then all would be better off.
- A crucial assumption in these models was that banks can sell their assets, pricipally loans, quickly, even though they might make a loss in doing so. Is this a realistic assumption?
- Valuing a loan is difficult and valuing a large portfolio of loans does not simplify the task as data about loans are rarely readily available and each loan has to be assessed on its own merit. In addition, buyers are exposed to adverse selection as banks will see to sell their worst performing loans first. All this makes agreeing a sale of loans a slow process.

→ We have seen that banks are fragile and subject to runs. We will now turn to the principal way this problem has been addressed, deposit insurance.

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Insuring deposits

- Banks or depositors could purchase insurance against any losses; this would avoid a bank run
- Such deposit insurance is often provided by governments for free or a fixed premium, based on total deposits
- Depositors would not demand a risk premium for their deposits
- This might affect the incentives of banks about the type of loans they give

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- Deposit insurance would provide depositors with repayment of their deposits if the bank is unable to do so. In principle each depositor could purchase such insurance for themselves, or banks could purchase this insurance to re-assure depositors that they will not face any losses.
- If depositors face no losses from banks not repaying their deposits, there should be no bank run as there is no benefits from withdrawing deposits.

- Deposit insurance is in many cases not bought by banks, and even less commonly by depositors themselves. It is common for governments to guarantee deposits without a charge or banks are charged a levy which typically is based on the total assets of a bank.
- With a such deposit insurance in place, deposits are risk-free and deposit rates should be reflecting this situation.
- With lower costs to banks from lower deposit rates, we will investigate how the lending behaviour of banks is influenced. We will look particularly at the level of risks banbks are taking.

→ The coming model will therefore assume that deposit insurance is provided at a fixed premium to see which effect it has and then we will look at the effect if the premium reflects any risks banks take.

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- With a such deposit insurance in place, deposits are risk-free and deposit rates should be reflecting this situation.
- With lower costs to banks from lower deposit rates, we will investigate how the lending behaviour of banks is influenced. We will look particularly at the level of risks banbks are taking.

→ The coming model will therefore assume that deposit insurance is provided at a fixed premium to see which effect it has and then we will look at the effect if the premium reflects any risks banks take.

Insuring deposits

- Banks or depositors could purchase insurance against any losses, this would avoid a bank run
- Such deposit insurance is often provided by governments for free or a fixed premium, based on total deposits
- Depositors would not demand a risk premium for their deposits
- This might affect the incentives of banks about the type of loans they give

Insuring deposits

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- Deposit insurance would provide depositors with repayment of their deposits if the bank is unable to do so. In principle each depositor could purchase such insurance for themselves, or banks could purchase this insurance to re-assure depositors that they will not face any losses.
- If depositors face no losses from banks not repaying their deposits, there should be no bank run as there is no benefits from withdrawing deposits.

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Andreas Krause
Chapter 17.1.1
Fixed-price deposit insurance

→ The model we are going to discuss is based on Chapter 17.1.1 of the book 'Theoretical Foundations of Banking'. A more detailed description of the model, additional steps for its solution, and a more in-depth discussion of results can be found there.

Discussion of model results

- Fixed price deposit insurance induces banks to increase risks.
- The price of deposit insurance needs to take into account the risk banks take to avoid moral hazard.

? With many governments providing free deposit insurance, why are bank failures not more common?

! Banks are heavily regulated, in terms of capital requirements; the time delay of repayments and inconvenience of deposit insurance makes depositors not indifferent to bank failures.

Discussion of model results

→ Now that we have derived the main results of the model, as far as relevant for us, we will briefly discuss some implications as well as limitations of this model. This will allow us to interpret the model in its context of the initial problem and enables us to apply it appropriately in a realistic context.

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- Banks are not free in how much risk they can take; capital requirements will limit any risks and hence failures. In addition, the repayment through deposit insurance scheme will often lead to significant delays until depositors receive payment; this means that depositors will not see deposits as entirely risk free and still demand a risk premium, increasing the costs of banks when increasing risks, offsetting the impact of moral hazard at least partially.

→ While deposit insurance is common, it is also limited to a certain amount per person per bank. We will explore why such an arrangement is optimal.

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Incomplete deposit insurance coverage

- Deposit insurance is usually limited to a certain amount of deposits per bank.
- With deposit insurance competition between banks is affected as there the value of insured deposits is higher than uninsured deposits.
- We will assess how this competition affects the preferences of banks for deposit insurance.

Incomplete deposit insurance coverage

→ Bank runs cannot be fully avoided if not all deposits are included in the deposit insurance scheme. Nevertheless it is common to limit the extent of coverage and we will see why banks prefer such an arrangement.

- Limits on the amount of deposits insured at each bank are imposed in most deposit insurance schemes and we week to determine why this is the case.
- We will argue that insured deposits are worth more than uninsured deposits and through the higher value of insured deposits competition to attract these is increased.
- Increased competition will generally reduce the profits and hence insuring deposits will affect bank profits. Thus banks might have preferences for the extent of coverage that deposit insurance provides such that competition is not increased too much, but while they can still benefit from paying lower deposit rates due to their risk being eliminated.

→ We will now look at a model determining the optimal deposit insurance coverage from the perspective of banks.

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Andreas Krause
Chapter 17.2.1
The optimality of deposit insurance limits

→ The model we are going to discuss is based on Chapter 17.2.1 of the book 'Theoretical Foundations of Banking'. A more detailed description of the model, additional steps for its solution, and a more in-depth discussion of results can be found there.

Discussion of model results

- Banks balance lower deposit rates due to deposit insurance with higher competition due to offering a more valuable "product"
- This results in a limit on the amount of deposits that are insured
- Would a retail bank providing loans to low-income borrowers and financing these with many small deposits advocate for a limit on deposit coverage?
- This is unlikely as we need a $\kappa > \frac{1}{1+r_{SS}}$ and the bank would need to be very safe; they would rather have no deposit insurance to limit competition

Discussion of model results

→ Now that we have derived the main results of the model, as far as relevant for us, we will briefly discuss some implications as well as limitations of this model. This will allow us to interpret the model in its context of the initial problem and enables us to apply it appropriately in a realistic context.

- Deposit insurance eliminates risk to depositors, allowing banks to offer lower deposit rates and increasing their profits; at the same time does the higher value of deposits increase competition for them, reducing bank profits. banks balance these two effects on their profitability.
- It turns out that bank profits are highest if only small deposits are insured, while large deposits remain partially insured.
- Some banks have as their main market retail customers, most of which will have very small deposits only; their deposits would therefore fall under any reasonable limit for deposit insurance cover. Would the advocate for a limit on the deposit insurance cover?
- Loans to low-income borrowers are usually seen as risky and we have seen that only safe banks would advocate for a limit on deposit insurance cover. It is therefore more likely that this bank would prefer to not have deposit insurance at all.

→ We have seen that safe banks would like to have a limit on any deposit insurance, while less safe banks would not want to any deposit insurance cover to be in place at all.

Discussion of model results

- Banks balance lower deposit rates due to deposit insurance with higher competition due to offering a more valuable 'product'
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→ Now that we have derived the main results of the model, as far as relevant for us, we will briefly discuss some implications as well as limitations of this model. This will allow us to interpret the model in its context of the initial problem and enables us to apply it appropriately in a realistic context.

- Deposit insurance eliminates risk to depositors, allowing banks to offer lower deposit rates and increasing their profits; at the same time does the higher value of deposits increase competition for them, reducing bank profits. banks balance these two effects on their profitability.
- It turns out that bank profits are highest if only small deposits are insured, while large deposits remain partially insured.
- Some banks have as their main market retail customers, most of which will have very small deposits only; their deposits would therefore fall under any reasonable limit for deposit insurance cover. Would the advocate for a limit on the deposit insurance cover?
- Loans to low-income borrowers are usually seen as risky and we have seen that only safe banks would advocate for a limit on deposit insurance cover. It is therefore more likely that this bank would prefer to not have deposit insurance at all.

→ We have seen that safe banks would like to have a limit on any deposit insurance, while less safe banks would not want to any deposit insurance cover to be in place at all.

Discussion of model results

- Banks balance lower deposit rates due to deposit insurance with higher competition due to offering a more valuable 'product'
- This results in a limit on the amount of deposits that are insured

? Would a retail bank providing loans to low-income borrowers and financing these with many small deposits advocate for a limit on deposit coverage?

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Summary of key results

- Bank runs can occur due to depositors forming expectations about other depositors' behaviour
- Bank runs can be self-fulfilling and need not have a fundamental reason
- Deposit insurance prevents bank runs, but it affects the incentives of banks to take higher risks
- Banks are also concerned about the impact deposit insurance has on competition between them and seek to limit the amount of deposits insured

Summary of key results

→ We can now summarize the key results we have obtained about bank runs.

- We have seen that banks are fragile in that expectations that a bank run will occur cause a bank run.
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  - We thus showed that bank runs can be self-fulfilling prophecies. It is therefore important to retain trust into each bank to ensure expectations do not switch.
  - This change of expectations does not have to have a reason in the risks of the bank being able to repay deposits that are not withdrawn, assuming no bank run emerges; the mere existence of a rumour is sufficient.
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  - Deposit insurance eliminate potential losses to depositors and makes bank runs irrational.
  - Deposit insurance has, however, side effects that provides banks with incentives to increase the risks they are taking.
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→ Banks are fragile and can be exposed to bank runs without any discernable reason; the remedy of providing deposit insurance leads banks to increase the risks they are taking and as deposit insurance increases competition between banks, they seek to limit the amount of deposits covered.

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Andreas Krause
Department of Economics
University of Bath
Claverton Down
Bath BA2 7AY
United Kingdom

E-mail: mnsak@bath.ac.uk