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Essays on bank monitoring, regulation and competition

Marinc, M.

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Chapter 1

Motivation and Outline

1.1 Introduction and Motivation

This dissertation consists of seven theoretical essays. Its main theme is the analysis of optimal regulation of banks. Broadly speaking, the essays address the following three issues in financial intermediation theory: *i*) why do we need banks, *ii*) how do we regulate them; and *iii*) how does competition impact the main functions that banks perform and the effectiveness of regulation?

Banks can be considered a lubricant for the economy at large. Banks are active on the asset side as well as on the liability side of their balance sheets. On the asset side, banks have loans that need monitoring. These loans are often rather opaque, reflecting the idiosyncracies of bank borrowers that may not have access to financial markets. In particular, information asymmetries could make financial markets inefficient in financing informationally opaque businesses (e.g., small and medium enterprises). Banks aim to resolve this market failure by screening and monitoring borrowers (e.g., businesses that need financing). This allows banks to intermediate between investors (depositors) and borrowers. The additional information that banks possess inevitably makes them opaque (see Morgan (2002)).

On the liability side, banks create liquidity. That is, banks finance illiquid loans with liquid demand deposits. The opaqueness of banks on the asset side, together with liquidity provision on the liability side, makes banks inherently unstable institutions. More specifically, if many depositors unexpectedly withdraw their funds, the bank involved incurs high liquidation costs and even a previously solvent bank might be forced into liquidation. A broader, systemic bank crisis could result because the banking industry is highly interconnected and the failure of one bank can have negative repercussions for other banks and hence for the economy at large.¹

Because such bank instability comes from a combination of banks' two core functions, the following question analyzed in this dissertation arises: *why do banks combine liquid demand deposits with lending to opaque borrowers that need monitoring?* Several narrow

¹Empirical evidence points at a cost of a bank crisis ranging from 5-20% of annual GDP (see Hoggarth, Reis, and Saporta (2002) and Bordo, Eichengreen, Klingebiel, and Martinez-Peria (2001)).

banking proposals have emerged that call for the separation of the two core activities of the bank (see Bryan (1988)). In their view, demand deposits should be invested in liquid securities, whereas illiquid loans should be financed with noncheckable long-term liabilities. However, such separation is rarely observed nor is it demanded by the regulator. It seems that a combination of demand-deposits and monitoring gives banks a distinct competitive advantage.²

The potential negative externalities of bank instability could provide a justification for bank regulation. More specifically, banks on their own may not fully internalize the costs of failure, i.e. the social cost of failure exceeds the private cost. A widely accepted form of regulation is the implementation of deposit insurance. Deposit insurance prevents bank runs because depositors know that their money will be repaid anyway. However, it creates other distortions. Depositors may no longer carefully examine the stability of their banks. The regulator may now have to take full responsibility for the prudent behavior of each bank.

Several regulatory tools have been created to deal with banks' potential excessive risk taking. Intrusive regulation in the past included restrictions on activities, geographical limitations, and various limitations on banks' prices (e.g., a deposit interest rate ceiling). Nowadays, rather than being "brute forced" into desired behavior, prevailing regulation is more of an indirect nature, in which banks are indirectly "compensated" for being prudent or alternatively charged for risk taking. An example is capital regulation, in which banks are obliged to hold a level of equity capital that corresponds to the riskiness of their activities.³

Although the regulator should stand for the stability of the banking system, it also needs to take into account the efficiency of the industry. More specifically, higher competition may improve the efficiency of the banking industry and this could be good for stability, yet, in the extreme with cut-throat competition it may possibly lead to bank failures. Older studies argue that higher competition induces banks to behave more risky, and creates instability (see Keeley (1990)). Although these studies emphasize the potential negative impact of competition, recent studies are more positive (see Vives (2001a) and Boyd and De Nicolo (2005)). The question that emerges here is the following: *how does competition impact bank behavior and, in particular, can competition hamper the fundamental functions that banks perform?*

In addition, fierce competition between banks (domestic or foreign entrants) may also make stability-oriented bank regulation work differently than expected. In particular, I ask the question, *how do competition and capital regulation interact?*

²Only a few explanations have been proposed. Calomiris and Kahn (1991) argue that demand deposits exert pressure on banks to behave prudently. Diamond and Rajan (2001) show that demand deposits give power to the bank to prevent borrowers from renegotiating their contracts. Berlin and Mester (1999) argue that core depositors respond less to a potential change in the interest rate. Therefore, banks more heavily funded with core deposits can smooth loan rates more and better insulate borrowers against exogenous credit shocks. See my analysis in Chapter 8.

³An example of intrusive regulation was the Glass-Steagall Act in the U.S. that kept investment banking and commercial banking separated. See Boot, Milbourn, and Deželan (2001) on the distinction between direct and indirect regulation.

1.2 Analytical Concepts

I analyze these issues using models that build on information economics⁴ and specifically game theory.⁵ The concepts of information economics are widely used in financial intermediation literature.⁶ In the most common situation, a principal hires an agent to perform a certain task. Contracting between the principal and agent is complex because of asymmetric information (i.e. hidden action or type). In the models that I use, borrowers may have an informational advantage over their bank, but also the bank may have proprietary information about its skills that its depositors and/or the regulator may not have. Agents may then act strategically and use information at their own advantage to extract rents. Anticipating this, the principal tries to mitigate the incentive problems and conflicts of interest that the information asymmetries may induce. This then boils down to the design of contracts and regulation.

I will analyze simple models that contain the deposit taking and lending operations of a bank using game theoretic tools. The Nash equilibrium concept is used extensively. I also use the framework of contemporary contract theory, which analyzes contracting between multiple principals and agents.⁷

Another important theme that appears in the analytical models throughout this dissertation is the notion of competition. I use several models to describe different forms of competition. Although pure price competition à la Bertrand is a useful starting point, banks usually operate in a less than perfectly competitive environment. This may for example be due to the presence of switching costs that borrowers incur when switching between banks. In Chapter 3, I use a simple search model in which borrowers search for competitive offers and may find them only with a certain probability.⁸ In Chapter 5, I use a spatial model in which borrowers may “travel” to a competing bank to receive a competitive offer; in doing so, they incur transportation costs.⁹

I combine these models of competition with heterogeneity in bank quality. Heterogeneity induces shifts in market share from low quality to high quality players, a positive aspect of competition that has frequently been neglected in the banking literature.¹⁰ Heterogeneity

⁴The literature on information economics starts with Akerlof’s (1970) lemon problem and the signalling model of Spence (1973). For a comprehensive recent treatise see Bolton and Dewatripont (2005).

⁵Seminal contributions that have spurred developments in game theory include von Neumann and Morgenstern (1944) and Nash (1950). For a review of this field, see Fudenberg and Tirole (1991) and Vega-Redondo (2003).

⁶Early contributions in financial intermediation theory include Leland and Pyle (1977), Diamond (1984) and Ramakrishnan and Thakor (1984). For overviews, see Bhattacharya and Thakor (1993) and Freixas and Rochet (1999).

⁷See Bizer and DeMarzo (1992), McAfee and Schwartz (1994), Segal (1999) and Prat and Rustichini (2003) for different models of multi-agent multi-principal contracting.

⁸Important contributions to the search literature include Diamond (1971) and Stiglitz (1987).

⁹The spatial literature starts with Hotelling (1929). Salop (1979) presents a circular model of spatial competition with uniform pricing. I use a spatial model of perfect price discrimination as developed also in Thisse and Vives (1988). This better applies to the competitive environment in banking; see also Degryse and Ongena (2005).

¹⁰Exceptions that account for differences between banks are Kopecky and VanHoose (2006) and Sengupta

may come from inherent differences in skill, but could also come from an information advantage of the incumbent bank. The incumbent bank may have proprietary information about the quality of its borrowers. Both sources of heterogeneity will be used in this dissertation.

1.3 Outline of Dissertation

This dissertation consists of seven additional chapters. The core literature review is contained in Chapter 2. This chapter allows me to build a framework for further analysis and to position the main findings of the dissertation in the literature. Other chapters contain new theoretical contributions. I now give a brief overview of the various chapters and their main conclusions.

In Chapter 2 (“Foundations of Banking”), I present a unifying framework of banking in which banks both monitor their borrowers and provide liquidity to depositors. In this framework I review the role of several features of banks. I focus on banks’ monitoring incentives, which are particularly relevant for their role in lending. This asset-side perspective is quite prevalent in the banking literature, and is the main focus of this dissertation. I also analyze bank fragility issues that may lead to bank runs and regulatory resolutions designed to contain bank fragility. Moreover, I discuss the potential positive disciplining effect of (the threat of) fragility in mitigating moral hazard. In addition, this review chapter discusses rationales for capital regulation and for banks to voluntarily hold capital.

The main analysis of the dissertation starts in Chapter 3 (“Competition and Entry in Banking: Implications for Capital Regulation”). I assess how capital regulation interacts with the degree of competitiveness of the banking industry. The most striking result is that increasing costly capital requirements can lead to *more* entry into banking, essentially by reducing the competitive strength of lower quality banks. I show that an implication of this is that banks on average may want the regulator to impose a higher capital requirement on the industry than is socially optimal. I also show that competition improves the monitoring incentives of better quality banks and deteriorates the incentives of lower quality banks; and that precisely for those lower quality banks competition typically compromises the effectiveness of capital requirements.

Chapter 4 (“Regulation of a Competitive Banking System”) presents the policy implications of my analysis for optimal bank regulation. It seeks to highlight and answer some of the daunting challenges in the regulation of a highly competitive and rapidly changing banking system. Competition typically increases efficiency, yet, is traditionally considered a threat to stability. Recent research, however, argues that competition and stability could (sometimes) also go hand in hand. In this chapter, I discuss direct and indirect barriers to competition stemming from stability-oriented regulation. Despite the potential beneficial effects of competition, regulators should only cautiously liberalize their banking sectors. Liberalization, and the period of transformation that it implies, can induce opportunistic

(2007) Empirical evidence confirms the market shift effect. See Demsetz (1973) for evidence that competition spurs the growth of efficient players at the expense of less efficient ones.

behavior suggesting the need for caution. Moreover, competition might lower the effectiveness of existing regulatory tools. I also consider the efficiency and effectiveness of current regulatory practices in light of recent consolidation in the banking industry.

Chapter 5 (“Competition and Entry in a Spatial Model with Applications to Banking”) recasts the analysis of Chapter 3 in a spatial framework (see Hotelling (1929) and Salop (1979)) in which firms are heterogeneous in their cost of production. The key result is that intensifying competition by lowering transportation costs can augment expected profits and entry, essentially by shifting market share from high-cost to low-cost firms. It is shown that increasing the differences in firm costs augments firm profits, entry, and social welfare. Lowering the production costs of high-cost firms augments entry if competition is low (i.e., for high transportation costs) but hampers entry if competition is high (i.e., for low transportation costs). When specifically applied to banking, the results of the analysis show that *i*) deposit insurance may lead to less entry, *ii*) capital regulation may lead to more entry in banking, and *iii*) bailout policies may reduce bank profits and entry, even if they come at no additional cost for banks.

Chapter 6 (“Bank Foreign Entry and the Role of Bank Capital”) asks how capital regulation affects foreign entry. I first show that tighter capital regulation may lead to more foreign entry, which is reminiscent of the results in Chapter 3. I show that especially bad domestic banks may have incentives to merge to prevent entry of foreign banks. Interestingly, increasing capital requirements augments the merger incentives of banks. I then allow for discriminatory policies against foreign bank entry. In particular, I allow for higher capital requirements imposed only on foreign banks.

In the last two chapters, I analyze specific functions the banks perform. Chapter 7 (“Demand Deposits and Bank Monitoring”) provides a novel rationale for why banks combine lending and deposit taking. I show that demand deposits may commit banks to monitoring in an environment in which monitoring is most valuable for long-term projects. Demand deposits, contrary to straight short-term and long-term debt, help commit a bank not to overleverage itself and this commits the bank to monitoring. I show that banks prefer demand deposits if the cost of early liquidation of borrowers is intermediate and if bank monitoring is costly.

The last chapter, Chapter 8 (“The Maturity of Monitored Finance: Covenants and Insufficient Liquidation”), analyzes the characteristics of an optimal lending contract in a model in which a bank obtains proprietary information by monitoring its borrowers. Key to the analysis is that with short-term contracts the incumbent bank’s rent-seeking behavior will trigger competitive offers such that bad borrowers can also obtain financing and liquidation is insufficient. This happens if competition for borrowers is high and competition between banks is based on *simultaneous* offers. Using a long-term contract with covenants adds efficiency and leads to liquidation of more bad borrowers. This chapter shows that lower-risk borrowers use short-term contracts whereas higher-risk borrowers finance themselves with long-term contracts with covenants. As competition for borrowers increases and/or is

expected to increase in the future, long-term contracts with covenants become more attractive to borrowers. Moreover, the use of covenants and maturity of contracts are positively correlated with monitoring precision.