

## **OVERVIEW OF COMPETITION IN THE BANKING SECTOR**

**Gamze Danisman**

Bogazici University, Department of Management, Istanbul, Turkey

[gamze.danisman@boun.edu.tr](mailto:gamze.danisman@boun.edu.tr)

### **Abstract**

*Competition in banking is entirely different from other sectors of the economy due to the special function of banks in the financial system. The standard competition paradigm in favor of competition regarding cost minimization and allocative efficiency is not entirely valid for banking because many market failures distort the nature of competition and its outcomes. This paper presents an overview of competition in the banking sector for developed markets and its particular characteristics. The uniqueness and fragility of banks, business models in banking, competition paradigm in banking, and historical overview of competition in banking is discussed. Finally, the different measures of competition frequently used in the empirical literature on banking are introduced.*

*Keywords: Banking, Competition, Developed markets, Liberalization, Deregulation, Bank Fragility, Measures of Competition*

### **INTRODUCTION**

The banking sector is entirely different from other sectors of the economy due to its specific functions which make it prone to tight regulations, supervision, and public intervention. Banks are vulnerable to instability due to their special functions in the financial system. They intermediate between investors and borrowers by achieving a unique maturity transformation in their balance sheets. While bank panic runs and systemic crises create a source of bank instability from the liability side; risk-taking behavior of banks generates another source of instability from the asset side (Matutes & Vives, 2000; Carletti, 2008). The stability of banking industry is very crucial because any instability may spread by contagion to the whole economy by distorting the interbank lending market and credit availability, and ultimately can lead to recessions (Allen & Gale, 2000). The standard competition paradigm in favor of competition

regarding cost minimization and allocative efficiency is not entirely valid for banking because many market failures distort the nature of competition and its outcomes. The main market failures include asymmetric information, switching costs and networks in retail banking and two-sided competition in deposits and loans. The liberalization and deregulation process in developed markets after the 1970s has altered the focus of banks from gathering deposits and providing loans to conducting a diverse range of activities, such as asset management, underwriting equity and debt issues, securitization, and insurance, which brought a competitive environment (Vives, 2016). The competition was limited in banking from the 1930s to the 1970s. After the 1970s, the process of liberalization and deregulation has resulted in increased competition in banking arising from both inside and outside banking industry, mainly from nonbank financial intermediaries, market-based finance and from the recent competitors emerging as fin-tech companies.

This paper presents an overview of competition in the banking sector and its particular characteristics. The paper is structured in seven sections. The uniqueness and fragility of banks and business models in banking are discussed in Sections 2 and 3, respectively. Section 4 introduces competition paradigm in banking and Section 5 continues with historical overview of competition in banking. Section 6 presents the different measures of bank competition frequently used in the empirical literature, and finally Section 7 concludes.

## **THE UNIQUENESS AND FRAGILITY OF BANKS**

Typical functions of banks include intermediary services between lenders and borrowers by gathering deposits, providing loans, transaction and payment services and financing entrepreneurial projects. Banks are vulnerable to instability, mainly due to the unique maturity transformation they undertake in their balance sheets (Matutes & Vives, 2000; Carletti, 2008). They take on various risks through the qualitative asset transformation (QAT) in which the characteristics of a bank's assets are different in many terms from its liabilities (Bhattacharya & Thakor 1993).

Sources of bank instability originate from both the liability side and the asset side. Bank instability from the liability side occurs through bank runs and systemic crises. Banks provide demandable contracts to depositors that can be withdrawn in a fixed amount, and if such withdrawals exceed the total amount available to banks from short-term investments, then banks need to sell illiquid assets, potentially initiating a bank run (Bryant, 1980). Moreover, a systemic crisis may occur if the bank defaults spread to the whole economy, which can happen as a result of contagion effects. While contagious runs are the diffusion of a single bank run to other banks, domino effects result from difficulties of distressed banks spreading to other banks

through interbank market commitments and payment systems (Allen & Gale, 2000). Another channel of contagion is that a banking crisis may negatively affect the whole economy through the feedback effects between financial and real sectors with a credit crunch. When a substantial part of the financial system has problems, it may lead to systemic risk, which causes fragility in the whole economy because of the central function of financial institutions.

Instability from the asset side arises from excessive risk-taking. Agency theory implies that when the objectives of the principal and the agent do not match, the agent does not always act in line with the principal's expectations (Jensen & Meckling, 1976). While the agency problem occurs in all leveraged firms, banks are more prone to the problem due to the opacity of bank assets, making them vulnerable to misallocation of resources. Moreover, the allocation of bank debt among small and uninformed depositors prevents their effective monitoring, which in turn leads banks, subject to limited liability, to engage in risky behavior without being easily detected (Matutes & Vives, 2000; Carletti, 2008).

## **BUSINESS MODELS IN BANKING**

The liberalization and deregulation process in developed markets after the 1970s has altered the focus of banks from gathering deposits and providing loans to conducting a diverse range of activities. These activities include the provision of services to investors and firms such as asset management, underwriting equity and debt issues, securitization, consulting, and insurance and proprietary trading (Vives, 2016).<sup>1</sup> Instead of investing in branches, banks started investing in information technology, communication networks, and specialized human capital. The relative weight of trading increased in the bank's balance sheets, replacing traditional relationship banking.

Information technology brought securitization, which allowed transforming illiquid loans such as mortgages into tradable instruments, and banks were able to extend more credit to investors and spread credit risk to investors with different risk profiles. Meanwhile, through securitization, banks were able to reduce capital requirements by off-balance sheet financing (Brunnermeier, 2009; Acharya, Schnabl, & Suárez, 2013). Banks' incentives for risk-taking and the intensity of competition have increased as larger scale operations became available. For instance, some institutions took hidden tail risks through highly leveraged positions in securitized subprime mortgages, which led to extreme losses during the 2007-2009 financial crisis (Acharya, Cooley, Richardson, & Walter, 2010).

---

<sup>1</sup>Proprietary trading refers to banks trading for their profits instead of trading on behalf of their clients.

Liberalization and the more recent consolidation trend have also increased the size of the largest banks and differentiated their business models from the rest of banks. In particular, large banks' business models are characterized by lower risk-weighted capital, more non-interest income, a lower deposit share in the total liabilities, more market-based activities and more complex organizations (Laeven, Ratnovski, & Tong, 2014).

## **COMPETITION PARADIGM IN BANKING**

The standard competition paradigm in favor of competition regarding cost minimization and allocative efficiency is not entirely valid for banking because many market failures distort the nature of competition and its outcomes. The main market failures include asymmetric information, switching costs and networks in retail banking and two-sided competition in deposits and loans.

The first market failure in banking is asymmetric information between banks and potential borrowers during the process of providing loans. Broecker (1990) analyzes the effect of competition in the loan market and shows that the competition mechanism does not work properly for banks. When a bank increases its loan rate above those of its competitors, it increases its earnings. On the other hand, the quality of firms which apply for loans declines, reducing the bank's profits. Riordan (1993) shows that competition decreases the informativeness of signals that banks receive on the borrower's loan quality, which leads to decreased bank portfolio quality and financing of less efficient investment projects. Moreover, Gehrig (1998) shows that competition from new entries deteriorates bank portfolio qualities because banks then reduce their investment on improving the quality of the borrower screening tests.

Banks also gather information on borrowers through the course of a relationship which creates another informational asymmetry. When a borrower needs to reapply for a loan, he chooses the incumbent bank, which grants that bank an informational monopoly. The borrower does not exert adequate effort, and the expected return on the investment projects diminishes (Rajan, 1992). The presence of adverse selection through heterogeneous borrowers and the information acquisition through lending generate endogenous fixed costs, keep other banks out of the market, and limit competition (Dell'Ariccia, 2001).<sup>2</sup> While the literature on competition under asymmetric information does not directly address the consequences of bank stability, it provides initial perceptions on their relationship.

---

<sup>2</sup>Adverse selection arises due to an information asymmetry between borrowers and banks where borrowers may undertake risky projects, and banks might not be aware of these projects.

The second market failure inherent in banking and distorting competition outcomes is switching costs, which is a crucial source of bank market power and consists of costs incurred by consumers when switching from one bank to another (Vives, 2001). On the one hand, banks desire lower switching costs because new customers can easily apply to them. On the other hand, they do want higher switching costs to lock in customers and discourage them from changing their bank.

Another banking market failure that disrupts competition is network structures. Banks sharing Automatic Teller Machine (ATM) networks is an example of a strategic variable that influences competition. Matutes & Padilla (1994), using a two-period model, show that depositors have easier access to their deposits in a shared ATM network and banks, in turn, gain from offering lower deposit rates. On the other hand, an ATM network ensures that banks are substitutable and increases price rivalry when possibly higher rates are offered by a rival bank. Banks choose to share ATM networks when the ATM is used less frequently in transactions. Equilibrium occurs by either no sharing or partial sharing of ATM networks due to maintaining some differentiation. The possible threat of new entrants may further encourage banks to share their network to obtain a concentrated structure and monopoly prices (McAndrews & Rob, 1996). Similar findings are reached by Degryse (1996) in a context where the bank customers can use different types of remote access, such as telephone or postal services. Introducing remote access steals depositors from rival banks (stealing effect). On the other hand, the substitutability of banks is promoted (substitution effect), and which of these two effects dominates defines the equilibrium.

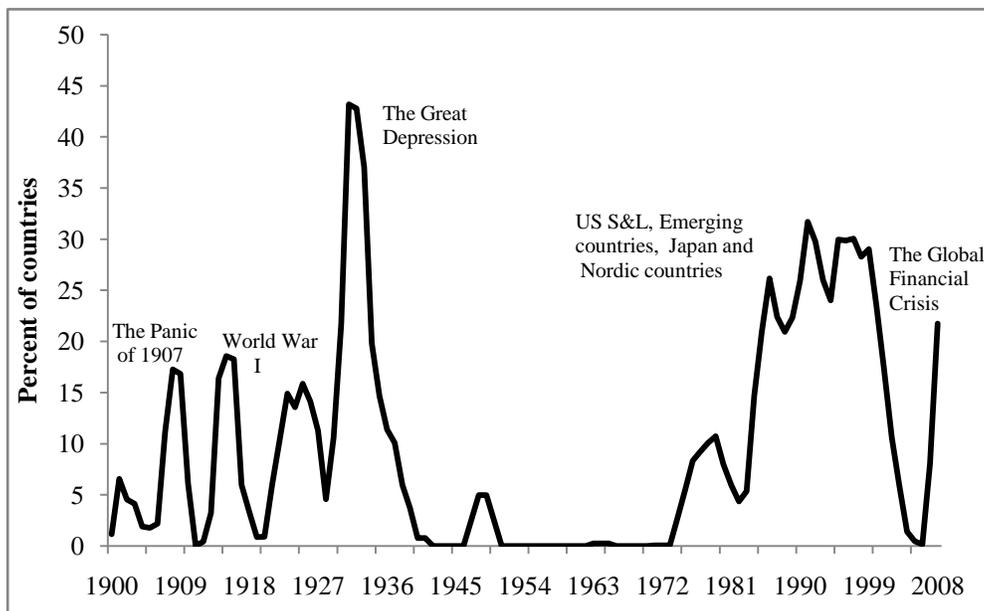
Banks compete in deposit markets to attract new depositors and also compete in loan markets to provide new loans to customers, which may lead to a final bias in competitive behavior. Yanelle (1997) shows that banks aim for gaining market power in one of these markets and offer noncompetitive prices in the other market.

## **HISTORICAL OVERVIEW OF COMPETITION IN BANKING**

Whether competition is good for the banking sector has been called into question for a long time. In Figure 1 the percentage of countries that experienced a banking crisis is displayed between 1900 and 2008 (Reinhart & Rogoff, 2008). As depicted in Figure 1, the recent history of the banking sector is divided into two distinct periods. A tightly regulated, interventionist and stable period from the 1940s to the 1970s with limited competition, followed by a period of liberalization, deregulation and greater instability, culminating with the 2007-2009 financial crisis (Vives, 2010). The competition was limited in banking from the 1930s to the 1970s, and public authorities preferred to deal with a concentrated banking sector and a collusive environment in a

range of countries. The argument was that competition narrows bank margins and increases incentives for risky behavior and destabilizes the system.

Figure 1. The proportion of countries with a banking crisis



Therefore, restrictive policies are conducted by regulators, among which are rate ceilings, activity limitations, and branching restrictions. The Glass-Steagall Act, initiated in 1933 in the US, inhibited performing commercial, investment and insurance activities under one single entity. After the 1970s, competition started to be favored with the belief that competition enhances efficiency, and financial liberalization and deregulation emerged (Vives, 2016). The process of liberalization and deregulation was mainly initiated in the US with the termination of deposit rate regulations by the Depository Institutions Deregulation and Monetary Control Act in 1980. Then the process continued with the removal of geographical expansion restrictions by the Riegle-Neal Act in 1994, and the Gramm-Leach-Bliley Act in 1999 (Kroszner & Strahan, 2014).<sup>3</sup>

The liberalization process in Europe included the “Big Bang” deregulation of 1986 in the United Kingdom (UK) and the establishment of the European Union (EU) in 1999 (Vives, 2016). The process accelerated with advances in information and communication technology (ICT), which boosted productivity and globalization advance through international capital movements, reductions in transportation costs and barriers to trade.

<sup>3</sup>Gramm-Leach-Bliley Act aimed to modernize the banking industry by repealing Glass-Steagall Act that inhibited performing commercial, investment and insurance activities under one single entity.

The liberalization and deregulation process increased competition for banks from both inside and outside the banking industry, mainly from non-bank financial intermediaries and market-based finance. Borrowers have access to funding directly from the market, which deteriorates the intermediary role of traditional banking, and non-bank financial intermediaries and shadow banking capture market share from banks.<sup>4</sup> Moreover, with more hard information available on borrowers in the market, banks face diminished market power, and borrowers can more easily switch from one bank to another bank or non-bank lending companies without facing too much switching costs (Vives, 2016).

Recent competitors for banks have emerged as fin-tech companies, which challenge the traditional banking business and put competitive pressure on banks by offering services such as transaction payments, lending, insurance and financial advising. According to the “Special Report on International Banking,” published in *The Economist* on May 9, 2015, few of them seek to get any share of the core business from taking deposits, but each introduces a superior and cheaper service in its specialist field. Even though banks have the biggest share in the market for transaction payments, newer innovations are brought by non-bank companies such as PayPal, Apple Pay and Google Wallet, which allow people to pay in shops through their phones without any need to open a bank account. Lending is another area which attracts many non-bank players with peer-to-peer (P2P) lending platforms, which match people in need of money with lenders, individuals and companies looking for investment. Moreover, financial advisory business from investment professionals is also challenged by “robo-advisors,” which generate investment advice based upon the historical data they have on customers and which is offered at a lower price (Vives, 2016).

Banks expanded into new and risky lines of business and new locations due to increased competitive pressure, which has resulted in excessive risk-taking, individual bank defaults, and crises occurred in various countries (such as the US Savings and Loan crisis in the 1980s, the Japan crisis in the 1990s, Scandinavia in the early 1990s and the crisis in Spain in the 1980s). Excessive competition and inadequate regulations were argued to have been primary causes of the failures (Keeley, 1990; Demirguc-Kunt & Detragiache, 2005).

The increase in competitive pressure has brought a relatively recent trend of bank consolidation to gain market power and reap economies of scale, increasing the size of banks. Large banks are characterized by diversification economies, high leverage, and more unstable funding. TBTF subsidies from governments and regulators preferring to deal with concentrated banking sectors are other reasons for the increase in bank size (Laeven & Levine, 2007). The

---

<sup>4</sup>Shadow banking refers to financial intermediaries that act like banks but are not regulated as banks. Examples include investment banks, structured investment vehicles (SIVs), hedge funds and money market funds.

number of banks started falling in the US, both before and after the 2007-2009 crisis, by 22% from 1997 to 2007 and 17% from 2007 to 2012. The same trend applies to Europe with 29% of a decrease in the number of banks from 1997 to 2007 and 6% of a decrease from 2007 to 2012. The 2007-2009 crisis further increased the consolidation trend in Europe, but instead stabilized it in the US (Vives, 2016).

## MEASURES OF COMPETITION IN BANKING

This section briefly introduces the most commonly used measures of competition. The structural and non-structural measures form the two main categories of measures for competition that are used in the empirical studies.

The structural measures rest on the Structure-Conduct-Performance (SCP) from industrial organization, which links market structures with performances. It argues that market structure influences the way how firms behave and how they perform. Therefore, the paradigm depicts that structure influences performance (Claessens, 2009). Market structure measures are used for the structural approach as a proxy for competition, which includes the ratios for concentration, the count of banks in a country and the Herfindahl-Hirschman Index (HHI). The count of banks just considers the number of banks in a market. Thek-bank concentration ratio and HHI are briefly presented below.

The sum of market shares of the k largest banks is considered while calculating the k-bank concentration ratio (CRk).  $\sum_{i=1}^k s_i$ , where the market share of the i-th bank and the number of banks is denoted by  $s_i$  and k, respectively. The choice of k is somewhat arbitrary but is usually between 3 and 5. Concentration ratios assign the same weight to each bank in the market and do not consider the effect of small-sized banks. The index ranges from 0 to 1. It reaches zero for infinitely many numbers of banks of the same size and approaches one if the banks considered in the calculation generate the entire banking industry (Bikker & Haaf, 2002).

The squares of market shares of banks are considered while computing the Herfindahl-Hirschman index (HHI):  $\sum_{i=1}^n s_i^2$  where the square of the market share of i-th bank and the count of banks are denoted by  $s_i^2$  and n, respectively. The index varies from  $1/n$  to 1, and the lowest value is reached when the market is comprised of n equally-sized banks (Bikker & Haaf, 2002). Since this index accounts for all sizes of banks, including smaller banks; it is also known as the full-information index.

The structural approach through SCP paradigm is criticized in the literature for three main reasons (Berger, Demirguc-Kunt, Levine, & Haubrich, 2004; Claessens & Laeven, 2004; Claessens, 2009). First, the market structure may not be exogenous; instead, it might be a

result of firm behavior. Second, competition in an industry may be affected by factors other than concentration, such as ownership structure, entry or exit barriers, and activity restrictions. Third, the firm performance may be influenced by factors other than competition, such as the country's macroeconomic context and the legal system.

Competition is a crucial element to achieve static and dynamic efficiency in banking, and empirical evidence indicates that poor use of inputs in banks leads to significant inefficiencies. Many banks function below their technical capabilities (Demirguc-Kunt & Huizinga, 1999), and it is, therefore, essential to use measures of competition which compute whether financial institutions act efficiently from a cost point of view (Claessens & Klingebiel, 2001). Moreover, it is crucial to consider competition from all banking and non-banking financial intermediation. A competitive environment does not necessarily indicate a higher number of firms. When contestability is present, a concentrated system can indeed be competitive.<sup>5</sup> For instance, as indicated in Claessens & Klingebiel (2001), many European and Canadian financial systems have concentrated banking systems, with the three largest banks market share often exceeding 30%, but they are counted as quite competitive. Developing countries, on the other hand, are not regarded as competitive as the developed ones, yet their concentration level of the largest banks is somewhat higher. The main difference between these two groups is that developed countries include more competition through different non-bank forms of financial intermediation. Therefore, increased competition and more consolidation need not be inconsistent.

The US has confronted a significant number of mergers in the last decades, without consolidation resulting in a reduction in the level of competition, but originating from possible improvements in efficiency, risk diversification, and the need for economies of scale and scope (Berger, Demsetz, & Strahan 1999). The US banking system is characterized by many small banks, and the consolidation trend may reflect an adjustment from a restrained state of banking. The EU Single-Market Program also encountered both considerable consolidations in banking systems within countries as well as increased competition (Vives, 1998).

The recent literature further emphasizes that concentration and competition are not correlated in banking, and they underline the necessity to consider bank-level competition measures (Berger et al., 2004, Schaeck et al., 2009). Moreover, they state that relying on country-level concentration ratios as a proxy of competition can lead to biased findings. As a response to these criticisms on structural measures, new measures of competition are introduced, like the H-Statistics, Lerner Index and Boone Indicator, which instead measure banks' conduct directly regarding marginal revenues and costs.

---

<sup>5</sup>In a contestable market, entry and exit are costless. Even if there is a monopoly, potential competition with new entries and exits disciplines the behavior of existing players.

H-statistic, developed by Panzar & Rosse in 1987, considers how a variation in the cost of input prices affects equilibrium revenues earned by banks. In a perfectly competitive market, marginal costs and revenues rise by the same amounts, but in a monopolistic market, the same increase in input prices leads to a lesser extent on an increase in revenues. A reduced form of the equation of revenues is considered for the calculation of the H-statistic:

$$\ln(TR_{it}) = \alpha + \sum_{k=1}^n \beta_k \ln(W_{k,it}) + \sum_{j=1}^n \gamma_j \ln(CF_{j,it}) + \varepsilon_{it} \quad (2.1)$$

Where,  $i$  and  $t$  denote bank and time.  $TR_{it}$  is total revenue,  $W_{k,it}$  stands for the  $k$ -th input factor, and  $CF_{j,it}$  shows other firm-specific control variables (Bikker et al., 2012). The H-statistic is then equal to  $\sum_{k=1}^n \beta_k$ , which is the sum of the percentage changes in gross revenue concerning inputs. If H-statistic  $\leq 0$ , a monopoly is obtained, and if  $0 < \text{H-statistic} < 1$ , monopolistic competition is reached. Finally, H-statistic=1 indicates perfect competition. For the profit-maximizing condition to hold, H-statistic assumes equilibrium in the market, which is the main drawback because equilibrium is quite rare. Moreover, it does not consider the differences between banks, such as size, product, and geographic differentiation. However, it is still commonly used in empirical research because it measures bank behavior directly.

The level of bank market power is calculated by the Lerner index and how much the marginal price is increased above the marginal cost is captured. It is a proxy for current and future profits and calculated as below:

$$\text{Lerner}_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \quad (2.2)$$

The indices  $i$  and  $t$  denote bank and time, and higher values denote more market power and less competition.  $P_{it}$  indicates the price of bank activities, and  $MC_{it}$  shows marginal costs which are generated from translog cost functions. The Lerner index is very beneficial because it is at the bank level and provides a better way to distinguish among different banking products. However, one drawback is that the information on prices and marginal costs can be difficult to collect.

The Boone indicator is introduced by Boone (2008) to measure the degree of competition. It is assumed that under competition more efficient banks perform better and steal market share from the rest of the banks. The Boone indicator is calculated using the following equation:

$$\ln(MS_{st}) = \alpha + \sum_{t=1, \dots, T-1} \beta_t D_t * \ln(MC_{st}) + \sum_{t=1, \dots, T-1} \theta_t D_t + \varepsilon_{st} \quad (2.3)$$

Where, market shares and marginal costs are indicated by MS and MC, respectively. D stands for time dummies, and the error term is denoted by  $\varepsilon_{st}$ . The Boone indicator is indicated by the coefficient  $\beta$  which can be interpreted as a profit-elasticity index. A larger negative value of  $\beta$  indicates more competition in the market.

## CONCLUSION

The liberalization and deregulation process in developed markets after the 1970s resulted in increased competition in the banking sector. Banks expanded into new and risky lines of business and new locations due to increased competitive pressure, which has resulted in individual bank defaults and crises in various countries. The standard competition paradigm in favor of competition regarding cost minimization and allocative efficiency does not hold for banking due to the market failures such as asymmetric information, switching costs and networks in retail banking and two-sided competition in deposits and loans. This paper reviews competition paradigm in the banking sector for developed markets and its particular characteristics. The uniqueness and fragility of banks and business models in banking are discussed. Moreover, competition paradigm in banking and historical overview of competition in banking is presented. Finally, the different measures of competition frequently used in the empirical literature on banking are introduced. Future research on this area could further explore the competitive pressure arising from the fin-tech companies which challenge the traditional banking by offering a variety of products bank do offer such as transaction payments, lending, insurance and financial advising. Moreover, artificial intelligence is expected to bring more competitive pressure on traditional banking which emerges as another area for future research.

## ACKNOWLEDGEMENT

This study is part of the Ph.D. dissertation (titled as 'Bank Competition, Regulations, and Stability in Developed Countries') of the Author, conducted in the Management Department of Bogazici University, Istanbul, Turkey, in 2018. Author would like to thank Dr. Pelin Demirel for providing the dataset for this study.

## REFERENCES

- Acharya, V. V., Cooley, T., Richardson, M., & Walter, I. (2010). Manufacturing tail risk: A perspective on the financial crisis of 2007–2009. *Foundations and Trends® in Finance*, 4(4), 247–325.
- Acharya, V. V., Schnabl, P., & Suarez, G. (2013). Securitization without risk transfer. *Journal of Financial Economics*, 107(3), 515–536.
- Allen, F. & Gale, D. (2000). Financial contagion. *Journal of Political Economy*, 108(1), 1–33.
- Berger, A.N, Demsetz, R.S., & Strahan, P.E. (1999). The consolidation of the financial services industry: Causes, consequences, and implications for the future. *Journal of Banking and Finance*, 23(2), 135–194.

- Berger, A.N., Demircuc-Kunt, A., Levine, R., & Haubrich, J.G. (2004). Bank concentration and competition: an evolution in the making. *Journal of Money, Credit and Banking*, 36(3), 433-451.
- Bhattacharya, S. & Thakor, A.V. (1993). Contemporary banking theory. *Journal of Financial Intermediation*, 3(1), 2-50.
- Bikker, J.A. & Haaf, K. (2002). Measures of competition and concentration in the banking industry: a review of the literature. *Economic & Financial Modelling*, 9(2), 53-98.
- Bikker, J.A., Shaffer, S., & Spierdijk, L. (2012). Assessing competition with the Panzar-Rosse model: the role of scale, costs, and equilibrium. *The Review of Economics & Statistics*, 94(4), 1-70.
- Boone, J. (2008). A new way to measure competition. *The Economic Journal*, 118(531), 1245-1261.
- Broecker, T. (1990). Credit-worthiness tests and interbank competition. *Econometrica*, 58(2), 429-452.
- Brunnermeier, M. K. (2009). Deciphering the liquidity and credit crunch 2007-2008. *Journal of Economic Perspectives*, 23(1): 77-100.
- Bryant, J. (1980). A model of reserves, bank runs, and deposit insurance. *Journal of Banking and Finance*, 4(4): 335-344.
- Carletti, E. (2008). Competition and regulation in banking. In Boot, A.W.A., & Thakor, A.V. (Eds.), *Handbook of Financial Intermediation* (pp. 449-482). North Holland: Elsevier.
- Claessens, S. & Klingebiel, D. (2001). Competition and scope of activities in financial services. *The World Bank Research Observer*, 16(1), 19-40.
- Claessens, S. & Laeven, L. (2004). What drives bank competition? Some international evidence. *Journal of Money, Credit, and Banking*, 36(3), 563-583.
- Claessens, S. (2009). Competition in the financial sector: overview of competition policies. *The World Bank Research Observer*, 24(1), 83-118.
- Degryse, H. (1996). On the interaction between vertical and horizontal product differentiation: An application to banking. *The Journal of Industrial Economics*, 44(2), 169-186.
- Dell'Ariccia, G. (2001). Asymmetric information and the structure of the banking industry. *European Economic Review*, 45(10), 1957-1980.
- Demircuc-Kunt, A. & Detragiache, E. (2005). Cross-country empirical studies of systemic bank distress: A survey. *National Institute Economic Review*, 192(1), 68-83.
- Demircuc-Kunt, A. & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, 13(2), 379-408.
- European Economic Review*, 38(5), 1113-1138.
- Gehrig, T. (1998). Screening, cross-border banking and the allocation of credit. *Research in Economics*, 52(4), 387-407.
- Jensen, M. C. & Meckling, W. H. (1976). Theory of the firm: Managerial behaviour, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Keeley, M.C. (1990). Deposit insurance, risk, and market power in banking. *The American Economic Review*, 80(5), 1183-1200.
- Kroszner, R., & Strahan, P. (2014). Regulation and deregulation of the US banking industry: Causes, consequences and implications for the future. In Rose, N.L.(Eds.) *Economic Regulation and its Reform: What Have We Learned?* (pp. 485-543). Chicago: University of Chicago Press.
- Laeven L., Ratnovski, L., & Tong, H. (2014). Bank size and systemic risk (Staff Discussion Note 14/4). Washington, DC: International Monetary Fund.
- Laeven, L. & Levine R. (2007). Is there a diversification discount in financial conglomerates? *Journal of Financial Economics*, 85(2), 331-367.
- Matutes, C. & Padilla, A.J. (1994). Shared ATM networks and banking competition.
- Matutes, C. & Vives, X. (2000). Imperfect competition, risk-taking, and regulation in banking. *European Economic Review*, 44(1), 1-34.
- McAndrews, J.J. & Rob, R. (1996). Shared ownership and pricing of a network switch. *International Journal of Industrial Organization*, 14(6), 727-745.

- Panzar, J.C. & Rosse, J.N. (1987). Testing for monopoly equilibrium. *The Journal of Industrial Economics*, 35(4), 443-456.
- Rajan, R. G. (1992). Insiders and outsiders: The choice between informed and arm's length debt. *The Journal of Finance*, 47(4), 1367-1400.
- Reinhart, C. & Rogoff, K. (2008). Banking crises: An equal opportunity menace (Working Paper No. 14587). NBER.
- Riordan, M. (1993). Competition and bank performance: A theoretical perspective. In Mayer C. and Vives X. (Eds.), *Capital markets and financial intermediation*. Cambridge, UK: Cambridge University Press.
- Schaeck, K., Cihak, M., & Wolfe, S. (2009). Are competitive banking systems more stable? *Journal of Money, Credit and Banking*, 41(4), 711-734.
- Special Report on International Banking. (2015, May 9). *The Economist*, p. 1–18.
- Vives, X. (1998). Competition and regulation in European Banking. In Claessens, S. & Jansen M. (Eds.), *Internationalization and liberalization of financial services: Issues and lessons for developing countries*. Boston: Kluwer Academic Press.
- Vives, X. (2001). Competition in the changing world of banking. *Oxford Review of Economic Policy*, 17(4), 535-547.
- Vives, X. (2010). Competition and Stability in Banking (SSRN Scholarly Paper No. ID 1610086). Rochester, NY: Social Science Research Network.
- Vives, X. (2016). Competition and stability in banking: The role of regulation and competition policy. Princeton, NJ: Princeton University Press.
- Yanelle, M. O. (1997). Banking competition and market efficiency. *The Review of Economic Studies*, 64(2), 215–239.