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**Uncertainty, Information, and Trust in  
Banking Intermediation**

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# Uncertainty, Information, and Trust in Banking Intermediation\*

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## Abstract

Banking intermediaries help to coordinate different agents' plans, reducing the uncertainty that might otherwise hamper transactions because of disruptive "lemon" problems. By establishing trust relationships based on private information, banks allow risk pooling and provide insurance to different classes of agents, act as market makers, and provide services that save transaction and notary costs. "Lemon" problems are also important to understand the difference between market pricing of the risk of bonds and the banks' pricing of the risk of loans. In the first case risk is priced on the basis of freely available information, relying heavily on the informational content of statistical time series. The resulting equilibria, though, are fragile, because they are subject to abrupt regime changes as new information becomes public. Banks, on the contrary, price loans on the basis of their private information, and they can thus provide insurance against different kinds of shocks. Given the opacity of their activities, and the huge externalities that their entrepreneurial choices imply, banks must be subject to an extensive regulation, imposing a transparent disclosure of their risk taking activities.

Keywords: Banks; Credit; Uncertainty; Information Costs; Trust.

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# 1 Introduction

The importance of uncertainty for a theory of the banking firm has somewhat been neglected. Modern theories of banking have in fact focused mainly on the analysis of information asymmetries and their role in shaping optimal contractual solutions, such as the debt contract, or the demand deposit contract. This paper suggests that the role of banking intermediation can be better understood on the basis of Malmgren (1961) intuition that firms help to coordinate the plans of different individuals. The basic intuition is that banking intermediaries help to coordinate different agents' plans, reducing the uncertainty that might otherwise hamper transactions. The limited knowledge of other agents' plans may, in fact, often generate disruptive "lemon" problems. Banks build trust relationships that not only permit to trade in absence of regulation and enforcement organizations, but often generate equilibria that are more efficient than those of an uncoordinated market. Trust allows banks to pool risks providing insurance to different classes of agents, to act as market makers allowing the exploitation of trade opportunities, and to provide services that save transaction and notary costs.

The paper is organized in two sections. The first is focused on the role of uncertainty for a theory of financial intermediation and the banking firm. In the first part of the section I discuss the benefit of financial intermediation in presence of uncertainty and costly information. The rest of the section analyzes the different services that banks provide, suggesting that the solutions banks develop to reduce the uncertainty individual agents face, generate economies of scope in the provision of different banking services. The final part of the section discusses why banks benefit from being organized as firms.

The second section draws some implications for the banking industry. In particular, it seems interesting to analyze the role of information and uncertainty in the bonds and loans market, respectively. My thesis is that the ubiquity of "lemon" problems is important to understand the difference between market pricing of the risk of bonds and the banks' pricing of the risk of loans. In the first case the market prices the risk on the basis of freely available information, and there is a simple, possibly linear relationship, as in the case of the CAPM model, between risk and its market price. But this relationship is fragile because it is subject to abrupt regime changes as new information becomes public. Banks, on the contrary, price loans on the basis of their past investment in information gathering activities. Banks can thus price risk in a fairly reliable way, maintaining relatively stable and predictable pricing policies, but their default costs must be convex, limiting the amount of risk they can take. The following parts of the section focus on how competitive forces operate in presence of uncertainty and information costs. The thesis is that the efficiency of the industry largely depends on the capability of banks to price discriminate. Gathering information banks can price risks individually, reducing rationing. Credit rationing, therefore, measures the potential for further development of financial intermediation.

In the concluding section I then discuss some implications for the regulatory framework of the industry. Given the opacity of their activities, and the huge externalities that their entrepreneurial choices imply, banks must be subject to an extensive regulation. In particular, regulation should aim to impose the disclosure of the risk taking activities entertained, by imposing tight accounting standards. Moreover, the lender of last resort should substitute depositors in forcing bankruptcy procedures, rather than bail out insolvent banks. These procedures, therefore, should be designed in order to preserve the

continuation of the activity, whenever viable.

## 2 Uncertainty and the role of banking intermediaries

### 2.1 Information and intermediation

Market prices convey information regarding the relative scarcity of different resources. Agents can plan their action, continuously revising their expectations as the actions of other agents change the environment, because market prices reflect these innovations (Hayek (1937, 1945b)). Coordination of plans can thus be achieved because the observable variations of prices avoid a large number of transactions. The speed and efficiency of the process depend on the success of the price system in reflecting, quickly and transparently, the new conditions.<sup>1</sup> Institutions such as organized markets make price systems more efficient and the availability of price information cheaper.

Prices are an efficient device to transfer information regarding goods whose properties are well known, so that they represent ideal standards that can be used as a reference point for whole sets of other goods. When more complex goods or services are traded, any contractual agreement must contain provisions covering aspects of the transaction different from the price. Whenever the transaction requires time to be completed, many possibly relevant factors cannot be contemplated *ex ante*, and contracts cannot cover all different possible outcomes. Coordination of different plans becomes increasingly difficult because of uncertainty. In general, every action or market transaction entertained by a single individual affects, more or less relevantly, all other members of the community (Knight (1923)). The definition of property rights permits single individual agents to cooperate by defining what kind of external effect of their activity must be tolerated by other members. However, the definition of a set of property rights and the existence of a mean of payment are not sufficient to permit the cooperation of different agents in these more complicated instances. A new set of rules and institutions is required to transfer and use the knowledge of different individuals. To conduct certain complex transactions, as those regarding industrial productions, or long-distance trade, it is necessary to coordinate different agents in order to reduce the costs caused by unpredictable events. These agents, possessing different resources and knowledge, must cooperate for a long period of time. And they must commit their resources, because a case by case involvement requiring several different interactions over time may produce too much uncertainty, making cooperation impossible. Individual contracts, necessarily incomplete, must be supported by implicit or explicit sets of rules, embedded in behavioral routines, such as traditional trade codes, or in specific organized institutions such as firms. As these institutions evolve, some agents can develop a specialized knowledge, useful to put together the resources of different agents, by acting as intermediaries.

When individual characteristics of the contracting agents remain fundamental, and transaction cannot take place by means of standardized, anonymous transactions, prices provide noisy signals. In the exchange of durable goods, or financial contracts, to provide a simple example, the expected future price is a relevant factor for today's choice of entering the transaction. In order to formulate an expectation regarding the future price, agents

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<sup>1</sup>In general equilibrium models, prices rather than quantities must adjust for the equilibrium to be stable.

need information regarding many specific individual aspects of the other agents, such as their entrepreneurial capability, if they produce or supply the goods, or their preferences, if they demand the goods. Each agent formulates the expectations on the basis of his own subjective, limited information. This implies, even under the (counterfactual) simplifying assumption that every individual uses the same logical models to analyze the reality, that every expectation regarding the choices of others is made with an error. Agents can (eventually) attribute probability distributions to the capabilities and preferences of others. Moreover, every agent knows that the expected future price, be it an actual price in a future market, or an individual conjecture, is affected by the different forecasting errors. Even if each of the forecasting errors is zero on average, the variance of the expected future price depends on the number of errors made, and consequently, on the number of agents whose choices are to be forecasted.

In our simple example where agents need to formulate an expectation for price of a good only, what we are showing is that the forecasting error of prices is ultimately due to lack of information, and uncertainty regarding individual characteristics. A crucial point is that the presence of many agents does not reduce the price variance, it rather increases it. Diversification does not work because prices depend on many *non linear* transformations of individual characteristics. These individual characteristics are not independent, since agents interact, cooperate and learn from each other. The interaction of different individual errors increases the dimension of the uncertainty, so that even if errors are not perfectly correlated, and thus on aggregate the impact of individual errors may be reduced by diversification, as the number of agents involved grows, a higher number of agents implies a larger number of variance factors. Whenever errors are not independent across different time periods, the second effect always dominates.

This basic consideration has a direct implication. Akerlof (1970) has shown that the likelihood of the emergence of a “lemon” problem crucially depends on the second moment of the probability distribution of the subjective evaluation of the quality of the goods. As possible outcomes increasingly diverge, a “lemon” problem becomes more likely. In the example of a durable good, the future price of the good plays the same role as the quality of the car in the example of the market for used cars. Clearly, as the number of agents involved grows, the likelihood that the transaction will not take place rises. In many cases the problem may be reduced by collecting information and modelling an aggregate variable, for example estimating a demand function. But aggregate models rely on assumptions regarding the stability of some basic relationships among the observable variables. And these relationships may change when some new factors change the basic underlying fundamentals, such as individual preferences, or put in question the reliability of the relevant information. In such instances a “lemon” problem may emerge abruptly and a well established market may suddenly collapse, as a consequence of rational behavior on part of the agents.

The presence of intermediary agents can play an important role, drastically reducing the number of errors, and, consequently, reducing the variance of the expected future price. If buyers make use of a broker, communicating the relevant information to the intermediary, or if the intermediary acts on behalf of both classes of agents, the number of expectation errors falls. The benefits are relevant even if the numbers are not large, because strategic interactions may generate the same kind of problems, since every agent must forecast the expectation regarding the expectations of every one else, and so on, to

an indefinite degree of abstraction. These benefits must be traded off with the cost of the information disclosure between the intermediary and his customers and the agency cost due to the information asymmetry between them. In many circumstances the benefits prevail. Bankers are intermediaries that simultaneously act as brokers for some classes of agents and selling agents for others, providing multiple services to each of them. Their fundamental role is to gather private information by means of direct personal contacts, in order to provide services that require specific knowledge and mutual trust. They help to coordinate agents by trading trust, reducing the need for explicit rules of conduct and enforcement procedures. “Good will has ... a rationale based on economic costs” (Malmgren (1961) p. 414).

### **2.1.1 Transaction services**

When some particular goods are used as means of payments, transactions are both expensive and risky. Storing these goods in safe vaults, payments can be processed by transferring just the title of ownership of the goods by means of bookkeeping entries. Bankers provide these services, allowing to settle transactions among agents physically distant from the intermediary and among them, by using letters of credit, bank notes, or checks. The diffusion of these important instruments is based on the reputation of the banker and on a waterproof relationship of trust between the banker and the customers. Letters of credit, bank notes, and checks are in fact accepted only because the intermediary is trusted, by personal knowledge or through his reputation, since the holders of the notes can hardly monitor the reserves of the bank. Agents who had large amounts of wealth at their disposal, possessed the storing facilities, and, more importantly, had a solid reputation, became the first bankers. During the early medieval age they were mainly goldsmiths, money changers and successful merchants.

Trade requires heavy transaction costs in order to ascertain not only the quality of the goods exchanged and the value of the medium of exchange, but even to prove that the parties are the legitimate owners of the goods traded and that the transaction is freely and deliberately undertaken. Banking intermediaries reduce these cost noteworthy, because their bookkeeping entries track every step of any transaction. In practice, banks furnish an implicit guarantee that the payment process has been proper. In this regard medieval money changers acted no differently from modern organized markets where all transactions are settled at the end of the day. They are market makers, providing a guarantee for the correctness and propriety of the transaction. The services that bankers furnish avoid an enormous amount of duplication of information acquisition. These do not normally extend to a full guarantee of the transaction, because the provision of this insurance service would be extremely expensive, since the acquisition of information would need to be more extensive. Nevertheless, it is not unusual for banks to back some specific large transactions of important customers.

In principle, the provision of payment services could be accomplished storing the money received in safe vaults and charging customers fees to cover the costs and earn a profit, keeping in the form of reserves the whole amount of gold received. But since the early age of banking only a fraction of the amount received has been kept as reserve. It was soon realized that guaranteeing the performance of the transactions services required holding as reserves only a fraction of the amounts of money received. The obvious so-

lution was to lend the rest. Furthermore, the inherent incompleteness of credit contracts created difficult problems in ages of poor definition of property rights, difficult enforcement of the law, and arbitrary confiscation on part of the political power. In these conditions storing large amounts of money carried a large risk, which increased the willingness to bear the credit risk (Rajan (1998)). Dominating the technology for the provision of depository services, bankers could cheaply provide payment services. They became financial intermediaries too, because lending provided further revenues without seriously increasing the risk of deposits (Kashyap et al. (2002)).

### **2.1.2 Financial intermediation**

Agents wishing to save part of their wealth in order to increase future consumption, often do not have access to valuable investment projects. Conversely, agents who can undertake profitable investments do not always own all the necessary resources. Trade between these two sets of agents would clearly be beneficial, because one set of agents has the resources, the other the knowledge, and investment requires both. But trade cannot in this case occur through a standard transaction, direct or indirect. Knowledge is, in fact, made up of information and the capacity to make use of the information. Both are very difficult to trade, because they are either non transferable or public goods, at least partially. Gains from trade can be exploited only if savers accept to transfer resources to the investors, in exchange for a promise to share future benefits of the investments. But the asymmetric availability of information, makes transactions of this type special. Investors in fact require time to fulfil their part of the transaction, because they have to complete the investment project to be able to keep the promise. In these conditions, standardized risk-sharing contracts generate severe adverse selection problems. And even when the contracts are individually tailor-made, moral hazard problems, due to the *ex post* emergence of information asymmetries, cannot be easily avoided. Repeated, anonymous transactions cannot take place. This generates a large potential market for technologies and techniques that could reduce the cost of information. Market forces create incentives for the development of several sorts of special incentive-compatible contracts and self-selection mechanisms, in order to overcome the “lemon” problem. Property rights may be reallocated by means of specially designed contracts, in order to create incentives to disclose the relevant information. The standard debt contract, transferring the ownership of the investment project to the creditor when part of the obligations are not fulfilled, is just the main example. Debt contracts are effective because they fully transfer the information costs to the borrower, who can undertake the investment whenever the expected returns are large enough to cover these extra costs. These contractual solutions though are very expensive devices, because they require a complex system of rules, laws, and organizations to protect the property rights they define. This generates large transaction costs, for both the definition and the enforcement of the contracts (Coase (1937, 1960)).

In the absence of a highly developed legal system, and a very efficient organization guaranteeing the enforcement of the law, complex transaction involving time lags cannot take place. Moreover, even in presence of sophisticated contractual agreements, a large demand for financing remain unsatisfied and profitable investment projects may not be undertaken in the absence of intermediaries that can reduce the asymmetry in the availability of information. Intermediaries, in fact, drastically reduce transaction costs by pooling the

savings of different agents, and by directly providing finance to investors, avoiding the multiplicity of costs that individual savers should bear to get informed (Diamond (1984)). This outcome can be achieved in presence of a relationship of mutual trust between the banker and both classes of customers. The value of the franchise of either a medieval money changer or any contemporary bank lies with the reputation and the network of relationships with the customers. A bank in fact needs to perform the same kind of activity in order to issue loans or service deposits: it must obtain information and build trust. Once these relationships are in place, they can be used to service deposits or to extend credit. To a certain extent, the difference between the provision of payment services or of financial intermediation is almost immaterial. To settle transactions by means of bookkeeping entries, as a matter of fact, credit and debt relationships are entertained, if only for a short lapse of time. So the difference lies with the length of the credit relationship.

### **2.1.3 Liquidity provision**

In a poorly developed economic system, individual agents must store some goods, in order to have some precautionary savings, to face adverse contingencies of different kinds. When agents cooperate through an intense network of exchanges, the need for precautionary savings can be reduced by developing instruments for mutual insurance, useful as long as the negative shocks envisaged do not affect every agent simultaneously and to the same effect. On the other hand, the network of economic relationships makes every agent dependent on each other, generating risks of a different nature: agents must cope with contingencies depending on the individual choices of their neighbors. In a developed economy, precautionary savings are necessary, in particular, to face unexpected variations of market prices. They stem from the impossibility to perfectly coordinate economic behavior, because of the difficulty to forecast correctly other individual's choices.

The demand for the services of an intermediary agent between savers and investors is due to the need to match the different aims of different agents. Savers are risk-averse and subject to shocks to both their income and their consumption needs, consequently they need to hold a relevant fraction of their wealth in a liquid form, in order to always be able to smooth consumption even when facing negative shocks. Investment projects require time to be completed and to generate profits. The resources allocated to finance risky investment projects are therefore illiquid. For this reason, risk-averse agents can finance these projects to a limited extent only, making use of the savings in excess of the liquid reserves they need. But whenever liquidity shocks are not perfectly correlated, if savers could pool their savings, the need for reserves would be reduced noteworthy. Borrowing by means of demand deposits, banks allow savers to finance productive investments, while holding the liquid reserves they need to smooth consumption (Diamond and Dybvig (1983)). Establishing a relationship of mutual trust with the intermediary, depositors can pool their precautionary savings, minimizing their amount.

In a similar way, an important part of lending activities is the provision of liquidity on demand. Bank lending is in fact, to a large extent, based on commitment credit. Pre-defined amounts of money are kept at the disposal of a borrower that can use the line of credit at his request. A crucial aspect of the activity is the need to hold idle reserves of the means of payment or other assets that can easily be liquidated. Unless the liquidity needs of consumers and firms are perfectly correlated, the cost of reserves is lower by jointly



managing the liquidity of different classes of agents. Indeed, in many circumstances the correlation may be negative, for example because of seasonal patterns of consumption. In this case the overall variance of the liquidity needs of the system is much lower, consequently a lower amount of idle reserves is necessary (Kashyap et al. (2002)). Bank reserves are a cost that must be borne because individual agents have different, and sometimes mutually incompatible, expectations. Reserves play the same role as precautionary savings, but they are a much more efficient device. By means of their intermediation, bankers build impersonal and anonymous trust relationships among a multiplicity of different agents. Bankers coordinate different agents' responses to shocks, making them mutually compatible, whenever possible. The outcome achieved is very efficient, but the system can be fragile. When an adverse shock affects every member of the economic system, no insurance scheme is viable. More importantly, intermediaries cannot coordinate the reactions of different agents, because all agents move in the same direction. Whenever agents cannot discern the general and systemic nature of the shock, the relationship of trust may be put in question. In these instances they cannot discriminate the intrinsic limits of the system from a collapse of the relationship of mutual trust.

#### **2.1.4 Relationship lending**

The success of most entrepreneurial projects is based on some specific knowledge of market conditions. Information regarding the conditions of a particular market, in a particular place, in a particular moment (Hayek (1945a)). The knowledge of these particular circumstances of place and time, together with the command of skills that are often based on *tacit knowledge*,<sup>2</sup> form most of the intangible capital of the borrower. Creditors assume a relevant part of the risk of an investment, and their entrepreneurial function is the analysis and selection of risks. In many circumstances, the problem of the lender is to evaluate the intangible capital, that cannot be collateralized, and often is the main asset of the borrower.<sup>3</sup> Whenever the intangible capital is large in relation to the tangible assets of the borrower, relationship lending is the only available external source of finance. Bearing the costs of the establishment of a personal direct relationship, lenders can extend short-term credit and finance projects that would be unprofitable for other investors. By means of a consolidated personal relationship, they can obtain particular knowledge regarding almost every aspect of the entrepreneurial activity of the borrowers. This "inside lending" provides a comparative advantage with respect to any other form of "outside" debt (Fama (1985)). As "inside" lenders it is possible to evaluate the investment projects, and even more importantly, the reliability of the borrower. Moreover, a long term relationship may reduce the impact of moral hazard problems because the capability of the intermediary to obtain and process the relevant knowledge grows as the relationship takes place and goes on. Developing a deeper understanding of the specific aspects of the market, in fact, the lender can get a higher return in case of default, and this reduces the potential incentives for the borrower to strategically default.

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<sup>2</sup>Information and skills that are embedded in the particular traditions, rules of conduct and capacity of single individuals, and are not transferable because they are strictly subjective.

<sup>3</sup>"Not all the knowledge of the ever changing particular facts that man continually uses lends itself to organization or systematic exposition; much of it exists only dispersed among countless individuals. The same applies to that important part of expert knowledge which is not substantive knowledge but merely knowledge of where and how to find the needed information." (Hayek (1960) p. 25).

Investors in human capital intensive sectors need to establish direct relationships to obtain finance and persuade the lender that returns of the projects are appropriate. It is a very costly process, with a small chance of success, and in many cases very difficult to replicate with other potential lenders. In this instance, borrowers face relevant search costs. In order to maximize the return of the investment in the relationship, the lender may impose different kinds of switch costs, locking the borrower up (Klemperer (1995)). The most natural strategy followed is to provide a wide range of services that would imply the duplication of search costs if provided separately. In particular, banking intermediaries impose to the borrower the choice of the intermediary for the management of his payments. Furthermore, by managing the transactions, bankers can monitor the liquidity of the borrower, obtaining most of the fundamental information they need regarding the business.<sup>4</sup> The cash-flow of the firm conveys information regarding the health of the firm in real time, and its volatility measures the impact of shocks that affect the business. To achieve this aim they often extend credit at favorable terms to the best customers (the “prime” rate) passing them some of the profits they make from the fees and commissions of the transactions (Hodgman (1961)). Or alternatively they pay them a higher interest rate on deposits, or they charge lower fees, in order to consolidate a long-term relationship. When the payment of interests on deposits was forbidden, banks simply compelled borrowers to hold as a deposit a fraction of the loan or credit facility issued, through the compensating balance requirements (Sprenkle (1969, 1972)). Banks can in this way reduce competitive pressures, making it too costly for borrowers to turn to competitors for the management of their payments.<sup>5</sup> Bank customers pay the trust relationship by being charged monopolistic prices.

Apparently relationship lending does not require the existence of an agent who acts as an intermediary between savers and investors. It is necessary to ask why the analysis of the inside information that lenders must perform cannot be done by the final providers of finance, savers in general. If returns on investment projects were independent and identically distributed, and transaction costs irrelevant, savers who were willing to rent their resources to potential investors could eliminate all risks through diversification. But returns are correlated, and knowledge is costly to acquire. And since knowledge is in many regards a public good, devices to keep it private are very expensive, and make transaction costs relevant. It is difficult to obtain the relevant information, and difficult to trade it.<sup>6</sup> A specialized intermediary can achieve economies of scale in the selection and analysis of information and investment projects, avoiding duplication, by collecting the relevant information and selling it to different agents, including the less wealthy. It follows that individual lenders have a strong incentive to jointly delegate the function of monitoring to an intermediary, in order to avoid duplication. Delegation, however, raises the problem of the control of the intermediary on part of the lenders. When the intermediary has limited liability, the problem is to control the risk that he takes on, there is a delegation cost. The possibility for the intermediary to diversify the portfolio, financing

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<sup>4</sup>Vale (1993) assumes that by managing payments banks acquire information regarding the risk attitude of customers.

<sup>5</sup>The requirement of this implicit payment explains, according to Sprenkle (1969), the apparently irrational amount of deposits that firms normally hold.

<sup>6</sup>Wealthy agents have a great advantage, but they face a higher opportunity cost, because of the high value of their leisure.

different investment projects, can drastically reduce this cost (Diamond (1984)).

## 2.2 The banking firm

Loans can be provided by individual agents. But information regarding a specific credit contract is often to a large extent both a fixed and a sunk cost, so it is in most instances impossible to diversify the portfolio by simply reducing the size of the single loan. Diversification is important in financial intermediation, because the lower the risk of the portfolio, the lower the agency costs that the presence of an intermediary generates. When the financial intermediation services are provided by individual agents, they often do not possess the information required to diversify the portfolio to the extent necessary to make the intermediation viable. In other words, the importance of diversification for an efficient intermediation generates relevant economies of scale. Consequently, most of the times financial intermediation requires that different individuals pool their information and coordinate their activity. Banking becomes a team activity where it is difficult to evaluate the marginal contribution of each individual; banks must be firms (Alchian and Demsetz (1972)). Moreover, intermediation services require very specialized individual capabilities that are hard to acquire and to transfer. The acquisition and management of all the necessary resources (largely immaterial), implies specialized investments and heavy transaction costs. Transaction costs (Coase (1937)) and specialized investments of human capital (Williamson (1971)) make standardized contractual agreements too expensive.<sup>7</sup>

Whenever intermediation goes beyond a very small community, team production becomes necessary to dispose of more efficient technologies. Besides, the team production of a firm may help to develop the reputation. A firm is an institution, a set of explicit and implicit rules allowing different individuals to coordinate their activities. The behavior of the members of the institutions is shaped by these internal cultural rules, and the institution can thus develop over time a reputation. It is the reputation of its own members, because outsiders observe their actions, but it goes beyond the individual members, because it does not depend exclusively on any one of them, and it survives every one of them.

Commercial banks develop large networks of branches largely to provide transaction services. The organized structure of a firm is particularly useful because banking firms can achieve large economies of scale in dealing with the necessary information, while agency problems arise to a limited extent only. Most of the business can in fact be managed through highly standardized procedures. The network of branches often provides crucial cost-savings that allow banks to obtain a competitive advantage in the provision of relationship lending. In the case of lending services, though, agency problems are heavy, and they increase with the complexity of the organization. The actual lender, the desk officer, must be granted the necessary freedom to evaluate projects and borrowers, but this freedom may create incentives to collude with borrowers or to take risks different from those that the liability holders would like. The problem is that an organization requires standardized rules and procedures to operate efficiently, but these rules must be flexible enough to allow the desk officer (the only person who has the relevant information) to decide freely (Berger and Udell (2002)). Besides, these rules must provide incentives to

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<sup>7</sup>Even if individual private bankers played a relevant role in the early development of the banking industry.

take the kind of risks that liability-holders require. Large corporations face a trade-off between the cost-savings achieved providing multiple services, and the agency costs that increase with the complexity of the organization.<sup>8</sup> Whenever the bank is not just an individual firm, the main problem of the banking firms is how to keep agency problems under control.

## **3 The banking industry**

### **3.1 What's different about loans**

Relationship lending financed by means of demand deposits allows large classes of uninformed agents to finance risky investment projects through the intermediation of a bank. When the risk of these investment projects can be evaluated at a low cost with the available information, these projects can also be financed by means of standardized debt contracts available in the market. In order to understand the role and the function of banks in a developed economic system it is necessary to explain how financial market and banks complement each other.

Borrowing firms pay a higher rate on loans than on bonds. The issuance of a loan must thus imply the furnishing of a service that for some reason is worth more than the interest rate paid on a bond of comparable maturity (Fama (1985)). Bank loans cannot be perfect substitutes for bonds. They are two different assets because the acquisition of information is costly, and the future is uncertain. The market can price bonds on the basis of publicly available information, such as that disclosed on the balance sheet of the issuer. Loans, on the contrary, are mainly issued to firms whose business prospects depend on information that is scarce and opaque. Bonds are liquid, loans are not.

Some firms -small firms in particular- do not have access to financial markets because the cost of disclosing the relevant information to enable the market to price the risk is too large relative to the benefits from getting access to large classes of savers. The diffusion of information involves both fixed costs and a network-type of externality; the cost of the disclosure of information that an issuer must assume initially rises as the size of the issue grows, and eventually begins to decline when a certain size is achieved. A sufficiently large issue is necessary to get access to the bond market; smaller investors need to rely on personal relationships to obtain credit. The intermediation of a bank allows extending credit through relationship lending, while benefiting from economies of scale in the collection of savings. Banks get access to information regarding the entrepreneurial projects of the borrower that other market participants cannot get.

Large firms borrow from banks because the banks' own credit record provides a signal to the market about the reliability of the borrower (Diamond (1991)). The disclosure of the relevant information normally requires the presence of an intermediary whose reputation guarantees the reliability of the information revealed. In many circumstances, in fact, borrowers may face incentives not to report correctly the relevant information. Bank loans signal the creditworthiness of the borrower. The credit relationship is particularly valuable even for the bank in the case of large firms: as they have access to large pools of savers, banks can profitably act as intermediaries in the placing of bonds of industrial

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<sup>8</sup>For this reason small local banks coexist with large banking corporations.

firms, thereby earning fees and commissions. Banks often hold some of the bonds they place to signal their willingness to share the risk.

Those borrowers who already have a good reputation, a good credit rating and whose capital largely consists of tangible assets must have another reason to borrow from banks. The relationship is worth the cost because banks provide insurance against risks that cannot be hedged in the market. Different types of shocks may, in fact, require new, as yet unavailable information. When this is the case, the market cannot properly price the risk, a “lemon” problem emerges, and the bond market dries up (Akerlof (1970)). There are different examples of shocks that cause these problems. A typical case is a negative demand shock, such as the one that affected suppliers of telecommunications companies in the late 2001. Another example is the emergence of new information putting in question the reliability of the accounting figures of a class of borrowers. Other shocks may affect the market as a whole, as happened after the collapse of the LTCM, following which no bond could be placed for more than a month. In any of these cases, companies may find themselves in the impossibility of getting finance at the moment they need it most because their liquidity is strained. Commitment loans provide insurance against these shocks. For this reason large firms are always willing to pay fees to obtain lines of credit that they often do not use. Fees and interest rate mark-ups are an insurance premium.

Bonds can be purchased without incurring increasing marginal costs, because even large intermediaries like banks are price takers. By contrast, the issuance of loans implies the existence of convex default costs. The reason is that with increases in the quantity of loans a bank issues, it will end up, sooner or later, financing projects with a lower than average return. Also the analysis of the value of the collateral becomes increasingly difficult and complex. At the root of the problem lies the fact that the relevant information financial intermediaries can uncover is limited. Thus the returns of investment in information gathering must be decreasing. There is only so much knowledge to be found.<sup>9</sup> This argument might seem at odds with standard financial theory, such as the CAPM, that suggests that there is a market price for risk, and any agent can buy any amount of risk at the market price. But it is not. A competitive market for risk only exists for investment projects on which the right amount of information is available. Loans are issued to finance projects whose risk the market *cannot* efficiently price. The information publicly available is not sufficient to attribute a reliable probability distribution to the outcomes of the projects: there is Knightian uncertainty (Knight (1921)). The entrepreneurial function of the banker is to obtain a reliable probability distribution on the outcomes of projects that the rest of the market cannot price. A fundamental aspect of the task is to evaluate the borrower’s capability to make the investment profitable. For this purpose the banker must evaluate the intangible human capital of the borrower and the specific non-reproducible resources that he commits to the project. These are not made up exclusively of the borrower’s knowledge, but depend as well on his willingness and capability to use efficiently the different resources given his time constraints.<sup>10</sup> Thanks to their particular knowledge,

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<sup>9</sup>Alternatively it can be assumed that banks have a constant return to scale technology in the monitoring activity, and that returns are a convex function of the level of monitoring. This is the road followed by Gorton and Pennacchi (1995).

<sup>10</sup>“Much of the particular information which any individual possesses can be used only to the extent to which he himself can use it in his own decisions. Nobody can communicate to another all that he knows, because much of the information he can make use of he himself will elicit only in the process of making

bankers obtain a special understanding of both the correlations among the risks of different borrowers and investment projects, and the structural parameters on which risks depend. They have a superior dynamic perspective of how risks change over time. Risk parameters are in fact time-varying, and credit transactions require time. This special knowledge allows banks to diversify risk not only among individual agents and industrial sectors, but even across time. Banks can thus reduce the risk of the portfolio realizing a degree of diversification that no other agent can achieve. Nevertheless, the benefits of diversification are bounded: any bank is constrained by the available demand for credit. The degree of diversification depends on the existent production structure of the market: there is a non-diversifiable market risk. Even with regard to a whole portfolio of bank loans, default costs are a convex function of the quantity issued.

### **3.2 Information and competition in the banking industry**

Competition in the banking industry does not produce competitive prices. Banks compete to attract new customers to whom they offer a whole range of services. When dealing with households, banks benefit from the high search costs necessary to develop a relationship covering a whole range of services. Households need payment services, consumer credit, mortgages, brokerage services, and financial intermediation for the optimal allocation of savings. Since banks benefit from economies of scope in the provision of these different financial products and services, they can attract customers offering better than average terms on one product to increase the revenues from other. Banks' real advantage is that search costs make it normally too expensive for households to hold many different banking relationships. Intra-industry competition is limited by the fixed costs necessary to establish branches, and by the long time necessary to develop lasting relationships, which generate local natural monopolies. Transport costs in fact increase dramatically the search costs that households must undertake. The other fundamental barrier to entry in banking is caused by the network externalities in dealing with information, which benefit well-established banks. On the other hand, banks also suffer from competition from other types of intermediaries that provide some of the same services, such as insurance companies or mutual funds. Since recent technological developments have dramatically reduced the costs to these intermediaries, the market share of banks in the financial industry has markedly declined in most advanced countries in the last decades (Allen and Santomero (1997)).

The relationship between banks and firms is of a different nature. Search costs are much less relevant for firms, for which it is normally profitable to hold relationships with many different banks. Competitive pressures are accordingly much stronger than in the case of households. Banks face both intra-industry and inter-industry competition for the clientele of firms. Inter-industry competition is particularly relevant in the case of large corporations that can get finance in bonds or stock markets and need banking interme-

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plans for action. Such information will be evoked as he works upon the particular task he has undertaken in the conditions he finds himself, such as the relative scarcity of various materials to which he has access. Only thus can the individual find out what to look for, and what helps him to do this in the market is the responses others make to what they find in their own environments. The overall problem is not merely to make use of given knowledge, but to discover as much information as is worth searching for in prevailing conditions" (Hayek (1988), p. 77).

diation largely for payment services. Intra-industry competition is stronger than in the case of households, because firms can shop cheaply among different banks, so that the local natural monopoly does not arise. Banks benefit from monopoly power only to the extent that they act as relationship lenders. Relationship lending, in fact, allows banks to price monopolistically, because the cost of information generates monopoly power: “Customer relationships arise between banks and firms because, in the process of lending, a bank learns more than others about its own customers. This information asymmetry allows lenders to capture some of the rents generated by their older customers” (Sharpe (1990), abstract). Firms are trapped in the relationship when it is too costly to convey the relevant information to outsiders. Somewhat paradoxically, competition could in this case generate an inefficient allocation of capital: competing banks would need to offer better terms to all customers indiscriminately in order to get a share of the rents because it would be too costly for them to price the risk of every borrower individually.<sup>11</sup> The banking industry can thus be efficient to the extent that individual banks can price discriminate. Two conditions must be met: first, monitoring costs must be too large for outsiders, so that relationships give banks a sort of natural monopoly over individual customers; secondly, competitors must not be able to extend credit profitably to their creditors in a standardized fashion, by pooling the borrowers. Network externalities and economies of scale in the analysis of information must be overwhelming. This can be the case for investment banks specialized in financing very risky business projects, or local banks focused on small-firm lending.

At the limit, relationship lenders might be able to extract the entire surplus generated by a loan from the borrower. But this would be true exclusively when the lender has the same information of the borrower on the process, and the investment does not require the commitment of any specific resources to the project on part of the borrower. Whenever the specific knowledge of the borrower plays a relevant role, he has an incentive to curtail the effort if the bank can extract the entire surplus. Since banks anticipate this outcome, the market might collapse. In order to avoid this problem banks must give up part of their rents. Besides, by the very act of extending credit, banks disclose valuable information. Thus, they cannot keep their rents indefinitely. Issuing loans, in fact, they signal to the market that a borrower is reliable and that his investments are expected to be profitable. If debt contracts extend for more than one period, “banks can correct this incentive problem by committing to share with other lenders their private information about the quality of their customers at the end of the first period. The resulting competitive pressure forces them to forgo opportunistic behavior in the second period” (Padilla and Pagano (1997), p. 207). In this way they can keep the rents for the first period, while the disclosure of information drastically reduces profits in the second period only. The commitment of the bank to disclose information, though, must be credible. Reputation mechanisms are sufficient only when borrowers can cheaply transfer among them the information regarding the bank, allowing them to avoid banks that are not credibly committed. Otherwise banks must rely on institutional devices such as credit bureaus, agencies where banks pool the information.<sup>12</sup>

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<sup>11</sup>Sharpe (1990) considers this outcome inevitable.

<sup>12</sup>Institutions of this kind are widely diffused in many countries, in the US in particular (Pagano and Jappelli (1993)).

### 3.3 Credit rationing

In the absence of banks, debt contracts could exist, but they would be written directly by the savers, who often possess no information whatsoever on the investment projects. In this situation credit would be severely rationed, and most projects could not go forward. Credit rationing theories normally refer to bank credit, but they are based on very general arguments that do not take into account any of the specific characteristics of banks and bank intermediation.<sup>13</sup> These problems are particularly acute *in the absence* of specialized intermediaries.

Credit may be rationed even in the presence of banks, but not to the same extent. In fact, even if perfectly efficient banks could price every risk individually, credit would still be rationed. Since the monitoring costs that result under tailor-made lending to the individual are convex, equilibria with credit rationing may result under this solution as well. Moreover, perfect price discrimination would require enormous information costs. Like any other monopolist, a bank must trade off the benefits of investing sufficiently to permit perfect discrimination as against the profits that can be made pooling the customers and rationing some of them. Nevertheless, banks have a big advantage over the individual saver: they have far better information about each borrower's willingness to pay. Still, the banks must invest in monitoring their borrowers, whose willingness to pay may vary over time. Banks adopt both strategies - individual monitoring and lumping into classes - and in equilibrium the two will provide equal net marginal revenues. The monitoring is only constrained in resources, while the risk-class strategy causes greater problems of moral hazard and adverse selection too. The more the banking system is efficient in the analysis of information, the lower the share of assets that will be allocated by means of standardized contracts.

The entrepreneurial role of banks is to select the investment projects that potential borrowers are willing to undertake (Schumpeter (1934, 1939)). If banks select borrowers, some of them must be rationed, even if a well-functioning banking system may enormously increase lending opportunities. Credit rationing cannot be easily reduced by any short-term policy measure, nor would such a policy be desirable. It is not due to the inefficiency of credit market institutions; it rather measures the potential for further development of financial intermediation.

## 4 Concluding remarks: a note on competition and regulation in the banking industry

Central banks have been granted a large amount of discretion in both the conduct of monetary policy and the regulation of the banking system, in order to allow them to face unforeseen aggregate shocks. In these cases, in fact, information costs may prevent an efficient coordination of individual agents' responses. Besides, each individual's choices may produce large external effects on other agents in the market, so that, in the aggregate, they may systematically under or over-react to the shocks. A centralized authority may react more quickly and in a more balanced way, working on the basis of the most widely accepted models of behavior of aggregate variables. Nevertheless, independent authorities

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<sup>13</sup>See Jaffee and Russell (1976); Stiglitz and Weiss (1981, 1992).



may act more effectively by adopting transparent procedures and clear objectives, since when private agents correctly anticipate the behavior of the authorities the cost of the intervention is much lower.

A fundamental role of the banking system is to provide insurance against unforeseen shocks, because banks pool liquidity thanks to the network of relationship of trust between the bank and the customers. Banks, though, not only furnish a reciprocal insurance service for different agents, but they as well provide a public service of insurance against economy-wide shocks. The problem lies with the fact that bank managers' decisions regarding the amount of reserves are taken with the aim of maximizing profits, and might not take account of the public role of bank reserves as a system-wide insurance premium. Moreover, bankers take these decisions individually, in an uncoordinated way, while they jointly provide insurance, given the existence of the interbank market. Heavy systemic shocks, thus, could strain the banking system, since banks often cannot hedge those risks. When this is the case, an intervention of public authorities is desirable, in order to preserve the intangible capital represented by the network of relationships. Discretionary powers in the regulation of the banking system are thus important for a lender of last resort. The authority to bail out insolvent banks may be necessary to prevent financial contagion and large scale bank runs. This argument, though, does not imply that it is normally desirable to bail out individual banks.

Banking regulators face a difficult task. They have to bail out when necessary, but without creating the expectation on part of the liability-holders of other poorly capitalized banks that the likelihood of a bailout is high. Bailouts should thus be uncommon and unpredictable, and this apparently suggests that regulators should not follow any well defined rule in this instance. But this is not necessarily the case. The regulator's behavior should follow rules pushing the market to remove the inefficient management in anticipation of an intervention. These rules should thus impose penalties on both management and shareholders, as in the case of bankruptcy procedures. The standard solution adopted in the past has rather been to give inspection and intervention powers to the authorities in order to protect all different classes of liability holders, including shareholders, from any abuse of the management. The main reason is that agency problems are particularly acute in the industry, since bankers benefit of very specific knowledge. As a consequence, market mechanisms were not trusted to guarantee neither the efficiency, nor the stability of the system. The problem is that the regulator may not be more informed than the market, in normal conditions. A proper evaluation of the risk undertaken by all banks would imply a duplication of the information costs of the whole system. Consequently, regulators can only supervise the policies adopted to price risks by individual banks, and, eventually, analyze in depth the risk profile of those banks presenting anomalies. Not possessing a specific knowledge of the risks of all banks of the system, they cannot price the banks any better than the market. This suggests that regulators should not protect shareholders, and, as a consequence, not only they should not, under normal circumstances, bail out banks, but they should rather force bankruptcy procedures when inspections reveal that capital is depleted. Regulators should thus, in normal conditions, force bankruptcy procedures, rather than bail out. These procedures, as in the case of Chapter 11, should than be designed in order to preserve the continuation of the activity, whenever viable.

With the aim of guaranteeing a stable and competitive environment, regulators have been granted the power to evaluate, and eventually block, mergers among banks, and to

give selective access to the market, on the basis of information transmitted privately to the authority. In light of the opaque nature of the knowledge that gives bankers their rents, and of the relevance of the incentives for the capture of the regulator, it is not surprising that this solution has never effectively reduced the problems of moral hazard. Competition in the banking industry, in fact, cannot be increased simply by limiting the market share of the incumbents. The value of a bank is given by the discounted present value of the sum of its current and future rents. A division of the rents among different subjects does nothing to reduce them. Competition can be promoted only by creating an environment where a large number of different institutions can get access to the market. A more promising strategy would be a continuous development of a regulatory framework that creates market incentives for both stability and efficiency. In particular, regulation should focus on promoting the disclosure of relevant information regarding the analysis of the risks undertaken, in order to allow a proper evaluation of the management. For example, transparent rules should impose the write-off of bad loans, limiting the discretion in the manager's evaluation, or should rigorously forbid the transfer of risks to only apparently unrelated off-balance sheet entities. Furthermore, given the nature of the rents that characterize the market, a free-entry policy is essential for the efficiency of the system. Unfortunately, though, most of the regulations put in place in many different countries, apparently in order to guarantee the stability of the system, seem specially designed to protect the rents of the incumbents, and the power of bank managers.

## References

- Akerlof, George A.. “The Market for Lemons: Quality Uncertainty and the Market Mechanism.” *Quarterly Journal of Economics* 84 (August 1970), 488–500.
- Alchian, Armen A. and Harold Demsetz. “Production, Information Costs and Economic Organization.” *The American Economic Review* 62 (December 1972), 777–795.
- Allen, Franklin and Anthony M Santomero. “The Theory of Financial Intermediation.” *Journal of Banking & Finance* 21 (December 1997), 1461–1485.
- Berger, Allen N. and Gregory F Udell. “Small Business Credit Availability and Relationship Lending: the Importance of Bank Organisational Structure.” *The Economic Journal* 112 (February 2002), 32–53.
- Coase, Ronald H.. “The Nature of the Firm.” *Economica* 4 (November 1937), 386–405.
- Coase, Ronald H.. “The Problem of Social Cost.” *Journal of Law and Economics* 3 (October 1960), 1–44.
- Diamond, Douglas W.. “Financial Intermediation and Delegated Monitoring.” *Review of Economic Studies* 51 (1984), 393–414.
- Diamond, Douglas W. “Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt.” *Journal of Political Economy* 99 (1991), 689–721.
- Diamond, Douglas W. and Philip H. Dybvig. “Bank Runs, Deposit Insurance and Liquidity.” *Journal of Political Economy* 91 (1983), 401–419.
- Fama, Eugene. “What’s Different About Banks?” *Journal of Monetary Economics* 15 (January 1985), 30–57.
- Gorton, Gary B. and George G. Pennacchi. “Banks and Loan Sales: Marketing Nonmarketable Assets.” *Journal of Monetary Economics* 35 (1995), 389–411.
- Hayek, Friedrich A.. “Economics and Knowledge.” *Economica* 4 (February 1937), 33–54.
- Hayek, Friedrich A.. *Individualism and Economic Order*. London: Routledge and Kegan Paul 1945a.
- Hayek, Friedrich A.. “The Use of Knowledge in Society.” *The American Economic Review* 35 (September 1945b), 519–530.
- Hayek, Friedrich A.. *The Constitution of Liberty*. London: Routledge and Kegan Paul 1960.
- Hayek, Friedrich A.. “The Fatal Conceit: The Errors of Socialism.” In *The Collected Works Vol.*, edited by W. Bartley, London: Routledge, 1988 .
- Hodgman, Donald R.. “The Deposit Relationship and Commercial Bank Investment Behavior.” *The Review of Economics and Statistics* 43 (August 1961), 257–268.

- Jaffee, Dwight and Thomas Russell. "Imperfect Information, Uncertainty and Credit Rationing." *Quarterly Journal of Economics* 90 (November 1976), 651–666.
- Kashyap, Anil K., Raghuram Rajan, and Jeremy C. Stein. "Banks as Liquidity Providers: An Explanation for the Co-Existence of Lending and Deposit Taking." *The Journal of Finance* LVII (February 2002), 33–73.
- Klemperer, Paul. "Competition When Consumers Have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics and International Trade." *The Review of Economic Studies* 62 (October 1995), 515–539.
- Knight, Frank H.. *Risk, Uncertainty, and Profit*. Boston, MA: Hart, Schaffner & Marx 1921.
- Knight, Frank H.. "The Ethics of Competition." *Quarterly Journal of Economics* 37 (August 1923), 579–624.
- Malmgren, H. B.. "Information, Expectations and the Theory of the Firm." *Quarterly Journal of Economics* 75 (August 1961), 399–421.
- Padilla, Jorge A. and Marco Pagano. "Endogenous Communication Among Lenders and Entrepreneurial Incentives." *The Review of Financial Studies* 10 (Spring 1997), 205–236.
- Pagano, Marco and Tullio Jappelli. "Information Sharing in Credit Markets." *The Journal of Finance* 48 (December 1993), 1693–1718.
- Rajan, Raghuram G.. "The Past and the Future of Commercial Banking Viewed Through an Incomplete Contract Lenses." *Journal of Money, Credit and Banking* 30 (August 1998), 524–550.
- Schumpeter, Joseph A.. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycles*. Cambridge Mass: Harvard University Press 1934.
- Schumpeter, Joseph A.. *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York and London: McGraw-Hill Book Co. 1939.
- Sharpe, Steven A. "Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model Of Customer Relationships." *The Journal of Finance* XLV (September 1990), 1069–1087.
- Sprenkle, Case M. "The Uselessness of Transaction Demand Models." *The Journal of Finance* XXIV (December 1969), 835–848.
- Sprenkle, Case M. "On the Observed Transaction Demand for Money." *The Manchester School* (1972), 261–267.
- Stiglitz, Joseph and Andrew Weiss. "Credit Rationing in Markets with Imperfect Competition." *The American Economic Review* 71 (June 1981), 393–410.

Stiglitz, Joseph and Andrew Weiss. "Asymmetric Information in Credit Markets and Its Implications for Macroeconomic." *Oxford Economic Papers* 44 (1992), 694–724.

Vale, Bent. "The Dual Role of Demand Deposits under Asymmetric Information." *Scandinavian Journal of Economics* 95 (1993), 77–95.

Williamson, Oliver E.. "The Vertical Integration of Production: Market Failure Considerations." *The American Economic Review* 61 (May 1971), 112–123.