

Introduction and road-map for the first 6 lectures

1. Introduction

This course covers three sets of topic: (I) microeconomics of banking, (II) macroeconomics of banking, and (III) regulation of the banking sector. Microeconomic topics include (i) the behavior and the incentives of a single bank within different environmental contexts and (ii) systemic issues in the banking industry. This note presents a few introductory observations about the banking industry and provides a road-map of the topics covered in the next lectures.

The main actors in this course are bank owner, bank managers, borrowers, depositors and other creditors (including other banks and non-financial firms), the Central Bank (CB), the Financial Supervisory Authority, the Ministry of Finance, and the Deposit Insurance institution. In this course, bank owners and bank managers are always considered as one unified group.

To get a picture of the size of the banking sector in Norway, we can report some numbers. The percentage of employment (number of wage earners) in bank and finance (*finansiering og forsikring*) of total onshore employment in Norway was 2,1% in the first quarter of 2014. The share of onshore gross product in bank and finance (in 2011-prices), was 4,7% in the first quarter of 1995 and 5,6% in the first quarter of 2014.²

¹ This handout is in part based on the one written by Jon Vislie for the Fall 2014 Banking course. Whenever there is text in quotation marks without a reference, the source is Wikipedia.

² Source: Statistics Norway.

The banking sector is not that big in terms of employment and share of GDP. Our interest in the sector must therefore be explained by other factors, such as its specialized role in matching savers and investors, its instrumental role for monetary policy, the costs to other actors if banks do not operate in accordance with social goals, as well as the statistical fact that a large proportion of total financing of non-financial firms is provided by banks.³

2. What is a bank and what do banks do?

A bank is a financial middleman or intermediary whose current operation consists of taking deposits from subjects in financial surplus and transforming these deposits, along with bank equity, into loans.

Capital-rich and mature firms with good reputation might get funding for their projects directly from the market by selling bonds or shares that can be traded.⁴ This type of finance is called *direct* or *market* finance, as opposed to *bank finance*. Other firms, with no reputation or no history and being short of capital, borrow from banks, and so do households that need to borrow in order to buy a house or an expensive commodity.

Banks have 4 main functions:

- 1) Banks provide *maturity or asset transformation*;
- 2) Banks *contribute to the payment system and provide liquidity and liquidity insurance to the public*;
- 3) Banks *screen* the quality of the applicants' (potential borrowers') projects, and specialize in *monitoring* the borrowers so that they act according to what they are expected to do with the borrowed money;

³For more on the size financing done by banks, see the survey by Gorton and Winton on "Financial Intermediation" in the *Handbook of the Economics of Finance*.

⁴The term *project* refers to any kind of business activity, or household purchase. A project can be a new business, the expansion, or the overhaul of an existing business, as well as the purchase of a house or a (usually expensive) commodity.

4) Banks manage various *risks* involved in the lending process.

We will consider a bank as a *corporation with limited liability*, owned by a group of shareholders (=equity owners).⁵ We will consider banks to be *commercial* and *universal* banks.

Commercial banks: here the term *commercial bank* refers to any bank with the exception of investment banks. While “a commercial bank is a type of financial institution that provides services such as accepting deposits, making business loans, and offering basic investment products”, an investment bank is “a financial institution that assists individuals, corporations, and governments in raising financial capital by underwriting or acting as the client's agent in the issuance of securities.”

By and large, the legal distinction between commercial and investment banks exists only in the Anglo-Saxon world, and banks that operate only as investment banks exist only in the US (Goldman Sachs, Morgan Stanley).⁶ In Europe, small banks operate only as commercial banks, while bigger ones operate as universal banks (see below). For the purposes of this course, savings banks as they exist in Norway are included in the definition of commercial banks.⁷

Universal banks: these banks are at the same time commercial and investment banks (e.g. BNP Paribas, HSBC, Deutsche Bank, ING Bank, UBS).

Let's discuss in more details the 4 functions of banks.

⁵ Corporation with limited liability: “A private company that legally exists separately from its owner(s) and whose owners are legally responsible for its debts only to the extent of the amount of capital they invested”.

⁶ “After the Great Depression, through the [Glass–Steagall Act](#), the U.S. Congress required that commercial banks only engage in banking activities, whereas investment banks were limited to capital market activities. This separation was mostly repealed in 1999 by the Gramm-Leach-Bliley Act but was restored by the Volcker Rule, implemented in January 2014 as part of the [Dodd-Frank Act of 2010](#).”

⁷ Nowadays commercial and savings banks in Norway are quite similar in terms of services provided: taking deposits and making loans to individual and businesses. The two types of banks differ in the ownership structure. As we focus on banks owned by shareholders, formally we are excluding Norwegian savings banks, but most of the topics covered apply to savings banks as well.

(1) Banks provide maturity or asset transformation

Size: Due to economies of scale, many projects require a minimum size of funding, and hence substantial funding from a bank (or from other investors), above the average size of deposits (or wealth) of a saver. Hence, most loans are much larger than the deposit of an average saver – the project needs therefore funding from several depositors. The bank therefore pools a large number of small deposits into one big loan.

Duration: Banks, by pulling together money from many depositors and turning it into loans, can match short-term lenders with long-term borrowers.

Diversification: Diversifying investments reduces idiosyncratic risk.

(2) Banks contribute to the payment system and provide liquidity and liquidity insurance to the public

Historically banks played a role as money changers and providers of payments services – through transfers between bank accounts. Nowadays, banks still play an important role in the payment system.

Moreover, banks provide LIQUIDITY to their depositors. Deposits are a liquid asset, that is, an asset that can be traded at short notice without losing much (or any) of its value. The Diamond-Dybvig model, presented in *The Theory of Corporate Finance*, Tirole, chapter 12, captures this function of banks.

The model focuses on *liquidity insurance*: there are three periods and a continuum of risk-averse agents (consumers/depositors). In the first period, each agent is endowed with some given amount of a good. The good can be invested. Two investment options are available: a liquid project that yields its return after one period but has no net return, and one illiquid project that requires two periods to pay off with a positive net return. This illiquid project can, if necessary, be liquidated after only one period (that is, prior to completion or maturity), but at a liquidation cost or loss of return.

In the second period each agent learns whether he is “impatient”, and hence gets utility from consuming the good in the second period, or “patient” and therefore gets utility from consuming the good in the third period. As the investment choice is made before the agents learn what category they belong to (whether patient or impatient) they are uncertain about their liquidity needs. In this setting, agents are better off pooling their resources (setting up a bank) rather than making individual investments.

(3) Monitoring

Banks perform a role of screeners of potential borrowers, and, once the loan is granted, banks play the role of supervisors of the activity of the borrower.

We will consider how banks can mitigate problems of moral hazard and asymmetric information when designing loan contracts. We will derive optimal debt or loan contracts under moral hazard, and then with uneven distribution about the quality of the borrowers. The model by Holmström and Tirole (1997) is well suited for discussing moral hazard problems. We will see the consequences for the allocation of loans to entrepreneurs that differ in the size of own capital or internal funds, and how allocation is affected by market conditions. As we will discuss, one implication of asymmetric information is *credit rationing and market frictions*.

(4) Banks manage various risks involved in the lending process

Banks face **credit risk** and **market risk**. In order to distinguish these risks, it is useful to take a look at a simplified balance sheet of banks. A bank’s balance sheet shows its *assets* and its *liabilities (debt)*, along with *equity*.⁸ A typical balance sheet of a commercial (and universal) bank looks like:

⁸ All items in the balance sheet are stock variables; measured as some monetary value at some specific date.

Assets	Liabilities
Deposits in CB	Retail Deposits
Loans to the public	Wholesale Deposits
Loans to other banks	Other debt
Loans to the government (=Bonds)	Loans in CB
Reserves	Equity

We can distinguish between risk factors on the liability side and on the asset side. On the asset side, banks face **credit risk**. The first banks (in Europe, in the late Middle Age) were similar to pawnbrokers: they were lending money but they demanded collateral of value equivalent to the money lent. Nowadays loans are backed by collateral that is worth much less than the amount loaned. As banks have moved into the business of risky loans they have developed a role as experts in the valuation of credit risk.

On the liabilities side, banks face a host of **market risks**. The first is the *interest rate risk*: the cost of funds may raise above interest income. The second is the *liquidity risk*. The liquidity risk is “due to the difference in the marketability of the claims issued and that of the claims held” (Freixas and Rochet (2008)).

Tirole (2011) overviews issues related to the liquidity in the banking sector. In the words of the author: “The recent crisis was characterized by massive illiquidity. Financial institutions and industrial companies scrambled for cash by selling assets at fire prices. Central banks injected unprecedented amounts of liquidity into the system.” (Tirole (2011)) The current debate on regulation focuses on avoiding a repeat of this episode.

5. Why do we have banks?

In a world without **transaction costs** and without **informational asymmetries**, all the functions of the banks would be either useless (e.g. monitoring and providing liquidity) or could be performed directly by the owners of funds to be lent at no cost (e.g. transforming assets, assessing credit risk, managing market risk).

Transaction costs have to do with the cost for a lender to search around for an appropriate project. Of course, any person with some financial surplus might circumvent a bank and provide funding directly to an investor (direct finance), as we do observe in real life. Because the amount of money each saver can invest in a project is normally far below the ordinary amount of money needed to undertake a project, each project needs finance from a lot of savers. For a saver there is a search cost of finding a profitable project because searching around is resource-consuming. To make things even worse, since most savers are risk averse, their savings should be diversified so as to reduce the risk of making bad investment choices, therefore increasing transaction costs.

Transaction costs are also there when it is the moment of selling an asset. Different assets have different liquidity (e.g. cash or bank deposits VS a painting by Rembrandt or a loan to a small local business). Every saver would like to have liquid assets; if investing in a long-term project, liquidity is lost until maturity. Therefore, by depositing the financial surplus in a bank that offers short-term demand deposits that can be regarded as very liquid and safe, the transaction cost of searching around for a larger number of diversified projects, will be saved. Direct finance requires longer maturity, more risk and less liquidity than what can be offered if we let a bank take care of one's saving and the coordinating role of choosing what projects to finance.

Because of asymmetric information between lenders and borrowers, when investing in a project, every lender will want to have a loan or debt contract specifying under what circumstances the investor is going to repay and what amount; also, a lender will need some way of having the borrower monitored – how the project is

undertaken until completion (the lender wants, of course, that the investor does not take the money and run abroad). Banks have lower monitoring costs than the individual investors as there are economies of scale in the monitoring business (e.g. learning to read a company's book or assessing the outlook of a firm). At the same time, banks have stronger incentives than individual investors to monitor the way the firm uses the funds borrowed (the incentive comes from the size of the bank loan, which justifies the cost of monitoring)

Under direct finance, there are also issues of coordination in monitoring. If a project under direct finance has a lot of direct investors, each individual will either choose to spend resources on monitoring or expect others to do so, to get the required information, which is a public good.

Setting up a bank with some expertise to distinguish between good and bad projects – acting like a pool that collects deposits that are used as loans to finance the realization of profitable projects – while at the same time offering risk sharing terms to the depositors so that direct finance is out of the question for each of them (offering a better risk profile, more liquidity and shorter maturity), write and enforce, on behalf of the depositors, contracts with the borrowers and impose monitoring devices (and having incentives, in fact, to act as a delegated monitor) so as to get the borrowers to behave according to the contract, a lot of resources can be saved. Therefore, we expect that a bank, under some circumstances, can lend money to profitable projects in a more effective way than alternative financing. Banking is then socially beneficial. Transaction costs are highly reduced compared to a system with no banks. (We take this as a fact despite that banks sometimes are doing it very bad, and can even engage in fraud and incur large costs on tax payers.) The savers' preferences are better met as they are offered liquid and safe demand deposits involving low risk. This is an important social rationale for having banks.

To fix ideas, on a separate handout I take a short digression and consider a very stylized general equilibrium model that shows that banks have no role in a world with no transaction costs and symmetric information.⁹

But why do we have problems with banks? Why do we have financial crises? Is there anything within the banking activity that should make us suspicious? Or is a financial crisis like a natural disaster that we cannot protect against? If we believe that financial crises are not like a natural disaster, how should they be regulated?

In a nutshell, banking is a risky business, as we discussed above- and while banks might be better than individual investors at dealing with this risk, banks do not eliminate this risk. Moreover, while banks might reduce moral hazard of the borrowers, banks might themselves pursue objectives that are not aligned with those of the depositors or society at large. Having said this, now it is good time to discuss the role of regulation in the banking sector.

5. Regulation

Compared to other sectors, the banking sector is heavily regulated. The traditional reasons for regulation are: (I) protection of depositors, (II) the risk inherent in the banking activity due to the maturity mismatch between debt and loan, and (III) the public-good role of bank as providers of liquidity and means of payment.

The idea behind the protection of depositors is that most depositors do not have the means to assess whether a bank operates in their best interest. Banking regulation is imposed to protect (small) depositors through deposit insurance (in Norway a depositor is guaranteed to get 2 million NOK if the bank should fail, in other countries deposits guarantees are of a similar order of magnitude). Depositors' guarantees are meant to stabilize the payment system, and also to avoid that if one bank fails, other will follow.

⁹ The model is taken from Freixas and Rochet (2008).

If some borrowers of one bank default, the bank might be forced to close credit lines to other customers. When credit from this bank dries up, economic activities will stop and other firms might get into trouble, which again can hurt other banks. Then we have a domino effect which can generate very high social costs. One important goal of banking regulation is therefore to protect society from such systemic risk.

In some circumstances the bank suffers only from lack of liquidity, but is still solvent. In that case the Central Bank (as the lender of last resort) or other banks (in the inter-bank market) might provide short-term liquidity so that the bank can continue its operations. In other circumstances, the bank is in fact insolvent and should therefore normally be liquidated and taken over by a government agency.

Part of the banking regulation is to set up safety nets for banks – and for the society, and also put up some limitations on bank behavior; requirements as to the size of equity relative to the value of the assets (capital adequacy requirements in the Basel Agreement), reserve requirements (say; the bank is required to hold liquid Governments Bonds or Treasury Bills), and rules for supervision or monitoring and consequences under a bailout.

The regulations themselves might generate a series of new problems. We face a large number of tradeoffs when new regulatory rules are to be imposed: regulating one part of the banking activity might produce *moral hazard* problems either directly or elsewhere:

- If a bank knows it will be saved or bailed out if the borrowers default, as they might do in a recession, the bank might pay too little attention ex ante as to the quality of the borrowers that are granted loans.
- If the bank and the bankers are subject to limited liability, they will also have distorted incentives. If the debt obligations are not met, the tax-payers' money is used to save the bank, but any profit, under success, will accrue to the bank; its owners and the managers. The bank is then protected against downside risk, but will benefit from any upside risk. (This might also explain why we

observe higher leverage in banks than in other firms.) Such a reward structure might lead to excessive risk-taking: the banks might have a too strong incentive to provide loans to risky projects.

- Deposit insurance is likely to induce most depositors not to exert a lot of effort to monitor the management of the bank.
- The bank might have an incentive to take advantage of the deposit insurance by paying higher rates of interest on deposits than its competitors so as to capture new customers, because it will not internalize the full cost of taxation should payment from the Deposit Insurance be required.

A political economy problem can arise: if the government has made an ex ante commitment not to bail out a troubled bank, it might be ex post difficult to stick to the commitment. Having said that no bail out will take place, the government might ex post turn out to be time inconsistent – the government will ex post be pushed to intervene by interest groups or political pressure, or simply because the social loss from not saving the bank, might be too high. If big banks have strong beliefs that the government will save them, despite an ex ante commitment not to bail out, incentives to take a safe position are highly distorted.

To sum up, as a result of the regulatory environment and limited liability, there are strong incentives to choose too risky loan portfolios (moral hazard) or to be less cautious in the selection of projects (weak incentives to screen loan applicants ex ante). Because banks are to a very large extent debt-financed, they are also exposed to runs from depositors (mainly from wholesale depositors – other banks). Such runs might at first cause liquidity problems and then, perhaps insolvency, as equity, which is used to absorb losses, can be wiped out, and the bank's assets are not sufficient to repay its debt. Due to externalities (systemic risk), failure among important banks will have high social costs as the payment system and credit lines are interrupted with contagious impact; therefore the banking industry is highly regulated or protected. This protection is like a double sword – a bank believing it will be saved if

failure (too-big-to-fail) will produce moral hazard among banks being considered systemically important. (Note that all these issues coexist.)

6 Systemic Issues in the Banking Sector

At the end of these first 6 lectures we will look at 2 systemic issues. Diamond and Rajan (2011) focus on the role of liquidity risk and liquidity shocks (see above). Liquidity risk has been an important element in the recent financial crisis. Rather than studying how a single bank deals with liquidity risk, the authors look at many banks at the same time. They show that, in times of high liquidity risk, individually rational behavior of each single institution can leave to inefficient overall outcomes.

In the last lecture, we consider competition in the banking sector. Competition can be modeled in a number of ways. Here we use a dynamic model, with moral hazard, as outlined in Hellmann et al. (2000). Banks compete in prices or deposit rates so as to get deposits that can be invested in two types of projects; one safe and one risky. Moral hazard might undermine prudent bank behavior as banks can sometime gamble too much. This is more likely if banks have low charter values due to too fierce competition or too high deposit rates.

Some of the issues taken up so far are important background for understanding financial fragility. One factor behind financial fragility is competition, which is, as in standard economic theory, good for efficiency, but within the context of banking, might be bad for stability.