

Chapter 3.1 Negotiation costs



Outline

- Problem and model assumptions
- Direct lending only
- Bank lending only
- Direct and bank lending
- Market structure
- Summary

- The benefit for depositors of a bank is that they do not need to negotiate a large number of loans with different borrowers, but instead only need to agree with the bank on the terms of the deposit.
- Similarly, borrowers benefit from bank in that they do not need to negotiate with many lenders, but only with the bank.
- Thus both, borrowers and lenders, can save on negotiation costs due to the existence of banks.
- We will look at how this reduction in negotiation costs may benefit banks, but will also look at the effect this has on loan and deposit rates

- We will look at a range of scenarios and compare the profits for borrowers and lenders,
- We will look at a situation where no bank is present, where lending can only be done through banks, and where both lending forms co-exist.
- We will then determine the equilibrium market structure that will be observed.

■ Problem and model assumptions

■ Direct lending only

■ Bank lending only

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■ Market structure

■ Summary

- We will first set out the basic environment in which the model is set and then discuss the specific assumptions we make.

Cost advantage of banks

Cost advantage of banks

- Using banks can reduce the negotiation costs compared to negotiating between multiple borrowers and lenders.
- ▶ In general negotiations between parties are costly, they require time and the collection as well as analysis of information.
- ▶
 - An advantage banks have is that they will have standard procedures established and through experience can focus on key aspects important to the agreement.
 - This experience and focus on few aspects will reduce the costs of negotiations.
- ▶ Hence these costs will affect loans, given directly and through banks. It will also affect deposits, which we can interpret as a loan to the bank.
- We can now set out the process of bargaining between borrowers and lenders.

Cost advantage of banks

- ▶ **Direct** negotiations between borrowers and lenders on loan conditions are costly

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Nash bargaining

- We assume that borrowers and lenders are negotiating the terms of the loan rather than the terms being imposed by one party. We assume that this negotiation is done using Nash bargaining.
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 - We assume that any direct negotiation between borrowers and lenders imposes a fixed costs on both parties.
 - This costs have to be borne even if the negotiations fail; they are treated as sunk costs.
- ▶ In contrast we assume that negotiations with banks are free due to the experience of banks.
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 - We assume that Nash bargaining is applied in all negotiations.
 - The negotiation will be limited to interest rates, with all other terms and conditions agreed at no costs. Such terms might include the time to maturity, the amount, any collateral.
- ▶ If any direct negotiation between borrowers and lenders fail, both parties can negotiate with a bank. If the negotiation with a bank fails, borrowers and lenders can negotiate directly. These alternatives are known as the outside option in Nash bargaining.
- Using Nash bargaining we can now determine the interest rates that are agreed and from these obtain the profits borrowers, lenders, and banks make.

Nash bargaining

- ▶ Negotiating between borrowers and lenders directly imposes **costs** C

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- ▶ If a bank and direct lending are **both** available, the other lending channel can be used if a negotiation fails

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■ Direct and bank lending

■ Market structure

■ Summary

- We will first look at the case where no bank is available with borrowers and lenders only able to negotiate directly.

Profit functions

→ We can now first determine the profits of borrowers and lenders

- ▶ The borrower (company) and the lender (depositors) are negotiating directly with other facing the fixed sunk costs. There is no bank available in this initial scenario.
 - ▶
 - We assume that the investment the company makes with the proceeds of the loan is successful with some probability. If the investment is not successful, we assume that no return is obtained. As companies have limited liability, they will repay their loan only if they have the resources to do so; this here requires the investment to be successful.
 - The return on a successful investment is fixed and we assume that the investment is fully financed by the loan.
 - From the successful investment, the company will repay the loan, including its interest. It is this interest that is negotiated.
 - ▶ The company profits are reduced by the negotiation costs.
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 - The depositors (lenders) have their loan returned including interest.
 - The loan is only repaid if the investment is successful, as otherwise companies do not have the necessary funds available.
 - The profits of the depositors has to take into account the initial investment; we assume that there are no costs involved in this initial investment, including no opportunity costs.
 - ▶ The depositor profits are reduced by the negotiation costs.
- Having obtained the profits of the two parties negotiating, we can now apply Nash bargaining to obtain the loan rate that is agreed.

Profit functions

► Company and 'depositor' face **negotiation costs** of C each

► Company profits: $\hat{\Pi}_C =$ $- C$

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- ▶ Company and 'depositor' face **negotiation costs** of C each
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- ▶ Investment of company **succeeds** with probability π , yields a **return** R if successful
- ▶ Company profits: $\hat{\Pi}_C = \pi ((1 + R) L) - C$

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- ▶ Company and 'depositor' face **negotiation costs** of C each
- ▶ Investment of company **succeeds** with probability π , yields a **return** R if successful and pays a **loan rate** r_C
- ▶ Company profits: $\hat{\Pi}_C = \pi ((1 + R) L - (1 + r_C) L) - C$

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Profit functions

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- ▶ Investment of company succeeds with probability π , yields a return R if successful and pays a loan rate r_C
- ▶ Company profits: $\hat{\Pi}_C = \pi ((1 + R) L - (1 + r_C) L) - C$
- ▶ Depositors obtain the loan with **interest**
- ▶ Depositor profits: $\hat{\Pi}_D = (1 + r_C) L - C$

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- ▶ Company profits: $\hat{\Pi}_C = \pi ((1 + R) L - (1 + r_C) L) - C$
- ▶ Depositors obtain the loan with **interest** if the investment is **successful** and have an **outlay** of the initial loan
- ▶ Depositor profits: $\hat{\Pi}_D = \pi(1 + r_C) L - L - C$

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- **Having obtained the profits of the two parties negotiating, we can now apply Nash bargaining to obtain the loan rate that is agreed.**

Optimal loan rate

Optimal loan rate

- We can now obtain the optimal loan rate by applying Nash bargaining.
- ▶ In Nash bargaining we have to consider the profits of any outside option. The outside option here is to not provide a loan or accept a loan after the negotiation. This will imply that both parties have to bear their negotiation costs, giving them profits of $-C$. For Nash bargaining we consider the difference of the profits from an agreement and the profits if no agreement is reached.
- ▶ The objective function in Nash bargaining is the product of these two profit differentials. We will maximize this expression over the loan rate.
- ▶ Taking the first derivative, setting it equal to zero and solving the resulting equation, gives us that the profits of the company and depositor are equal.
- ▶ Using this equality of profits, we can solve for the loan rate and obtain the *formula*.
- Using this result, we can now determine the profits of the company and the depositor.

Optimal loan rate

- ▶ The **outside option** of companies and depositors is to not enter an agreement, just incurring costs C

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- ▶ The objective function in Nash bargaining is the product of these two profit differentials. We will maximize this expression over the loan rate.
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- Using this result, we can now determine the profits of the company and the depositor.

Optimal loan rate

- ▶ The outside option of companies and depositors is to not enter an agreement, just incurring costs C
- ▶ Nash bargaining maximizes $\mathcal{L} = \left(\hat{\Pi}_C + C \right) \left(\hat{\Pi}_D + C \right)$

Optimal loan rate

- We can now obtain the optimal loan rate by applying Nash bargaining.
- ▶ In Nash bargaining we have to consider the profits of any outside option. The outside option here is to not provide a loan or accept a loan after the negotiation. This will imply that both parties have to bear their negotiation costs, giving them profits of $-C$. For Nash bargaining we consider the difference of the profits from an agreement and the profits if no agreement is reached.
- ▶ The objective function in Nash bargaining is the product of these two profit differentials. We will maximize this expression over the loan rate.
- ▶ Taking the first derivative, setting it equal to zero and solving the resulting equation, gives us that the profits of the company and depositor are equal.
- ▶ Using this equality of profits, we can solve for the loan rate and obtain the *formula*.
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Profits of company and depositor

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- We can use the profits of the company and the depositor to determine whether the negotiation is profitable.
- ▶ We can insert the loan rate into the profits of the company and depositor and obtain the *formula*.
- ▶ Borrowers will only demand a loan and depositors only provide a loan if the profits from doing so are positive.
- ⇒ *Formula*
- ▶ This implies that negotiation costs must not exceed a certain value as given in the *formula*.
- We have thus established the under which condition direct lending is feasible.

Profits of company and depositor

- ▶ The profits are then given by $\hat{\Pi}_C = \hat{\Pi}_D = \frac{1}{2} (\pi (1 + R) - 1) L - C$

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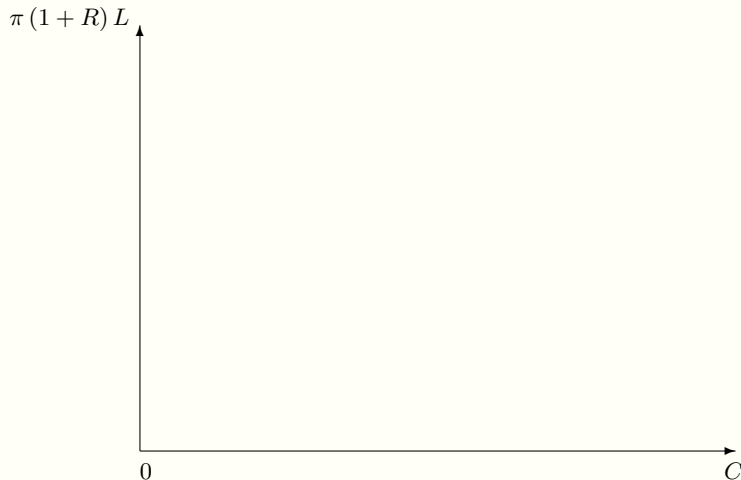
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Feasibility of direct lending

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- This feasibility of direct lending can now be analysed graphically.
- ▶ We look at the combination of negotiation costs and profitability of the investment.
- ▶ We can plot the line implied by the condition on the maximum negotiation costs.
- ▶ We see that direct lending is feasible if the combination of these parameters is to the upper left of this line. On the lower right direct lending is not feasible.
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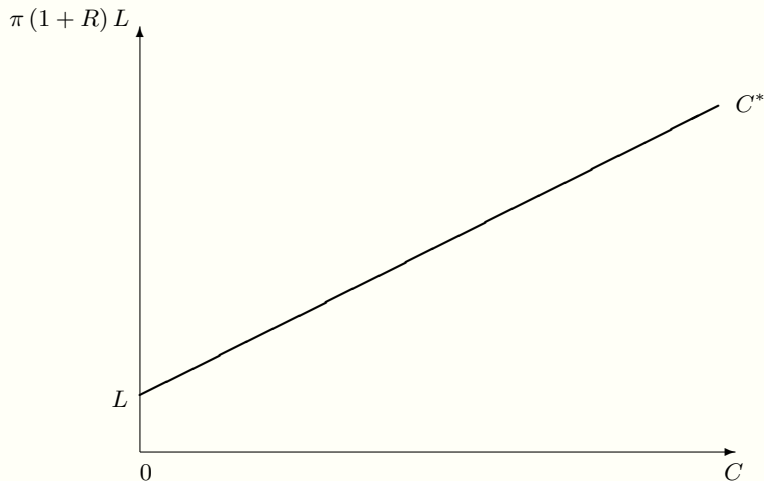
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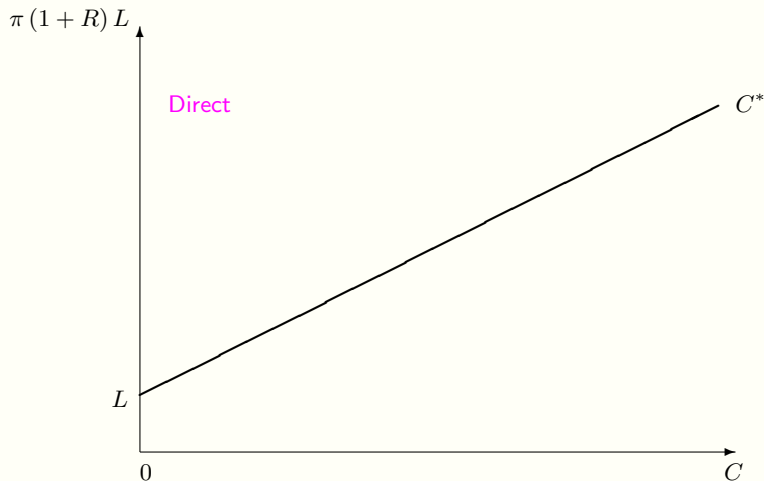
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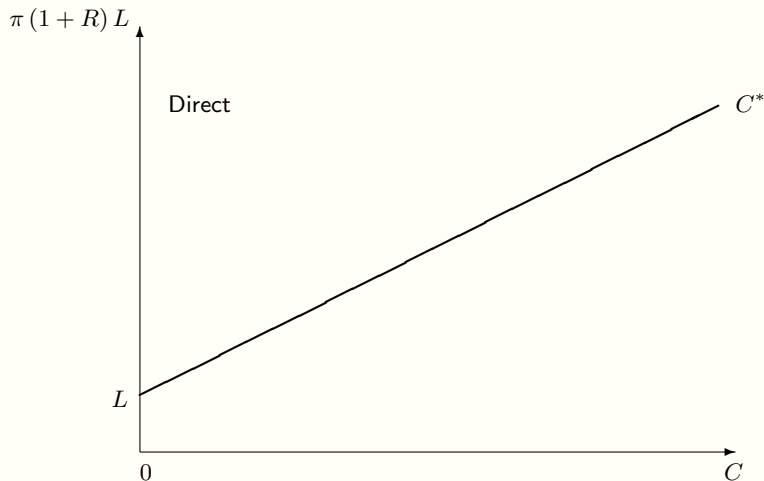
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■ Problem and model assumptions

■ Direct lending only

■ **Bank lending only**

■ Direct and bank lending

■ Market structure

■ Summary

- Rather than allowing only for direct lending, we will now assume that only banks can provide loans and all depositors will have to use banks.

Profit functions

- As before, we first determine the profits functions of depositors, companies, and the bank.
- ▶ We have assumed that negotiations with banks are not incurring any costs, hence we can neglect that term.
- ▶
 - The company and depositor profits are essentially given as before.
 - There are no negotiation costs to be taken into account.
 - We now have different loan and deposit rates as banks are acting as an intermediary.
- ▶ In line with the profits from direct lending, company profits are given in this *formula*.
- ▶ In line with the profits from direct lending, depositor profits are given in this *formula*.
- ▶ Banks also have limited liability and will only repay depositors if they are repaid the loan they have given, which happens if the investment by the company is successful. In this case the bank obtains the repayment from the loan and uses these proceeds to repay depositors, giving the profits as in the *formula*
- We can now use these profits to use Nash bargaining and obtain the optimal loan and deposit rates.

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Nash bargaining

Nash bargaining

- We will consider the negotiations between companies, depositors, and banks.
- ▶
 - We now have Nash bargaining between the bank and the company about the loan rate.
 - In addition we will have a second Nash bargaining between the bank and the depositor about the deposit rate.
- ▶ As there are no negotiation costs, the outside option is to not agree a loan or deposit rate, respectively, and in this case no profits are generated.
- ▶ The objective function of the negotiation between the bank and company is then given by the product of the two profits.
- ▶ The objective function of the negotiation between the bank and depositor is then given by the product of the two profits.
- We can now solve this bargaining problem for the optimal loan and deposit rates.

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- ▶ Bargaining happens between the bank/company

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Optimal loan and deposit rates

Optimal loan and deposit rates

- We now maximize the objective functions and solve for the loan and deposit rates emerging.
- ▶ If we maximize the bank/company objective function of the loan rate and the bank/depositor for deposit rate and solve the resulting first order condition, we see that all profits are equal.
- ⇒ These two equalities can be solved for the optimal loan rate.
 - Similarly do we obtain the optimal deposit rate.
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- We now maximize the objective functions and solve for the loan and deposit rates emerging.
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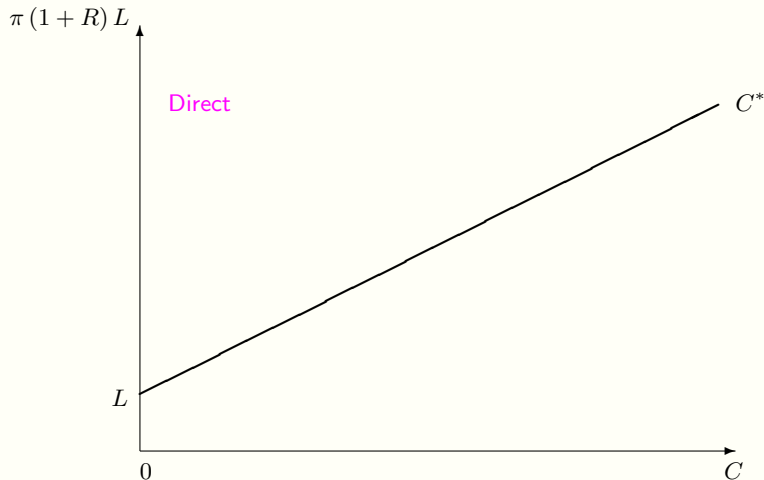
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- We will be looking at the feasibility of bank lending compared to direct lending. As before, we will look at the relationship between negotiation costs and profitability of the company investment.
- ▶ As with banks there are no negotiation costs, the condition will be horizontal.
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- The possibility of lending has been extended now to cases with higher negotiation costs, and where negotiation costs were low enough to support direct lending, bank lending would also be feasible.

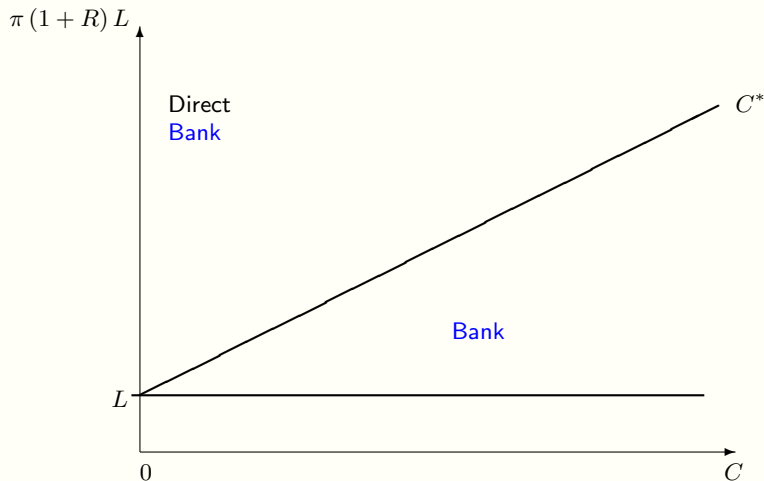
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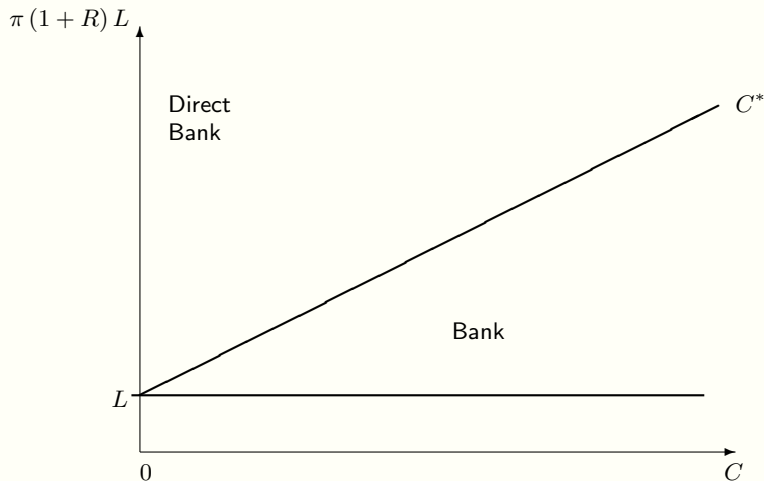
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■ Problem and model assumptions

■ Direct lending only

■ Bank lending only

■ Direct and bank lending

■ Market structure

■ Summary

- Having investigated direct lending and bank lending as the only options, we now look at the case where both lending forms can co-exist.

Outside options

- Having both lending form available will mostly affect the outside options the depositors and companies have.
- ▶ If companies are depositors can not agree their respective interest rates, a loan can still be agreed.
- ▶ This agreement would be directly between the depositor and the company. Hence in the negotiation with banks, depositors have the outside option of lending directly to companies
- ▶ Banks have no outside option as they will not be involved in the lending if no agreement is reached.
- ⇒ The objective function for negotiation of the deposit rate is then the difference in profits between bank and direct lending for depositors and the bank profits.
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Optimal loan, deposit and direct lending rates

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- Solving these three equations, we see that the differences in profits between bank lending/deposits and direct lending are identical for depositors and lenders, and this in turn is equal to the bank profits. We can solve these two equations for the three variables required.
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→ We have to distinguish between profits from direct lending and bank lending/deposits

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 - Positive profits for banks implies that banks are always willing to lend
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- Hence, if both bank and direct lending, is available, bank lending will be chosen.

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Participating in the market

- While it might be more beneficial to choose bank lending or deposits over direct lending, both depositors and companies must be willing to use banks, thus is must be profitable.
- ▶ For depositors to provide deposits, their profits need to be positive.
- ⇒ This implies that the return on deposits must be sufficiently high.
- ▶ For companies to demand loans, their profits need to be positive.
- ⇒ This requires negotiation costs, which are included into the loan rate, to be sufficiently low.
- ▶ Overall, if the negotiation costs are not too high, bank lending is feasible.
- We can now compare the feasibility of bank lending in this case with the other scenarios.

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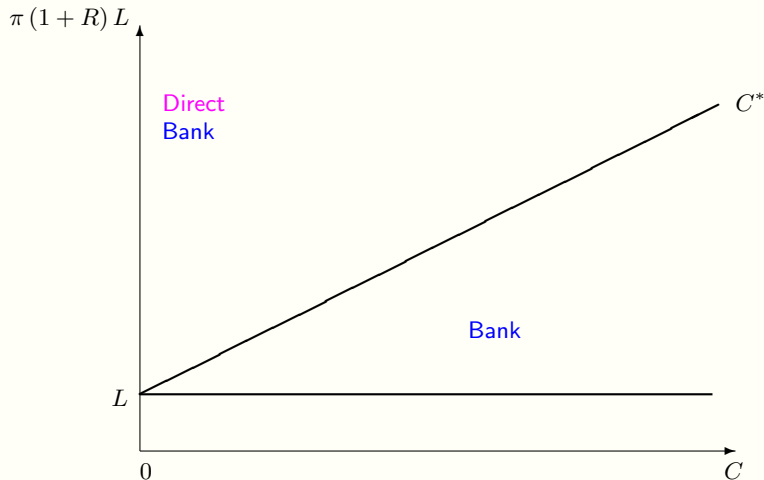
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Feasibility of co-existence of direct and bank loans

Feasibility of co-existence of direct and bank loans

- We will be looking at the feasibility of bank lending if direct lending is an alternative and compare this to the case where direct lending only was possible, or bank lending only. As before, we will look at the relationship between negotiation costs and profitability of the company investment.
- ▶ The condition on the feasibility of bank lending has a lower slope, but a higher starting point.
- ▶ Above this line bank lending and direct lending can co-exist, although we know that only bank lending will be chosen; direct lending is only used as an outside option in the negotiations with the bank to extract better conditions.
- Knowing under which conditions lending is feasible, we can now establish which market structure is preferred.

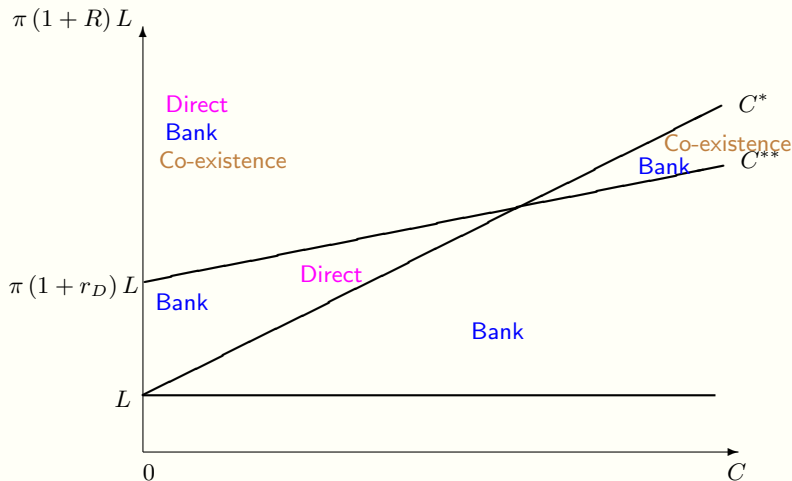
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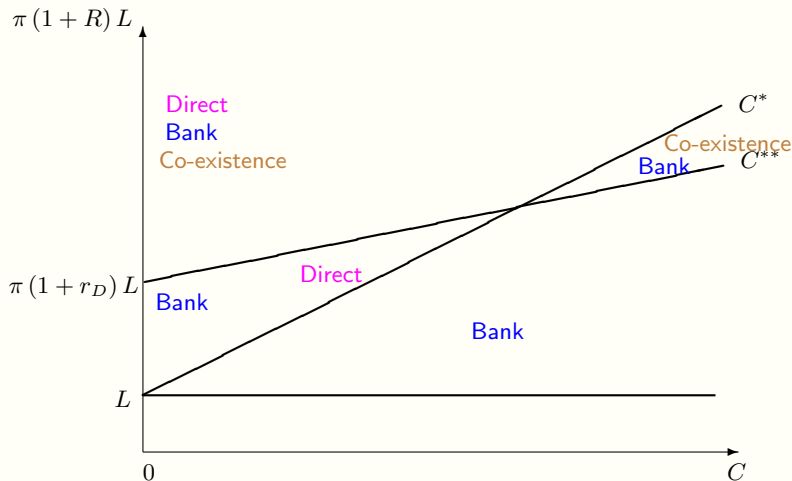
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■ Problem and model assumptions

■ Direct lending only

■ Bank lending only

■ Direct and bank lending

■ **Market structure**

■ Summary

- We have established under which conditions lending is feasible in the different scenarios of directly lending only being possible, only bank lending being possible, or bank lending and direct lending co-existing.
- We can now determine which of these scenarios is optimal and would be preferred by market participants.

Comparing direct and bank lending

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 - ⇒ The condition of bank lending being more profitable results in this *formula*.
 - ▶ If the negotiation costs are sufficiently large, bank lending is preferred. If negotiation costs are high, banks can extract surplus from depositors and companies, while in direct lending the high costs of failure lead to better conditions between depositors and lenders without the bank extracting any profits.
- This condition can now be included in our consideration of the market structure that would be preferred.

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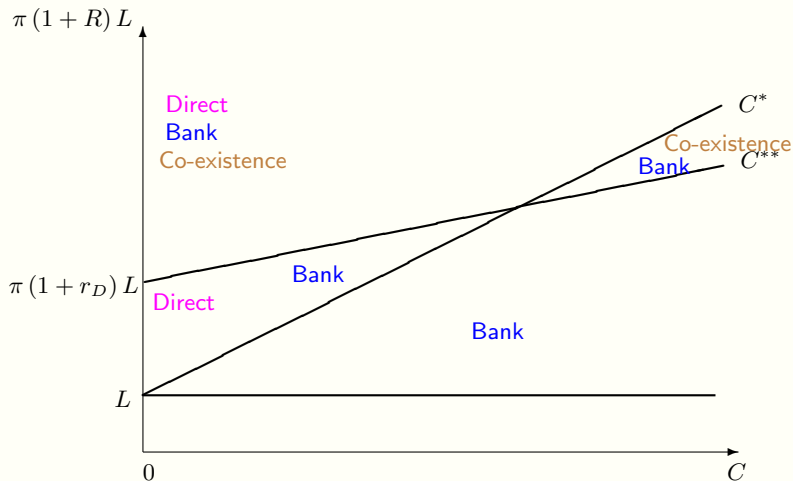
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Preferred market structure

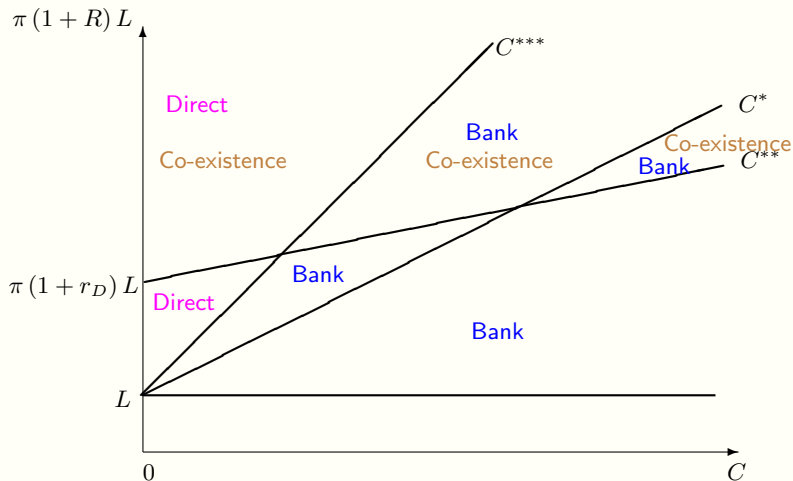
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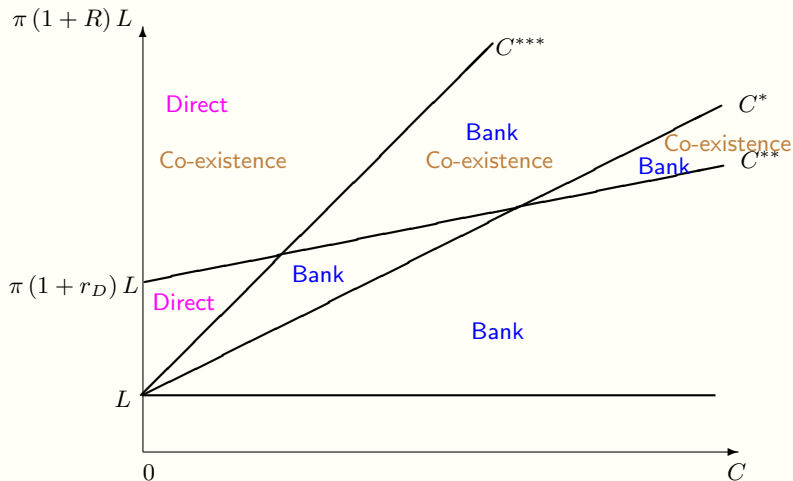
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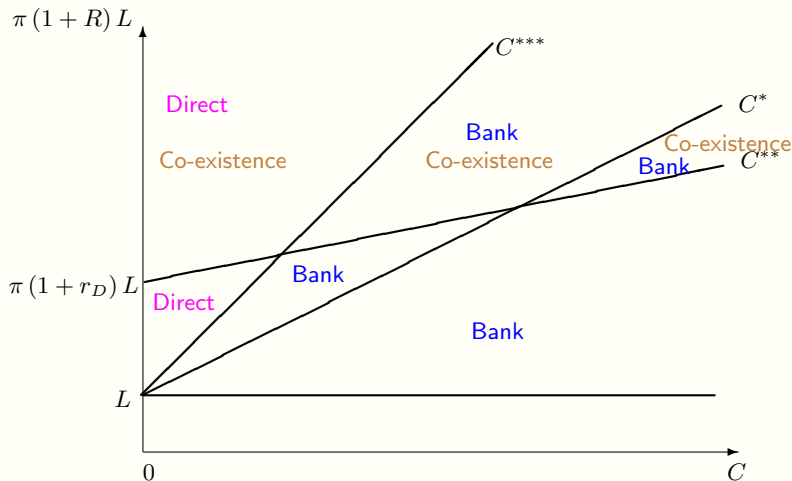
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Preferred market structure of depositors and companies

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- We can add these preferences by companies and depositors for market structures into our analysis.
- ▶ The condition for preferring bank lending over the co-existence of both lending forms was identical to direct lending to be feasible. Of course bank lending can only be preferred in areas where it was feasible in the first place. Of course for returns on the company investment that does not even cover its initial loan, no lending will occur at all.
- ▶ We can only exclude the desirability of the co-existence of bank and direct lending for high negotiation costs and mid-sized returns on the company investment.
- While this shows the feasible market structures, we can now also determine which type of lending, direct lending or bank lending, will be actually observed in the market.

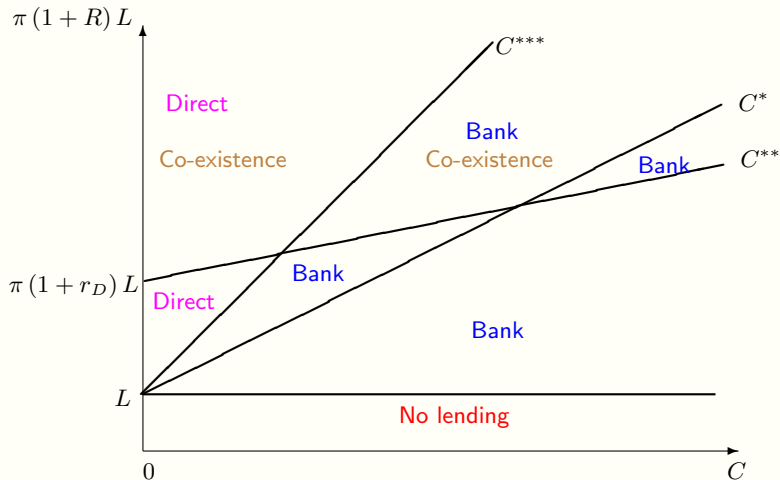
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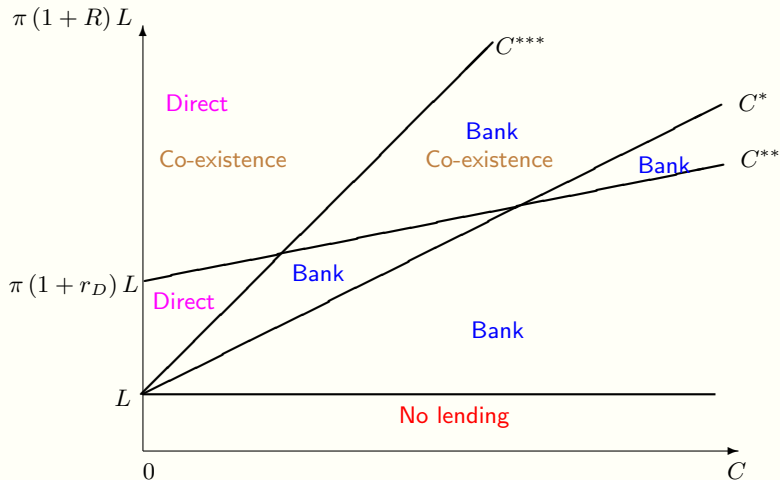
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Widespread preference for banks

→ We can now analyse the results obtained and discuss the type of lending that can be observed in the market.

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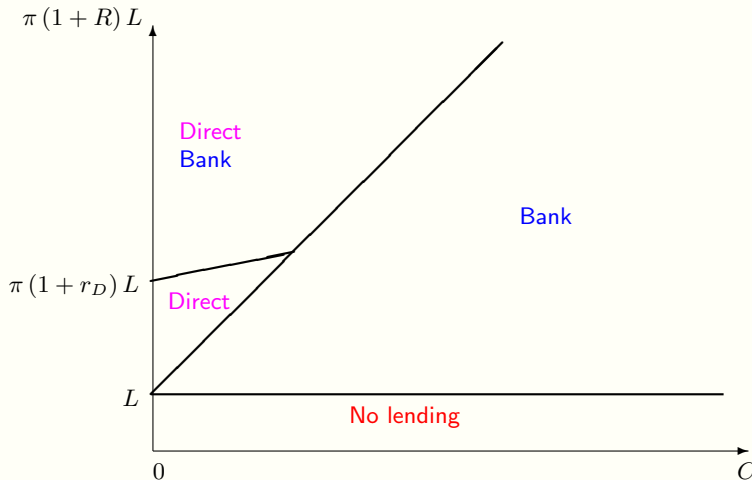
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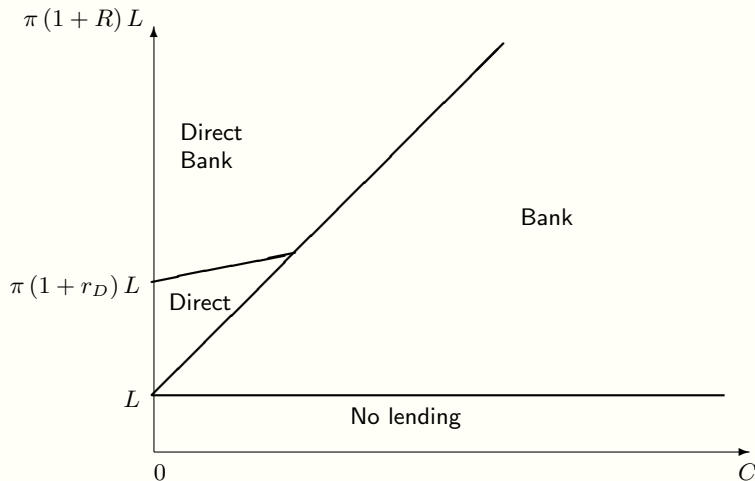
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■ Problem and model assumptions

■ Direct lending only

■ Bank lending only

■ Direct and bank lending

■ Market structure

■ Summary

- We can now summarize the finding of this model.

Dominance of bank lending

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- We have seen that overall bank lending will be the most common form of lending.
- ▶ In most cases, except for a small range of intermediate negotiation costs, bank lending is preferred.
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 - The lower negotiation costs with banks makes them more attractive as their use reduces the costs to companies and depositors.
 - This holds even if banks extract some of these additional profits from companies and depositors; the benefits of not having to incur negotiation costs are shared between all market participants.
- ▶ If negotiation costs are in an intermediate range, direct lending can be feasible. This would most likely be by experienced investors providing such loans directly on the one side, but also companies experienced in negotiating loans on the other hand.
- ▶ High investment returns make bank loans compete with direct lending as the high profits of companies make it feasible for the bank to extract only a small part of this surplus while reducing negotiation costs.
- Overall, bank lending will dominate the loan market, except in some specific circumstances.

Dominance of bank lending

- ▶ Depositors and companies favour **bank lending** in most cases

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Dominance of bank lending

- ▶ Depositors and companies favour bank lending in most cases
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- ▶ Direct lending is preferred only for companies if negotiation costs are **neither high nor low**

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 - This holds even if banks extract some of these additional profits from companies and depositors; the benefits of not having to incur negotiation costs are shared between all market participants.
- ▶ If negotiation costs are in an intermediate range, direct lending can be feasible. This would most likely be by experienced investors providing such loans directly on the one side, but also companies experienced in negotiating loans on the other hand.
- ▶ High investment returns make bank loans compete with direct lending as the high profits of companies make it feasible for the bank to extract only a small part of this surplus while reducing negotiation costs.
- Overall, bank lending will dominate the loan market, except in some specific circumstances.

Dominance of bank lending

- ▶ Depositors and companies favour bank lending in most cases
- ▶ The reduction in negotiation costs provides banks with an inherent advantage, even if extracting some of the surplus generated
- ▶ Direct lending is preferred only for companies if negotiation costs are neither high nor low
- ▶ High investment returns make **bank lending** feasible even for mid-range negotiation costs

Dominance of bank lending

- We have seen that overall bank lending will be the most common form of lending.
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Advantage of banks

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- Bank lending dominates the market and this is due to the reduced transaction costs of banks.
- ▶ Banks have the advantage of having the knowledge and experience in providing loans; assessing companies and risks will be conducted in an efficient way. Even if they make profits and thereby reduce the profits of companies and depositors, the lower costs will outweigh these losses in most cases.
- ▶ As companies and depositors are better off, banks enhance the welfare in the economy.
 - In some cases these advantages of banks are not sufficient to compensate for the extraction of surplus.
 - In this case direct lending is preferred.
- Banks are beneficial due to their lower transaction costs, despite making a profits for themselves.

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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