

Some issues on the microeconomics of banking – part 1:

Why should banks and their behaviour concern us – what so special about banks?

by

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August 2014

(Very preliminary)

1. Introduction

The purpose of this note is to provide some background for the topics taken up during the lecture series in The Economics of Banking. There are three main topics during the lecture series: One on micro aspects, another on macro aspects, and the third on regulation.

The more micro-oriented issues will be concerned with the behaviour and incentives of a single bank within different environmental contexts (with respect to informational asymmetries and regulation), and then consider the nature of competition in the banking industry and its role for financial stability. Before we get to these questions we have to present the main actors of telling a relevant story about what's going on those financial markets where banks operate. Then we point, rather briefly, at some issues that are typical for banking activity, and why we have banks. (This part is also covered by the note by Rødseth.) Thereafter we take a closer look at a bank's balance sheet to identify the main risk factors facing a bank. At last we sketch some problems that will be taken up during the lecture series, and relate these problems to papers on the reading list. (Some questions as to debt contracts under asymmetric information will be taken up in a separate note.)

The *main actors* of our story are: Banks – owners and bank managers, considered as one single unified group¹, borrowers, depositors and other creditors (including other banks and non-financial firms), the Central Bank, The Financial Supervisory Authority, The Ministry of Finance, and the Deposit Insurance institution.

What is a bank and what is a bank doing? A bank is a financial middleman or intermediary taking deposits from people in financial surplus (“savers” – mostly risk averse who want to smooth the consumption profile over time), while transforming these deposits, along with bank equity, into loans to profitable projects – so-called “*maturity or asset transformation*”. In order to survive the bank must earn a profit: The expected rate of return on loans; i.e. the rate of interest paid by the borrower under no-default scenario multiplied by the “*success probability*”, must exceed the expected cost of funding (of which deposit interest rate is one element). This difference is the “*spread*” which should cover ordinary costs (wages, salaries and bonuses) and a required rate of return to equity holders. (The profit of a bank, net of taxes, actual losses and loss provisions, can be distributed to owners as dividends, or kept as retained earnings which then are added to equity. The present value of a bank’s future expected profits is called the bank’s “*Charter Value*”, which will be lost if the bank fails. Hence, the higher is this charter value, the more careful may the bank be, as the more will then be lost if failure. We come back to this charter value when we consider competition and financial stability. Here we should mention that the charter value might, under some circumstances, have a disciplinary impact on bank behaviour. The existence of profits in the banking sector is important and necessary, and should therefore be protected by regulation. If competition should

¹In several problems we don’t need to distinguish between owners – shareholders – and bank managers; they have preferences that to a large extent go in the same direction. When no distinction is required, their preferences are assumed to be identical with similar incentives. In other problems, a distinction is needed as bank managers have objectives different from their owners. Then we have a traditional principal-agent problem which is given more attention in Corporate Finance.

become so fierce that profits are wiped out, banks might be motivated to take too many chances or choose a too risky loan portfolio.)

In addition to being instruments for improving efficiency in the economy by financing profitable investment projects, banks also contribute to *the payment system and provide liquidity and liquidity insurance* to the public. The banks are instruments for the government's monetary policy. By making loans or granting credit they create money for the public. Banks specialize in extending, granting or making loans, screening or sorting the quality of the applicants' (potential borrowers') projects that need finance, and specialize in *monitoring* the borrowers so that they act according to what they are expected to do with the borrowed money. (Here we don't pay much attention to the payment system as such, except for the role of interbank lending and borrowing.)

We will in most cases consider a bank as a corporation with *limited liability*; owned by a group of shareholders (equity owners). Banks are operating in markets with different types of *risk* and the products they offer are in their nature "services". The spread mentioned above is the price the public is willing to pay for these services. 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 2,9% in 1995Q1, and 2,1% in 2014Q1. (The use of information technology that has replaced labour, explains this feature.) The share of onshore gross product in bank and finance (in 2011-prices), was 4,7% in 1995Q1 and 5,6% in 2014Q1. (Source: Statistics Norway). According to these numbers the sector is not that big. Our interest in the sector must therefore be explained by other factors; as their 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. (See the survey by Gorton and Winton on “Financial Intermediation” in Handbook of the Economics of Finance.)

In addition we will in the following consider banks to be commercial and universal banks that offer demand and time deposits; most of which can be considered as short-term claims or short-term debt as seen from the bank’s perspective.² 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 higher 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.³ Also, most loans are long term, and of longer duration or maturity than what is the case for an average deposit. This *maturity mismatch* is one fragile feature of the banking system. Banks are to a large extent, perhaps too much, debt-financed, with too little equity. (This is one of the messages found in the book by Admati and Hellwig.) This mismatch can produce a tension in the sense that the bank under some circumstances is expected to be insolvent and then be subject to a run, so that deposits are

² This will exclude investment banks that do not offer deposits to the public; but include “mutual” or saving and loans institutions that are owned by the depositors. In this note we assume that the bank is a corporation of the limited liability type.

³ Some projects undertaken by capital rich and mature firms with good reputation and history might get funding directly from the market by selling bonds or shares that can be traded. 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, will need outside funding for their projects now provided by banks that, in principle, have some advantage in sorting out the quality of the project and also better able to monitor the borrower’s activities. (Banks, as opposed to an ordinary investor, are better able to manage risk, due to risk diversification.) When a project, undertaken by an entrepreneur with no reputation, is financed by a bank, the transaction is governed by a contract that cannot directly be traded. This contract, as specified as a loan covenant, will put restrictions on the borrower’s activity, what and when to pay back. It will also specify what rights the lender (the bank) has if the borrower defaults; i.e., he/she does not adhere to the contract or is not able to repay his/her debt. We will later consider a model by Holmström and Tirole where the role of capital is analyzed within a “double moral hazard”- context, where some firms finance the projects in the market whereas others get bank finance.

withdrawn, financing sources dry up, or other types of debt are not rolled over. The role of equity is to absorb losses on the bank's lending operations. Runs might occur if the creditors believe that the bank is insolvent in the sense that they might fear that the bank will not be able to repay them. If the bank suffers a loss, equity holders are the first to step in. If losses are so high that equity is wiped out, the value of the assets will not cover the external debt. This might happen if some borrowers of the bank default, which is typical in a recession, so that losses exceed what can be covered by the bank's owners. In that case a bank might be liquidated or bailed out; taken over by the public with tax-payers' money, while also replacing the former top management with a new one. (This happened in Norway in the banking crisis in the late 80's and early 90's.) The fragility caused by a high leverage ratio (debt relative to equity) and maturity mismatch can justify that the banking industry is heavily regulated. Banking regulation is imposed to protect (small) depositors through deposit insurance (in Norway a depositor is guaranteed to get 2 mill NOK if the bank should fail), to stabilize the payment system, and also to avoid that if one bank fails, other will follow; this is *contagion*. We may say that the banking industry features a lot of externalities. We can distinguish between a "failure" externality (cost on others if a bank should fail; like an output loss), a "bailout" externality (we come back to this one later, but here we just mention that this externality captures the cost on other agents (say, tax-payers) when a bank is motivated to take "bad or risky" actions when anticipating being saved in a trouble scenario), and a "pecuniary" externality that can be explained by falling asset prices on the wealth distribution in the economy and then, in an imperfect market setting, the impact on the credit worthiness of some agents. (Pecuniary externalities do not play any role in a first best world.) These externalities are negative in nature, as they are related to the fact that failure in one bank might trigger run on other banks that at the outset were considered solvent; this is contagion.⁴ Through the interbank market banks are

⁴ Each bank's contribution to the public good "payment, clearing and verification system" used by all

strongly interconnected. Some banks are considered more systemically important than others – failure in one such important bank can cause the whole financial system to break down, at substantial social costs. 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 interbank 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 behaviour; 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. Therefore we will face a large number of important trade-offs when new regulatory rules are to be imposed. For instance, 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. Another guarantee as found in deposit insurance will induce most depositors not to exert a lot of effort to monitor the management of the bank. (One should also point at the fact that an ordinary depositor seldom is in a position to being able to monitor a bank.) Also, the bank might have an incentive to take advantage of the

banks is a positive externality.

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. Regulating one part of the banking activity might produce *moral hazard* problems either directly or elsewhere. The bank's incentive to exert effort to select good projects or find good borrowers will become weaker or distorted if the bank anticipates being saved if it should get into trouble. 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 the higher leverage in banks than in other firms.) Such a reward structure might lead to risk-loving behaviour, in the sense that the banks might have a too strong incentive to provide loans to too risky projects. A political economy problem is then that even 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, might ex post turn out to be time inconsistent – the government will ex post “be forced” to intervene by interest groups or political pressure, or simply because the social loss if 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.

An important feature of a bank's lending operations can be classified under “*informational issues*”; the lending operations feature in most cases *asymmetric information* because the borrowers know more about the quality of their projects (success probabilities and/or profitability) than what lenders do. Borrowers can also take actions ex post, after having been granted a loan, that are not in the lenders' interest (*moral hazard*).

To sum up some of the important features of banking operations: Depending on 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 are mixed together.)

2. Why do we have banks?

This question might seem a bit strange, but we should think about it. In order to identify the social benefits of having a banking system, we have to see what the alternatives are; how should projects be financed if no banks existed. An important concept is "*transaction costs*", broadly defined. To see why we have banks operating as a middleman between "investors – borrowers" on the one hand, and "savers – depositors" on the other, we have to compare the transaction costs in a banking system to the ones in a society without banks where direct finance dominates.

We might ask: Will a saver (in the role as investor) find it costly to search around for finding a match or an appropriate project and provide finance to his or her project?" We have seen that a bank is a specialized institution that can bunch or pool a lot of small deposits together while providing large loans to some entrepreneurs or households with more or less profitable projects. 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 time-consuming. Also there is a coordination problem related to “who should invest in what project”. Since each saver can be seen as being risk averse, his/her saving should therefore be diversified so as to reduce the risk of making bad investment choices. Risk aversion also means that the 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.⁵ Direct finance will require 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.

When investing in a project, the saver will want to have a loan or debt contract specifying under what circumstances the investor is going to repay and what amount; also, the saver will need some way of having the borrower monitored – how the project is undertaken until completion. (The saver wants of course that the investor does not take the money and run abroad.) If the project does not pay off, the lender will not be able to get his/her money back; i.e. if the investor fails the loss must be borne by the saver. Each saver will under direct finance and after having succeeded to find a promising project, have to write complex contracts for each project, while also exerting effort to monitor whether all projects proceed according

⁵ Deposits in a bank are less risky than direct finance. The reason is that a bank will normally choose a diversified loan portfolio. Also the projects are partly financed by some bank equity (depending on the prevailing capital adequacy requirements), while (retail) deposits are protected by deposit insurance; both factors will make deposits less risky than direct investment in the financial market. Also wholesale deposits might be more or less protected by indirect guarantees or because of “too-big-to-fail”.

to the contract until maturity. If each 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. Then we either have too much monitoring (duplication of monitoring costs – which is a socially wasteful due to the public good nature of information) or too little monitoring if anyone believes that others will exert the monitoring effort (free-riding on others' effort). To reduce these costs, a bank can act as a “delegated monitor”, undertake necessary monitoring (and being induced to do so) or supervision at a much lower cost than what an uncoordinated group of direct investors can accomplish.

If there should be no transaction costs for each saver, banks will not play any role in financial markets. In a competitive Arrow-Debreu world with no transaction costs and a complete set of contingent markets (for any possible state of nature in the future), banks have no role to play; their existence will not be efficiency-improving. However, because transaction costs and informational issues are prevalent and significant, whilst it is hard to establish a full set of contingent markets it will be socially beneficial to have banks as financial middlemen. Hence, 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 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.)

Hence, when having banks, there are savings in transaction costs. Banks are expected to have comparative advantage in selecting good projects, write and enforce complex contracts and impose effective monitoring devices. They also have, perhaps not always, some trust or confidence that savers will not fear to leave the money to the bank and delegate their choice of finding good projects. 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.

But why do we have problems with banks? Why do we have financial crisis? 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 crisis is not like a natural disaster, how should they be regulated? In the subsequent sections we will go through some issues, questions and problems that are related to various banking activities which can be seen as some basics for understanding both macro and regulatory issues.

To get into the specific features of various banking operations and related problems, we will start by looking at a bank's balance sheet. (We ignore so-called "Off-balance sheet operations".) Here we will identify the various risks the bank will face from the various items on the balance sheet, and also suggest proper actions for handling risk (risk management). Thereafter we look at some issues how to meet or accommodate to these risks as seen from the bank's perspective.

3. A closer look at a bank's balance sheet

A bank's balance sheet shows its *assets* and its *liabilities (debt)*, along with *equity*. The asset side is, along with equipment and buildings (not specific to banking, and will therefore be ignored in the following), made up of loans to borrowers (firms and households), loans to other banks (interbank loans – not secured), loans to

government as expressed as the stock of government bonds, and deposits or reserves in the Central Bank. All items are stock variables; measured as some monetary value at some specific date. The liability side is made up of debt: Retail deposits (mainly from households and small firms – secured through deposit insurance), wholesale deposits (including interbank debt – not secured), other debt (to the Central Bank – collateralized). The residual or difference between the value of assets and debt is equity. Hence a typical balance sheet of a commercial (and universal) bank will look like:

| Assets | Liabilities |
|----------------------|--------------------|
| Deposits in CB | Retail deposits |
| Loans to the public | Wholesale deposits |
| Loans to other banks | Other debt |
| Loans to government | Loans in CB |
| | Equity |

Figure 1

A bank's balance sheet

What types of risk the bank will face can be read from this balance sheet. We can distinguish between risk factors on the liability side and on the asset side: On the liability side we have first of all *liquidity risk*: The bank's funding, beyond its equity, comes from various types of deposits or debt. One issue related to this type of risk is the problem analyzed in the article by Tobin on the reading list; see Tobin (1982), namely *uncertainty about the supply of deposits*: Suppose a bank's balance sheet is given by $D + E = L + R + kD$, where D is the volume of deposits, E is equity, L is the loan volume, R is "free" reserves or defensive position beyond required reserves set

by the government, kD ; e.g. kept as deposits in CB. If the bank should decide its volume of *illiquid* loans, L , *before* the exact volume of deposits, D , is known, how will that affect its lending policy, as well as its holding of reserves, R ? The reason, according to Tobin, that at banks hold reserves beyond what is required, is “to defend themselves against deposit withdrawals which they cannot perfectly foresee.” One reason for this type of uncertainty is the uncontrollable expansion or contraction of lending activities of other banks in the interbank market that “will spill deposits and reserves into a bank, or suck them from it.” Because of the role played by the CB as “the lender of last resort”, and the existence of deposit insurance, the historic justification for keeping reserves as a buffer or cushion against insolvency caused by illiquidity, is no longer valid. According to Tobin, “the modern function of reserves is to provide a mechanism of monetary control over the economy by the central bank”; cf. Rødseth’s note. But why then keep reserves? Banks are required to do so – these required reserves cannot be used to meet deposit withdrawals. But why then keep reserves beyond what is required? Such reserves are kept, according to Tobin, “for fear that they might not pass the required reserve test without incurring the special costs of borrowing or of liquidating high-yielding investments.”

Let the rate of interest, r , earned on positive reserves (the bank as lender) differ from the rate of interest paid on negative positions (the bank as borrower), as given by $r + b$, where b is additional funding cost under borrowing. If the exact volume of deposits is not known (or the exact amount of withdrawals is not known), how can the lending behavior of a risk-neutral commercial bank then be characterized? In other words, what characterizes a precautionary portfolio decision? Because being too cautious, in the sense of keeping too large reserves or too large positive defensive positions, the bank may forego or sacrifice profitable lending opportunities. On the other hand, if the bank is too optimistic, it will expand its lending too much, so that positive reserves might be wiped out by large unanticipated withdrawals. In that case the bank has to borrow at the higher rate of interest or higher funding cost. This higher cost of funding or borrowing either in the central bank or in the interbank

market must be balanced against the marginal revenue from lending. This is the first problem to be discussed in the lectures.

In Tobin's model, the issue is about uncertainty in the supply of deposits. Another type of liquidity risk is related to *uncertainty in the demand for liquidity among the depositors*. This problem, as captured by the Diamond-Dybvig model, is presented in chapter 12 in Tirole, *The Theory of Corporate Finance*. The model has become a workhorse in the economics of banking because it might describe equilibria characterized by *bank runs*. (The model has been extended in a large number of directions.) But before we discuss "bank runs", we will outline the main idea in this model where focus is on *liquidity insurance*: We have three periods and a continuum of risk-averse agents (consumers/depositors), each endowed with some given amount of a good, at the ex ante stage ($t = 0$), when the agents are identical. This good can be consumed in period 1, by "impatient" agents, or in period 2 by "patient" agents, and it can also be used for investment. The investment choice is made at $t = 0$ when the agents have not yet learnt what category they belong to (whether patient or impatient – hence uncertainty about liquidity needs), and there are at $t = 0$, two investment options or projects: One liquid short-term project, being realized after one period but with no net return, and one illiquid project that requires two periods to pay off with a positive net return. This long-term project can, if necessary, be liquidated at $t = 1$, prior to completion or maturity, but at a liquidation cost or loss of return. The agents learn their type at $t = 1$. This information is not publicly observable and can therefore not be verified by a third party. (A patient agent can always claim to be impatient.) Ex ante there is common knowledge that a given fraction of the agents will be impatient and will only care about consuming at $t = 1$. The remaining fraction of agents will become patient and care about consumption at $t = 2$. Agent types are i.i.d. (idiosyncratic risk – no macroeconomic, systematic risk, no correlation – hence the risk can be diversified away through the law of large numbers).

Learning to be impatient is a kind of “*liquidity shock*” in this economy. Without any risk sharing institutions, each agent must on her own, choose how to invest so as to maximize expected utility, before knowing her true type. (This is self-insurance or autarky.) Then at $t = 1$, one’s type is learnt, and an impatient or early (patient or late) agent will have to liquidate her long-term investment so as to consume early (will roll over the short-term investment another period with no payoff while reaping the return of her long-term investment so as to consume at $t = 2$).

The efficiency of the autarky (self-insurance) equilibrium can now be improved by introducing banks. Banks can realize the Pareto-optimal ex ante allocation (optimal risk sharing) by pooling deposits from the agents, making the optimal investment choice while offering deposit contracts to the agents so that the return from short-run projects is offered to impatient agents, and the return from long-term projects to the patient agents. This type of problem is the second topic for the lecture series.

There is a third risk factor associated with liquidity, so-called *interest rate risk*.

Because of the maturity mismatch, the contracted interest rates on loans that are revenues for banks might show less variability than short-term funding rate of interest, which is a cost to the bank. This discrepancy might cause troubles for the banks. How can banks protect themselves against this type of risk?

The risk factors on the *asset side* of the balance sheet are related to *credit or default risk among a bank’s borrowers*. On granting loans to borrowers, which is a main task for banks, the banks know that some of the borrowers might default; that is, the borrower cannot repay his debt (principal plus interest). The losses have to be absorbed by the bank. But such default risk is not necessarily exogenous; it might be affected by the borrower herself (moral hazard), or because the bank cannot distinguish between good and bad borrowers – “the lemon problem” – loans are granted, now and then, to (ex post) bad projects. Therefore, the third topic of the lecture series is to consider contractual design under moral hazard and asymmetric information, and see how banks can mitigate these problems 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. One implication of these informational failures is *credit rationing and market frictions*. 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. Asymmetric information, when borrowers are better informed about the quality of their projects, will appear in Part 2 of this note, to be published later.

The fourth topic is related to competition in the banking sector. Competition can be modelled in a large number of ways. Here we will 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 behaviour as banks can some time (especially with low charter values due to too fierce competition or too high deposit rates) gamble too much. The equilibrium outcome is analyzed in detail in the paper. Because there are regulatory instruments (capital requirements and ceiling on deposit rates), we have a model that can be seen as a bridge to “regulation”.

Some of the issues taken up so far are important background for understanding financial fragility or financial instability. 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. We can then, perhaps, try to answer the difficult question “what is the optimal market structure (nature of competition) in banking”? Some fragments of this important problem, which is carried over to the macro part and the regulation part of these lectures, can be found in the articles by Allen and Gale (2004), and in Vives (2010), on the reading list.