Andreas Krause

Chapter 7.2

Credit rationing caused by moral hazard

- Banks provide loans to companies for investments, but they have in the end very little control over what investment the company will conduct.
- Instead the bank will have to rely on incentives to ensure that the investment chosen is such that it is profitable for the bank.
- We will see how such an incentive can lead to credit rationing.

Risk-taking by companies

Risk-taking by companies

→ Companies might be induced to take on more risk when taking loans, a phenomenon called risk-shifting in the corporate finance literature.

- Once companies have obtained a loan to conduct investments, they can chose how much risk they seek by making different investments than initially agreed or proceeding with different approaches in their investment.
- Banks will provide incentives to companies that will rule out too risky investments.
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  - The tool banks have to provide such incentives are the loan conditions that have been agreed, other form of agreements are not easy to monitor and may be undermined by the company.
  - The loan conditions banks can use are the loan rate they agree with the company
  - and the size of the loan.

→ We will now look at how different risks affect company profits and their optimal choice of investment.

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Company profits

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→ We will not look at how the bank can ensure the company chooses the low-risk investment.

▶
- If the company is successful in its investment, it will obtain the return on its investment. This return will vary depending on the investment chosen. In general we assume that a higher risk (lower success rate) is associated with a higher return.
- The company uses this return to repay the loan.

▶ *Formula*

▶ The company will choose the investment with the high success rate (low risk) if it is more profitable to do so.

⇒ This condition can be solved for us to obtain a maximum loan rate. Below this loan rate, the company will choose the low-risk investment.

→ Having established the incentives required to companies for choosing the lo-risk investment, we can now determine the bank profits.

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- If successful, companies obtain their return
- $\Pi_C^i = \pi_i \left((1 + R_i) L \right.$ $\left. \right)$

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→ The bank profits will depend on the choice of investment the company makes.

- If the investment the company conducts is successful, the bank is repaid its loan.
- Banks finance their loans thorough deposits, which always need to be repaid.

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- Given the incentives for the company, which risk companies take will depend on the loan rate applied.
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- A low loan rate implies that low risks are taken
- and a high loan rate that a high risks are taken.

→ We can now determine the equilibrium demand and supply graphically.

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Demand and supply

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→ We now derive the equilibrium demand and supply graphically. To this effect we will start with the profits of the bank.

- We start by looking at the relationship between banks profits and the loan rate.
- We know that at the loan rate $\hat{r}_L$ the company switches to the high-risk investment, as the success rate is lower, the bank profits reduce here.
- In the green area the profits with a higher loan rate are lower than with a lower loan rate due to the increased risk companies take. Banks would not choose a loan rate in this area as a lower loan rate can be chosen that gives the bank a higher profit.
- We can now determine the relationship between loan size and bank profits.
- The bank profits will increase the larger the loan is. We have to distinguish between whether the company chooses high risks (low success rate L) or low risks (high success rate H).
- As the success rate is higher, the relationship is steeper
- We can now similarly identify the green area of loan rates that banks would not apply.
- To generate the requisite graph, we need to reflect the loan rate onto the vertical axis.
- The loan rates that are not applied by the bank are again identified in green.
- We can now combine the graphs to obtain the relationship between loan size and loan rate.
- We can construct the new graph by choosing some key locations.
- This will give us the supply curve for bank loans. While the supply is increasing, there is the green area of loan rates that the bank will never apply.
- With the usual downward slowing demand curve, for low demands an equilibrium is obtained where demand and supply meet.
- The same is true for high loan demand.
- For intermediate loan demands the equilibrium would be in the green area; however as banks would not quote these loan rates this cannot be an equilibrium.
- Instead, they would quote the loan rate $\hat{r}_L$ and this leads to a situation where demand and supply do not meet. At that loan rate, an excess demand emerges.

→ The excess demand implies that companies apply for larger loans than the bank is willing to grant. Hence, the bank will not grant the full loan, but ration the loan amount; credit rationing occurs. The loan amount they grant is fixed, hence no overbidding on the loan size they apply for is a beneficial strategy.

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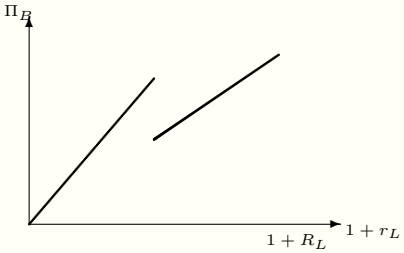

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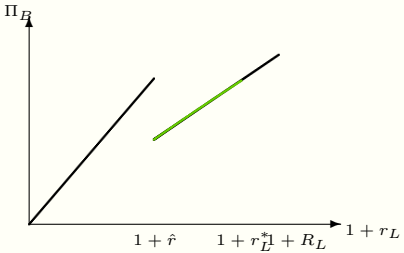

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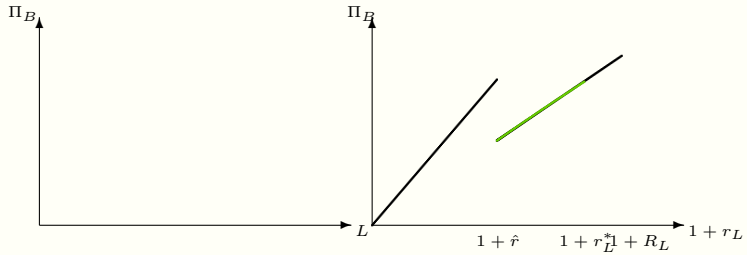

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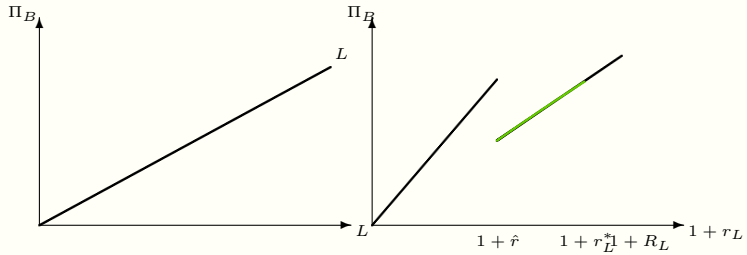

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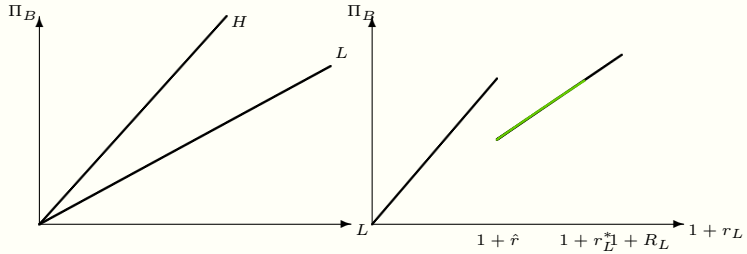

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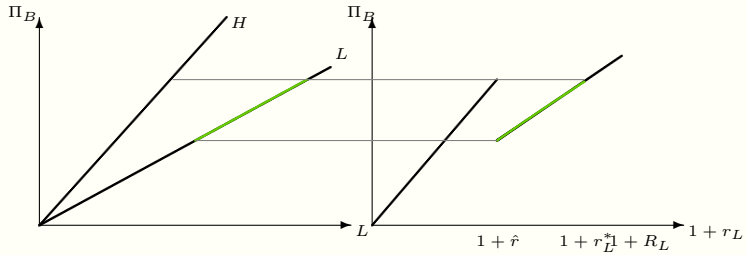

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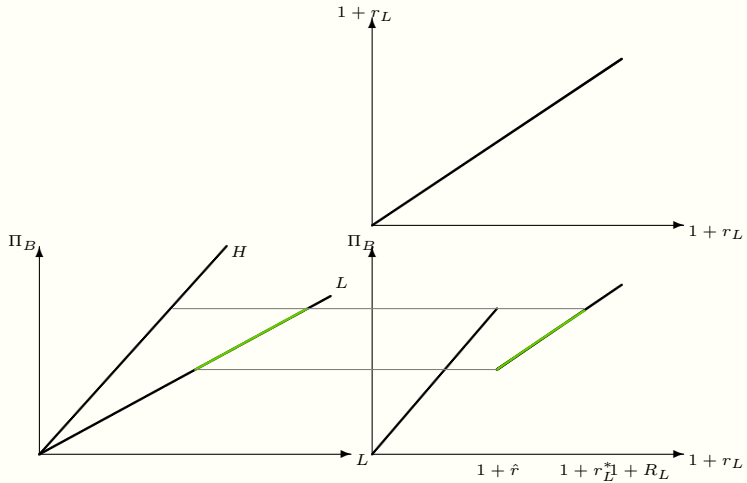

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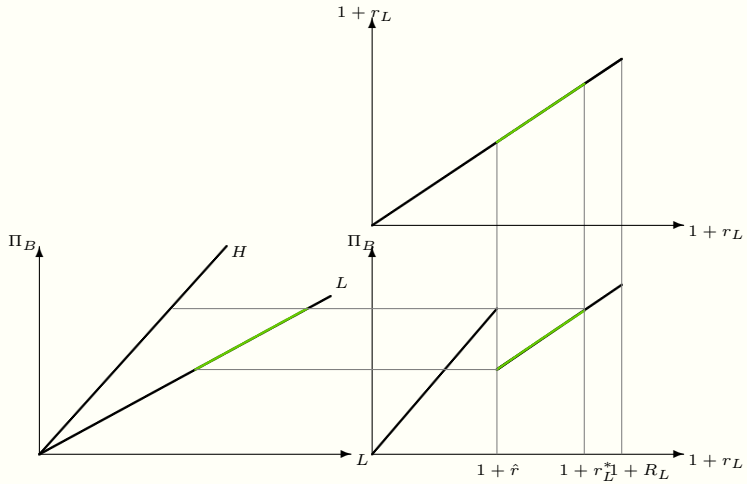

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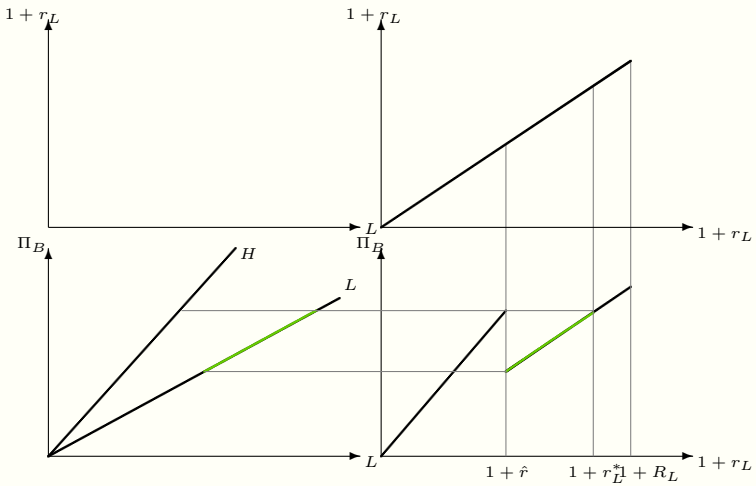

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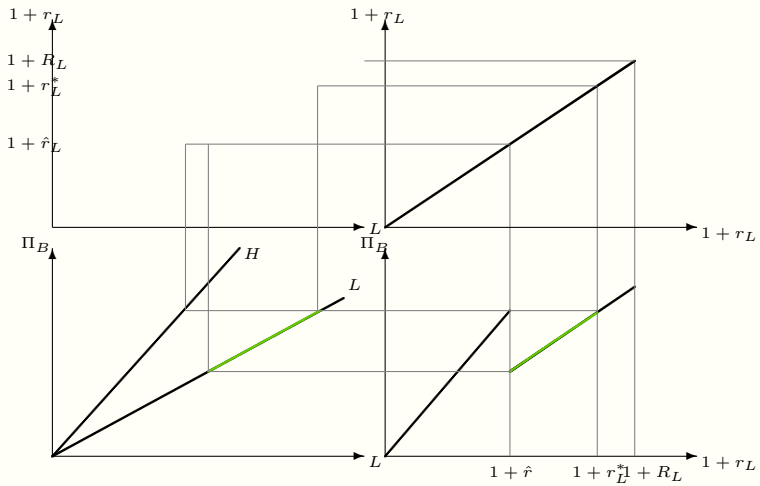

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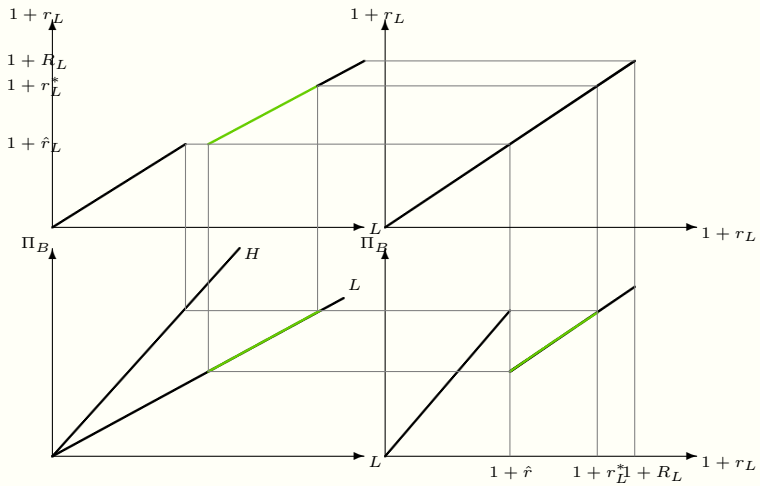

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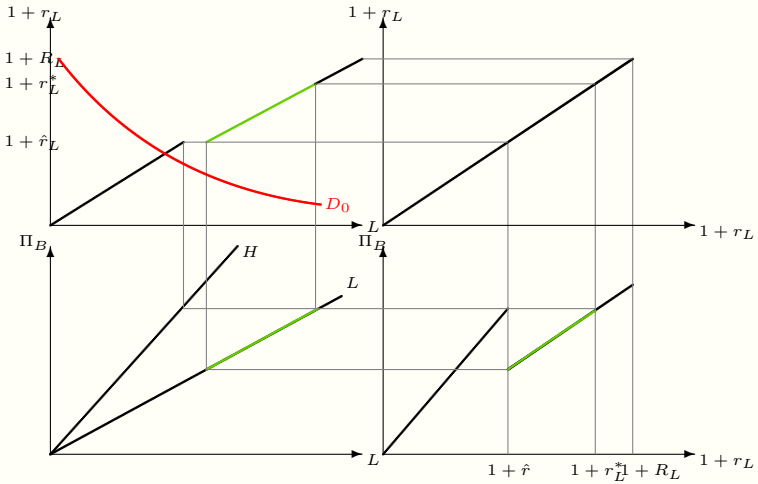

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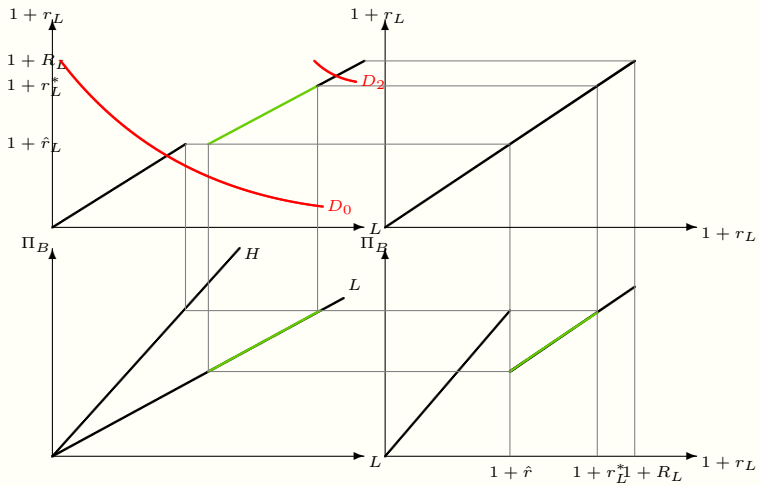

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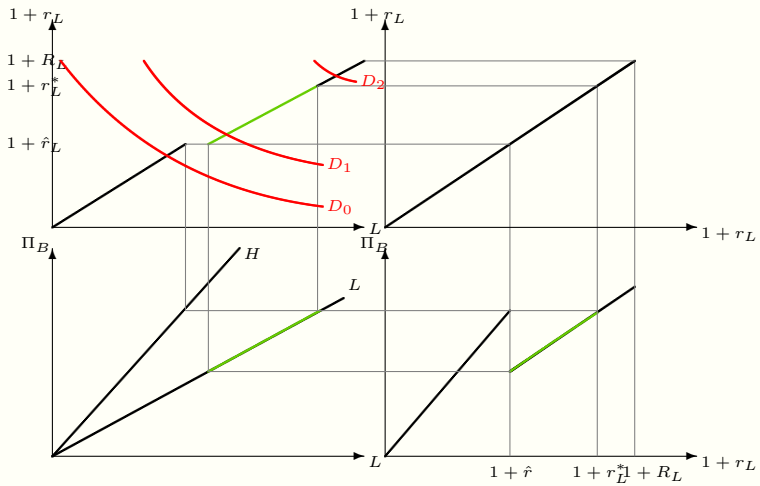

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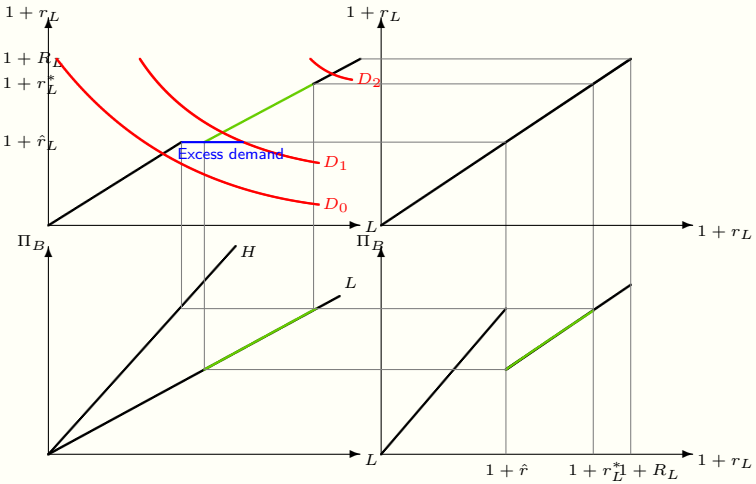

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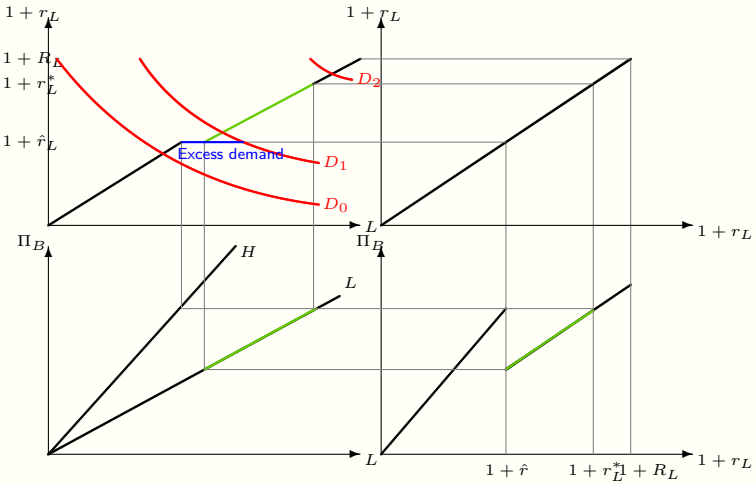

Demand and supply

→ We now derive the equilibrium demand and supply graphically. To this effect we will start with the profits of the bank.
- We start by looking at the relationship between banks profits and the loan rate.
- We know that at the loan rate $\hat{r}_L$ the company switches to the high-risk investment, as the success rate is lower, the bank profits reduce here.
- In the green area the profits with a higher loan rate are lower than with a lower loan rate due to the increased risk companies take. Banks would not choose a loan rate in this area as a lower loan rate can be chosen that gives the bank a higher profit.
- We can now determine the relationship between loan size and bank profits.
- The bank profits will increase the larger the loan is. We have to distinguish between whether the company chooses high risks (low success rate L) or low risks (high success rate H).
- As the success rate is higher, the relationship is steeper
- We can now similarly identify the green area of loan rates that banks would not apply.
- To generate the requisite graph, we need to reflect the loan rate onto the vertical axis.
- The loan rates that are not applied by the bank are again identified in green.
- We can now combine the graphs to obtain the relationship between loan size and loan rate.
- We can construct the new graph by choosing some key locations.
- This will give us the supply curve for bank loans. While the supply is increasing, there is the green area of loan rates that the bank will never apply.
- With the usual downward slowing demand curve, for low demands an equilibrium is obtained where demand and supply meet.
- The same is true for high loan demand.
- For intermediate loan demands the equilibrium would be in the green area; however as banks would not quote these loan rates this cannot be an equilibrium.
- Instead, they would quote the loan rate $\hat{r}_L$ and this leads to a situation where demand and supply do not meet. At that loan rate, an excess demand emerges.

→ The excess demand implies that companies apply for larger loans than the bank is willing to grant. Hence, the bank will not grant the full loan, but ration the loan amount; credit rationing occurs. The loan amount they grant is fixed, hence no overbidding on the loan size they apply for is a beneficial strategy.

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→ credit rationing is the result of banks addressing the moral hazard of companies choosing high-risk investments.

- Banks would not increase the loan rate above $\hat{r}_L$, unless they would increase it substantially. The reason is that such a high loan rate would trigger companies to switch from lo-risk to high-risk investments. This higher risk will reduce the profits of the company, making it unattractive to banks.
- Banks will ration loans at this loan rate for intermediate demand as they are not willing to supply loan at slightly higher loan rates to reduce demand due to the switching of companies to the more risky investment.

⇒ Banks seeking larger loans will be rationed to avoid them taking higher risks.

→ The moral hazard of companies choosing high-risk investments can induce credit rationing as banks seek to avoid this switch while it is not profitable to them.

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This presentation is based on
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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