The Changing Geography of Banking and Finance

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In memory of the beloved Francesca Alessandrini.

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Chapter 1
The Changing Geography of Banking and Finance: The Main Issues

Pietro Alessandrini, Michele Fratianni, and Alberto Zazzaro

1.1 Introduction

Technological progress, deregulation, and consolidation have deeply changed the geography of the banking industry in many countries. In particular, two contrasting trends have emerged from the intense integration and consolidation process that have swept the European and US banking industry in the 1990s: the geographical diffusion of banking structures and instruments and the geographical concentration of banking power in few financial centers within each country. The first trend emerged as a result of the easing of geographical restrictions on banking activity, the opening of new branches, and the expansion of impersonal methods to conduct business, such as Internet-banking, home-banking, or phone-banking, which contributed to greatly reduce the *operational distance* that separates banks from their clientele. The second came as the consequence of the wave of mergers and acquisitions that have reduced the number of banks and created large national and multinational bank holding companies. The ultimate outcome has been a geographical concentration of banking decision centers and strategic functions, leading to an increase in the *functional distance* that separates the decision center of a bank from its operational branches. The conflicting movements in *operational* and *functional distances* not only have left a mark on market structure, financial integration, competition, and regulation of the banking industry but also have induced a transformation in organizational structures, lending behavior, and relationships between banks and firms. Such developments have not been limited to the national level; cross-border activities and the globalization of finance have also transformed financial centers.

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The objective of this book is twofold. The first is to survey the great research effort that, during the last ten years, has been directed in analyzing the geography of the banking industry and the way changing distances have impacted on banks' behavior. The second is to push the frontier of knowledge and, thus, provide new insights and empirical evidence on the changing geography of banking and finance. In addition to this chapter, the volume has 12 chapters organized in three parts. Part I deals with distance and banks′ organizational structure, Part II with borders and market structure, and Part III with regulation and financial centers.

1.2 The Contributions

The five chapters in Part I provide a current view of recent changes in the territorial distribution of banking and their impact on firm lending. The key insight that emerges from this reading is that as distance changes, bank–firm relationships and loan conditions also change. Distance is particularly relevant for small and medium-size firms (SMEs) that enjoy a less diversified financial structure and are more dependent on bank lending than large firms. Proximity to bank offices is still critical to SMEs, even in the presence of technological innovations and consolidation of banking structures.

In Chapter 2, Gregory Udell examines the principal aspects of the academic literature regarding the determinants of the lengthening of the distance between banks and borrowers, the distinction between soft and hard information, the distinction between relationship and transactions lending, and the impact of these factors on SME lending. Technological innovations and changes in bank organizational structure are the two main drivers of the evolution of distance in credit markets. The new information technology reduces the economic relevance of distance, and bank consolidation imposes changes in distance. In their spatial interaction, these two phenomena play a complementary role: the establishment of larger bank conglomerates increases the distance that separates borrowers from lenders, while the adoption of technological innovations facilitates the transmission of information. Information technology fosters more bank concentration and concentrated banks demand more information technology. But, the information used in bank lending is not homogeneous, and much of it is not widely available. Udell emphasizes the centrality of the distinction between soft and hard information. This dichotomy opens the discussion to interrelated issues like different degrees of information transmitting power, diverging impacts of distance and proximity, the distinction between relationship and transactions lending, and different banks' organizational structures.

On the one hand, relationship lending to SMEs requires soft information, non-generic contacts, lender-borrower proximity, and decentralized banking organizations. On the other hand, transactions lending to SMEs – even opaque SMEs – utilizes hard information and generic contacts. Because hard information can be easily transmitted, transactions lending does appear to require borrower proximity

or a decentralized banking organization. However, Udell suggests that the empirical evidence in support of these implications is still inadequate. Key unresolved issues include the impact of technological innovations on specific lending technologies and on the relationship between distance and lending. The lack of data on individual lending technologies hampers empirical analysis of these issues, including whether there exists a substitution effect of hard information for soft information based on changes in the relative costs of relationship lending and of transactions lending. The longer distance between banks and borrowers appears to have increased the relative importance of transactions lending; but it is not clear if and to what extent this increase has been driven by a substitution of hard information for soft information. It is possible that while transactions lending has increased, relationship lending has remained unaffected.

The empirical evidence of the effects of banking consolidation on SME lending is somewhat more robust. The focus is on the difficulty that more complex organizational forms have in generating soft information about small firm creditworthiness. Bank size is commonly used as a proxy of organizational complexity. The results generally confirm that larger banks have a lower propensity to lend to small businesses, and their loan underwriting places less emphasis on soft information. Alternatively, organizational complexity can be measured by the distance that separates banks' branches from their headquarters. In this approach, spatial distribution of a bank is a proxy of its organizational complexity. As shown in Chapter 5 of the volume, the results obtained from this line of research support the theoretical hypothesis that banking consolidation could dampen small businesses lending. Udell concludes that relationship lending is not likely to be entirely displaced by transactions lending, financial innovation notwithstanding. There is likely a lower limit to the reduction of relationship lending that will determine the division of labor in the credit market between small community banks that deliver relationship lending and large banking conglomerates that deliver transactions lending.

In Chapter 3, Kenneth Brevoort and John Wolken ask the question whether distance matters in banking. The question is not rhetorical. An often-cited book by Richard O'Brien (1992) makes the case that financial globalization, spurred among other things by new information technology, spells the "end of geography"; see also Chapter 12 by Michele Fratianni. A growing literature has analyzed the merit of this proposition. Our authors bring evidence to bear on the physical separation between US banks and their customers. Over the last decade, this distance has increased because transaction and information costs borne by distant credit institutions in dealing with local borrowers have declined as a result of technological innovations, such as online banking, automated teller machines, and automated credit scoring systems. It is not surprising that distance has become somewhat less relevant on average. But less relevance does not translate into irrelevance. The evidence suggests strongly otherwise. To begin with, half of banking services to small enterprises are supplied by credit institutions located within five miles of the firms' headquarters. Furthermore, geographic proximity varies across types of institutions and types of services. While it is true, for US data, that average distance between lender and borrower

has increased, this effect is not uniform for the entire distribution of borrowers. For example, Brevoort and Wolken report that "for some loans and financial management services, and for some nondepository sources, distances actually declined between 1998 and 2003." The importance of physical proximity of small business to lenders is a recurrent theme in the book. One reason is that lending to small business requires more qualitative and more costly information. There may be other reasons, but theory is behind on this score.

In Chapter 4, Geraldo Cerqueiro, Hans Degryse, and Steven Ongena provide more insights on the theoretical and empirical literature on the effects of both the physical bank–firm distance and the bank's organizational structure on lending decisions. These authors focus on spatial models of loan pricing and credit rationing a bank adopts to discriminate among borrowers. The decisive factors are two distances from the location of the borrower: the one relative to the lending bank office and the distance relative to the location of other potential bank competitors. Accordingly, the lending bank can differentiate its market power strategy applying higher loan rates the closer are borrowers and the more distant are competitors. Transportation costs and information asymmetries are the driving explanatory variables. A bank can extract locational rents from closer borrowers, taking advantage of lower transportation costs. Moreover, bank–firm proximity offers the advantages of more informed relationship. On the contrary, higher transportation costs and lower quality of information on the borrower diminish the market power of the distant competing bank. In this theoretical scheme, the spatial loan pricing should benefit distant borrowers. But, on the other hand, increased distance between borrower and lender should increase the probability of credit rationing. In reviewing the empirical literature on these issues, the authors concur with the inadequacy of data underscored in Chapter 2. As a consequence, many questions remain unanswered, even though intuitively they appear clearly stated in theory.

The empirical evidence confirms spatial loan price discrimination. But, there are unresolved problems of identification of the effects of transportation costs and information asymmetries. Moreover, it is still not clear that geographical credit rationing exists. Cerqiero, Degryse, and Ongena estimate the effect of bank–firm distance on collateral requirements. Their purpose is to investigate the underlying mechanism of spatial loan pricing. The results are economically and statistically modest.

The second part of chapter 4 is dedicated to the relation between the organizational structure of the bank and its lending strategy. The debate on relationship versus transactional lending, linked to soft versus hard information and to centralized versus decentralized organizations, is recalled, in line with the discussion presented in the previous chapter of the volume. In this debate, our authors remark that little attention has been paid to the competitive structure of credit markets and its influence on the lending to local firms. The geographical distribution of branches and the bank's ability to apply discriminatory lending conditions are bounded not only by its own organizational structure but also by organizational choices made by the bank's rivals. Again, problems arise empirically. It is neither clear what determinants play a role in the progressive loss of information quality across hierarchies nor

is it clearly confirmed that small, decentralized banks have a comparative advantage in relationship lending. If this advantage exists, it appears to be relatively modest. Cerquiero, Degryse, and Ongena conclude that the complex relations between distance, bank's organizational structure, and lending conditions need further research to be empirically confirmed.

Chapter 5, by Pietro Alessandrini, Andrea Presbitero, and Alberto Zazzaro, contributes to the empirical research effort on the impact of banking organizational complexity urged in Chapters 2 and 4. The problem is to determine which type of distance matters in banking. In particular, the question is what type of distance is most relevant at different levels of hierarchy. For this purpose, the authors define two different kinds of distances, operational distance and functional distance. The first one measures the average distance of the bank office from its customers. Undoubtedly, the distance of bank branches from their customers is quite important in the bank–firm relation; and a great deal of effort has been spent on this issue in the empirical literature with unresolved difficulties discussed by Udell in Chapter 2. However, it is evident that operational distance could not fully capture the internal complexity of the organization underlying banks' branches. It is in the back-office structure of hierarchical levels that the transmission of soft information, collected by direct contact of local branches with small businesses, can find possible sources of disincentives and bureaucratic frictions. This crucial point has received less attention in the literature. In the absence of detailed information on banks' organizational structure, one empirical strategy has been to use bank size as a proxy of the number of intra-bank hierarchical levels, with the implicit assumption that there is a direct correlation between the two variables. Alessandrini, Presbitero, and Zazzaro suggest a different approach based on what they label functional distance, that is, the distance of the local branch, where information on borrowers is collected, from its headquarters or, if a group, the distance from the leading bank, where lending decisions are made. The unstated assumption is that organizational frictions are related to geographical dispersion of branches and subsidiaries. Bank size being equal, if the geographical distance between center and periphery increases, different aspects become more relevant for lending relationships, such as the costs of monitoring, reliability of communication and trust between central managers and local officers, and, not to be underplayed, cultural and social differences between territories. In this chapter, the authors combine both empirical strategies. They estimate the effects of the two indicators of the bank's organizational complexity – bank size and functional distance – on the likelihood of innovations by firms and on financing constraints. The objective is to determine what source of organizational friction has the greatest influence on innovation and on rationing credit to SMEs. The econometric exercise is applied to a large data set consisting of micro data on the Italian manufacturing level of Italian provinces. The results confirm the hypothesis that functional distance has a negative impact on small firms, reducing their propensity to innovate and increasing the probability to be credit rationed. These adverse effects are independent of the operational proximity of bank offices and of the degree of competition in the credit market. The impact of bank size is statistically less significant and much weaker.

In Chapter 6, Guido de Blasio studies empirically the relationship between new information technology and bank–customer distance. The expected outcome is a drastic reduction of the importance of distance, since e-banking offers clear advantages for geographically remote consumers; see also Chapter 3. Internet customers, in relation to traditional customers, can save on transportation costs and on search costs. It follows that distance is an important determinant of e-banking. More precisely, a positive relation between distance to the closest bank branch and the use of e-banking should emerge. Of course, this result is conditioned by the customer's specific factors, such as income, education, and age. Moreover, the use of e-banking is negatively affected by customers' preference for face-to-face interactions with bank officers, independent of distance. de Blasio tests empirically the likelihood of navigating the Internet and the likelihood of using remote banking. In addition to controlling for the mentioned variables, the main determinant is the city size that proxies for the rate of urbanization where customers are localized. The tests are performed on household data collected by the Bank of Italy that includes sections on information technology and banking services. Surprisingly, the empirical findings do not confirm that less urbanized consumers use e-banking more intensively than more urbanized consumers. It appears that distance remains important for banks' customers. The author cautiously reminds us that the sample is from 2002, when the full potential of e-banking had not been fully exploited. On the other hand, the results show that, compared to urbanized customers, geographically remote customers are more frequently supplied with a loan by their own bank and give more weight to personal relationships. Overall, these findings are consistent with theories that stress that the difficulty to communicate soft information about lending practices to families and small businesses is a serious impediment to the spread of Internet banking.

Part II of the volume deals with market structure and the increasing internationalization of banking. In Chapter 7, Klaus Schaeck reviews the contemporary literature on the effect of harsher competition in deposit and credit markets on bank soundness. A well-established tradition in the literature has supported the thesis that a more competitive environment leads banks to take more risks, raises the probability of bank failure, and undermines the systemic stability of the banking industry. This view has been challenged by a growing body of theoretical and empirical research suggesting instead that competition may actually strengthen banks and banking systems. In his chapter, Schaeck addresses four fundamental issues: what are the appropriate notions of competition and concentration, how related are they to one another, and how should they be measured; what constitutes bank soundness and banking system stability; what are the mechanisms that tie competition to bank soundness; and what policy and regulatory implications stem from these considerations. Following an in-depth review of modern advances in the field of industrial organization and banking, Schaeck arrives at the cautious conclusion that more research is needed to improve our understanding of the relation between market structure and stability of banking systems. At the policy level, he finds that it is hard to advocate the use of concentration indices for drawing inferences regarding the competitiveness of a banking industry. In this spirit, decisions of regulatory

authorities on bank mergers and acquisitions, which are exclusively based on the effect on concentration ratios, seem to lack any solid justification. Likewise, policies encouraging domestic bank consolidation to the prejudice of cross-border mergers may have to be re-examined in light of recent economic literature.

The subsequent two chapters address the questions of national and regional segmentation of the banking industry. Starting from the 1990s, an ever wider process of internationalization of the bank industry has affected both developed and underdeveloped countries with an increase in the range and quantity of services supplied to foreign customers, an increase in the number of foreign branches, and an increase in the volume of cross-border shareholding exchanges. However, the national banking industry remains dominated by domestic institutions. In Chapter 8, Alberto Pozzolo focuses on cross-border mergers and acquisitions (M&As). The latter, measured as a proportion of total M&As, have doubled between 1990 and 2006, with the geographical pattern being quite different across developed countries. Pozzolo underscores that there are several reasons why cross-border bank M&As occur. In particular, these M&As are more likely to occur between countries that are geographically closer, economically integrated, and culturally similar. Moreover, there is evidence of a Ricardian comparative advantage effect for which both a higher level of development of the banking industry in the origin country and larger differences in banking development with respect to the host country are positively correlated with the probability of cross-border acquisitions. Yet, it emerges that, when the model is reestimated for different subperiods, bilateral linkages and comparative advantages at the country level do not explain the most recent patterns of cross-border M&As, suggesting that they can be better explained by bank-specific factors. In the last part of the chapter, Pozzolo analyzes the consequences of cross-border M&As on counterparties and on the hosting economy. At the microeconomic level, cross-border M&As do not appear to create beneficial effects on the value and risk position of the bidder and target banks (the effects sometimes are adverse). At the macroeconomic level, the evidence is more mixed. While some studies show evidence that foreign banks tend to shy away from lending to small firms even if potentially sound, others come to the opposite conclusion, namely that host countries, especially if developing, benefit from the entry of foreign banks.

In Chapter 9, Massimiliano Affinito and Matteo Piazza explore barriers hindering the integration of the European retail banking market. The authors present two novel econometric exercises on the banking structures of 147 regions in 13 European Union countries. First, they study the degree of localism of regional banking markets, as measured by the ratio of total banks headquartered in a region to total branches operating in the same region. Second, they test the determinants of cross-border branching across European regions. The results are strongly supportive of the notion that cultural and informational factors explain the presence of borders that keep retail banking markets segmented. Once they control for national legal and regulatory provisions and for country fixed effects, Affinito and Piazza find that the degree of localism of a regional banking system is positively associated with the presence of linguistic minorities in the region and negatively associated with the average size of local firms. From this viewpoint, integration of banking markets in

Europe will face inescapable limits determined by the economic structure of many European regions that are strongly characterized by small firms and a strong cultural identity. The further development of information technologies can loosen these constraints but not remove them. In a result that is consistent with the fact that soft information alters the thickness of banking markets' borders, Affinito and Piazza also show that the incidence of foreign bank branches in a region increases with the average size of local firms. Once again, what this finding suggests is that a deep knowledge of local culture and borrowers is still an important competitive advantage in banking, an advantage that cannot be acquired by merely opening branches or subsidiaries.

Part III examines regulatory issues and financial centers. In Chapter 10, Giorgio Di Giorgio and Carmine Di Noia focus on the issue of designing a regulatory framework for multinational financial conglomerates. After discussing the evolving features of financial intermediation, cross-border strategies in banking, and the internationalization of finance, the authors tackle two main questions. First, they consider problems arising from the fact that the range of regulatory and supervisory activity often does not match the geographical range of business activities. Regulation fails to be completely harmonized, not only across national borders but also within the borders of integrated areas like the European Union. Even within a sovereign nation, coordination mechanisms among different regulatory agencies are hard to implement, especially during a crisis. Second, they wonder whether an international perspective is needed on single banking regulatory instruments like capital ratios, deposit insurance, reserve requirements, and lending of last resort. The subprime financial crisis of 2007–2008 has painfully confirmed the worst fears of a mismatch between regulation and supervision and global banking and financial activities. For the authors, "it is too late to continue with different national (or state) regulators and supervisors, [but] it is probably *too early to adopt a central regulator (s) and supervisor (s) at the Euro or US federal level*." They propose instead a "4-peak" regulatory model by objectives, where four separate institutions would pursue macrostability or monetary policy, microeconomic stability, investor protection, and competition in the financial sector. This regulatory design has the advantage of reducing conflicts due to policy trade-offs that are imbedded in a single regulatory institution. The downside is the risk that the different institutions may not talk to one another. As to the international coordination of national regulators, they propose a European System of Financial Regulators, structured like the European System of Central Banks, for the European Union and the so-called Blueprint proposal of regulatory reform by the US Treasury for the United States.

In Chapter 11, Boot and Marinč focus on supervision of banking markets in the EMU countries and in particular on the lender-of-last-resort (LOLR) facilities for crisis management. Currently, the provision of emergency liquidity to individual financial institutions is under the responsibility of national central banks, with the ECB playing a coordinating role. In addition, the ECB can directly intervene during a general liquidity crisis to preserve the stability of the payment system. According to Boot and Marinč, the rationale for such arrangement has more to do with the political motivation "to prevent the emergence of an overly powerful ECB" than

with the benefit that may accrue from exploiting the informational advantages of national central banks concerning liquidity shortages of domestic banks. Although the global nature of the 2007–2008 credit crisis has given the ECB a leading role, the weakness of the current LOLR arrangement is clear and calls for a more explicit and direct involvement of the ECB in the LOLR function. However, as Boot and Marinč warn, this objective could be realized if it is accompanied by a greater centralization of national supervisory structures and, even more importantly, by conferring on the EU a certain amount of fiscal authority. Given that fiscal centralization may be unrealistic in the near future, the next best alternative would be to set rules on seigniorage sharing among EMU member countries resulting from national LOLR interventions.

The last two chapters of the book deal with financial centers. In Chapter 12, Michele Fratianni focuses on the historical evolution of financial centers. Financial centers accompany financial revolutions and emerge when specific mechanisms and institutions are in place, such as a government committed not to renege on its debt, the presence of a public or central bank, stable money, and innovations in financial instruments and markets. Once started, financial centers benefit from the advantages of agglomeration. Financial products, unstandardized and subject to a great deal of uncertainty, tend to concentrate geographically because of the reduction in information costs resulting from close contacts. Concentration leads to economies of scale and encourages external economies. The benefits from agglomeration are partly offset by costs related to congestion and the acquisition of distant information. Great financial centers enjoy a high degree of persistence but are not immune from decline and eventual demise. Yet, their achievements are passed along in an evolutionary manner. In revisiting the historical record of seven international financial centers – Florence, Venice, Genoa, Antwerp, Amsterdam, London, and New York – Fratianni finds evidence of a long evolutionary chain of banking and finance. Process and product innovation tend to last longer than location. Many great financial centers of the past have been swept away by regulation-friendly competitors placed in more dynamic environments. Bruges, Antwerp, Genoa, Venice, and Florence were once great financial centers; today they are insignificant. London and New York have retained their greatness by remaining competitive in the provision of high-quality services and in the regulatory structure. London was declining before big bang rejuvenated it. New York, according to some observers, is now suffering from an excess of costly regulation. In a world of global finance, "path dependence" protects established financial centers much less than in the past.

In the final chapter, Michael Grote examines the roles of European financial centers today and makes two important points. The first is that space "virtualization" – the weakening of the benefits from agglomeration through the widespread use of information and communication technology – has its own limits. Space virtualization works well for standardized information, like stock prices, but not for complex information requiring constant interpretation. For the latter, face-to-face contacts cannot be duplicated by breaking down complex information into a series of simple and faceless information bits. As Grote puts it, reading a simple and well-illustrated cookbook does not make one a chef. Interpretation of complex problems is best

done through physical and repetitive interaction, inclusive of body language and eye-to-eye contact. Financial centers retain a strong comparative advantage on this score and announcements of the "death of distance" ignore this fundamental principle. The second point is that banking activities are regionalized rather than globalized. This outcome is consistent with the regionalization of international trade and sales of multinational enterprises; see Fratianni (2006). The implication is that the forces of competition are much stronger between first-tier financial centers – such as London and New York and Tokyo – and second-tier centers – such as Frankfurt and Paris – than among second-tier centers. The nature of information, again, puts a limit on the concentration of financial centers. The more localized the information, the lesser the financial concentration. This implies a hierarchical structure of financial centers: international financial centers have a comparative advantage in products requiring global and transparent information, whereas national financial centers have an advantage in products requiring national and more opaque or softer information. Thus, location matters because information is distance sensitive. The trend toward increasing concentration of capital markets is consistent with the existence of local capital markets. Small and medium-size firms do not have the characteristics to accede to large centralized markets, hence the reason why local capital markets can survive alongside concentrated markets.

1.3 Thoughts for Future Research

Looking at the future, at least three themes appear to be worthy of additional investigation. The first concerns the costs and benefits of various forms of bank organizations. We need to know more about the sources of organizational frictions before we can disentangle their effects on credit allocations. Is functional distance a proxy of the cost of transmitting soft information as opposed to the costs of big, complex organizations of absorbing this type of information? Are the restrictive effects of hierarchy on small business lending due to the distance separating a large decision-making center from the markets or to the number of decisional layers? Does decision-making decentralization enhance the use of soft information and small business lending? The evidence on these issues is scarce and inconclusive. At the aggregate level, Alessandrini et al. (2008) find that the innovative efforts of Italian small firms are hampered by the average distance of local branches from their headquarters but are unaffected by the average size of banks. Similarly, Mian (2006) finds that in Pakistan the supply of small business lending is negatively correlated with the distance between clients and banks' headquarters but is uncorrelated with bank size. Liberti and Mian (2009) are the only authors to have studied sources of organizational friction. They show that the amount of credit approved at higher hierarchical levels is less sensitive to soft information; such a reduction has a significant discontinuity at levels where officers sit in different geographical locations, suggesting that distance between hierarchical levels matter more than their number. However, Liberti and Mian only consider a single multinational bank operating in Argentina. Clearly, we could benefit from

more extensive studies involving banks with different organizational structures and different countries.

The second theme concerns the "originate and distribute" banking model that transfers credit and illiquidity risk from the balance sheet of banks to the markets; see Fratianni (2008). This model has been a prominent feature of the subprime crisis of 2007–2008 and has been blamed as one possible cause. The original intent of "originate and distribute" was to lower overall credit risk by moving it out of banks and spreading it over a large set of actors, institutions, and markets. The collateralized products turned out to be opaque and difficult to evaluate, and the spreading of the risk over a larger set of operators made it difficult to locate who actually held risky assets. The location problem was made immensely more complicated by the rise of distrust that typically permeates financial crises. In the end, the "originate and distribute" model created the unintended consequence of raising the overall level of uncertainty. What went wrong? The originators appeared to have failed in investing in reputation. Had they retained a sufficient amount of originated assets – especially those with lower credit risk – the markets would have gained confidence in the overall quality of the distributed assets. The credit rating agencies appear to have failed in their role of assessors of the collateralized products. The regulators have failed in their role of bank supervisor. These three failures may spell out a reduction of the "originate and distribute" model and possibly the end.

The third theme concerns the massive expansion of the safety net as a consequence of governments bailing out large insolvent non-bank financial intermediaries, such as Bear Sterns, Fannie Mae, Freddie Mac, and AIG. While the bailouts were deemed necessary by governments in dampening the effects of the financial crisis, the enlargement of the safety net will exacerbate moral hazard behavior. Credit risk has been shifted onto governments, which may have to pay in the future a higher risk premium on their debts. Furthermore, as the financial industry consolidates into fewer and bigger institutions, future bailouts will become more costly and in some cases even beyond the means of governments' deep pockets. Institutions that are now considered too big to fail will be tomorrow too big to save.

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Part I
Distance and Banks' Organization

Chapter 2
Financial Innovation, Organizations, and Small Business Lending

Gregory F. Udell

Abstract   Technological innovation and changes in bank organizational structure have each had a significant effect on small business lending. Both of these phenomena have a spatial dimension. Technological innovation may allow banks to lend at a longer distance if it significantly diminishes the importance of direct customer contact. If consolidation produces fewer banking offices, then the average distance between borrowers and lenders will necessarily increase. The impact of these effects on small business lending, however, greatly depends on the extent to which hard information about borrower quality is a good substitute for soft information. This chapter assesses the theoretical and empirical evidence on the extent to which these changes will likely effect small business lending.

2.1 Introduction

There has been a considerable amount of interest in how technological innovation and changes in bank organizational structure have affected small business lending. Technological innovations in recent decades have changed the nature of loan underwriting in a variety of ways. These include, for example, financial statement analysis using spread sheet software; bank–borrower interface through Internet communication; and statistical analysis of borrower quality through credit scoring. Changes in bank organizational structure may have also had an impact on small business lending. Banking industry consolidation has led to an increase in the average size and complexity of banking institutions. This could affect small business loan underwriting if larger and more complex institutions underwrite small business loans differently than smaller and less complex institutions.

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Both of these phenomena have a spatial dimension. Technological innovation may allow banks to lend at a longer distance if it significantly diminishes the importance of direct customer contact. With respect to organizational structure, if consolidation produces fewer banking offices and more concentration, then the average distance between borrowers and lenders will necessarily increase. Moreover, these two phenomena may be related in the sense that increases in efficiency from technological innovation may promote consolidation by reducing the importance of having smaller banks located closer to their borrowers.

The magnitude of these effects on small business lending, however, greatly depends on the extent to which hard information about borrower quality is a good substitute for soft information. On the one hand, hard information is quantifiable and easily stored and can be produced and communicated over long distances. Examples of hard information include financial statements and credit scores. On the other hand, soft information cannot be easily stored; and it can neither be easily generated over long distances, nor be easily communicated over long distances or within large and complex banking organizations. Examples of soft information include assessments of managerial skill, managerial integrity, and strategic decisions. Soft information is likely generated at the loan officer level and is most associated with a type of loan underwriting known as "relationship lending". If technological innovation significantly expands the ability of banks to produce hard information, then banks might substitute hard information for soft information – and, therefore, substitute transactions-based lending for relationship lending. This could occur if innovations make hard information less expensive to produce, and/or if these innovations improve the informativeness of hard information relative to soft information. This, in turn, could reduce the importance of small banks and rationalize the consolidation of the banking industry.

In this chapter, we offer an assessment of the academic literature on these phenomena. Specifically, we examine the theoretical and empirical evidence on the extent to which technological innovation and changes in bank organizational structure have an effect on small business lending and the distance between borrowers and lenders. We begin with an overview of the literature on relationship (vs. transactions) lending and its centrality to the debate over distance and lending. Then we turn to an assessment of the research on the impact of technological innovation on small business loan underwriting followed by an assessment of the literature on bank consolidation and organizational form and their impact on small business lending.

2.2 Relationship (Versus Transaction) Lending and Distance

The academic information-based literature on bank lending started from the perspective that bank lending differed from public debt in terms of the production of private information (e.g., James 1987, Lummer and McConnell 1989, Rajan 1992). With some risk of oversimplification, this led to the view that bank lending – particularly small business lending – was best characterized as relationship lending.

Relationship lending emphasizes the accumulation of soft information over time and over the provision of multiple products. The empirical evidence on relationship lending suggested that borrowers benefit from better credit terms and credit availability as the relationship grows in strength (e.g., Petersen and Rajan 1994, 1995, Berger and Udell 1995, Harhoff and Körting 1998, Elsas and Krahnen 1998).[1]

A more refined view of small business lending emphasized a distinction between relationship lending and transactions lending (Boot and Thakor 2000, Cole et al. 2004, Berger et al. 2005, Agarwal and Hauswald 2007). Transactions lending, which is based on hard information, may come in a variety of forms, including financial statement lending, small business credit scoring, factoring, asset-based lending, equipment lending, real estate-based lending, and leasing. The initial emphasis in this research was based on the assumption that transactions lending was better suited for relatively transparent small businesses, while relationship lending was better suited for more opaque small businesses. Additional work in this area, however, suggests the possibility that all of the transactions-based lending "technologies" except financial statement lending may be well suited for many opaque small borrowers (Berger and Udell 2006, Berger and Black 2007, Uchida et al. 2007). These technologies do not focus on the overall quality of the firms (which may be quite opaque), but, rather, they focus on the quality of specific assets that are used as collateral and which can be valued using hard information, e.g., accounts receivable (factoring), accounts receivable and inventory (asset-based lending), and equipment (equipment lending).

Another important distinction between relationship lending and some of the transactions-based lending technologies is cost. Because relationship lending is labor intensive, it is likely to cost much more than many of the transactions-based lending technologies; particularly financial statement lending, credit scoring, equipment lending, real estate-based lending and leasing (DeYoung et al. 2004). This is consistent with empirical work that shows that large banks tend to earn lower risk-adjusted yields and tend to charge lower loans rates on small business loans (e.g., Hannan 1991, 1997, Berger and Udell 1996, Carter et al. 2004, Berger 2006).

On the spatial dimension, relationship lending may also differ significantly from transactions lending. Specifically, it has been hypothesized that in order for relationship lenders to collect soft information they need to be located close to their borrowers. This proximity enables loan officers to personally contact their borrowers at a lower cost and to use their knowledge of the local community to better assess managerial skills, integrity, and strategic decision making (e.g., Sussman and Zeira 1995, Hauswald and Marquez 2006). Transactions lending, in contrast, has no such spatial limitation because the (mostly electronic) generation, storage, and transmission of hard information is not likely dependent on distance.

It is difficult to directly test the spatial hypotheses on distance and lending (including the hypothesis that distance matters to relationship lending but not to

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[1] For a review of the relationship lending literature see Berger and Udell (1998), Boot (2000) and Elyasiani and Goldberg (2004).

transactions lending) because the individual lending technologies are generally not observable by the empiricist.[2,3] Nevertheless, the findings in some studies are suggestive. For example, some studies have found that larger banks tend to lend at longer distances and depend more on hard information in loan underwriting – which would support the hypotheses on distance and lending if large banks emphasize transactions loans and small banks emphasize relationship loans (Berger et al. 2005, Cole et al. 2004, Uchida et al. 2008, forthcoming). Another approach emphasizes an analysis of the residuals estimated from loan pricing regressions. Using this approach one study found that the soft information component of loan underwriting diminishes with distance (Agarwal and Hauswald 2006). Another study using a different methodological structure found that greater distance led to more deviation from hard information-based loan pricing (Cerqueiro et al. 2007). However, they interpreted this result as attributable to risk and not to the accumulation of soft information.

2.3 Innovation and Small Business Loan Underwriting

There is little doubt that technological and financial innovations over the past three decades have had a profound effect on the banking industry. There is no shortage of examples of this phenomenon. ATM machines and the shift to an electronic payments system, for example, have profoundly affected the way in which banking services are delivered. Innovation in back-office technology was an important factor driving the securitization of the residential mortgage market.[4] Many researchers have also argued that technological innovation has had an equally powerful effect on small business loan underwriting essentially arguing that technological innovation has reduced the absolute and relative cost of transactions-based lending vis-à-vis relationship lending leading to increased credit availability and substitution effects.[5] That is, innovation could lead to an increase in credit availability to formerly rationed small businesses for whom information production becomes

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[2]For a rare exception see Agarwal and Hauswald (2007) who are able to distinguish between relationship lending and transaction lending at the loan level.

[3]The lack of data on lending technologies also makes it difficult to test the impact of market structure on credit availability to small businesses. Some theoretical work suggests that increased competition impedes relationship lending (but not transactions lending) (Petersen and Rajan 1995); but other theoretical work (Boot and Thakor 2000) – and the structure, conduct and performance hypothesis – suggests the opposite. Empirical evidence on the importance of these effects is mixed, possibly in part because it suffers from this inability to isolate relationship loans (e.g., Laderman 2006, Carbo-Valverde et al. 2009).

[4]For a more comprehensive analysis of technology driven changes in the banking industry over this period see DeYoung et al. (2004).

[5]See, for example, Petersen and Rajan (2002), Berger and Frame (2006), and DeYoung et al. (2007). See also Hauswald and Marquez (2003) for a theoretical model of the effect of advances in information technology on credit markets and an analysis of market structure and the incentives to gather information.

cost-effective. It could also lead to a substitution effect where the decreased relative cost of these transactions-based technologies shifts the optimal underwriting technology away from relationship lending for some small businesses. In this section, we explore this argument and suggest the possibility that a more circumspect view may be appropriate.

It is easy to list examples of where technological innovation has likely reduced the cost of delivering transactions-based lending technologies. For instance, communications and software innovations have likely reduced the cost of monitoring accounts receivable, the essential collateral component of two important lending technologies – factoring and asset-based lending. Equipment lending offers another example. Some equipment liquidations are now conducted by liquidators who use online auctions. Many of these liquidators also act as equipment appraisers relying on information compiled in databases from their liquidation activities.[6] And, of course, the canonical example cited in the academic literature is the introduction of spreadsheet software used to spread and analyze borrower financial statements.

Somewhat surprisingly, however, there is virtually no direct evidence presented in the literature on the magnitude of the cost savings from these innovations nor is there evidence on whether they have significantly improved the ability of lenders to assess borrower quality. For example, no one denies that spreadsheet software has made "number crunching" easier than it was two decades ago. However, it is not clear that the ("old-fashioned" method of) manual spreading of financial statements and the manual calculation of financial ratios (in the pre-software era) was a particularly expensive or time-consuming activity. It was mostly conducted by relatively low-paid credit analysts (at least, relative to loan officers) and may have involved only 20-30 minutes of time for a good analyst (based on my own personal experience as a bank credit analyst). Thus, when amortized over a $1,000,000, or even $500,000, loan, this innovation may not have been as economically important as some have suggested in the academic literature.

The innovation in small business lending that has received the most attention in the recent academic literature is small business credit scoring. But despite the abundance of research on this innovation there are still some interesting and unanswered questions about the nature of its overall impact. On the consumer side, credit scoring was first used in the 1950s and is now widely used for most types of consumer lending. It was adapted by large banks to the micro-end of small business lending in the 1990s for loans below a specified ceiling set by the adopting banks – the ceiling appears to range from $100,000 to $250,000. The credit scoring models themselves appear to combine data on the entrepreneur from credit bureau reports with mercantile credit information from third party information exchanges such as Dun and Bradstreet, along with other entrepreneur and firm information.[7]

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[6]See Udell (2004) for more detail on equipment lending, equipment appraising, and liquidation.

[7]Dun and Bradstreet is the world's largest third party information exchange. It is similar to a credit registry except that it is a for profit private enterprise.

The general finding in the empirical literature on small business credit scoring is that the use of this technology is associated with an increase in lending to marginal borrowers and an increase in overall lending (Frame et al. 2001, Berger et al. 2005). However, it is not clear from the empirical evidence whether the benefits from the adoption of credit scoring come solely from decreased underwriting costs or they come in part from an improvement in failure prediction power possibly at the expense of a decrease in failure prediction power (DeYoung et al. 2004).[8] Another somewhat unresolved issue is the extent to which the increase in commercial lending from small business credit scoring is due to a substitution from consumer lending. It is possible that many loans that used to be underwritten as consumer loans to entrepreneurs (and booked in a different portfolio) are now underwritten with small business credit scoring (and booked in the commercial and industrial loan portfolio).

As we noted above, one of the potential implications of these types of technological and financial innovations in SME financing is a shift toward more transactions-based lending that would allow banks to lend at a longer distance. There have been a number of studies that have found evidence consistent with this hypothesis. Specifically, studies have found that the average distance between small business borrowers and their banks has increased over the past several decades. The first of these studies estimated that the median small business borrower–lender distance grew from 2 miles to 5 miles from 1973 to 1993 (Petersen and Rajan 2002). Subsequent research on the growth of borrower-lender distance and the increase in out-of-market lending has shown generally similar effects (Hannan 2003, DeYoung et al. 2007, Degryse and Ongena 2005, Brevoort and Hannan 2006).[9]

While the evidence of a growing distance between borrowers and lenders is consistent with the substitution of hard information for soft information (i.e., transactions-based lending technologies for relationship lending), it is also consistent with other hypotheses. In particular, in the US the finding could be an artifact of the dismantling of restrictions on branch and interstate banking that occurred during this period. It is also possible that the increase in distance is confined to transactions-based lending and not due to a substitution between relationship lending and transactions-based lending or due to an increase in the distance at which relationship lending takes place. That is, small businesses with prior transactions-based loans may have simply changed the banks (from local to less-local) from which they procure these transactions-based loans but not their relationship loans.

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[8]A related issue is whether information innovation necessarily benefits borrowers. It has been shown theoretically that in some cases innovation can lead to more capture, increasing borrower costs and lender profits (Dell'Ariccia and Marquez 2004). One paper has been able to examine the issue of capture using data and a methodology that can distinguish between relationship loans and transactions loans at the loan level. It finds evidence of capture in relationship loans (Agarwal and Hauswald 2007).

[9]One study found that *within* nine US metropolitan areas the distance between borrowers and their lenders actually decreased between 1997 and 2001 (see Brevoort and Hannan 2006, Brevoort and Wolken 2009: Chapter 3, this volume).

Finally, it is not clear that the observed changes in distance are large enough to affect soft information production. That is, an increase of 3 miles in the distance between a borrower and lender may not have an appreciable impact on the ability of a loan officer to accumulate soft information about his or her borrowers.[10]

Additional evidence in the literature offers insight on these issues. Consistent with the interpretation that transaction lending does not require a strong relationship, it has been shown that small business borrowers are far less "loyal" to their banks when it comes to motor vehicle loans, equipment loans, and mortgages than they are to lines of credit which are more likely to be relationship-based (Berger and Udell 1995). Petersen and Rajan (2002) concluded that their finding of an observed increase in distance was mostly due to a greater use of information technology (which could be interpreted as increased use of transactions lending). They drew this conclusion because their distance findings controlled for consolidation and other factors, and because bank employment normalized by bank lending shrank (consistent with a technology-labor input substitution). Unlike Petersen and Rajan, DeYoung et al. (2007) were able to directly link changes in distance to a specific lending technology. They found that recent increases in borrower-lender distance are related to the use of small business credit scoring although they also find a secular trend toward increasing distance unrelated to credit scoring that might be related to other technological innovation.

2.4 Banking Industry Consolidation and Small Business Lending

The world has seen a global trend toward banking industry consolidation. This trend has been associated with a decrease in the number of small banks and an increase in the average size and complexity of banks. Theoretical arguments suggest that small banks might be best suited to deliver relationship lending because their simple organizational structure does not require the internal transmission of soft information as part of the loan underwriting process (Stein 2002). Thus, banking consolidation could have negative consequences for small businesses if a reduction in small banks leads to a reduction of relationship lending, and transactions lending is not a good substitute for some types of opaque SMEs.

Policy concern over this issue is heightened by the fact that large banks appear to have a lower propensity to lend to small businesses based on simple balance sheet calculations showing that large banks allocate a lower fraction of their assets to small business lending than do small banks (e.g., Berger et al. 1995, Keeton 1995, Strahan and Weston 1996, Alessandrini et al. 2008 on the different asset allocation

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[10]Arguably, loan officers accumulate information about their borrowers by visiting them personally. The additional time involved in traveling an extra 3 miles may not be economically significant. That is, as long as the increased distance does not move the borrower out of the local "information market", the 3 extra miles may not matter.

of acquired banks). In addition, a number of studies have found that larger institutions tend to have weaker relationships with their borrowers, and they tend to lend less on soft information. In addition, larger institutions tend to lend to older and larger SMEs with stronger financial statements (e.g., Haynes et al.1999, Cole et al. 2004, Scott 2004, Berger et al. 2005). There is also evidence that as lending decisions are made higher in the organizational structure there is less emphasis on soft information (Liberti and Mian 2009).

In addition, there is evidence that functional distance as well as operational distance may matter (for this distinction, refer to Alessandrini et al. 2009). Operational distance refers to the distance between the borrower and the lender as discussed above. Functional distance refers to the distance between the branch (or location) where a loan is originated and the headquarters in the banking organization where the lending decision is made. Empirical evidence suggests that credit availability and innovation adoption are inversely related to functional distance (Alessandrini et al. 2008, 2009: Chapter 5 this volume). These findings on operational and functional distance are suggestive of large banks being less able to produce soft information and less inclined to make relationship loans and implying that banking consolidation could have a negative effect on small businesses.

There is also evidence that suggests that the impact of consolidation and the associated shift in the size structure of the banking market on small business lending may be relatively benign. One study found that the likelihood of an SME receiving a line of credit from a small bank is roughly proportionate to the presence of small banks in the local market (Berger et al. 2007). Other studies found that while merged banks tend to reduce their small business lending, other banks in the local market tend to increase their small business lending (Berger et al. 1998, Alessandrini et al. 2008). And, yet another study found that whether a merged bank decreases its small business lending depends on how the acquisition is handled organizationally. If the acquired bank is allowed to keep its charter and operate as a separate subsidiary, small business lending tends not to change after the acquisition. However, the merging of charters tends to be associated with a reduction in small business lending (Hancock et al. 2006). The finding in DeYoung et al. (2007) that the most important factor driving recent increases in borrower–lender distances was the adoption of small business credit scoring suggests that innovation has made distance less important for some types of borrowers. Consistent with this conclusion is recent evidence that most of the increase in out-of-market small business lending has been confined to the smallest category of loans (i.e., loans under $100,000 which are most likely to be credit scored) (Brevoort 2006).

Consequently, forecasts of the demise of small business lending in a post- consolidation world may be premature. To the extent that large banks replace community banks through mergers and acquisitions, the small business transaction lending that was formerly done by the acquired community banks can be assumed by the surviving large banks without affecting underwriting costs. Moreover, demand for relationship lending may impose a limit on consolidation. That is, consolidation may proceed only to the point where enough community banks (or small bank affiliates of large banking holding companies) survive to ensure that a sufficient amount

of relationship lending is provided to small businesses that need it (DeYoung et al. 2004).[11] Alternatively it may be possible for large banking groups to adopt a flexible decentralized strategy, maintaining local chartered banks with their proximity-relationship assets, at least in some percentage (Hancock et al. 2006).

2.5 Conclusion

In this chapter, we have examined the academic research on the impact of innovation and organizational change on bank small business lending. Technological innovation appears to have had a significant impact on how many small business loans are underwritten. Though it seems likely that one type of lending, relationship lending with its emphasis on soft information, has been less affected by technological innovation than the other lending technologies which are based on hard information. This differential impact may affect how banks interact spatially with their borrowers. The balance of the literature suggests that innovations in transactions-based technologies appear to be associated with the ability of banks to lend to these borrowers at longer distances. However, the literature also suggests that relationship lending likely still requires the proximity of the borrower to the lender. In addition, it appears that relationship lending is best delivered by smaller banks because of problems associated with producing and communicating soft information in large and complex banking institutions. Thus, it appears that increases in bank-borrower distance driven by the consolidation of the banking industry are likely to be mostly associated with loans that are underwritten by larger banks using transactions-based lending technologies and not relationship lending. Moreover, the necessity that relationship lending be underwritten by small local banks – or, at least, small affiliates of large banking organizations – probably imposes a limit on the nature and amount of banking industry consolidation. Estimating this limit with any precision, however, appears quite difficult.

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[11] One recent paper emphasized that the viable model for community (i.e., small) banks in the long run is likely one that emphasizes "personalized service and relationships based on soft information" (DeYoung et al. 2004). The authors identified the "profitable" sector of the community banking segment of the industry in the US today (i.e., the sector whose average ROE is equal to the average ROE of large banks). They suggested that the number of these 'profitable" small banks may be the best forecast of how many community banks might ultimately survive industry consolidation. However, they also emphasized that estimating how many community banks there will be in the future is also a "fool's" game.

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Chapter 3
Does Distance Matter in Banking?

Kenneth P. Brevoort and John D. Wolken

Abstract Deregulation and technological change have reduced the transaction costs that led to the dominance of local financial service suppliers, leading some to question whether distance still matters in banking. This debate has been particularly acute in small business banking, where transactions costs are believed to be particularly high. This paper provides a detailed review of the literature on distance in banking markets, highlighting the reasons why geographic proximity is believed to be important and examining the changes that may have affected its importance. Relying on new data from the 2003 Survey of Small Business Finances, we examine how distances between small firms and their financial service suppliers changed over the 1993–2003 decade. Our analysis reveals that distances increased, though the extent varied substantially across financial services and supplier types. Generally, increases were observed in the early half of the decade, while distances declined in the following 5 years. There was also a trend toward less in person interaction between small firms and their suppliers of financial services. Nevertheless, most relationships remained local, with a median distance of 5 miles in 2003. The results suggest that distance, while perhaps not as tyrannical as in the past, remains an important factor in banking.

3.1 Introduction

Over the past several decades, substantial changes have occurred in the technologies employed by banks in providing financial services and in the regulatory environment in which they operate. The changes in technology have included both those improvements that allow banks to interact with customers or prospective customers more efficiently (such as automated teller machines (ATMs) and online banking) and

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those that allow banks to more accurately measure and manage risk (for example, credit scoring and loan securitization). At the same time, banking deregulation has removed many of the regulatory barriers that limited the geographic areas in which banks were permitted to operate. The changes ranged from fewer restrictions on branching activity (both intrastate and interstate) to a greater ability for banks in one state to offer financial services in another state free from additional regulatory burden (e.g., preemption).

That these technological and regulatory developments have had an impact on the structure of the banking industry is indisputable. In the United States, these changes have fostered a dramatic increase in industry consolidation at the national level that has reduced the number of banks and thrifts from 16,392 in June 1989 to 8,848 in June 2006. Nevertheless, the US banking industry continues to have a large number of banks, the majority of which continue to focus on serving their local community and local customers. Consequently, there is significant disagreement about whether the regulatory and technological changes have altered the methods of providing banking services sufficiently to break the traditional reliance of households and small businesses on local suppliers.[1] The extent to which this reliance on local suppliers, which some refer to as the "tyranny of distance", has declined over time has been the subject of a substantial amount of research.

This research, which is summarized below, focuses primarily on whether the distances between bank customers and their banking institutions have increased over time. Generally, these studies report that average distances have increased over the past two decades. However, there also is evidence that these changes may not have affected all banks or customers equally. This leaves open several questions about the role of location in banking. In particular, as banking institutions and their customers have adjusted to deregulation and technological advances, has having a local presence become insignificant for either banks or their customers? Or does distance continue to matter in banking?

In this chapter, we focus on why distance is important and how the distances between banks and their customers have changed in US banking markets.[2] Specifically, we examine different rationales for why geographic proximity might be an important factor in the provision of banking services and whether these rationales remain relevant in the modern banking marketplace. Then, focusing on small businesses, the area of banking that has received the most attention, we examine data from multiple waves of the Survey of Small Business Finances (SSBF) to examine how the geographic distances between banks and their small business customers

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[1]Several published studies have established the reliance of households and small businesses on local suppliers of financial services. For example, see Kwast et al. (1997), Amel and Starr-McCluer (2002), Amel and Brevoort (2005).

[2]We suspect that the same evolutionary process is playing out for similar reasons across the developed world and that consequently our results for US markets will be more broadly applicable. One advantage of using US data is that our analysis can focus specifically on the issue of distance, without worrying about the effect of international borders. The distinction between the related concept of distance and borders is made by Degryse and Ongena (2004).

have changed between 1993 and 2003. We find that distances generally increased over the decade, though the extent of the increase varied substantially across the types of financial services being supplied and the types of institutions that were supplying them. Additionally, there seems to have been a general trend toward less in person interaction between small firms and their suppliers of financial services. Despite these changes, however, the data show that distance, while perhaps not as tyrannical as in the past, remains an important factor in banking.

The remainder of this chapter discusses and reviews the current literature on why distance might matter in the delivery of financial services and how recent technological innovations may have altered the value of proximity. Both theoretical and empirical studies are reviewed. The latter part of this chapter then provides updated information from the Surveys of Small Business Finance on how the importance of distance and the tendency to conduct business in person have changed over the past decade. Conclusions and suggested areas for future research follow.

3.2 Why Distance Might Matter

Udell (2009: Chapter 2, this volume) provides a discussion of the alternative technologies available to lenders in underwriting and pricing small business credit. That discussion detailed how a lender's choice of lending technology (e.g., relationship versus transactions lending) can affect a lender's ability to extend credit to more distant borrowers. In this chapter, we supplement Udell's analysis by examining the underlying costs that give rise to the need for alternative loan production technologies, focusing on costs borne by lenders and borrowers.

Specifically, we begin our analysis of the role of distance in banking by exploring the reasons why one might expect distance, or more specifically geographic proximity, to play an important role in the provision, delivery, and use of banking services. We then discuss technological or regulatory changes that have occurred in US banking markets in recent years that may have diminished the role that geographic proximity plays. Finally, the section concludes by examining the literature on how the relative locations of banks and their customers have changed over time.

3.2.1 Sources of Advantage from Geographic Proximity

The role of geographic proximity in the provision of financial services is most often attributed to its effect on the transaction costs incurred by banks or their customers. Elliehausen and Wolken (1990) delineate two components of transaction costs that are affected by geographic proximity – transportation and information costs.

Transportation costs include the dollar and time costs incurred by banks or their customers in conducting business in person. For consumers of financial services, transportation costs vary directly with the number of transactions the consumer has with a financial service provider, the distance between the consumer and the

institution, and the extent to which the consumer has to conduct transactions with their financial institution in person, rather than by other means (e.g., telephone, mail, or online). If these costs are nonnegligible, then they will tend to serve as a source of competitive advantage for nearby banks (Chiappori et al. 1995, Dell'Ariccia 2001, Park and Pennacchi 2003, Villas-Boas and Schmidt-Mohr 1999). As discussed in Cerqueiro et al. (2009: Chapter 4, this volume), this competitive advantage may lead banks to spatially differentiate their pricing (Degryse and Ongena 2005, Degryse et al. 2006).

Financial institutions also may incur transportation costs, primarily in the provision of credit. Evaluating loan applications or monitoring borrowers after a loan is made (particularly business customers) may require multiple site visits by a loan officer. In this case, any travel costs incurred by a lender would make lending to distant borrowers costlier and, to the extent that the banks cannot pass along the higher transportation costs to borrowers through higher interest rates or fees, decrease the willingness of lenders to extend credit to more distant borrowers (Almazan 2002). The larger the transportation costs incurred by financial institutions, the more likely consumers are to receive services from local providers.

As with transportation costs, information costs may also be incurred by either financial institutions or their customers. For customers, information costs primarily relate to search costs associated with acquiring information about alternative suppliers. These search costs may vary directly with the distance between the customer and financial institutions and the degree of heterogeneity in financial services. Providing information to prospective customers can also impose costs on financial institutions in the form of advertising or the costs associated with maintaining relationships with brokers or other agents who interact with potential customers.

Financial institutions may also face other information costs that vary with distance and that are specifically related to the provision of credit. Unlike deposit markets, the costs of providing credit may vary across customers according to the credit risk posed by the borrower. Problems related to information costs may be particularly acute in small business lending, where lenders may lack the "hard" information provided by audited financial statements or the publicly priced debt or equity available for larger firms and have to rely more heavily on "soft" information collected through previous dealings or through knowledge of the local community and economic conditions. As discussed by Udell (2009: Chapter 2, this volume), lenders who rely more heavily on relationship lending technologies as a way of collecting soft information on small business borrowers, may face lower costs as a result of proximity. Thus, lenders that are more proximate to prospective borrowers may possess superior information about those borrowers and be able to monitor the loan performance of the borrowers more easily than more distant lenders.[3] These factors may affect the willingness of distant lenders to extend credit.

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[3] A detailed discussion of the importance of soft information in small business lending is provided by Berger and Udell (2002).

Indeed, Dell'Ariccia et al. (1999) suggest that the information provided by previous credit relationships may provide such a substantial competitive advantage as to constitute a barrier of entry to new lenders. In this case, prospective borrowers may find that more distant lenders are not willing to supply credit due to fear of a "winner's curse," in which the bank winds up only making loans to borrowers who have been rejected by lenders with superior information (Shaffer 1998).[4]

In the case of consumer lending, soft information is less likely to be an important component of lending for several reasons. One reason is that consumer loans tend to be smaller in size than commercial loans, and therefore the marginal costs incurred in acquiring soft information may not be cost-effective.[5] A second reason is the existence of credit bureaux that collect and maintain large databases on each individual's past credit experiences. To the extent that information on credit accounts is transmitted to the credit bureaux, the informational advantage possessed by local lenders because of past credit relationships with a prospective borrower is diminished (though for the provision of depository services and other activities not reported to the credit bureaux, the information advantage would be maintained). These credit bureaux have the effect of taking what may previously have been considered soft information possessed by a single lender and "hardening" it in a form that is accessible to all lenders.

While some small business lenders will also utilize information from credit bureau records of the owner of the small business,[6] the data sources on the past credit experiences of small businesses are much less developed.[7] Additionally, consumers may be more able to produce documentation of income levels and other pieces of information that provide additional hard information to the lender, thereby reducing the extent of asymmetric information in consumer loan markets. Consequently, one might expect the reduced potential for information asymmetries in consumer lending markets to make geographic proximity less important in these credit markets than in small business lending markets. Nevertheless, transaction costs incurred by households or consumers in conjunction with preferences to conduct financial business in person may still provide a rationale for the importance of distance for these bank customers.

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[4]Even though local banks may have an advantage in information production, it is possible that distant lenders could be competitive with local lenders if their cost of funds was sufficiently lower than the cost of funds for the local lenders. Such a situation is possible if the nonlocal institution is very large. Dell'Ariccia and Marquez (2004) provide such a theoretical model.

[5]The notable exception to this may be residential mortgages, which tend to be larger than other types of consumer loans. In evaluating mortgage applications, lenders often expend effort to document income levels and secure other information about the borrower or the property.

[6]Refer to Mester (1997) and Cowan and Cowan (2006).

[7]Kallberg and Udell (2003) discuss the small business credit information collected by Dun and Bradstreet. They find that the information contained in these models provides significant additional predictive power above that provided by the other credit information available to lenders.

3.2.2 Technological Changes and the Importance of Distance

The discussion above suggests that the importance of geographic proximity in banking markets can be primarily attributed to the transaction costs incurred in the provision of financial services. Technological changes have occurred in the past few decades that may have reduced, or even eliminated, some transaction costs. If so, then one would expect the role of geographic proximity to have diminished in banking. Two technological changes stand out as potentially having reduced the transaction costs associated with distance between financial service companies and their customers: alternative service delivery mechanisms and automated credit scoring systems.

The first major technological advance has been the development of alternative service delivery mechanisms, such as online banking and automated teller machines (ATMs). These new technologies have the potential to reduce the transportation costs incurred by consumers in interacting with their financial institution. At the same time, these technologies may have lowered the transaction costs of distant institutions dealing with local customers by reducing the frequency with which a customer needs to interact in person with his or her financial institution.

The existing evidence on the extent to which these new service delivery mechanisms have allowed consumers to reduce their need for in person interaction with their financial services suppliers is mixed. Regarding online banking, Khan (2004) finds that a household's use of online banking services is not affected by the distance to the closest bank branch and suggests that online banking services may be a supplement to, rather than a substitute for, personal interaction with banks. Amel and Brevoort (2005) reach a similar conclusion for small businesses based on an analysis of survey data in which firms that used the Internet for banking reported fewer alternative services available than other small businesses not using the Internet. These studies suggest that while the development of online banking has the potential to reduce the transportation costs incurred by consumers in obtaining financial services, at present it is operating as a service enhancement, rather than a substitute for in person interaction.

Similarly, if the customers of a bank view ATM networks as substitutes for bank branches, then it is possible that banks can compete for customers in which they have few or no branches, provided their customers can access their services through an ATM. While this is unlikely to play any role in lending,[8] ATMs may provide an alternative to brick-and-mortar branches that can allow banks to expand their geographic reach at much lower cost. Using data on banks in Italy, Hester et al. (2001) find that the number of ATMs in a province is positively related to the number of branches a bank has in that province and that the strength of this association is increasing over time. This result appears inconsistent with a trend toward

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[8]The services accessible through ATMs are generally related to deposit-account-related activities (e.g., cash withdrawals or deposits) and do not include credit-related activities like loan application processing or underwriting.

substituting branches for ATMs. In contrast, using US banking data, Hannan and Hanweck (2007) find that the average bank branch size (measured as the number of bank employees per branch) declined during a period when both the number of branches and ATMs have increased, suggesting that perhaps ATMs are serving as substitutes for bank tellers, but not necessarily for bank branches.

The second major technological advance has been the development of automated credit scoring systems. These systems, along with the large storehouses of information upon which they rely, have the potential to reduce the transaction costs incurred in providing credit. This reduction is a result of the use of credit scoring in three distinct ways: prescreening, loan origination, and loan monitoring.

The first use of credit scoring is to "prescreen" potential borrowers to allow solicitations to be focused only on those borrowers who satisfy established credit criteria. By allowing financial institutions to identify and target their advertisements at a smaller subset of borrowers, credit scoring may help reduce the information costs associated with search incurred by both borrowers and lenders.[9]

A second use of credit scoring that may have reduced transaction costs involves loan origination and possibly loan pricing. As discussed earlier, the assembling of data on past credit experience by individuals by credit bureaus has served to provide hard information about the quality of individual applicants. This information can be used in credit scoring models to evaluate an individual's creditworthiness at very low marginal costs. While the information in credit bureaux is primarily related to individual (and not business) credit histories, it has also proven useful in commercial lending. Cowan and Cowan (2006), for example, report that 80 percent of lenders that use credit scoring in underwriting small business loans rely exclusively on the personal credit score of the owner of the small business, Only 2.6 percent use only a credit score calculated for the business, with the remaining lenders using a combination. These scores and the information upon which they are based may potentially reduce the information costs faced by lenders and, to the extent that they reduce the information asymmetries between distant and local lenders, may reduce the extent of adverse selection and increase the willingness of lenders to actively lend to distant markets.

Finally, the third use of credit scoring that may help reduce transaction costs is loan monitoring. While most of the attention that credit scoring has received in the literature involves the use of credit scoring in underwriting and pricing, credit scoring is also widely used as a means of monitoring existing loans. Indeed, Cowan and Cowan (2006) report that banks are over 50 percent more likely to use credit scoring in small business lending for the monitoring of existing loans than for risk-based pricing. To the extent that credit scoring can substitute for site visits in loan monitoring, this would be expected to reduce the transportation costs incurred by lenders in extending credit to distant suppliers.

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[9]For a discussion of the use of credit scoring in the solicitation of credit, see Board of Governors of the Federal Reserve System (2006).

To date, there has only been a limited amount of empirical research on the effect of credit scoring on lending activity. In the area of consumer lending, the Board of Governors of the Federal Reserve System (2007) found that the adoption of credit scoring had likely contributed to increased credit availability and affordability, though very little direct empirical evidence was available on this point.[10] In the area of small business lending, two related papers by Frame et al. (2001, 2004) find that the use of credit scoring by large banks is positively correlated with the banks' volume of small business lending. A third study by Berger et al. (2005) finds that banks that use credit scoring have higher ratios of small business loans to assets, loan prices, and loan risk. However, since large lenders are more likely to acquire credit scoring technologies (Mester 1997), and since the authors of these three studies are unable to separate the treatment effects of credit scoring adoption from selection effects, it is unclear how much of the higher lending activity can be attributed directly to the use of credit scoring.

Together, these two major technological developments provide reason to believe that the transaction costs that drive the importance of proximity in banking may have been reduced over the years. However, the literature available on the effects of these changes is ambiguous and does not provide a conclusive answer and, consequently, the extent to which these technological and regulatory changes have diminished the importance of distance remains unclear. The next section surveys the evidence that has been provided on these questions by the literature that examines the evolving relationship between distance and banking.

3.2.3 Empirical Evidence on the Importance of Distance

Several studies have empirically examined how geographic distance is related to banking. Generally, the studies present empirical evidence that is broadly consistent with the hypothesis that in recent years the distance between financial institutions and their customers has been nondecreasing over time. Most of these studies base their conclusions on average distances across firms and institutions.

3.2.3.1 Consumer/Household Users of Financial Services

The literature on the evolving role of distance in consumer banking markets is thin. While several studies have examined how distance affects a consumer's choice of depository institution, none that we are aware of has examined the extent to which this relationship is changing over time. Indeed, most of the empirical studies of consumer choice of depository institutions have fundamentally glossed over the issue

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[10]Consequently, the Federal Reserve Board's conclusion was based primarily on public comments, as opposed to published empirical studies or original research.

of distance.[11] The two exceptions to this are Ishii (2008), who estimates a discrete choice model in which the utility of a depositor is a function of the distance to the nearest two bank branches, and Grzelonska (2006), who estimates a model that allows for the possibility that consumers may be in different places during a day and that this may affect how each individual values a branch network. In each of these studies, consumers are more likely to choose nearby banks.

Beyond depository services, the only paper that we are aware of that has examined the changing role of distance in consumer banking is Amel et al. (2008). These authors used multiple waves of the Survey of Consumer Finances (SCF) to examine how the distance between individuals and their financial service suppliers changed between 1992 and 2004. This work builds upon earlier papers by Kwast et al. (1997) and Amel and Starr-McCluer (2002), both of whom examine the distance between individuals and their financial institutions using single cross-sections of the SCF.

The data provided by Amel et al. (2008) document an increased usage of nonlocal suppliers of financial services by consumers between 1992 and 2004, though this increase was not observed for all services. In particular, for depository services, the median[12] distance between a consumer and its financial service institution remained constant between 1992 and 2004 at 3 miles.[13] In contrast, the median distance for all loans over the same time period increased from 7 to 22 miles.[14]

This increase has been aided by the increased frequency with which consumers receive financial services from nondepository institutions. Over the 12-year period, the share of households using a depository institution remained approximately constant at 99 percent, while the share-receiving services from nondepositories nearly doubled from 34.6 to 63.0 percent in 2004. This increase in usage was observed for both local and nonlocal nondepositories.

Overall, Amel et al. (2008) find that the median distances between consumers and their financial service providers remained under 4 miles between 1992 and 2004. This result largely reflects the continued reliance of consumers on local suppliers for account management services. The distance between consumers and their suppliers of most credit products (with the exception of lines of credit) have increased over

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[11]For example, both Dick (2008) and Adams et al. (2007) estimate discrete choice models of consumer choice of depository institutions where the utility an individual receives from each alternative institution is a function of the branch density of the institution in that market. While higher branch densities should be correlated with distances, these studies ignore the location of individual branches relative to individual depositors.

[12]The distance data reported in the SCF is truncated from above at 50 miles. Consequently, mean distances are not available. The distance referred to is the distance to the office or branch used most frequently. In many instances, this is the office where the loan payment is sent and not where the firm or consumer applied for the loan.

[13]By product, distances remained the same for checking accounts, savings accounts, money market accounts, and certificates of deposit. Median distances increased, however, for IRA/Keogh, brokerage, and trust accounts.

[14]Similar increases were observed for mortgages, vehicle loans, and "other" loans. The median distances for lines of credit only increased slightly from 3 to 4 miles.

time, suggesting that geographic proximity may have been less of an advantage in consumer credit markets over the time period.

3.2.3.2 Small Business Users of Financial Services

Unlike the literature on distance in consumer lending, several papers have examined distance in small business banking markets. Generally, these papers have focused on the role of distance in small business lending markets.

The first paper to explicitly examine how distance is changing over time in small business lending was by Petersen and Rajan (2002). Using the 1993 SSBF, the authors construct a synthetic panel based upon the year in which the relationship between the small business and its lender began.[15] The paper focuses on those relationships that began between 1973 and 1993. Petersen and Rajan (2002) find that the average distance between small firms and their lenders increased by 3.4 percent per year, a trend that they attribute to improvements in bank productivity. Additionally, the authors speculate based upon conversations with industry experts and unspecified "other studies" that the trend has accelerated since 1993.

The changing role of distance in small business lending was also addressed using the 1993 and 1998 SSBF by Wolken and Rohde (2002). Comparing distances across the two survey years, Wolken and Rohde (2002) find that the average distance of a small firm's headquarters and the location of its lending institutions increased from 115 miles in 1993 to 244 miles in 1998. This increase corresponds to an annual growth rate of over 15 percent, which is consistent with the speculation of Petersen and Rajan (2002) that the growth in mean distances over time after 1993 was accelerating. However, Wolken and Rohde (2002) also note that while average distances increased dramatically, the median distances only increased from 9 miles in 1993 to 10 miles in 1998. This finding suggests that the productivity improvements (or other causes) that were driving the dramatic increase in mean distances were largely affecting the upper tail of the distance distribution and were affecting only a subset of bank-borrower relationships.

Brevoort and Hannan (2006) examine how changes in the distance between banks and their borrowers were playing out at the lower end of the distance distribution. They used Community Reinvestment Act data[16] from 1997 to 2001 to assess how the geographic pattern of local lending by banks with branches in a sample of nine

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[15]As a robustness check, Petersen and Rajan (2002) also incorporated data from the 1987 SSBF. Rather than examining how distances changed across the two time periods, the authors created a synthetic panel from the 1987 observations as well, using those relationships that began between 1973 and 1987.

[16]The Community Reinvestment Act data provide information on the geographic distribution of small commercial loans made by depository institutions in each calendar year. The data supply the number and dollar volume of loans made by each bank in each census tract to which it extended credit. For each bank, the data are aggregated at the census tract level, so no detail is available about the characteristics of the loans or the borrowers. For more detail on the CRA data, see Bostic and Canner (1998).

randomly selected MSAs was changing over time. Brevoort and Hannan (2006) find that the probability that a bank extends credit to small businesses in a given census tract decreased as the distance to that census tract increased and that this "deterrent effect of distance" was stronger for smaller banks. Furthermore, there was little evidence that this effect decreased over the time period studied. In fact, the authors suggest that the in-market commercial lending they evaluate was taking place at shorter distances in local markets, a finding they argued was consistent with theoretical papers by Dell'Ariccia and Marquez (2004) and Hauswald and Marquez (2006). Both studies predicted that greater competition from distant lenders would cause local banks to concentrate their lending on more proximate borrowers for whom they retained an information advantage. This result also reinforces the notion that the increases in distance between bank lenders and small businesses were primarily occurring at the upper end of the distance distribution.

A related paper by Brevoort (2006) examines lending activity at the upper end of the distance distribution. The paper uses CRA data from 1998 to 2003 to examine how the geographic pattern of commercial loans extended by banks into MSAs in which they had no local branch presence (out-of-market loans) changed over the period. The study documents a large increase in the amount of out-of-market commercial lending, whether measured in terms of the number or dollar volume of loans. This finding is consistent with an earlier study by Hannan (2003) that also used CRA data to examine how the share of commercial lending accounted for by local lenders was changing over time. However, after controlling for the size of the bank and of the loan, Brevoort (2006) attributes all of the increase to large banks and small loans. Additionally, the results indicate that the deterrent effect of distance in out-of-market lending activity only declined for those lenders specializing in extremely small loans (an average loan size of $10,000 or less). For other lenders and loan sizes, distance appeared to have more of a deterrent effect on lending activity over time. These results are consistent with the speculation that the upper tail of the distance distribution is changing over time as well as suggesting that the effects on distance may be limited to only a subset of lenders.

Additional evidence that the evolving relationship between distance and small business lending may not be affecting all lenders equally is provided by Degryse and Ongena (2005). While not focusing on how the relationship between distance and small business lending is changing over time, Degryse and Ongena (2005) report that the distance between the large Belgian bank, for which they have data, and its borrowers did not increase substantially between 1975 and 1997.

A series of papers have used data collected from the US Small Business Administration's (SBA's) 7(a) Loan Program. This loan program is targeted at small businesses that have been unable to obtain financing from conventional sources and provides a government guarantee of loans made under this program, for generally between 50 and 85 percent of the outstanding loan balance.[17] As a fraction of the

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[17]For a description of the SBA's 7(a) Loan Program, see United States Government Accountability Office (2007).

total small business lending market, the 7(a) program is quite small, accounting for an estimated 1.3 percent of small business loans and 4.1 percent of outstanding small business loan dollars for loans under \$1 million in 2005 (US GAO, 2007).

These SBA data formed the basis of the work by DeYoung et al. (2006, 2007a, 2007b). In the first two of these papers, the SBA data were supplemented with survey data on the use of credit scoring by large banks conducted by the Federal Reserve Bank of Atlanta in 1998.[18] Both papers reach essentially the same conclusion in regard to changes in distance. They find that average distances between small business borrowers and their lenders grew between 1984 and 2001 and that these observed increases were larger at banks that had adopted credit scoring by the time of the 1998 survey. While it is not possible to identify a credit scoring treatment effect, the results are consistent both with the earlier observed increases in mean distances and with the notion that the increases have not affected all lenders equally. Additionally, DeYoung et al. (2007a) find that small business borrowers in low-to-moderate income tracts had slightly lower mean distances during the 1980s and mid-1990s, but higher mean distances after 1998.

3.2.3.3 Summary of Empirical Literature

Taken together, the evidence supplied by these papers suggests that the technological and regulatory changes that have been playing out in the banking marketplace have reduced the importance of proximity in banking. Generally, the empirical evidence indicates that distances between financial service suppliers and small businesses have increased in recent years. These studies also suggest that neither all borrowers nor all lenders have been equally affected. The importance of distance may have declined only for some borrowers or some lenders. While averages may have increased, such changes may not have occurred uniformly across the distribution of distances and may only have occurred at the upper or lower end of the distribution.[19] Moreover, these studies generally do not study how and whether the distance changes observed in the past few years differ by bank customer, financial service supplier, or product used.

Hence, the remainder of this paper focuses on the small business lending marketplace using newly available data that provide the best and most up-to-date examination of how the relationship between distance and small business banking relationships have evolved over the past decade. An important contribution of this work is disaggregating the data to permit an examination of changes that account for differences in product and institution characteristics. In the empirical section below, we offer some evidence that suggests that distance remains important for a large subset of bank customers and financial service suppliers.

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[18]This credit scoring survey also served as the basis for the papers by Frame et al. (2001, 2004) and Berger et al. (2005).

[19]The importance of distance and its effect on policy (e.g. market definition of banking services) may be different if the incidence of distance changes is concentrated in certain portions of the distribution or among certain groups of customers, products, or institutions.

3.3 Data and Univariate Analysis

Since its inception, the Survey of Small Business Finances (SSBF) has provided the most comprehensive picture of the financial dealings of small businesses. The latest wave of this survey, the 2003 SSBF, together with the 1993 and 1998 SSBFs, makes it possible to examine how the distance between small businesses and their suppliers of financial services have changed over the decade 1993–2003.

The SSBF offers the best dataset available for examining how distances between the locations of small businesses and their providers of financial services are changing over time. Unlike other studies in this area that use regulatory data or data from a single bank and its customers, the SSBF surveys small businesses directly and obtains a nationally representative dataset of small businesses' financial relationships and services used by each business. Because the data are obtained from the firm, it is possible to obtain an inventory of financial services and suppliers used by the firm. Hence, suppliers other than banks can be examined. Further, while studies utilizing individual bank or CRA data typically have little information available on the firm, the SSBF contains a broad set of firm and owner characteristics. Finally, the SSBF asks firms to identify their financial service suppliers, and from this information the data can be matched to banking data to obtain characteristics of the bank or other financial supplier, as well as the market or geographic area in which the firm is headquartered.

More specifically, in the SSBF, firms provide information about the institutions from which they received financial services, including the institution's type and geographic location. The firm is asked to report both the location of the office or branch of the financial institution used most frequently and the distance between the firm's headquarters and this office. When the firm does not know the distance, the location of the financial service provider is used to calculate the distance between the firm's main office and each of its suppliers. Firms also provide information on whether the most frequent method of conducting business with the branch or office was in person.[20] These data permit an examination of how the geographic relationship between a small business and its financial service suppliers varies by institution and product type and how these geographic relationships have changed over the 1993–2003 decade.[21]

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[20]During the 1993, 1998, and 2003 surveys, respondents were asked the following: "Think of the office of branch of (NAME) that the firm used most frequently. (i) Approximately how many miles from the main office of the firm is this office or branch of (NAME)? (ii) What was the most frequent method of conducting business with this office of branch?" For additional details, see the questionnaire or codebook for the surveys at Board of Governors of the Federal Reserve (2008).

[21]All data presented are weighted to provide estimates of population parameters. The samples drawn in each of the 3 survey years are stratified (by size, region, and urban/rural status) nonproportional random samples. The weights adjust for unequal selection probabilities and response rates.

3.3.1 Location of Financial Service Suppliers by Type of Supplier

Suppliers of financial services to small businesses are divided into two broad categories or "institution types" – *depository* and *nondepository* institutions. Depositories include commercial banks, thrifts (savings banks and savings and loans), and credit unions. Nondepository institutions include finance and factoring companies, brokerage and pension firms, leasing companies, and insurance and mortgage firms.[22] Mean and median distances between each small business and its suppliers of financial services are provided in Table 3.1.[23] In addition, this table provides the proportion of the institutions that are "local," defined as those institutions located within 30 miles of the firm's main office.[24] These data suggest that the distribution of distances is highly skewed. In 2003, the mean distance among all firm–institution pairs was 134 miles, while the median distance was 5 miles. This is a pattern that repeats itself across all institution types. Depository institutions were located an average of 55 miles from the firm, while the median distance was only 3 miles. In contrast, the mean distance between the firm and its nondepository sources was 317.7 miles, and the median was 40 miles.

Between 1993 and 2003, there was moderate growth in the distance between firms and their providers of financial services. Average distances increased significantly for most types of suppliers. On a per-annum basis, average distances increased 5.3 percent per year; depository distances grew at 5.9 percent per annum, whereas nondepository distances grew at 3.8 percent per annum. However, the median distance between the firm and its institutions remained largely unchanged, increasing from 4 to 5 miles. For depository institutions, the median distance was largely unchanged increasing from 2 to 3 miles. Among nondepository institutions, the median distance increased from 30 to 40 miles, and average distances increased significantly from 218.6 to 317.7 miles. Between 1993 and 1998, there were substantial increases in median and average distances for most types of nondepository institutions, but most of these increases had reversed by 2003. Between 1998 and 2003, the average distance for both depository and nondepository institutions fell significantly but not so much as to eliminate the increases in average and median distance that occurred during the first half of the decade.

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[22]Other nondepository sources, including credit card and check processors, governments, individuals, and otherwise unclassified sources are not included in the tables. Information about the location and method of conducting business with these types of suppliers was not collected in the 1993 survey. These sources account for about 10 percent of all sources used in each of the survey years.

[23]Estimates of the statistical significance of differences of means and proportions between 1993 and 2003, and between 1998 and 2003 are reported in the 1993 and 1998 columns, respectively. These calculations are adjusted for sampling weights and sampling strata, using survey statistical techniques available in STATA.

[24]While the use of 30 miles to denote local suppliers is somewhat arbitrary, using alternative definitions (e.g., 15, 20, 25, or 35 miles) would not change the qualitative results.

Table 3.1 Distance between firm's headquarters and financial source by type of financial source and year[1]

Type of financial service supplier	Mean distance			Median distance			Percent within 30 miles			Memo: incidence[2]
	2003	1998³	1993³	2003	1998³	1993³	2003	1998³	1993³	2003
Any source	134.0	166.6**	74.7**	5	4	4	74.7	76.8**	82.2**	96.4
Depository institutions	55.0	67.1*	30.9**	3	2	2	87.9	90.2**	91.9**	96.0
Commercial banks	52.7	68.0**	30.8**	3	2	2	88.5	90.1**	92.0**	86.6
Thrifts	81.6	76.9	31.9**	3	3	3	85.4	90.3*	92.4**	13.7
Credit Unions	40.6	34.5	33.1	7	4	5	84.0	92.0**	89.2	8.1
Nondepository institutions	317.7	465.4**	218.6**	40	123	30	43.8	36.7**	50.2**	40.4
Finance and Factoring	365.9	458.9**	208.8**	50	213	39	37.4	29.7**	43.2**	25.2
Brokerage and Pension	226.2	277.5	169.2*	20	15	12	59.9	61.7	69.8**	14.9
Leasing	284.2	751.3**	292.7	45	465	57	37.1	16.0**	40.1	4.5
Insurance and Mortgage	350.8	497.7**	198.5**	51	139	38	38.1	35.5	48.4	5.4

[1]Includes all firm–institution pairs where the firm has at least one financial service (checking account, savings account, line of credit, mortgage, motor vehicle loan, equipment loan, capital lease, other loan, transactions services, credit card processing services, trust services, brokerage services, cash management services, or credit related service), and the financial service supplier is a depository institution or a nondepository financial institution, including finance and factoring firms, brokerage, pension, leasing, insurance or mortgage companies.
[2]Indicates the percentage of firms that used that type of institution in 2003.
3* indicates significantly different from 2003 value at 10 percent level of significance; ** indicates significantly different from 2003 value at 5 percent level of significance.

The relative stability in median distances is reflected in the percentage of financial service providers that are located within 30 miles of the firm. In 1993, slightly more than four-fifths of providers were local. By 2003, the percentage had only fallen to 74.7 percent. Among depositories, between 1993 and 2003 the percentage located within 30 miles of the firm fell only 4 percentage points – from 91.9 percent in 1993 to 87.9 percent in 2003.

3.3.2 Location of Financial Service Suppliers by Type of Service

Table 3.2 provides mean and median distances between small businesses and their financial service providers, as well as the percentage of these providers that are local, by type of service for 1993, 1998, and 2003. Services are grouped into three categories: asset services, which include checking and savings accounts; loan services, which include lines of credit, capital leases, mortgages, equipment loans, motor vehicle loans, and other loans; and financial management services, which include cash management, credit-related, pension, brokerage, transactions, and credit and debit card processing services.[25]

As with the breakdown by institution type, the distance distributions across product types are highly skewed. Focusing on 2003, distances are lowest for asset services (median of 3 miles and mean of 28.9 miles), with somewhat shorter distances for checking than savings accounts. Financial management services also tended to be provided by nearby suppliers, with a median distance of 5 miles and a mean of 106.8. Institutions providing loans were located somewhat farther from the firm than institutions providing other services but were still located relatively close to the firm. The median loan provider was located 11 miles from the firm, and the average loan provider was located 180.6 miles from the firm.

The change in distance over the decade by product type, illustrated in Table 3.2, shows a consistent pattern across products – median and average distances generally increased, and the average changes were significant for all but mortgages and cash and credit services. The increase in median distance to suppliers providing asset services was minimal, increasing from 2 to 3 miles. The median distance for loan providers increased from 8 to 11 miles, with all of the increase occurring between 1998 and 2003. The median distance for financial management services

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[25] In 1993 and 1998, firms were asked about credit card processing as part of the question on transactions services. In 2003, the question on credit card processing was split from the question on transactions services and the new question on credit card processing was expanded to include pin- and signature-based debit card processing. The question changes may have led to more institutions being identified in 2003. However, we expect that institutions that provide credit card processing also provide debit card processing, which should mitigate any overstatement. For additional information, see Mach and Wolken (2006).

Table 3.2 Distance between firm's headquarters and financial source by selected product and year

Type of service used	Mean distance			Median distance			Percent within 30 miles			Memo: Incidence[1]
	2003	1998[2]	1993[2]	2003	1998	1993	2003	1998[2]	1993[2]	2003
Any service	134.0	166.6**	74.9**	5	4	4	74.7	76.8**	82.2**	96.4
Asset services	28.4	25.9	18.3**	3	2	2	93.9	95.7**	95.6**	95.0
Checking	21.3	16.8	13.8**	2	2	2	95.3	96.6**	96.4**	94.7
Savings	49.2	52.1	30.3**	3	2	2	89.6	92.7**	93.5**	22.1
Loans	180.6	242.9**	110.6**	11	8	8	65.4	66.0	72.1**	57.0
Line of credit	77.1	109.4**	48.4**	3	3	4	87.3	85.8	88.1	33.9
Mortgage	82.8	156.4**	70.2	7	4	4	76.8	82.3*	84.0**	12.4
Motor vehicle loan	198.9	206.9	65.4**	24	15	9	54.7	61.6**	73.1**	25.2
Equipment loan	254.5	281.3	144.0**	19	11	10	59.0	60.6	68.0**	9.0
Leases	438.0	563.2**	298.0**	54	230	48	33.2	30.4	40.6**	7.7
Other loan	161.6	79.0**	62.4**	10	3	3	68.0	87.2**`	84.1**	4.8
Financial management services	106.8	137.9**	75.3**	5	3	3	80.2	80.2	84.7**	58.8
Cash management	61.8	40.6	41.9	3	3	2	89.8	92.6	91.1	6.6
Credit related	122.7	123.4	81.0	7	6	3	79.6	75.2	81.4	4.8
Pension	183.4	280.6**	104.8**	15	15	9	64.4	59.3	75.1**	16.2
Brokerage	212.7	129.2*	117.4**	15	15	10	65.4	71.5	77.3**	5.5
Transaction (inc. cc proc.)	.[3]	96.7	49.0	.[3]	2	2	.[3]	87.5	91.2	.[3]
Transaction (exc. cc proc.)	34.7	.[3]	.[3]	3	.[3]	.[3]	92.1	.[3]	.[3]	38.7
Credit card processing	140.1	.	.	5	.	.	89.8	.	.	23.8

[1]Indicates the percentage of firms that used the service in 2003.

[2]* indicates significantly different from 2003 value at 10 percent level of significance;

** indicates significantly different from 2003 value at 5 percent level of significance.

[3]The questions on transaction services were changed between the 1998 and 2003 surveys. In 1993 and 1998, transaction services included obtaining paper money or coins, credit card receipt processing, night deposits, and wire transfers. In the 2003 survey, transaction services did not include credit card processing, which was asked about with PIN-based and signature-based debit card processing.

almost doubled between 1993 and 2003 from 3 to 5 miles, with the largest percentage increase observed for credit-related services.[26]

Although the percent of suppliers located within 30 miles generally declined over the 1993–2003 period, a very large percentage of small businesses' financial suppliers are located within 30 miles of the firm. Over 90 percent of institutions providing asset services were located within 30 miles, a share that has declined only slightly – but significantly – over the decade (from 95.6 percent in 1993 to 93.9 percent in 2003). More than four-fifths of financial management sources were located within 30 miles of the firm. Loans were less likely to be obtained from local suppliers than asset services, but even for loans, nearly two-thirds of lending institutions are located within 30 miles of the firm, although the percentage of loans obtained locally declined significantly from 72.1 percent in 1993 to 65.4 percent in 2003.

3.3.3 Location of Financial Service Suppliers by Supplier Type and Product Type

Since there is a correlation between the types of financial service providers and the products they supply, it is useful to examine how distance varies by product category across institution types. Table 3.3 provides the median distance to financial service providers by institution type and major product category for 1993, 1998, and 2003. Table 3.4 presents average distances and tests for significant differences between 2003 and 1998, and between 2003 and 1993. The results show depository institutions tend to be located closer than other institution types for each of the products being provided. In 2003, the median distance to depository institutions was less than 5 miles for each of the major product types. The median distance to nondepositories was considerably higher than to depositories, ranging from a median of 18 miles for checking and savings accounts to 26 miles for financial management services and 52 miles for loans.[27]

The median distance across product and institution types has increased moderately over the decade. The median distance to services provided by depository institutions has remained largely unchanged, with no changes for asset services and loans and only a 1- mile increase (from 2 to 3 miles) in financial management services. For nondepository institutions, there has been an overall increase in the median distance from 30 to 40 miles, with the majority of this increase likely attributable to financial management services.

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[26]The inclusion of credit card processing as a separate service in the 2003 survey, which has a relatively high median distance of 17 miles, may have been responsible for some of the observed increase in median distance among financial management services between 1998 and 2003.

[27]The distance measures for nondepository institutions that provide asset services may be noisy due to the fact that relatively few firms obtain checking and savings accounts from these institutions.

Table 3.3 Median distance to financial services provider by institution type and major product category

Type of service used	Any service			Checking or savings			Loans or lines of credit			Financial management services		
	2003	1998	1993	2003	1998	1993	2003	1998	1993	2003	1998	1993
Any source	5	4	4	3	2	2	11	8	8	5	3	3
Depositories	3	2	2	2	2	2	4	3	4	3	2	2
Commercial banks	3	2	2	2	2	2	4	3	3	3	2	2
Thrifts	3	3	3	2	2	2	5	4	5	4	2	2
Credit unions	7	4	5	5	4	4	10	5	5	6	3	3
Nondepositories[1]	40	123	30	18	10	12	52	252	47	26	25	14

[1]Includes finance and factoring, brokerage and pension, leasing, and insurance and mortgage companies.

Table 3.4 Mean distance to financial services provider by institution type and major product category

Type of service used	Any service			Checking or savings			Loans or lines of credit			Financial management services		
	2003	1998¹	1993¹	2003	1998¹	1993¹	2003	1998¹	1993¹	2003	1998¹	1993¹
Any source	134.0	166.6**	74.9**	28.4	25.9	18.3**	180.6	242.9**	110.6**	106.8	137.9**	75.3**
Depositories	55.0	67.1*	30.9**	17.6	17.5	12.1**	74.6	84.5	42.3**	47.1	78.3**	46.3
Commercial banks	52.7	68.0**	30.8**	14.4	17.9	11.7	75.4	83.9	40.6**	43.4	78.1**	48.2
Thrifts	81.6	76.9	31.9**	42.4	11.6**	15.4*	80.3	105.7	57.5	93.9	122.0	22.3***
Credit unions	40.6	34.5	33.1	23.2	17.9	13.0	55.6	67.3	49.4	21.2	14.8	35.4
Nondepositories²	317.7	465.4**	218.6**	274.8	289.1	176.5	357.4	552.7**	249.8**	264.4	312.8	152.9**

¹* indicates significantly different from 2003 value at 10 percent level of significance;
** indicates significantly different from 2003 value at 5 percent level of significance.
²Includes finance and factoring, brokerage and pension, leasing, and insurance and mortgage companies.

In sum, between 1993 and 2003, the average and median distances between financial service suppliers and their customers increased generally for most types of suppliers and most types of financial products. The largest increases occurred among nondepository sources and among loan and financial management services. However, between 1998 and 2003, for many products and suppliers, average distances actually declined significantly for loans from nondepositories, and for financial management services from depositories. Hence, while distances increased over the decade, there is some evidence that the increases may have attenuated or reversed for some institutions and some products between 1998 and 2003.

3.3.4 Conducting Business in Person

As discussed in an earlier section, the reasons to suspect that geographic proximity might be playing a reduced role in banking relate primarily to technological changes that have reduced the need for in person interactions between banks and their customers. The SSBF asks each firm to list the most frequent method of conducting business with each of their financial institutions. The range of possible answers has changed somewhat over the three surveys, making a direct comparison of each possible response across the three waves difficult. However, in each survey year, one of the possible responses was "in person." These data can help to indicate whether the observed changes in mean and median distances actually reflect a reduced tendency to conduct interactions with financial institutions in person.

3.3.4.1 Conducting Business in Person by Type of Supplier

The share of firm-institution relationships that were conducted most frequently in person is reported for each of the three samples by institution type in Table 3.5. Overall, in 2003, firms were slightly more likely than not (54 percent) to conduct business with their financial service suppliers in person. The tendency toward in person interactions was noticeably higher for depository institutions, where 71 percent of relationships were primarily in person. In contrast, among nondepositories in 2003, 15 percent of relationships were conducted primarily in person.

Over the course of the decade, the tendency to conduct business in person declined by 8 percentage points from 1993 to 2003, with most of the decrease occurring since 1998. A large portion of this decrease can be attributed to the changes in incidence at depository institutions, which over the decade declined 6 percentage points.

The tendency of relationships with nondepository institutions to be conducted primarily in person was identical in the 2003 and 1993 surveys at 15 percent. While these incidences did decline in 1998 (to 12 percent), this trend appears to have been reversed by 2003. Not only were the observed changes in the incidence of in person interaction at each type of nondepository small, they were also insignificant. Nevertheless, relationships with nondepository institutions contributed to the overall decline in in person interaction over the decade, as there was an increase in the

Table 3.5 Proportion of firms that conducted business in person by type of financial source and year

Type of financial service supplier	Proportion conducting business in person			Memo: incidence[1]
	2003	1998[2]	1993[2]	2003
Any source	0.54	0.61**	0.62**	96.4
Depository institutions	0.71	0.77**	0.77**	95.9
Commercial banks	0.71	0.77**	0.77**	86.5
Thrifts	0.73	0.76	0.78	13.7
Credit Unions	0.62	0.70	0.64	8.1
Nondepository institutions	0.15	0.12**	0.15	54.7
Finance and Factoring	0.14	0.12	0.13	25.2
Brokerage and Pension	0.20	0.19	0.24	14.9
Leasing	0.07	0.05	0.08	4.5
Insurance and Mortgage	0.16	0.11	0.13	5.4

[1]Indicates the percentage of firms that used that type of institution in 2003.
[2]* indicates significantly different from 2003 value at 10 percent level of significance;
** indicates significantly different from 2003 value at 5 percent level of significance.

share of relationships involving nondepository institutions, and the levels of in person interaction at these institutions is so much lower than at depositories.

3.3.4.2 Conducting Business in Person by Type of Service

The incidence of relationships involving primarily in person interaction can also be broken down by the type of financial service being provided (Table 3.6). In 2003, asset services continued to be dominated by relationships involving in person interaction with 78 percent of such relationships being conducted primarily in person. Relationships involving the provision of loans were conducted in person in 44 percent of the cases although there was substantial heterogeneity across loan types. For lines of credit, mortgages, and other loans, in person interactions occur more than half of the time. In contrast, relationships involving the provision of motor vehicle loans, equipment loans, and capital leases were all more likely to not involve in person interaction, with incidences of 32, 40, and 8 percent, respectively.

Among relationships involving financial management services, business was conducted in person in 57 percent of the cases. As with loans, there was significant heterogeneity across these services, with the incidence of in person interaction ranging from a high of 75 percent for transactions services to as little as 22 percent for brokerage firms.

Looked at over the course of the decade, overall, the incidence of in person interaction fell significantly between 1993 and 2003. Declines were recorded for all product categories, most of which were significantly different from zero. While remaining predominantly in person in 2003, the percentage of in person interactions for asset services declined by 5 percentage points over the decade, with all of the observed decrease being reported between 1998 and 2003. This pattern is

Table 3.6 Distance between firm's headquarters and financial source by selected product and year

Type of service used	Proportion conducting business in person			Memo: incidence[1]
	2003	1998[2]	1993[2]	2003
Any service	0.54	0.61**	0.62**	96.4
Asset services	0.78	0.84**	0.83**	95.0
Checking	0.80	0.85**	0.85**	94.6
Savings	0.71	0.76**	0.74	22.1
Loans	0.44	0.48**	0.49**	60.4
Line of credit	0.66	0.70**	0.71**	34.3
Mortgage	0.61	0.61	0.64	13.3
Motor vehicle loan	0.32	0.42**	0.41**	25.5
Equipment loan	0.40	0.46	0.53**	10.3
Lease	0.08	0.15**	0.15**	8.7
Other loan	0.56	0.68**	0.71**	10.1
Financial management services	0.57	0.62**	0.61**	64.8
Cash management	0.66	0.69	0.68	6.7
Credit related	0.49	0.61*	0.64**	5.0
Pension	0.30	0.25*	0.40**	17.2
Brokerage	0.22	0.23	0.24	5.6
Transaction (inc. cc proc.)	.[3]	0.75	0.76	.[3]
Transaction (exc. cc proc.)	0.75	.[3]	.[3]	38.9
Credit card processing	0.57	.[3]	.[3]	37.2

[1] Indicates the percentage of firms that used that type of institution in 2003.

[2] * indicates significantly different from 2003 value at 10 percent level of significance; ** indicates significantly different from 2003 value at 5 percent level of significance.

[3] The questions on transaction services were changed between the 1998 and 2003 surveys. In 1993 and 1998, transaction services included obtaining paper money or coins, credit card receipt processing, night deposits, and wire transfers. In the 2003 survey, transaction services did not include credit card processing, which was asked about with PIN-based and signature-based debit card processing.

observed for relationships involving both checking and savings accounts. Relationships involving loans also were less likely to be conducted primarily in person in 2003 than they were in 1993. As with asset services, most of the overall change occurred between the 1998 and 2003 SSBFs, when the incidence of in person interactions for loans fell from 48 to 44 percent.[28] Over the decade, relationships involving each of the individual loan types, with the exception of mortgages, declined by a statistically significant amount with all of the difference appearing after 1998.[29]

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[28] The change in the incidence of in person interaction for relationships involving loans between 1993 and 1998 was not significant at the 10 percent level.

[29] For each of the six loan types, none of the changes in incidence between 1993 and 1998 was statistically significant at the 5 percent level. Only equipment loans had a statistically significant change over this 5-year period at the 10 percent level (data not shown in tables).

Finally, the relationships involving financial management services also experienced a decline in their propensity to involve primarily in person interaction. Like the other product categories, the decline over the decade (from 61 to 57 percent) was attributable to changes in the incidences between 1998 and 2003.

3.3.4.3 Conducting Business in Person by Financial Supplier Type and Service Type

A breakdown of the incidence of in person relationships by service category across institution types is presented in Table 3.7. The table provides an institution type breakdown of the incidence of in person relationships for each of the major service types: checking or savings accounts, loans and lines of credit, and financial management services.

As shown in Table 3.7, the overall tendency of relationships involving the provision of asset services to be conducted in person is only observed for depository institutions. In 2003, 81 percent of asset service relationships involving depository institutions were conducted in person. In contrast, asset service relationships with nondepository institutions were substantially less likely to involve in person interaction than those involving depositories (22 percent versus 81 percent). Over the course of the decade, the propensity for in person interaction in asset service relationships declined for both depository and nondepository institutions. In both cases, the observed decline over the decade was dominated by changes occurring after 1998.

Similar differences were observed across institution types for relationships involving loans. Loan relationships with depository institutions in 2003 were conducted primarily in person 62 percent of the time, compared with only 14 percent of the time for nondepository institutions. Incidences of in person interaction at depository institutions declined by 6 percentage points between 1993 and 2003, while at nondepositories they increased by 4 percentage points. In both cases, the observed changes transpired after 1998 and were significant at the 5 percent level.

Finally, for relationships involving the provision of financial management services, similar differences were observed across depository and nondepository institutions. While financial management relationships involving depositories were largely conducted in person (73 percent in 2003), the observed incidences for nondepositories were substantially lower (18 percent).

3.3.5 Summary and Discussion

The data provided in the previous section provided a detailed look at the relationship between the locations of a firm and its financial service suppliers and how those relationships changed over the decade 1993–2003. The results of the analysis conducted in this study suggest several things about the role of geographic proximity in the provision of financial services to small businesses.

Table 3.7 Proportion of firms conducting business in person, by institution type and major product category

Type of service used	Any service			Checking or savings			Loans or lines of credit			Financial management services		
	2003	1998[1]	1993[1]	2003	1998[1]	1993[1]	2003	1998[1]	1993[1]	2003	1998[1]	1993[1]
Any source	0.54	0.61**	0.62**	0.78	0.84**	0.83**	0.44	0.48**	0.49**	0.57	0.62**	0.61**
Depositories	0.71	0.77**	0.77**	0.81	0.86**	0.85**	0.62	0.69**	0.68**	0.73	0.77**	0.76**
Commercial banks	0.71	0.77**	0.77**	0.81	0.86**	0.85**	0.63	0.70**	0.69**	0.73	0.77**	0.76**
Thrifts	0.73	0.76	0.78	0.85	0.87	0.88	0.62	0.63	0.60	0.72	0.77	0.82*
Credit unions	0.62	0.70	0.64	0.71	0.79	0.81	0.52	0.55	0.56	0.68	0.77	0.63
Nondepositories[2]	0.15	0.12**	0.15	0.22	0.28	0.30	0.14	0.09**	0.10**	0.18	0.16	0.22

[1]* indicates significantly different from 2003 value at 10 percent level of significance; ** indicates significantly different from 2003 value at 5 percent level of significance.

[2]Includes finance and factoring, brokerage and pension, leasing, and insurance and mortgage companies.

The first is that distance continues to matter in banking. While distances vary substantially across financial service products, as of 2003, most financial services provided to small businesses were provided by local institutions. In addition, half of all such services were provided by financial institutions located within 5 miles of the firm's headquarters and the primary method of conducting business with financial institutions remained in person. The close proximity of firms and their financial service suppliers, as well as the frequent use of in person interaction, suggest that the importance of geographic proximity remains.

The second conclusion from this analysis is that the importance of geographic proximity appears to vary substantially across the types of institution providing financial services and according to the financial service being provided. Even when controlling for the type of service, distances between small firms and their non-depository institution providers are substantially greater than those between small firms and the depository institutions from which they receive services. At the same time, the incidence with which relationships are conducted in person is substantially lower for nondepository institutions than depositories. Similarly, even when controlling for institution type, there are consistent differences in distances across product types, with asset services being provided locally more often than loans or financial management services. While explaining the reasons behind these differences is beyond the scope of this paper, clear differences do exist. This suggests that the importance of geographic proximity varies across institution and product types.

The third conclusion to be drawn from this analysis is that the geographic relationships between small firms and their lenders are changing over time. Over the course of the decade examined here, both mean and median distances for most institution types and services provided increased. Additionally, there seems to be a general trend toward less in person interaction between small firms and their suppliers of financial services. However, just as the differences in distances and the tendency toward in person interaction differed across institution types and services being provided, the extent to which distances changed over the decade varied substantially. Any technological changes that may have contributed to these higher distances and diminished use of in person interaction seem to have affected different institutions and products to varying degrees.

Another finding is that while distances generally increased between small businesses and their financial service providers, the changes across the decade were not always monotonic. In particular, for some loans and financial management services, and for some nondepository sources, distances actually declined between 1998 and 2003. These findings are in contrast to the speculation of Petersen and Rajan (2002) that the growth in mean distances over time after 1993 was accelerating. What is responsible for these attenuations or reversals and whether the trends will continue requires additional research. However, such findings do suggest that some factors other than distance-minimizing technological changes may be attenuating the tendency toward increased distance and less in person business.

3.4 Suggested Areas for Additional Research

While there seems sufficient evidence in the data to suggest that geographic proximity remains important in the provision of banking services, several other questions remain unanswered. In this section, we draw upon the existing literature and the analysis provided here to suggest additional areas where further study is needed.

The central unanswered question in the literature is " why does distance matter in banking?" As discussed in the literature review, there are several theoretical reasons to believe that distance should matter in banking, each of which relates to some aspect of transactions costs. Nevertheless, there has been very little empirical work that has attempted to determine the role of these transactions costs in order to ascertain why distances between financial institutions and their customers (particularly small businesses) remain predominantly local. In the current study, we have shown that financial services provided to small businesses tend to be provided by local suppliers, but we are unable in this analysis to determine the relative contributions of different types of transaction costs in leading to this outcome.

Related to the question of why geographic proximity matters in the provision of financial services is "how is the importance of geographic proximity changing?" While this study has documented that distances have changed over the 1993–2003 period in small business lending, the extent of the changes differs substantially across product types and the types of financial institutions that provide them. Nevertheless, most studies on how distances have changed in small business lending have focused exclusively on the question of *whether* distances are changing overall. They have not examined how the changes in distance over time have played out across product and institution types and have not attempted to ascertain how these changes may be affected by the characteristics of the borrowers themselves. A careful analysis of the evolving role of distance that allows for such heterogeneity across firms, institutions, and products is needed.

Without such an analysis it is difficult, if not impossible, to determine what is driving the changes in distance observed in this and other papers, or to speculate about the potential for these changes to continue. While some studies have attempted to test the extent to which small business credit scoring has contributed to greater distances between small businesses and their lenders, they have been unable to isolate the treatment effect of credit scoring. Consequently, it is not possible to draw inferences about the likely effects of a continued expansion of credit scoring.

Additionally, there has been no research, of which we are aware, on the role that demand-side factors may play in the importance of geographic proximity. While technological change may increase the willingness of suppliers of financial services to offer services at a distance, if customers still have a preference for local suppliers and face-to-face contact then the extent to which the technological changes will impact average distances will be muted. An analysis that can disentangle the demand and supply factors that promote the local provision of financial services would improve our understanding of how these markets are currently functioning and of whether geographic proximity will likely continue to matter in banking.

Finally, one factor that has not received much attention is how distance is or should be defined. In each of the theoretical papers that examine the role of proximity in banking, the concept of "distance" is clear and distinct. Banks are located in one point in space (be it geographic, product, or information space), and each customer at another. The size of the transaction costs or the extent of the information asymmetries can then be expressed as a function of the distance between these two points. In empirical studies, that focus on the importance of distance in geographic space, however, this simple concept of distance may be less relevant when either the bank or its customers have multiple geographic locations.

Particularly in the provision of credit, when a bank has multiple offices the concept of distance becomes muddled, and it is not necessarily clear how best to calculate it. The bank's offices may play different roles in providing services to borrowers, with one branch serving as the point of contact where the customer applied for a loan and another housing the decision makers who approve or deny the application, and other offices processing payments, providing customer service, or housing loan monitoring operations.[30] An argument can be made that the distance between the customer and each of these different locations plays a role. Similarly, for banking customers with multiple locations (e.g., businesses with multiple offices or consumers who work and live in different areas), it is not necessarily clear which location is the most important factor in determining from where it obtains its financial services. Each location may play a role, and the importance of each location may differ depending upon the financial service being obtained.

While the most appropriate definition of distance might be multi-dimensional, most of the extant research on the role of distance in banking, including this study, has focused on a single, scalar measure of distance.[31] To a large extent, this reflects the fact that the studies used data sources that contained only a single measure of distance. Nevertheless, as technological and regulatory changes may not have affected the role of each type of distance equally, the choice of distance measure used may affect the conclusions reached.

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[30]Some evidence that such differences may be important is available from the SSBF. In the 2003 survey, firms that applied for loans within the last 3 years were asked to report on how they applied and whether they at some point had to go in person to obtain the loan. Roughly 78 percent of loan applicants went in person at some point in the application process. In contrast, as documented in this chapter, on average in 2003, 44 percent of firms with lending relationships conducted business in person. Likewise, the average and median distances for loan applications were 77 and 5 miles, respectively. For outstanding loans, the average and median distances were 181 and 11 miles. We speculate that the difference is in part because once the loan is approved, many businesses need only make loan payments, and the loan payment office may differ from the loan application office.

[31]There are two notable exceptions to this. The first is the work of Alessandrini et al. (2005), who distinguish between two different types of distance: operative distance, which is the physical distance between the bank and its customers, and functional distance, which is the distance between the bank's decision-making center and the local community of the borrower. This latter type of distance is not limited to measures of geographic distance but may include economic or cultural differences. The second exception is a related work by Alessandrini et al. (2009: Chapter 5, in this volume) who find that both of these measures of distance are important predictors of several different measures of credit rationing to small businesses.

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Chapter 4
Distance, Bank Organizational Structure, and Lending Decisions

Geraldo Cerqueiro, Hans Degryse, and Steven Ongena

Abstract   We survey the extant literature on the effects of both a bank′s organizational structure and the physical distance separating it from the borrower on lending decisions. The available evidence suggests that banks engage in spatial pricing, which can be rationalized by the existence of transportation costs and information asymmetries. Moreover, their ability to price-discriminate seems to be bounded by the reach of the lending technology of surrounding competitors. It is not entirely clear from an empirical viewpoint that small, decentralized banks have a comparative advantage in relationship lending. This advantage is motivated theoretically by the existence of agency and communication costs within a bank. However, differences in data and methodology may explain the inconclusive evidence.

4.1 Introduction

The last two decades have witnessed profound changes in the landscape of the banking industry, especially in the United States and Europe. Deregulation gave rise to an unprecedented wave of consolidation activity. At the same time, the relentless technological progress in information processing and communication abilities redefined the operational scope of financial intermediaries. A first-order effect of technological development seems to have been an increase in the contestability of financial markets. In particular, the facility with which information can now be communicated across large distances resulted in an increase in the geographical reach of all potential financiers. Banks – whose lending activities traditionally relied on their superior ability to overcome informational asymmetries in the credit market – have been forced to revise their *modus operandi* in order to face these new challenges. Widely voiced concerns regarding the potential effects of these changes in the banking industry on the economic activity promptly soared. In particular, these voices

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questioned to what extent small firms – the engine of economic growth and those that most critically depend on bank financing – would be affected.

Among the various consequences of the complex reorganization in the banking industry, two of them are becoming particularly visible. First, banks are becoming larger and more hierarchically complex. Second, banks are expanding in their geographical span and consequently able to lend at larger distances. In this chapter, we review the extant literature on the relation between a bank's organizational structure, its geographical span, and lending decisions. This is a natural step toward understanding the effects on the economic activity of the sea changes taking place in the banking industry, and the fact that this topic has recently attracted great attention of researchers seems to cope with this view.

Despite the existence of a rich theoretical background to understand the relation between organizational structure, distance, and lending conditions, providing proper empirical tests of these theories has proved an extremely challenging task. One major difficulty is due to data limitations. Fortunately, substantial progress has been made in recent years in this respect.

The available evidence suggests that distance is an important factor in lending decisions. Specifically, the degree of local market power the lender possesses is inversely proportional to distance separating it from the borrower. Less obvious is the mechanism driving this effect. The theory suggests that both transportation costs and information asymmetries could induce banks to engage in spatial pricing, but the existing evidence is mixed with this respect. In particular, the available empirical evidence does not allow one to safely single out any of the above explanations.

The role of organizational structure on lending decisions is also far from being a settled issue. Again, data limitations could be behind the inability of the empirical literature to reach a consensus. Although the bulk of the evidence indicates that small, decentralized banks are better in providing relationship loans, there are also some unsettled issues, which may reflect more than simply differences in empirical methodology or data. In particular, it is by no means clear where the competitive advantage of small banks in providing relationship loans stems from. This advantage could be due to larger organizations having higher internal agency costs, higher vertical and horizontal communication costs (across hierarchies and across distance), or to poor incentives of the credit staff to produce "soft" information.

Recent attention has also been drawn to the interrelation between organizational structure and distance as mutual determinants of a lending technology, which in turn influence lending conditions. The interaction between different lending technologies ultimately determines the pattern of competition in the banking market. The geographical reach of each organization is determined not only by its own choices but also by the choices made by the competing banks. In particular, it seems that a bank's geographical reach as well as its ability to price discriminate is negatively related to the reach of the competitors operating in the vicinity.

We organize the rest of the paper as follows. Section 4.2 reviews the literature on the relation between distance and lending decisions. Section 4.3 summarizes the literature on the relation between organizational structure and lending decisions. Section 4.4 concludes.

4.2 Distance and Lending Decisions

Economic theory has long recognized physical, or functional,[1] distance as a source of inefficiency in credit markets, causing potentially relevant economic costs for both the banks granting credit and the firms seeking financing.[2] Market imperfections arise because, for given physical locations of borrower and lender, distance creates an imbalance in the competitive environment in the credit market. In particular, distance shifts market power toward the bank that is located closest to the firm; banks located further away are at a competitive disadvantage, since establishing ties with faraway firms requires a greater effort. Not only are there distance-related pecuniary costs such as transportation costs, but there may also be extra efforts required from the bank to assess the creditworthiness of potential borrowers or to monitor firms' investments.

Recent structural changes in the banking industry stemming from technological progress and consolidation activity have resulted in a substantial increase in the geographical reach of banks.[3] These changes have therefore developed renewed interest in the role of borrower location on lending behavior. A handful of empirical studies now analyze how physical distance separating a bank from its clients affects lending decisions, i.e. the availability and cost of credit for firms.

We start by reviewing the theoretical literature on spatial pricing. We discuss two broad channels through which distance affects lending decisions: transportation costs and asymmetry of information.[4] In the subsequent section, we review the empirical evidence on spatial pricing and spatial rationing.

4.2.1 Theory

4.2.1.1 Transportation Costs

Transportation costs may relate to time, effort, and effective outlays borne by a borrower who seeks to personally interact with a potential financier. The effect of transportation costs on pricing behavior has been formalized in the context of location or

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[1] Alessandrini et al. (2009: Chapter 5, this volume) discuss the differences between functional distance and operational distance and provide empirical evidence on their effects on innovation adoption by firms.

[2] Brevoort and Wolken (2009: Chapter 3, this volume) discuss in greater detail the relevance of distance in banking.

[3] See Udell (2009: Chapter 2, this volume).

[4] In the subsequent theoretical exposition, we disregard long-run dynamics by treating the number of banks (or the level of competition) as given. This assumption is implicit in most empirical studies we will analyze, as they employ samples spanning short time periods. Harsher competition should translate into lower loan rates, since it reduces the average distances between all possible combinations of firms and neighboring banks. On the other hand, an increase in the number of banks aggravates the adverse selection problem by enabling low-quality firms to obtain financing (Broecker 1990) and may result in a retrenchment toward relationship lending (Hauswald and Marquez 2006), resulting in higher loan rates.

product differentiation models (see Hotelling 1929, Salop 1979, Lederer and Hurter 1986). More recently, Chiappori et al. (1995) proposed a spatial competition model of the banking sector (see Freixas and Rochet (1997) for a review). Provided that banks do not observe the location of the borrowers, spatial price discrimination will not occur, even if firms incur different transportation costs.[5] However, banks customarily know the addresses of their loan applicants, and therefore banks can exploit the physical distance separating them from the firm. Greater distance and hence larger transportation costs result in stronger (local) monopoly power for the bank. Accordingly, a bank optimally charges higher loan rates to those borrowers that are located closest to its bank branch. Of course, the degree of monopoly power depends on the locations of potential competitors. The rationale is that closer borrowers face higher transportation costs when visiting competing banks that are located further away than the lending bank. This allows the lending bank to increase the loan rate by an amount equivalent, in the limiting case, to the opportunity transportation cost faced by the borrower.

In the same way, banks may incur transportation costs related to their lending activities, in particular while screening applicants and monitoring borrowers. Banks could in principle pass along these costs to the firms by setting higher loan rates. However, the fact that total monitoring costs increase with the borrower–lender distance opens another window of opportunity for banks to engage in discriminatory pricing. Sussman and Zeira (1995) formalize this idea in a costly state-verification framework and show that banks have local economies of scale with advantages for monitoring the closer they are to their clients. In other words, lenders can extract rents from closer borrowers because more distant competing banks take into account their own higher monitoring costs in their loan terms offers.

In short, spatial price discrimination models based on transportation costs entail the following empirical predictions: (i) a negative relationship between the loan rate and the borrower-lender distance, and (ii) a positive relationship between the loan rate and the borrower-closest competing bank distance.

4.2.1.2 Asymmetry of Information

In the transportation-cost models analyzed, spatial discrimination simply takes place through loan pricing. If the severity of the asymmetric information problem intensifies with distance, then banks can strategically use their informational advantage to create a threat of adverse selection for their rivals, and thus soften competition. Hauswald and Marquez (2006) formalize this idea in a model where the quality of a bank's information-generation process is a decreasing function of the distance separating it from the borrower (see also Almazan 2002). Because banks receive more precise signals about close borrowers, competing banks face increasing adverse

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[5]Notice that location is not exogenous in these models. See for instance Hoover (1936) for a spatial price discrimination model with fixed locations.

selection problems when approaching these locally captured firms. As a result, the informed relationship bank can charge higher loan rates to closer firms. An increase in distance between borrower and bank, however, curtails the bank's incentives to invest in information-generation activities. Consequently, distance weakens the bank's capability to extract rents from relationship borrowers, at the same time it aggravates adverse selection problems for the lender with respect to transactional borrowers. Interestingly, the predictions in Hauswald and Marquez (2006) on loan pricing resemble those from transportation-cost models, i.e. loan rates decrease in the distance between the borrower and the relationship lender, but increase in the distance between the borrower and the competing transactional banks. As we will show later, the coinciding predictions on the role of distance on loan rates stemming from such dissimilar theoretical arguments pose serious identification challenges at the empirical level.

Spatial pricing models based on informational asymmetries also demonstrate that geographical credit rationing by banks can occur in equilibrium, where the underlying rationale is an adverse selection mechanism close in spirit to that in Stiglitz and Weiss (1981). In Hauswald and Marquez (2006), for example, more distant applicants are more likely to be credit rationed because of the winner's curse threat. A similar prediction is put forward by Carling and Lundberg (2005). Hauswald and Marquez (2006) also postulate that the precision of the signal that a bank receives when assessing a borrower's default probability decreases with distance, and show that banks optimally turn down credit applications from some distantly located firms. Carling and Lundberg (2005) illustrate the idea that physical distance aggravates the information asymmetry problem with the *Church Tower Principle* (CTP). According to the CTP, a bank is on the church tower, and its visual ability to observe the quality of the surrounding firms is constrained by the distance at which the firm is located from the tower.

4.2.2 Empirical Evidence

4.2.2.1 Spatial Pricing

Petersen and Rajan (2002) are the first to provide evidence of spatial loan pricing. They employ the 1993 National Survey of Small Business Finance (NSSBF) and find that a borrower located around the corner from the lender pays on average 126 basis points more than a borrower located 9 miles (the sample median) from the lender. While economically and statistically relevant, they don't control for the presence of other potential lenders in the vicinity. Moreover, Petersen and Rajan (2002) use predicted distance rather than actual distance in their regressions, which makes the results difficult to interpret. They calculate predicted distance by projecting a set of variables associated to the credit quality of the firm on observed distance. The underlying assumption is thus that more transparent firms have greater predicted distance.

In a recent study, Degryse and Ongena (2005) provide more comprehensive evidence on the occurrence of spatial price discrimination in bank lending. They employ a dataset comprising the entire loan portfolio of an important Belgian bank that operates throughout Belgium. This dataset contains information on both the distance between the borrower and its lending bank and the distance between the borrower and other competing banks, as well as several measures of banking competition. In addition, the dataset covers a narrow period of time (1995–1997), making it suitable to test hypotheses generated by static spatial pricing models. They find that an increase in traveling distance from zero to the sample median (about 4 minutes) drops the expected loan rate by 14 basis points. In addition, they obtain a symmetric and qualitatively similar impact on the loan rate resulting from an analogous increase in the distance to the closest (quartile) competitor, a result that may reflect linear transportation costs.[6] From a variety of exercises, Degryse and Ongena (2005) confirm that transportation costs are the likely cause of the spatial price discrimination documented for Belgium.[7,8]

In an ensuing study, Agarwal and Hauswald (2006) exploit a novel dataset from a major US bank to analyze the effect of borrower proximity on credit-market conditions. Their results suggest that a borrower located around the corner from the lender pays on average 195 basis points more than a borrower located 2.6 miles (the sample median) from the lender. In addition, an increase in a firm's traveling distance to the closest competing bank from zero to the sample median (0.55 miles) raises the loan rate by 55 basis points. Agarwal and Hauswald (2006) subsequently show that these results become statistically insignificant when they introduce a proxy for the bank's proprietary information about the borrower (the bank's internal credit score). Accordingly, they conclude that physical distance is simply a proxy for a lender's informational advantage, hence providing support for models of price discrimination based on information asymmetries.[9]

4.2.2.2 Spatial Rationing

In theoretical models founded on information asymmetries (Hauswald and Marquez 2006, Carling and Lundberg 2005), geographical credit rationing may be the bank's optimal response to the deterioration of the quality of the information pertaining

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[6]The cost of one traveling minute equals 3.5 basis points in Degryse and Ongena (2005) and about 5.4 basis points in Petersen and Rajan (2002) (we infer the average speed in the United States from Agarwal and Hauswald (2006)).

[7]For instance, they find that borrowers located in densely populated (i.e. urban) areas experience discrimination twice as harshly, which is probably related to higher traveling times in urban areas due to traffic congestion.

[8]Recent evidence by Casolaro and Mistrulli (2007) seems to support this view. They find with an Italian dataset that spatial pricing is mainly confined to transactional loans.

[9]The bank's internal credit score itself could also be the avenue through which loan officers price discriminate, a possibility not addressed in their paper.

to distantly located firms. Nevertheless, the empirical evidence on the existence of geographical credit rationing is mixed. For instance, Petersen and Rajan (2002) find that applications from more distantly located firms are turned down more often in the US and that this effect has sharply decreased over time. In contrast, Agarwal and Hauswald (2006) find that the effect of distance on the likelihood of credit denial nearly vanishes once they properly control in their regressions for the credit quality of the borrowers. Findings by Carling and Lundberg (2005) and by Uchida et al. (2008) indicate the absence of distance-related credit rationing in Sweden and Japan, respectively.

We offer three potential, not necessarily mutually exclusive, explanations for the lack of conclusive evidence on the incidence of spatial credit rationing. First, technological innovations may be breaking the "tyranny of distance" in small business lending. These innovations have granted small firms with increased access to transactions loans, for which physical distance does not matter.[10] Second, transportation costs (that are fixed per loan), rather than informational asymmetries may be the explanation for the spatial price discrimination documented (as Degryse and Ongena (2005) argue). Third, we have disregarded so far the firm's incentives concerning the choice of a lender. Although the distance between borrowers and lenders has increased in the US, there is strong evidence that small firms still seek to establish ties with local financial institutions.[11] This suggests that the empirical literature may have failed to detect spatial credit rationing due to a self-selection mechanism. In particular, those firms that are likely to be rationed credit on the basis of distance have incentives to seek relationship loans from local banks.

4.2.2.3 Distance and Collateral

Petersen and Rajan (2002) and Berger et al. (2005) find that collateralized loans are made, on average, at greater physical distance from the lender. However, they assume in their regressions that the causation effect goes from the collateral variable to the distance variable, hence disregarding a potential endogeneity problem.[12]

We believe that an empirical test of the effect of physical distance on collateral requirements would shed light on the nature of the mechanisms underlying the documented spatial pricing. For instance, if information asymmetries are driving the observed spatial pricing, as adverted in Agarwal and Hauswald (2006), then the likelihood that the loan is secured by collateral should increase with distance (*ceteris paribus*). In contrast, if collateral requirements are not related to distance, models

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[10]Udell (2009: Chapter 2, this volume) analyzes the effect of technological innovation on small business lending.

[11]See Brevoort and Wolken (2009: Chapter 3, this volume).

[12]An important set of theoretical models motivates collateral as arising from information gaps between borrowers and lenders. In particular, collateral may offset problems of adverse selection (Bester 1985, Chan and Kanatas 1985, Besanko and Thakor 1987) and/or moral hazard (Boot et al.1991) in credit markets.

based on transportation costs would be a more plausible explanation of spatial pricing (as in Degryse and Ongena 2005).[13]

We estimate the effect of the distance between borrower and lender (*Distance*) on the likelihood that the loan is secured by collateral (*Collateral*).[14] For this purpose we employ both the 1993 NSSBF and the Belgian dataset used by Degryse and Ongena (2005).[15] By applying the two datasets we can retain differences between Belgium and US in banking markets landscapes as a possible route to reconcile the conflicting views of Degryse and Ongena (2005) and Agarwal and Hauswald (2006).

First, we present the results for the 1993 NSSBF data set of estimating a *logit* regression of *Collateral* as a function of firm, loan characteristics and *Distance*.[16] Our findings, reported in Table 4.1, indicate that an increase in distance between

Table 4.1 Incidence of collateral in the 1993 NSSBF

Variable	Coefficient	Standard error
Log of length of relationship (years)	−0.27***	0.08
Main bank (0/1)	−0.27*	0.15
Number of borrowing sources	0.01	0.03
Log of firm's age at start of relationship (years)	−0.24	0.21
Log of total assets	0.14***	0.04
Debt-to-assets ratio	0.10	0.07
Profit-to assets ratio	0.02	0.02
MSA (0/1)	−0.15	0.14
Distance to lender (miles)	0.08**	0.04
Number of observations	1,656	
Pseudo-R^2 (%)	4.83	

The table lists the coefficients and the standard errors from a logit regression where the dependent variable is one if the firm pledged collateral for the most recent loan. Besides the variables reported, each regression includes eight 2-digit SIC code dummies and three variables controlling for the type of organization of the firm. We refer to Chakraborty and Hu (2006) for a detailed description of the dataset and variables. The symbols ∗, ∗∗ and ∗∗∗ denote significance at the 10, 5 and 1% level, respectively.

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[13] A third possibility is addressed in Inderst and Mueller (2007). In their model the use of collateral is limited to loans granted by local lenders that have superior information over more distantly located competitors.

[14] This analysis implicitly assumes that the choice of a lending bank located at a given distance from the firm precedes the design of the loan contract. This is always the case when the firm has a pre-established relationship with the bank.

[15] Unfortunately, the two datasets contain different types of information, which restrains us from performing a totally controlled (i.e. ceteris paribus) empirical test.

[16] We use a specification similar to that in Chakraborty and Hu (2006) (model (1) in Table 2, p. 97), who also employ the 1993 NSSBF, with the following differences: (i) we use the variable *Main Bank* as a proxy for the scope of the bank-firm relationship rather than the number of financial services, (ii) we correct the age of the firm by the duration of the relationship between bank and firm, and (iii) we add to the model the bank-firm distance, as well as a variable indicating whether the firm is located in a Metropolitan Statistical Area.

lender and borrower from zero to the sample median raises the probability of the loan being secured by collateral by 2%. The effect is statistically significant at the 5% level but economically modest (as the sample median loan is secured by collateral). Second, we perform the same exercise using the Belgian sample. We report the results in Table 4.2. Employing a specification identical to that used in Degryse and Van Cayseele (2000) (model (1) in Table 3, p. 105) we find a negative, though both economically and statistically negligible, effect of *Distance* on *Collateral*. We also acknowledge a substantial difference in fit between the two models (in terms of pseudo-R^2).

Table 4.2 Incidence of collateral in the Belgian sample

Variable	Coefficient	Standard error
Small firm (0/1)	0.73**	0.34
Log of length of relationship (years)	0.57	0.10
Main bank (0/1)	−0.09***	0.06
Log of loan size	0.47***	0.08
Log of repayment duration	0.62***	0.16
Distance to lender (minutes)	−0.03	0.06
Number of observations	15,044	
Pseudo-R^2 (%)	80.29	

The table lists the coefficients and standard errors from a logit regression where the dependent variable is one if the firm pledged collateral for the most recent loan. Besides the variables reported, each regression includes 49 two-digit NACE industry dummies, eight regional dummies, two year dummies, four dummies for the revisibility of the loan, five dummies for the purpose of the loan and three dummies for the governance characteristics of the firm. We remit to Degryse and Van Cayseele (2000) for a detailed description of the dataset and variables. The symbols ∗, ∗∗ and ∗∗∗ denote significance at the 10, 5 and 1% level, respectively.

These results are not necessarily inconsistent with the view that different mechanisms may drive spatial pricing discrimination in loan markets in US and Belgium. In particular, our findings do not contradict the finding in Degryse and Ongena (2005) that transportation costs cause the discrimination they document for Belgium, whereas asymmetries of information seem to be an important determinant of the spatial pricing discrimination observed for the US.

4.3 Organizational Structure and Lending Decisions

A recent body of literature draws attention to the relation between the organizational structure of a bank and its proclivity to provide credit to particular types of firms. This literature is founded on the view that relationship lending and transactions lending are intrinsically different lending technologies. As a result, a bank that favors relationship lending requires a different organizational form from one that specializes in arm's length lending (Berger and Udell 2002).

Under relationship lending, loan officers collect proprietary information over time through frequent and personal contacts with their clients, as well as with the

local community. This information is "soft" in nature, being difficult to store and credibly communicate to others. A large bank, where multiple layers of management separate the agents who collect this "soft" information from the ultimate decision makers, may have a competitive disadvantage in relationship lending (Berger and Udell 2002, Stein 2002). In contrast, a complex organizational structure may give the bank an advantage in transactions-based lending, where the decisions are essentially based on automatisms that are fed on objective criteria, or "hard" information (e.g. balance sheet or income statement information).

Relationship lending allows a bank to overcome information asymmetries in credit markets (Boot 2000) and therefore it should primarily benefit small and opaque businesses. It is not surprising, as a result, that the recent organizational changes driven by consolidation in the banking industry (Berger et al. 1999) raised widely expressed concerns of a severe cut-back in small business lending. At the same time, these concerns have sparked a renewed interest by scholars in the broader relation between the organizational design of banks and lending conditions.

We start by providing an overview of the theoretical literature that studies organizational design and delegation of authority in the context of the banking industry. We subsequently review the relevant empirical evidence in light of this theory.

4.3.1 Theory

The economics literature has recently drawn substantial attention to the organizational design of firms, focusing in particular on the distinctive features of centralized and decentralized systems. The comparative performance of the decentralized and centralized allocation systems is typically analyzed on the basis of communication and information processing they entail, as well as on the incentives these systems induce on individual agents. Decentralization involves the distribution of information processing responsibilities across agents and minimal communication requirements, resembling a market-based system consistent with self-interested behavior of agents. This implies, however, that an agent who is a delegated decision-making authority tends to act in its self-interest, rather than the interest of the organization; in other words, decentralization may give rise to internal agency costs. If these incentive problems cannot be contractually remedied *ex ante*, the choice between a centralized and a decentralized system follows from the balance between these internal agency costs and communication or information processing costs. In particular, a decentralized system is generally the preferred design when these agency costs are not too severe (Mookherjee 2006) or when the activity of the organization crucially depends on the agent's – i.e., the loan officer's – expertise (Berger and Udell 2002, Stein 2002).

The fact that information is critical to the activity of lending makes the banking sector especially interesting to analyze organizational theories. Following the recent consolidation activity, academics have increasingly focused their interest to

the potential implications of the induced changes in the organizational structure of banks on small business lending.[17] There is a widely held view that small banks should be more inclined than their larger counterparts to lend to small and opaque firms. This result is due to the existence of organizational diseconomies that restrict the scope of large banks in their lending activities. While several theories have been proposed to motivate the existence of such organizational diseconomies, it seems that these diseconomies stem altogether from a common origin – the fact that small business lending and transactions-based lending are two inherently different activities (Boot 2000, Berger and Udell 2002).

In small business lending, the bank bases its credit decisions largely on proprietary or "soft" information about the firm and its owner, gathered through a multiplicity of contacts over time. This information allows the bank to assess the quality of the firm beyond what the financial statements of the firm (the "hard" information) might otherwise indicate. Consequently, "soft" information may confer the bank with a competitive advantage over banks that make their decisions merely on the basis of "hard" information, as they obtain a less precise signal of the creditworthiness of the firm. This "soft" information is, however, hardly verifiable by anyone else than the agent who produces it, and thus difficult to transmit to others or to store. Consequently, the inexistence of proper channels to communicate this "soft" information within a bank requires that internal adjustments be made at the organizational level. For instance, the bank should adopt a more general communication code, as well as alternative channels of information transmission within the organization at the cost of specialization (Crémer et al. 2007). Put differently, the optimal organizational structure minimizes communication costs and expected information losses that result from both horizontal and vertical communication of subjective information.[18]

The subjective nature of "soft" information is essentially what makes small business lending different from transactions lending and what restrains more centralized banks (e.g. a large bank holding company) from being as competent at relationship lending as decentralized banks (e.g. a small community bank). This point is demonstrated, for example by Stein (2002), who investigates how the organizational structure of a bank affects the incentives of loan officers to produce and use different types of information. Stein (2002) shows that loan officers in hierarchically complex organizations will have less incentive to collect "soft" information since they do not generally have decision-making authority and instead have to report that information to their superiors (see also Aghion and Tirole 1997). In contrast, a decentralized organization is more likely to reward research efforts of loan officers by ensuring that they will have access to funds that they can use to capitalize on that

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[17]There is ample evidence of the importance of a bank relationship to small firms in terms of credit availability (Petersen and Rajan 1994), lower loan rates (Berger and Udell 1995, Degryse and Van Cayseele 2000) (in relationship duration and scope, respectively), reduced collateral requirements (Berger and Udell 1995) and intertemporal risk sharing (Petersen and Rajan 1995).

[18]See, for instance, Becker and Murphy (1992), Bolton and Dewatripont (1994), Radner (1993) and Garicano (2000).

expertise. Of course, one can argue that "soft" information can be somewhat hardened and subsequently passed on "upwards".[19] The model in Stein (2002) suggests that in this case small banks may still be more efficient providers of relationship-based loans than large banks, since the incentives problem turns into a bureaucracy problem, i.e. loan officers reallocate excessively their effort from "field work" to report writing.

The prediction that a narrower gap between allocation and control promotes relationship lending is shared by Berger and Udell (2002). They address the key role that a loan officer plays as a repository of "soft" information within a bank and focus on the agency problems that this gives rise to. As suggested before, these agency problems stem from the intangible nature of "soft" information and, in particular, from the difficulty in disseminating this information within an organization. This creates a trade-off in terms of the efficiency of a decentralized system. On the one hand, banks have to delegate more authority to their loan officers, since loan officers are in a unique position to personally contact the firm, its owner, and the local community, i.e. they have the greatest exposure to "soft" information. On the other hand, delegation may aggravate agency problems if the incentives of the loan officer are not properly aligned with those of the bank.[20] The implications arising from this trade-off have been extensively analyzed in the principal-agent theory. In particular, a bank that specializes in relationship loans should invest more in monitoring both loan officers and the performance of their loan portfolios (Udell 1989, Berger and Udell 2002).[21] Because these monitoring costs increase with the hierarchical complexity of the organization, small decentralized banks are endowed with another source of comparative advantage in small business lending.

So far we have neglected the fact that the competitive structure of credit markets (and hence lending conditions) is also shaped by differences in organizational structure across different competing banks. In other words, the organizational choices made by a bank's rivals limit its own scope concerning lending decisions. Degryse et al. (forthcoming) bridge this gap by investigating how differences in rival banks' organizational structures shape banking competition. They start by bringing into

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[19]Petersen (2004) argues that the categorization of information into "hard" and "soft" is often too restrictive. He further suggests that "hard" and "soft" information are the extremes of a continuum along which information can be classified. An illustrative example of hardening "soft" information is a loan officer filling a report where he evaluates several attributes of an applicant (e.g. honesty and managerial competence).

[20]These agency problems may result in the collusion between the loan officer and the firm (Tirole 1986), manipulation of "soft" information (Godbillon-Camus and Godlewski 2005, Ozbas 2005), excessive use of "discretion" in defining loan terms (Cerqueiro et al. 2007), and overlending or hiding a deteriorating condition of a borrower (Berger and Udell 2002).

[21]Godbillon-Camus and Godlewski (2005) use a principal-agent framework to study a loan officer's incentives to manipulate the signals conveyed about potential borrowers, which are based on "soft" information. They suggest that an adequate compensation scheme solves *ex ante* these agency problems. Ozbas (2005) analyze the optimal level of organizational integration when the agents' (i.e. loan officers') access to resources depends on the signals they communicate to their superiors.

a theoretical model the evidence that banks engage in spatial price discrimination together with the view that organizational structure affects the nature of the lending technology. Their model extends the Hotelling (1929) location differentiation framework in that they allow a bank's organizational structure to act as a lending technology that determines a bank's geographical reach. Though they assume that the marginal cost associated with distance (transportation or monitoring costs) is identical across firms and banks for one visit, the required number of visits or the monitoring effort is determined by the lending technology. For instance, large, hierarchical organizations with automated decision-making mechanisms have an economic advantage at lending to distant firms since their technology is more cost-effective. Because these organizations rely to a larger extent on "hard" information, they will communicate less often and in impersonal ways with their borrowers, resulting in lower distance-related costs.

4.3.2 Empirical Evidence

4.3.2.1 Organizational Structure and Information Use Within a Bank

A recent stream of empirical studies concerns the transmission of different types of information within an organization. Liberti and Mian (forthcoming) investigate the effect of credit approval at higher hierarchical levels on the importance of "hard" and "soft" information in the credit approval decision.[22] They use a dataset consisting of detailed information from the credit folders of a multinational bank in Argentina. The data contain objective elements as well as subjective assessments collected by the loan officer during the application process. This dataset also contains information on how far in the hierarchical ladder (and where) the application needs to travel before reaching the final credit decision. Consistent with organizational theories, Liberti and Mian (forthcoming) find that "hard" information gains importance while "soft" information loses importance when going up the hierarchical ladder. They also find that these changes in "hard" and "soft" information sensitivity are particularly abrupt when the higher-level officer is located in a different branch. This is in line with the view that the subjective nature of "soft" information makes its communication across large distances difficult. Liberti and Mian (forthcoming) also find that the decrease in sensitivity to "soft" information is less pronounced when information is assembled by more experienced loan officers. They cannot say, however, whether this result is due to a "reputation effect" or due to superior communication skills of more experienced loan officers (Ozbas 2005, Crémer et al. 2007).

   Despite providing support of the view that communicating subjective information across hierarchies is costly, Liberti and Mian (forthcoming) are unable to isolate the factor driving this effect. Their results strongly suggest that it is the physical distance (and not necessarily the hierarchical gap) generating the loss of credit sensitivity to

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[22]See also Liberti (2005).

"soft" information. Consistent with this view, Mian (2006) uses data from Pakistan to show that the geographical distance between a foreign bank's headquarter and the local branches leads the bank to shy away from relationship lending. In contrast, Liberti (2004) provides support for the loan officers' incentives view in Stein (2002) by demonstrating that relationship managers who receive more authority put more effort into collecting "soft" information from their corporate clients.

4.3.2.2 Organizational Structure and Information Use Across Banks

Considerable research has been recently devoted to test whether less hierarchical complex organizations are more efficient providers of relationship-based small business loans. The interest in this topic emerged primarily in response to the public concerns that the financial services industry consolidation trend might result in the reduction in the availability of credit to small firms (Berger et al. 1999). These concerns are founded on the fact that small businesses have crucially relied on banks to satisfy their credit needs (Cole et al. 1996, Berger and Udell 1998) and further reinforced by the evidence that large banks allocate smaller percentages of their assets to small business loans than do small banks (Berger and Udell 1996, DeYoung et al. 1999, Keeton 1995, Peek and Rosengren 1996, Strahan and Weston 1996).

There is ample evidence that small banks are better able to collect and act on "soft" information (Scott 2004, Cole et al. 2004, Berger et al. 2005, Uchida et al. 2008, Casolaro and Mistrulli 2007). However, there is also some conflicting evidence. For example, Jayaratne and Wolken (1999) find that the probability that a small firm is credit rationed does not significantly depend on the presence of small banks in the market. Furthermore, Black and Strahan (2002) find that the liberalization of banking laws in the United States increased the rate of creation of new businesses, though it simultaneously reduced the number as well as the share of small banks.

The documented evidence provides insufficient indication that a bank's organizational structure affects credit availability to small businesses. In fact, the theory clearly states that it is organizational complexity rather than bank size shaping a bank's proclivity to make small-business loans. Studies that analyze the effect of organizational complexity on lending conditions to small firms also provide somewhat inconclusive evidence, which may be explained by the diversity of measures of organizational complexity employed. For instance, Strahan and Weston (1998) find that the organizational complexity of a holding company (measured as the total number of bank subsidiaries and the number of states in which it operates) is not significantly associated with its propensity to lend to small firms. In contrast, Keeton (1995) finds that banks with a large number of branches and banks owned by out-of-state holding companies devote lower proportions of their deposits to small businesses than do comparable banks. DeYoung et al. (1999) control for the confounding effects of a bank's size and age and obtain similar results, while Alessandrini et al. (2008) show that differences in corporate culture between parent and affiliated banks lead the latter to shy away from small business lending. Degryse

et al. (forthcoming) demonstrate that the presence of larger and hierarchically organized rivals in the vicinity reduces the geographical reach of the lending bank and assuages spatial pricing.[23]

4.4 Conclusion

A growing body of both theoretical and empirical literature studies the real effects of the recent changes at the organizational as well as operational level in the banking industry. We review the literature that focuses on the effects of both bank-firm distance and bank organizational structure on lending decisions.

There is strong evidence of spatial pricing by banks, but it is still unclear what is the underlying mechanism driving it. Transportation costs and information asymmetries are two, nonmutually exclusive, explanations. Important differences in the datasets that have been used to test these theories may explain the dissimilar results obtained. The empirical evidence on spatial credit rationing is even more inconclusive. Moreover, it seems inconsistent with theories that rationalize spatial pricing in the context of models of asymmetric information.

Concerning organizational structure, it seems that small banks and less hierarchical complex organizations have an advantage in relationship lending. However, the empirical findings are not fully conclusive and suggest that this advantage may have decreased over time due to the expansion of transactions lending activities by large organizations. One major difficulty faced by empiricists appears to be the lack of precise measures of organizational complexity beyond bank size.

In short, despite notable research efforts, the complex net of relations linking distance, organizational structure, and lending conditions is far from dismantled. As a result, the most likely conclusion springing from this chapter is that further research is definitely warranted.

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[23]Important changes in bank organizational structure have resulted from technological innovation and to the recent wave of bank consolidation in recent decades. The effects of these phenomena on small business lending are covered by Udell (2009: Chapter 2, this volume).

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Chapter 5
Geographical Organization of Banking Systems and Innovation Diffusion

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Abstract The empirical literature is largely supportive of the importance of financial constraints and identifies local banking development and relationship lending as possible determinants of firms' propensity to innovate. In this chapter, we argue that the spatial organization of banking systems and the distance of local branches from banks' decisional centers are major factors influencing the effectiveness in collecting and processing soft information on local innovative firms. We provide evidence showing that, while branch density and the length of credit relationships have a positive causal effect on innovation when considered singularly, after controlling for the functional distance between the banking system and the local economy they lose statistical significance in favor of the latter. In this perspective, our results suggest that the geographical organization of banks and the spatial distribution of their headquarters represent key variables for local development.

5.1 Introduction

The objective of this chapter is to examine the impact of the geographical distribution of a country's banking system on the diffusion of process and product innovations across firms.

Innovation is the first pillar of the Lisbon strategy for boosting the competitiveness of the European Union and achieving the target of full employment. In a globalized and fast changing economy, it is argued, European companies must increase R&D spending in order to ride competition successfully, and they have to speed up the diffusion of new technologies and the introduction of new products. To this end, the removal of all impediments to the creation and adoption of innovation is a key policy issue.

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A frequently mentioned hindrance to the diffusion of innovation is access to external financial resources. As argued, investments aimed at changing the firm's production process, introducing a new technology, or launching a new product are typically riskier than investments in the established activity of the firm. Moreover, they are characterized by a large content of proprietary information on future profitability, are firm specific, and consist in large part of intangible assets which can hardly be pledged as collateral to secure loans. All such features make the information gap to banks (as nonspecialized financiers) wider, dissuading them from funding innovative projects on fair terms.

The empirical literature is largely supportive of the importance of financial constraints for the adoption of innovation by firms.[1] A number of recent studies have considered the finance-innovation nexus by using the first, second, and third "Community Innovation Survey" carried out by the European Union and Eurostat on firms in EU area countries. These studies show that a firm's decision to introduce and complete an innovation is positively correlated with its cash flow and negatively correlated with the lack of appropriate sources of financing as perceived by the firms (Canepa and Stoneman 2002, Mohnen and Roller 2005, Savignac 2006, Mohnen et al. 2008). Moreover, insufficient financing shows a high degree of complementarity with other hampering factors like the perceived risk by firms, innovation costs (Galia and Legros 2004), or insufficient skilled personnel, lack of cooperation with other firms, and regulatory obstacles (Mohnen and Roller 2005).

However, by focusing on the effects of financial constraints on the firm's choice of innovating, such studies do not tell us whether the difficulties of funding innovative projects are demand or supply driven and, consequently, do not provide insights on how to remove financial impediments to innovation.

Closely related to our research question, contributions by Ferri and Rotondi (2006), Herrera and Minetti (2007) and Benfratello et al. (2008) attempt to ascertain to what extent the supply of finance affects the adoption of innovation by a representative sample of Italian manufacturing firms. These studies identify local banking development and relationship lending as possible determinants of a firms' propensity to innovate, extracting firm level information from the same source we use (the surveys run every 3 years by the Observatory of Small and Medium Enterprises affiliated to the Italian banking group Unicredit). Thus, their findings are directly comparable with ours.

Benfratello et al. (2008) measure the degree of development of the local banking system with the number of branches, divided by population at the provincial level, and find that over the period 1992–2000 the probability of introducing an innovation is significantly higher for firms headquartered in provinces where the branch density is higher. Such a positive effect of branch density proves to be more robust for process than for product innovation and greater for small, financially dependent,

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[1] See Hall (2005) for a review

high tech firms. Moreover, it maintains its statistical significance once the endogeneity of branch density is addressed by using instrumental variable estimations.

However, Benfratello et al. (2008) do not control for any other characteristics of the local banking system (e.g., the degree of market concentration) or for other aspects of the bank–firm relationship. The latter is the focus of the study conducted by Herrera and Minetti (2007). The authors consider only the 8th Unicredit survey covering the period 1998–2000 and document that, once instrumented, the length in years of the credit relationship with the main bank is positively correlated with the probability of a firm introducing innovation. Unlike Benfratello et al. (2008), Herrera and Minetti find that it is the likelihood of product innovation which is more sensitive to relationship banking. Moreover, they find that the branch density and degree of credit market concentration in the province, as well as regional financial development, do not significantly affect the decision to innovate.[2]

Ferri and Rotondi (2006) extend the study by Herrera and Minetti by adding data from the most recent Unicredit survey (covering the period 2001–2003), augmenting the model with the firm's financial structure and other control variables and distinguishing between firms operating in or outside industrial districts. On the whole, their findings confirm results obtained by Herrera and Minetti (2007), suggesting in addition that the duration of the bank relationship also strongly affects the likelihood of process innovation. They also find that branch density is slightly positively correlated with process innovation, while the Herfindahl-Hirschman index computed on bank loans reduces the probability of introducing product innovation.

Summing up, after controlling for the specific bank–firm relationship, empirical evidence gives limited support to the positive effect of the size and performance of the local banking system on the diffusion of innovation across local firms in Italy.

In this chapter, we further investigate the role of the geographical distribution of banks and argue that what matters for boosting innovation is not the number of branches working in the province but their organizational structure and distance from banks' decisional centers. In particular, our contribution with respect to the existing literature is twofold.

First, we estimate the likelihood of a firm introducing an innovation by controlling for the functional distance of the local banking system, in addition to the provincial branch density and the length of the bank relationship. In our approach, we define "functional distance" as the distance between local branches and headquarters of their parent banks (Alessandrini et al. 2005).[3] Our hypothesis is that such a distance internal to a bank matters for firms wishing to fund informationally opaque projects as in the introduction of an innovation. The larger the number of small firms in the economy and the greater the heterogeneity across local productive systems,

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[2]Following Guiso et al. (2004), Herrera and Minetti (2007) measure the financial development of Italian regions as the (estimated) relative ease of local households of accessing credit.

[3]Others have suggested the alternative labels of organizational and hierarchical distance (Jimenez et al. 2009, Mistrulli and Casolaro 2008).

the greater this adverse effect is expected to be. On these grounds, the empirical evidence of the Italian bank–firm relationship presented in this chapter can be viewed as a representative case study.

Our second contribution concerns the issue of causality. Although Ferri and Rotondi (2006), Herrera and Minetti (2007), and Benfratello et al. (2008) have already addressed this issue by using instrumental variable estimation methods, they only instrumented their own key explanatory variable – that is either the size of the local banking system or the length of the bank relationship – and not the other financial variables. Since both the size and the distance of the local banking system, as well as the duration of the ties with the main bank, are all potentially endogenous to the innovation propensity of firms, in this chapter, we estimate a model in which the three financial variables are jointly instrumented.

Our main results show that while branch density and the length of the credit relationship have the positive causal effect on innovation found by Herrera and Minetti (2007) and Benfratello et al. (2008) when considered singularly, after controlling for functional distance they lose statistical significance in favor of the former. This is especially true when we focus on the adoption of new technologies, which typically entails fixed investments and a large amount of external finance and attributes great importance to secrecy. Product innovations, whose adoption require a lower degree of secrecy and fixed costs than process innovations, are also positively affected by long-lasting relationships with the main bank.

The rest of the paper proceeds as follows. Section 5.2 provides a selective review of the literature on geographical distribution of banks and lending policies. Section 5.3 illustrates the recent evolution of the geography of the Italian banking system. Section 5.4 presents the dataset and the variables employed in the empirical analysis. In Section 5.5, we discuss our results and draw conclusions in Section 5.6.

5.2 Why Should the Geographical Distribution of Banks' Decision Centers Matter? Theory and Evidence

Consolidation and globalization in the banking industry over the world in the last decades led to the agglomeration of main banks' decisional centers in a few large metropolitan areas within each country. There are two kinds of network externalities that lead toward clustering decisional centers of large, global enterprises: the exchange of formal and informal information on market opportunities and the availability of high quality human, firm, and transport services (Henderson and Davis 2004, Strauss-Kahn and Vives 2005, Bel and Fageda 2008).

The intense debate that preceded and accompanied the process of financial integration in the European and US banking industry in the 1990s mostly emphasized the benefits of strengthened competition in credit markets, greater efficiency, and expanded lending capacity of banks. By contrast, the costs of the predictable geographical concentration of decisional centers that came with the wave of bank mergers and acquisitions were greatly neglected. In fully integrated markets, it was

typically claimed that the geographical reach of banking groups through affiliated banks and branches, as well as the mobility of financial flows, would have assured an adequate response to the needs of local economies, leaving no room for the location of bank decision centers. Admittedly, there could have been episodes in which liberalization and consolidation of banking structures should have negatively impacted on small firms operating far from financial centers. However, these episodes would have been limited in size and temporary, almost completely offset by the reaction of other local banks increasing the supply of relationship lending to small firms and the entry of de novo banks tapping market segments given up by consolidated banks. The distance between the lending office and the "thinking head" of its own parent bank should not have had any appreciable adverse consequence on credit allocation and the development of local economies.[4]

The current view of the effects of bank consolidation is less clear cut and optimistic than it was at the beginning of the 1990s. A growing body of research emphasizes the importance of banking organizational form for lending policies (Berger and Udell 2002, Udell 2009: Chapter 2, this volume). What drives credit allocation, it is typically claimed, is not only the availability of effective information technologies or the possibility of personal face-to-face contacts with borrowers by dislocating branches in the same borrowers' area but also the organizational complexity of the institution to which the loan office belongs. Put differently, the local branch of a large, nationwide bank competes and allocates resources differently than does the branch of a small, local bank.

Underlying this hypothesis are the assumptions that information is widely dispersed throughout the bank organization and that communicating it is a costly and imperfect process. A crucial part of information on local borrowers is non codified and recoverable only by loan officers of local branches with detailed knowledge of the particular environment within which they operate. It is the loan officer who has personal contacts with the borrower, lives in the same community, knows people and firms who do business with the borrower and shares a common set of cultural values, social norms, and business language. The capacity to select worthy projects depends on the officer's effort to combine hard with soft information. However, the amount of resources a loan officer devotes to acquiring soft information is not observable (Milbourn et al. 2001, Novaes and Zingales 2004) and, once collected, the available soft information cannot be inexpensively and unambiguously passed on to the upper layers of the parent bank (Garicano 2000, Stein 2002, Liberti and Mian 2008). Unobservability of information investments and shortfalls in communication channels within the bank generate incentive problems and agency costs (Berger and Udell 2002, Stein 2002, Takáts 2004) which make local branches of hierarchical banks shy away from allocating resources to activities absorbing a lot of soft information, such as small business lending or innovation financing.

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[4]Notable exceptions were Chick and Dow (1988), Martin (1989, 1994), Dow (1994, 1999) and Alessandrini and Zazzaro (1999) who forcefully argued that the costs of bank consolidation and agglomeration of decisional centers would not be temporary and could trigger vicious circles entrapping peripheral areas and local firms in low growth equilibria.

Recently, a number of studies have suggested that much organizational friction stems from the geographical dispersion of the bank organization from branches and subsidiaries and that communication and incentive problems increase with the distance between hierarchical levels.[5]

Functional distance reflects different physical and cultural factors. For example, it is reasonable to believe that the costs of monitoring loan officers per visit increase with geographical distance from the bank's headquarters where loan reviewers are employed. Similarly, reliability of communication and trust between managers and loan officers at the parent bank decrease not only with the physical distance between the bank head office and the local branch but also with the socio-cultural distance between the geographical areas where the staff of the bank's decisional center and operational peripheries work and live (Ichino and Maggi 2000).

Indications of the existence of agency and communication costs related to the functional distance between the parent bank and its lending offices can be gained from several different pieces of research. A number of studies, for example, have provided evidence that both foreign and out-of-market owned banks have a disadvantage in screening small businesses and allocate fewer resources to such companies than domestic and in-market owned banks (Keeton 1995, Cole et al. 2004, Carter et al. 2004, Alessandrini et al. 2005, Carter and McNulty 2005, Mian 2006).

Other studies, consistent with the presence of incentive problems in geographically dispersed banks, found that (i) the average time spent by a loan officer of nationwide banks in a specific branch is significantly lower (Ferri 1997); (ii) empowering loan officers increases the effort they devote to screening and monitoring borrowers and improves the performance of the bank (Liberti 2003); (iii) the resources that the parent bank spends on loan-reviewing activities is positively correlated with the organizational complexity of the bank and the degree of autonomy of local loan officers (Udell 1989).

More direct indications of the importance of distance-related bank organizational frictions are given by a number of recent studies concerning different countries at different levels of financial and economic development. Looking at US multibank holdings, Berger and DeYoung (2006) find that cost and profit efficiency of affiliated banks are negatively correlated with the kilometric distance from the parent bank, suggesting that geographic dispersion reduces the capacity of the bank holding to keep the resource allocation of each component of the bank group under control, even if advances in information and communication technologies seem to have reduced this deficiency over time.

Liberti and Mian (2008) analyze a large multinational bank operating in Argentina and document that the sensitivity of the amount of credit facility granted to soft (hard) information is lower (greater) for credit lines approved at a distant hierarchical level, consistent with the idea that communication frictions increase with distance between the communicating parties of the bank.

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[5]Complementary reviews of this literature are presented by Udell (2009: Chapter 2, this volume) and by Cerqueiro et al. (2009: Chapter 4, this volume).

Using loan level data from Pakistan, Mian (2006) finds that the degree of engagement in relational contracts and lending to informationally opaque firms is greatest for branches of domestic banks, then for branches of Asian banks, and least for branches of non-Asian foreign banks. By contrast, he could find no significant effect of bank size on credit allocation and relational lending.

Consistent with the hypothesis that functionally distant banks specialize in lending to more transparent borrowers, Jimenez et al. (2009) show that for Spanish banks the likelihood of the usage of collateral decreases with the distance between the province where the bank is headquartered and the province of the borrower, irrespective of the level of experience accumulated by the bank in the local market.

Working on Italian data, Alessandrini, Presbitero and Zazzaro (2009) found that small firms are relatively more financially constrained if they are located in provinces where a greater percentage of branches belong to banks headquartered in distant provinces and in provinces with different social and economic environments. Furthermore, Alessandrini, Calcagnini and Zazzaro (2008) find that in Italian bank acquisitions, the greater the cultural distance between the provinces where the dealing partners are headquartered, the greater the changes in the acquired banks' asset allocation in favor of large borrowers and transaction-based financial activities at the expense of small opaque borrowers.

5.3 The Changing Geography of the Italian Banking System

5.3.1 Branch Diffusion and Bank Consolidation

Two contrasting spatial trends emerge from the evolution of the banking system over the last two decades in Italy. On the one hand, the number of branches has increased steadily over time – the 2007 total being twice that of 1990. Moreover, the birth and success of new distributional channels contributed to boost the spatial diffusion of the banking system.[6] On the other hand, the banking industry has been affected by a tough process of consolidation which ended up with a dramatic reduction in the number of banks and with the creation of large banking groups. The total number of banks gradually decreased, dropping from 1,156 in 1990 to a low of 780 at the end of 2004, then slightly increasing in recent years up to 808 banks in 2007. The pace of decline in the number of banks was particularly fast for independent banks, especially in the South. This trend was partially contrasted by the rise in the foreign presence in the Italian banking market and by a growing number of banks affiliated to large banking groups (Table 5.1).

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[6] According to the data drawn from the statistical database (BIP on-line) of the Bank of Italy available at http://www.bancaditalia.it/statistiche, the number of ATMs in operation grew from 25,546 in 1997 to 43,809 at the end of 2007 and, over the same time period, the number of online retail (corporate) consumers increased from 65 (251) thousand to almost 12 (1.8) million, and the number of phone banking consumers increased from one to 11 million

Table 5.1 Italy: number of banks

Year	Center–North					South				
	Independent		Foreign banks	In groups		Independent		Foreign banks	In groups	
	Total	Of which: Mutual banks		Total	Of which: Mutual banks	Total	Of which: Mutual banks		Total	Of which: Mutual banks
1995	566	425	52	132	4	250	194	0	28	0
1996	536	406	50	135	4	235	186	0	30	0
1997	537	406	55	147	5	216	178	0	32	0
1998	534	396	59	155	5	192	169	0	45	0
1999	504	381	58	168	7	165	150	0	39	0
2000	479	366	58	180	7	144	133	0	41	0
2001	476	354	62	188	7	131	121	0	39	0
2002	462	346	60	197	8	124	116	0	33	0
2003	446	335	64	198	11	117	110	0	30	0
2004	437	329	60	196	11	118	110	0	29	0
2005	437	329	66	201	11	118	110	0	29	0

Notes: Our calculations from Bank of Italy data.

The first wave of mergers and acquisitions was strictly connected with the crisis of the major banks operating in southern Italian regions (Mattesini and Messori 2004, Zazzaro 2006). Since the mid-1990s, instead, most of the M&As in the Italian banking industry have been market driven, aimed at reaching the economies of scale and scope required to combat the growing national and international competition in a globalized banking market (Messori and Zazzaro 2003). At the peak of the consolidation process in the early years of the new millennium, a number of major operations created nationwide distribution networks able to offer a full range of products. Subsequently, the banking industry underwent a process of reorganization through the rationalization of distribution channels, branches, networks of sales staff, and the introduction of new organizational models (Bank of Italy 2008).[7]

The consequence of this twin process of geographical diffusion of branches and consolidation of bank organizations is an increase in both the size of the local banking systems and in their functional distance from the local economies. As shown in panel (a) of Fig. 5.1 , branch density has steadily grown all over the country during the period 1990–2007 but in southern regions at a lower pace than in the Center-North. The number of branches per capita almost doubled during the observed period in the Center-North – reaching almost 6.8 branches per 10,000 inhabitants – while the slower increase in southern provinces resulted in around 3.4 branches per 10,000 inhabitants in 2007. This has widened the gap between the two areas making the banking systems of almost all the provinces of the South still more undersized with respect to the served population (panel (b)).

More importantly, the number of branches in the south of Italy belonging to independent southern banks underwent a dramatic reduction from around 3,500 in the mid-1990s to about 1,000 in the new century. This was the result of the acquisition of all the major southern banks by banking groups headquartered in the Center-North causing the virtual disappearance of banking-decisional centers from the South and greatly increasing the functional distance of the local banking systems.[8]

5.3.2 Functional Distance

As discussed in Section 5.1, functional distance concerns the distance between the local branch, where face-to-face dealings with borrowers take place, and the bank's decisional center (typically the registered office), where lending policies are fixed and the loan officer's work has to be reviewed. At the aggregate level, the functional

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[7]In 2007, the consolidation process experienced a further acceleration. The two largest operations gave birth to two big players, Intesa-San Paolo and Unicredit Group, with a national market share equal, respectively, to 20.2 and 17.3% and with a significant presence in Europe (Bank of Italy 2008). However, consolidation also affected the world of cooperative banks (*Banche Popolari*), with the creation of two very large mutual bank groups, Banco Popolare and UBI Banca, both with a large geographical spread with a network of 2,000 branches each.

[8]At the end of 2005, the number of banks in the South was equal to 147, 110 of which were mutual banks, and 21 were affiliated to banking groups headquartered in the Center-North (Table 5.1).
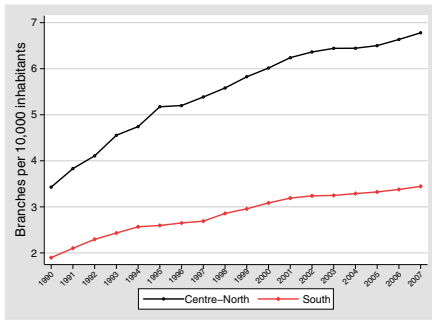
(a) Branch density: evolution
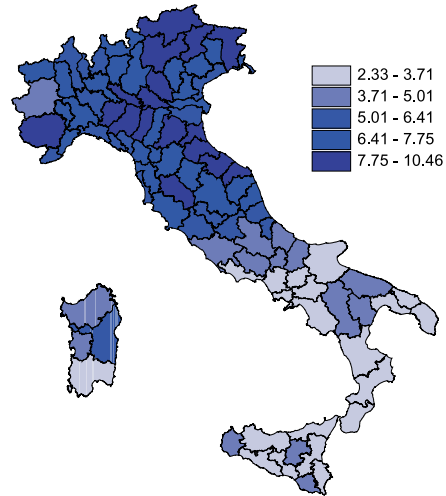
(b) Branch density: 2007

Fig. 5.1 Branch density in Italy

Notes: Our calculations on Bank of Italy data and from ISTAT. Panel (**a**) plots the number of branches per 10,000 inhabitants over the period 1990–2007 in Center–North and Southern regions. Panel (**b**) shows branch density in 2007 in the 95 Italian provinces, classified in quintiles.

distance of a banking system from a certain area (in our case defined according to the Italian administrative provinces) could be measured by the average physical or cultural distance separating local branches from their headquarters. More formally, *F-DISTANCE* in province j can be calculated as:

$$F\text{-}DISTANCE_j = \frac{\sum_{b=1}^{B_j} \left[Branches_b \times \ln\left(1 + D_{jz_b}\right) \right]}{\sum_{b=1}^{B_j} Branches_b}. \tag{5.1}$$

where B_j is the number of banks operating in province j, and D_{jz_b} is the kilometric and cultural distance separating branches belonging to bank b ($Branches_b$) from the headquarters of its parent bank located in province z (with $D_{jj_b} = 0$).[9] In particular,

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[9]Our data do not allow us to disentangle how much decisional autonomy a chartered bank loses when it enters a banking group. In what follows, we assume that the ultimate control of local branches of affiliated banks is in the hands of the lead bank of the holding company. For robustness, we reproduce our empirical analysis building *F–DISTANCE* indicators on the opposite assumption that the ultimate control on lending decisions is taken by the chartered bank. Estimation results remain substantially unaltered and are available on request from the authors. Finally, Italy is currently divided into 107 provinces, which are grouped into 20 administrative regions. However, since some provinces were recently constituted, we use the old classification of 95 provinces.

kilometric distances are calculated with a Jenness (2005) extension of the ArcView GIS software, while social capital is computed as the average voter turnout at the 21 referenda held in Italy in 1993, 1995, and 2001 as published by the Home Office.[10]

Panels (a) and (c) of Fig. 5.2 illustrates, respectively, the evolution of functional distance weighting branches with kilometric distance (*F-DISTANCE_KM*) and with social capital differences (*F-DISTANCE_SC*) in the Center-North and in the South over the period 1990–2007.

Even if functional distance has increased almost in all provinces during the last 20 years, it reveals a large geographic heterogeneity. On average, *F-DISTANCE* is much greater in the South that in the Center–North, especially when measured in terms of social capital, and this regional disparity generally grew throughout the period.[11] In particular, the functional distance of the banking system from the South augmented significantly in the years before and after 2000, when the last medium-sized banks headquartered in the South were acquired by banks headquartered in the Center-North, and then remained almost stable.

Finally, panels (b) and (d) show the great degree of spatial heterogeneity of functional distance across Italian provinces, especially when considering differences in social capital. Notwithstanding the clear North–South divide, there are provinces in the North where local banking systems are as functionally distant as in the South. Besides, even in the "Mezzogiorno", the picture is not homogeneous, with some provinces exhibiting values of the functional distance indicators much lower than the regional average.[12]

## 5.4 Data, Variables, and Descriptive Statistics

5.4.1 The Dataset

We draw information on innovation adoption, bank–firm relationship, and other firm characteristics from the widely used Survey of Manufacturing Firms (Indagine sulle Imprese Manifatturiere) published every 3 years by the Italian banking group Unicredit (and formerly by Capitalia and Mediocredito Centrale). The survey collects a large set of information on a representative sample (stratified by firm size, industry sector, and firm location) of Italian firms with more than ten employees.

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[10]Participation at referenda as indicator of social capital has been introduced by Putnam (1995) and employed in the banking literature by Guiso et al. (2004), Alessandrini, Calcagnini and Zazzaro (2008), and Alessandrini, Presbitero and Zazzaro (2009), amongst others.

[11]More precisely, in 2006, *F–DISTANCE* measured in terms of social capital (kilometers) in the South was 2.4 (1.6) times greater than in the Center-North, compared to a ratio of 1.9 (1.5) in 1990.
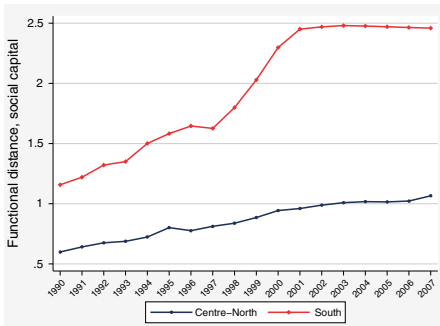
[12]Considering *F–DISTANCE_SC*, the provinces of Aosta, Imperia and Trieste are examples of the former phenomenon, while Chieti, Matera, Sassari, Cosenza, and Ragusa are amongst the southern provinces with levels of functional distance below the average.
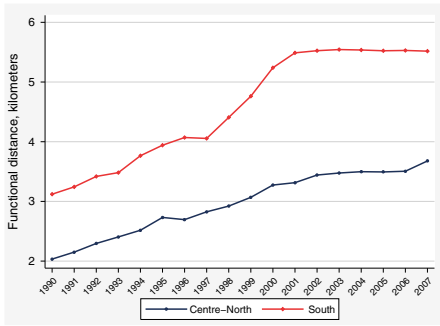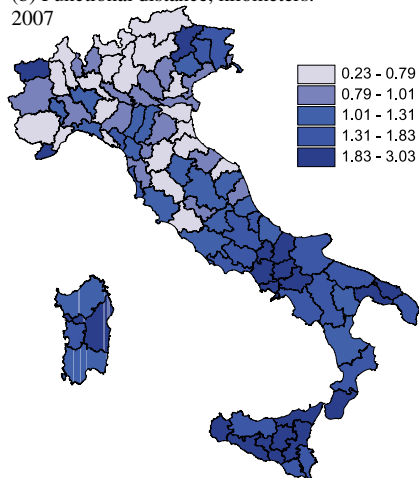
(a) Functional distance, kilometers:
evolution
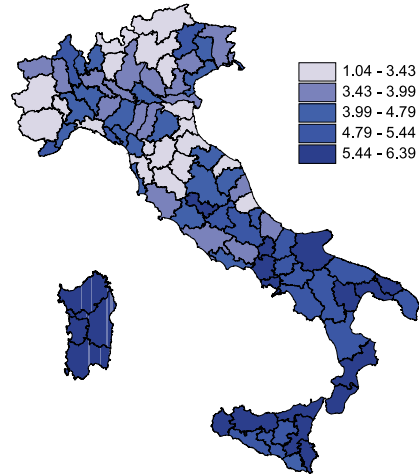
(b) Functional distance, kilometers:
2007

(c) Functional distance, social
capital: evolution

(d) Functional distance, social
capital: 2007

Fig. 5.2 Functional distance in Italy
Notes: Our calculations on Bank of Italy data. Panels (a) and (c) plot the evolution of functional
distance calculated, respectively, weighting branches by kilometers and social capital, over the
period 1990–2007, in Center–North and Southern regions. Panels (b) and (d) show, respectively,
F-DISTANCE_KM and *F-DISTANCE_SC* 2007 in the 95 Italian provinces, classified in quintiles.

In our empirical analysis, we merge the last three waves of the survey covering
the period 1995–2003. The pooling sample has information on 13,004 firms, largely
concentrated in the north of Italy and with a predominance of small businesses, in
accordance with the structure of Italian manufacturing industries. Due to missing
data, misreporting, and a trimming procedure that excludes extreme values of all
firm-level variables, we are left with 9,806 observations.

Data on the location of bank headquarters, bank holding composition and the provincial distribution of branches by bank come from the Bank of Italy for the sample period, as well as for 1936 and 1971. These 2 years will serve as benchmarks for our instrumental variable estimation (see below, Section 5.5.1). Finally, data on population and value added at provincial level are taken from the National Institute of Statistics (ISTAT).

5.4.2 Innovation Variables

Our dependent variables are self-reporting answers to survey questions. With regard to the adoption of innovation, firms had to answer the question: "During the three survey years, did the firm make any product and/or process innovations?" Starting from this question we build three dummy variables: (1) *INNOVATION*, which is equal to 1 if the firm adopted a product and/or a process innovation and 0 otherwise, (2) *PROCESS*, which is equal to 1 if the firm adopted a process innovation and 0 otherwise, and (3) *PRODUCT*, which is equal to 1 if the firm adopted a product innovation and 0 otherwise.

As shown in Table 5.2 , 47.5% of the firms in our sample stated that they had adopted process innovation, while product innovation was adopted by only 27% of firms. In both cases, the likelihood of introducing innovations increases with firm size and is higher for firms that make expenditure on R&D.

5.4.3 Financial Variables

Our key explanatory financial variables are (i) the duration of the bank–firm relationship, *RELATIONSHIP*; (ii) the size of the local banking system, *BRANCHES*; (iii) the functional distance of the local banking system, *F-DISTANCE*.

RELATIONSHIP is computed as the natural logarithm of one plus the length in years of a relationship between the firm and its main bank. The length of the main relationship is drawn from firms' responses to a survey question which asks for the number of years the bank that holds the largest share of the firm's debt *in the last year of the survey* has been its main bank. Since the questions on innovation adoption refer to the entire 3-year survey period, we antedate the length of the bank relationship to the first year of the survey by subtracting 3 from the years reported by firms and set at zero the negative values (i.e., bank ties lasting for less than 3 years).[13] Specifically:

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[13]This specification for the length of the bank relationship is proposed by Gambini and Zazzaro (2009), while Ferri and Rotondi (2006) simply subtract 3 from the number of years of the bank relationship as reported by firms.

Table 5.2 Variables: summary statistics

Variable	Mean	Std. Dev.	Min.	Max.
Dependent variables				
INNOVATION	0.570	0.495	0	1
PROCESS	0.475	0.499	0	1
PRODUCT	0.272	0.445	0	1
Financial variables				
BRANCHES	5.741	1.471	1.545	10.268
RELATIONSHIP	2.310	0.989	0	4.779
(in years)	13.747	11.811	0	118
F-DISTANCE_KM	3.420	1.042	0.707	6.497
(linear)	154.9	133.0	20.3	840.6
F-DISTANCE_SC	0.862	0.445	0.051	2.989
Control variables				
VALUE ADDED	9.863	0.252	9.044	10.348
(in euros)	19,786	4,608	8,472	31,190
EMPLOYEES	90.26	258.87	11	10233
AGE	24.74	18.06	0	191
R&D	0.777	1.906	0	14.827
CORPORATION	0.951	0.216	0	1
CONSORTIUM	0.112	0.315	0	1
ISO9000	0.404	0.491	0	1
EXPORT	0.697	0.460	0	1

Notes: Statistics refer to the pooled sample of 9,806 observations made by 3,194 observations from the first wave, 3,506 from the second one, and 3,106 from the last wave.

$$RELATIONSHIP = \begin{cases} T = \text{Re}lationship \; length - 3 & \text{if} \quad T > 0 \\ 0 & \text{if} \quad T < 0 \end{cases} \quad (5.2)$$

BRANCHES is computed as the ratio of bank branches operating in the province to resident population, while *F-DISTANCE* is computed as indicated in equation (5.1), by weighing, alternatively, each local branch by the kilometric and cultural distance with respect to the headquarter of its own parent.

Table 5.2 reports the summary statistics of the financial variables for the pooled sample and shows that the average firm has a relationship with its main bank lasting more than 13 years and operates in a province where there are 5.7 branches per 10,000 inhabitants, and the functional distance of the average branch from its headquarter is approximately 155 kilometers.

5.4.4 Control Variables

In our regression analysis we control for a number of firm characteristics that are expected to affect innovation adoption and, for the sake of comparison, have already

been considered by the previous literature on finance and innovation (Ferri and Rotondi 2006, Herrera and Minetti 2007, Benfratello et al. 2008).[14]

To the extent that innovation projects entail fixed costs and high level competencies, large firms should be better equipped than small firms to introduce new technologies and products. Moreover, large firms are more transparent and less likely to be rationed than small firms. Hence, we control for firm size, measured by the number of employees (*EMPLOYEES*). To allow for possible nonlinearities, we construct six dummy variables for the classes of employees: 11–20, 21–50, 51–100, 101–250, 251–500, and more than 500, where the first class is taken as reference category. In our sample, the average (median) firm has 90 (32) workers, but there is a predominance of small and medium enterprises, since 67 (82) percent of the sample has less than 50 (100) employees.

Then we control for firms' age, *AGE*. In this case, the expected association with innovation is ambiguous. Old firms are typically informationally more transparent and can therefore fund innovation projects easier. However, old firms are also in the mature phase of their life cycle when the introduction of innovations, especially of new products, proceeds slowly. Hence we introduce into the regression also the square of age.

As an additional control for firms' transparency we introduce a dummy variable *CORPORATION* that takes the value 1 if the firm is a corporation and 0 otherwise. Corporations are required, and are inclined, to disclose a great amount of information on their activity and have broader access to other sources of external finance alternative to bank credit.

Fourth, we control for the firms' propensity to innovate and export, both expected to affect innovation positively. The former, *R&D*, is measured by the expenditure on research and development per employee deflated by the ISTAT's price index by industrial sector; the latter, *EXPORT*, is proxied by a dichotomic variable that takes the value of 1 for firms exporting a share of their sales and 0 otherwise.

Finally, as proxies for firm's efficiency and for networking we introduce two dummies. The former, ISO9000, takes the value of 1 for firms whose production process and product qualities have been certified by the European Union. The latter, *CONSORTIUM*, takes the value of 1 if the firm belongs to one or more credit, export, and/or research consortia and 0 otherwise.

We also add controls for the logarithm of the real value-added at the provincial level (*VALUE ADDED*) and for unobserved geographic, technological, and cyclical specificities by introducing 17 regional dummies,[15] 21 industrial sector dummies (following Ateco2000 two-digit classification), and 3 wave dummies.

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[14]A detailed description of these and all other variables used in the empirical analysis is reported in Appendix.

[15]There are 20 Italian administrative regions, but to avoid the very low number of observations in three regions, Valle d'Aosta, Molise, and Basilicata are considered together with, respectively, Piemonte, Abruzzo, and Calabria.

5.5 The Evidence

5.5.1 An Empirical Model of Innovation Diffusion

We estimate a pooled probit model for the probability of a firm i located in province j adopting an innovation I during the survey period t as a function of financial variables and the other control variables described in the previous section:

$$\Pr\left(I_{ijt}\right) = \Phi\left(RELATIONSHIP_{it}, BRANCHES_{jt}, \atop F\text{-}DISTANCE_{jt}, X_{it}, Z_{jt}, D_t\right) \tag{5.3}$$

where the dependent variable is, alternatively, *INNOVATION*, *PROCESS*, and *PRODUCT* and Φ is the normal distribution function.

All three of our financial variables can be endogenous to innovation and can be jointly affected by unobserved factors. For example, both *BRANCHES* and *F-DISTANCE* could be driven by the level of local economic development, such that they cannot be considered exogenous with respect to firms' innovative capacity. More innovative firms will grow faster, fostering local development and promoting the opening of new branches and the acquisition of local banks. Similarly, the length of the bank relationship could be jointly determined with the innovation choice. For example, a firm that is planning the introduction of a new technology during the research period can construct stable and exclusive ties with a bank to give it the opportunity to know the firm and correctly evaluate the innovative projects. Conversely, if a long-term tie with the main bank gives it the power to extract rents from innovation projects, when planning innovation the firm can decide to interrupt the relationship. Finally, both financial variables and innovation decision may be jointly driven by other omitted variables.

To address endogeneity and omitted variable problems, we estimate equation (5.3) by instrumenting *F-DISTANCE*, *BRANCHES*, and *RELATIONSHIP* with factors that are likely to be correlated with such variables but not with innovation decisions. We follow Guiso et al. (2004) and impose the regulatory structure of the Italian banking system of 1936 and 1971 as the true exogenous factor. The geographical distribution of banks and branches in 1936 came about as a response to the 1930–1931 banking crisis and did not follow the strict logic of profit. Guiso et al. (2004) show that the number of branches per inhabitant and their distribution by size in 1936 were unrelated to the regional economic development of the time and can therefore be considered strictly exogenous with respect to innovation decisions in subsequent years. Moreover, the geographical distribution of branches in 1936 was significantly correlated with the local banking development in the 1990s.

In this spirit, we construct seven instrumental variables at the provincial level: (1) the number of branches per inhabitant in 1936 ($BRANCHES\_1936$); (2) the

share of branches owned by large banks in 1936 (BIG_1936);[16] (3) the share of branches owned by (credit cooperative) mutual banks in 1936 (CCB_1936); (4) the share of branches owned by saving banks in 1936 (SB_1936); (5) a functional distance indicator calculated with respect to the kilometric distance of branches from their headquarters in 1971 ($F - DISTANCE\_KM\_1971$); (6) the Herfindahl-Hirschman index calculated with respect to branches working in the province in 1971 (HHI_1971); (7) the average annual number of branches opened by entrants in a province over the 8-year period preceding the wave. The choice of 1971 was dictated by the fact that data on the branch distribution by banks were not published before this year. However, since the structure of the Italian banking system remained substantially unaltered until the end of the 1970s (Ciocca 2001), we take the functional distance indicator at 1971 as a valid instrument. Table 5.3 shows that, in our sample, the financial variables and the proposed instruments are generally significantly correlated.

5.5.2 Results

Table 5.4 presents the results of probit estimates of equation (5.3) regarding the determinants of the likelihood of firms introducing innovation, while the IV estimates are reported in Table 5.5 . At the bottom of that table, we report the Conditional Likelihood Ratio (*CLR*) test proposed by Rivers and Vuong (1988), which assesses the joint statistical significance of the residuals from the first-stage OLS regression in the structural probit equation (Wooldridge, 2002). The test generally rejects the null hypothesis of exogeneity of the financial variables, both when they are added in the model one by one (columns 1–4, except for *F*-DISTANCE_SC) and all together, suggesting the need for an IV approach.

Instrumental variable estimation is known to rely on (1) a significant correlation between the instruments and the endogenous variables, and (2) the absence of correlation between the excluded instruments and the error term of the structural equation. We verify the validity of the first assumption from the estimates of the first-stage regressions. In particular, referring to specifications in columns 5 and 6 of Table 5.5, we observe that all the instruments exhibit a significant (at 1 percent level of confidence) partial correlation with *F-DISTANCE* indicators and *BRANCHES*, while the length of the relationship is significantly correlated only with the Herfindahl-Hirschman index of concentration of banks' branches in 1971 and with the share of branches owned by large banks in 1936.[17] In any case, for all the first-stage regressions, the *F-test* rejects the null hypothesis that the instruments are jointly insignificant. Concerning the second assumption, the Sargan

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[16] Since data on bank branches in 1936 are classified by bank institutional type, we consider the "Istituti di Credito di Diritto Pubblico" and the "Banche di Interesse Nazionale" to be large banks.

[17] For the sake of brevity, we do not report the results of the first-stage regressions, but they are available on request from the authors.

Table 5.3 Credit market and instrumental variables: pairwise correlations

	BRANCHES	RELATIONSHIP	F-DISTANCE_KM	F-DISTANCE_SC	F-DISTANCE_KM_1971	CCB_1936	SB_1936	BRANCHES_1936	HHI_1971	BIG_1936	ENTRANTS
BRANCHES	1										
RELATIONSHIP	0.0734*	1									
F-DISTANCE_KM	-0.4360*	-0.0575*	1								
F-DISTANCE_SC	-0.4847*	-0.0853*	0.7385*	1							
F-DISTANCE_KM_1971	-0.5768*	-0.0502*	0.5419*	0.5985*	1						
CCB_1936	0.1278*	0.0456*	-0.018	-0.1344*	-0.1246*	1					
SB_1936	0.3814*	0.0311*	-0.0935*	-0.3291*	-0.2284*	-0.0513*	1				
BRANCHES_1936	0.5479*	0.0480*	-0.3803*	-0.3778*	-0.3436*	0.0338*	0.2721*	1			
HHI_1971	0.0253*	-0.0105	0.1428*	0.1414*	-0.0325*	0.1457*	0.4028*	0.1132*	1		
BIG_1936	-0.6597*	-0.0580*	0.3603*	0.3583*	0.5889*	-0.3763*	-0.2325*	-0.4758*	-0.0310*	1	
ENTRANTS	-0.0141	0.0328*	-0.1211*	-0.1258*	-0.1218*	-0.0777*	-0.2645*	-0.1524*	-0.4535*	0.0734*	1

Notes: *significant at 5%. Correlations refer to the pooled sample of 9,806 observations made up by 3,194 observation from the first wave, 3,506 from the second, and 3,106 from the last wave.

Table 5.4 Adoption of innovation: probit estimates

Dep Var: Pr(INNOVATION)	(1)	(2)	(3)	(4)	(5)	(6)
BRANCHES	0.023 [0.020]				0.009 [0.021]	0.019 [0.020]
RELATIONSHIP		−0.045*** [0.016]			−0.046*** [0.016]	−0.045*** [0.016]
F-DISTANCE_KM			−0.057*** [0.019]		−0.056*** [0.020]	
F-DISTANCE_SC				−0.118** [0.055]		−0.115** [0.055]
VALUE ADDED	−0.063 [0.134]	−0.066 [0.134]	−0.149 [0.137]	−0.147 [0.140]	−0.149 [0.138]	−0.145 [0.140]
21–50 EMPLOYEES	0.186*** [0.033]	0.183*** [0.033]	0.188*** [0.033]	0.188*** [0.033]	0.186*** [0.033]	0.186*** [0.033]
51–100 EMPLOYEES	0.372*** [0.044]	0.368*** [0.044]	0.373*** [0.044]	0.374*** [0.044]	0.368*** [0.044]	0.369*** [0.044]
101–250 EMPLOYEES	0.447*** [0.052]	0.443*** [0.052]	0.447*** [0.052]	0.450*** [0.052]	0.441*** [0.052]	0.443*** [0.052]
251–500 EMPLOYEES	0.581*** [0.074]	0.571*** [0.074]	0.582*** [0.074]	0.586*** [0.074]	0.569*** [0.074]	0.573*** [0.074]
MORE THAN 500 EMPLOYEES	0.735*** [0.105]	0.724*** [0.105]	0.735*** [0.105]	0.740*** [0.105]	0.723*** [0.105]	0.728*** [0.105]
AGE	−0.001 [0.002]	0.002 [0.002]	−0.001 [0.002]	−0.001 [0.002]	0.002 [0.002]	0.002 [0.002]

Table 5.4 (continued)

Dep Var: Pr(INNOVATION)	(1)	(2)	(3)	(4)	(5)	(6)
AGE^2	0.001	0.000	0.001	0.001	0.000	0.000
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
R&D	0.168***	0.167***	0.168***	0.168***	0.167***	0.167***
	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]	[0.014]
CORPORATION	0.104*	0.100	0.104*	0.103	0.104*	0.105*
	[0.063]	[0.063]	[0.063]	[0.063]	[0.063]	[0.063]
CONSORTIUM	0.197***	0.197***	0.197***	0.196***	0.198***	0.197***
	[0.044]	[0.044]	[0.044]	[0.044]	[0.044]	[0.044]
ISO9000	0.086***	0.085***	0.087***	0.085***	0.088***	0.086***
	[0.031]	[0.031]	[0.031]	[0.031]	[0.031]	[0.031]
EXPORT	0.190***	0.190***	0.189***	0.189***	0.190***	0.190***
	[0.031]	[0.032]	[0.031]	[0.031]	[0.032]	[0.032]
Observations	9,806	9,806	9,806	9,806	9,806	9,806
Wald test	1,065	1,066	1,070	1,063	1,075	1,068
Pseudo-R2	0.106	0.106	0.106	0.106	0.107	0.106

Notes: *significant at 10%; **significant at 5%; ***significant at 1%. Probit regressions report coefficients and the associated robust standard errors in brackets. The baseline for *EMPLOYEES* is the size class 11–20 employees. Each regression includes (3) wave, (21) sector, and (17) regional dummies and a constant not shown for reasons of space. As diagnostic, the Table reports the Wald χ^2 statistic for the likelihood ratio test of the goodness of fit of the regression and the Pseudo-R^2. AGE^2 is divided by 100.

Table 5.5 Adoption of innovation: IV probit estimates

Dep Var: Pr(INNOVATION)	(1)	(2)	(3)	(4)	(5)	(6)
BRANCHES	0.098** [0.043]					0.024 [0.064]
RELATIONSHIP		0.809** [0.390]				0.717 [0.491]
F-DISTANCE_KM			−0.131*** [0.048]		−0.133** [0.063]	
F-DISTANCE_SC				−0.208* [0.114]		−0.235* [0.142]
VALUE ADDED	−0.060 [0.135]	−0.030 [0.155]	−0.262* [0.153]	−0.209 [0.156]	−0.235 [0.176]	−0.196 [0.177]
21–50 EMPLOYEES	0.186*** [0.033]	0.230*** [0.043]	0.191*** [0.033]	0.190*** [0.033]	0.228*** [0.045]	0.229*** [0.046]
51–100 EMPLOYEES	0.370*** [0.044]	0.460*** [0.065]	0.372*** [0.044]	0.375*** [0.044]	0.447*** [0.071]	0.453*** [0.073]
101–250 EMPLOYEES	0.442*** [0.053]	0.564*** [0.082]	0.446*** [0.053]	0.451*** [0.053]	0.545*** [0.090]	0.553*** [0.094]
251–500 EMPLOYEES	0.578*** [0.075]	0.802*** [0.135]	0.580*** [0.074]	0.589*** [0.075]	0.768*** [0.152]	0.783*** [0.160]
MORE THAN 500 EMPLOYEES	0.738*** [0.102]	0.963*** [0.157]	0.734*** [0.102]	0.742*** [0.102]	0.929*** [0.170]	0.946*** [0.177]
AGE	−0.001 [0.002]	−0.044** [0.021]	−0.001 [0.002]	−0.001 [0.002]	−0.038 [0.025]	−0.039 [0.026]

Table 5.5 (continued)

Dep Var: Pr(INNOVATION)	(1)	(2)	(3)	(4)	(5)	(6)
AGE^2	0.001	0.030**	0.001	0.001	0.026	0.027
	[0.002]	[0.014]	[0.002]	[0.002]	[0.017]	[0.018]
R&D	0.168***	0.186***	0.168***	0.167***	0.185***	0.184***
	[0.010]	[0.014]	[0.010]	[0.010]	[0.015]	[0.015]
CORPORATION	0.114*	0.121	0.108*	0.104*	0.124*	0.125*
	[0.064]	[0.074]	[0.063]	[0.063]	[0.071]	[0.072]
CONSORTIUM	0.197***	0.181***	0.197***	0.195***	0.183***	0.181***
	[0.044]	[0.051]	[0.044]	[0.044]	[0.050]	[0.050]
ISO9000	0.087***	0.085**	0.090***	0.085***	0.090***	0.086**
	[0.031]	[0.036]	[0.031]	[0.031]	[0.035]	[0.035]
EXPORT	0.192***	0.178***	0.190***	0.188***	0.180***	0.179***
	[0.031]	[0.036]	[0.031]	[0.031]	[0.036]	[0.036]
Observations	9,806	9,806	9,806	9,806	9,806	9,806
Wald test	1,212	985	1,215	1,212	1,038	1,027
CLR test	0.048	0.012	0.092	0.366	0.060	0.087
Sargan test	0.224	0.742	0.317	0.077	0.833	0.537

Notes: *significant at 10%; **significant at 5%; ***significant at 1%. IV Probit regressions are estimated with Newey's two-step estimator (IVPROBIT using Stata 10 SE package). Additional instruments include *CCB_1936*, *SB_1936*, *BIG_1936*, *HHI_1971*, *ENTRANTS*, *F-DISTANCE_KM_1971* (excluding column 2), and *BRANCHES_1936* (excluding columns 3–4). The baseline for *EMPLOYEES* is the class 11–20 employees. Each regression includes (3) wave, (21) sector, and (17) regional dummies and a constant not shown for reasons of space. As diagnostic, the Table reports the Wald χ^2 statistic for the likelihood ratio test of the goodness of fit of the regression, the *p*-value of the conditional likelihood ratio (CLR) test of exogeneity of the endogenous regressors and the *p*-value of the Sargan test for over-identifying restrictions (the null is the validity of the instrument set). AGE^2 is divided by 100.

overidentification does not reject the null of noncorrelation between the excluded instruments and the error term of the structural equation. The only exception is for *F-DISTANCE_SC* (column 4), but in this case the *CLR* test fails to reject the null hypothesis of exogeneity.

5.5.2.1 Financial Variables

When considered one by one, financial variables are all significantly correlated to innovation and have the expected signs (Table 5.5 columns 1–4). Like in Ferri and Rotondi (2006) and Herrera and Minetti (2007), *RELATIONSHIP* has a negative impact on the probability of introducing an innovation, but its effect proves to be positive once the variable is instrumented. Similarly, branch density in the province boosts innovation adoption by local firms confirming the findings of Benfratello et al. (2008). The signs of *F-DISTANCE_KM* and *F-DISTANCE_SC* coefficients are negative both in the probit and IV probit estimates even if, after instrumenting, their magnitude is more than doubled.

To assess the economic significance of our findings, we calculate the average impact that a change from the first to the third quartile of each financial variable distribution has on the predicted propensity to innovate, instead of the more traditional marginal effects. Referring to the first four columns of Table 5.5, we find that the length of the credit relationship has the largest impact: a firm that has operated with a bank for 19 years has a probability of introducing innovation equal to 70.6 percent, compared with 45.8 percent for a firm with a credit relationship 5 years long. The economic impacts of a change in branch density and functional distance are smaller. The former raises the likelihood of innovation adoption by 5 percentage points, while the latter reduces that probability by 6 percentage points (3.4% when functional distance is measured in terms of social capital).

Nevertheless, to really understand the channel through which the financial system boosts innovation, one should compare the effects of the financial variables when they enter simultaneously in equation (5.3). In this case (columns 5 and 6), only the functional indicators preserve their statistical and economic significance. Although this finding proves valid regardless of the use of the distance indicator, the effect of these two measures has a different magnitude. In fact, the likelihood of introducing an innovation is reduced by 5.7 percentage points when *F-DISTANCE_KM* increases from the first to the third quartile of its distribution (column 5), while the same change causes a drop in the probability to innovate of 4 percentage points with *F-DISTANCE_SC* (column 6). Finally, the estimated effect of *BRANCHES* on the probability of firms introducing innovations becomes much smaller and statistically not significant, consistent with the findings of Herrera and Minetti (2007) who, however, do not instrument branch density. Unlike Herrera and Minetti, we do not obtain significant effects even for the length of bank–firm relationship whose coefficient in the IV estimates 5 and 6 appears to be statistically not different from zero and even smaller in modulus.

As a second step, we analyze process and product innovations separately.[18] As suggested by the literature, the former typically aims to reduce production costs and entails new machinery requiring large fixed investments and external finance, while the latter is targeted at improving product characteristics and requires a lower amount of fixed costs but also need for lower secrecy reducing the risk of informational capture by the main bank.

Consistent with the importance of finance for process innovations, we find that the impact of the financial variables in stimulating the diffusion of this type of innovation is statistically more significant (Table 5.6). However, once again it is the geographical organization of banking systems that seems to be the main financial factor driving the adoption of new technologies, as testified by the estimates in columns 5 and 6, where only *F-DISTANCE* preserves its statistical significance.

As regards product innovations, on the whole the coefficients on functional distance and branch density are less significant than for process innovation (Table 5.7). When financial variables are included separately (columns 1–4), they are significantly correlated to the decision of introducing new products, with the exception of *F-DISTANCE_SC*.

With regard to the economic impact of financial variables on the two types of innovation, functional distance is more important for process than for product innovation. By contrast, *BRANCHES* and *RELATIONSHIP* exert a greater effect on the adoption of new products. More precisely, replicating the exercise on the changes from the first to the third quartile of the financial variable distributions, described above, we can observe that a change in *F-DISTANCE_KM* and *F-DISTANCE_SC* reduces the probability of introducing a product (process) innovation by 4.3 (7.8) and by 1.1 (5.0) percentage points, respectively. A similar change in *BRANCHES* raises that probability by 3.7 (7.5) percentage points, while when *RELATIONSHIP* is at the third quartile of its distribution the likelihood of observing a product (process) innovation is 26.7 (27.5) percentage points higher than when *RELATIONSHIP* is at the first quartile

In the full specification (column 5), both *RELATIONSHIP* and *F-DISTANCE_KM* are slightly significant at the 10 percent level, while *BRANCHES* does not show any significant effect. In this case, the usual back-of-the-envelope calculations point out that the length of the credit relationship is much more important than functional distance for the decision of introducing new products. Increasing the length of the relationship from 5 to 19 years raises the likelihood of introducing a product innovation by 30 percentage points, while the negative effect due to a comparable change in functional distance is about one sixth of that.

Thus, looking at the effects of the financial variables in the full specification, we find evidence of a differentiated effect on innovation adoption. Functional distance is a major impediment to the introduction of process innovations, but it is

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[18]In order to save space, we report only results for the IV estimates, while the probit estimates are available upon request.

Table 5.6 Adoption of process innovation: IV probit estimates

Dep Var: Pr(PROCESS)	(1)	(2)	(3)	(4)	(5)	(6)
BRANCHES	0.140***				0.050	0.077
	[0.043]				[0.064]	[0.061]
RELATIONSHIP		0.884**			0.530	0.553
		[0.393]			[0.444]	[0.465]
F-DISTANCE_KM			-0.153***		-0.133**	
			[0.048]		[0.060]	
F-DISTANCE_SC				-0.235**		-0.236*
				[0.113]		[0.135]
VALUE ADDED	-0.016	0.014	-0.257*	-0.189	-0.199	-0.158
	[0.133]	[0.156]	[0.151]	[0.154]	[0.167]	[0.168]
21–50 EMPLOYEES	0.173***	0.221***	0.179***	0.178***	0.207***	0.207***
	[0.033]	[0.044]	[0.033]	[0.033]	[0.043]	[0.044]
51–100 EMPLOYEES	0.355***	0.454***	0.357***	0.361***	0.414***	0.419***
	[0.043]	[0.066]	[0.043]	[0.043]	[0.067]	[0.069]
101–250 EMPLOYEES	0.410***	0.545***	0.416***	0.422***	0.488***	0.496***
	[0.051]	[0.082]	[0.051]	[0.051]	[0.085]	[0.088]
251–500 EMPLOYEES	0.607***	0.853***	0.611***	0.622***	0.752***	0.767***
	[0.071]	[0.134]	[0.071]	[0.071]	[0.143]	[0.150]
MORE THAN 500 EMPLOYEES	0.803***	1.046***	0.798***	0.807***	0.949***	0.966***
	[0.095]	[0.155]	[0.095]	[0.095]	[0.159]	[0.165]
AGE	-0.002	-0.050**	-0.002	-0.002	-0.030	-0.032
	[0.002]	[0.021]	[0.002]	[0.002]	[0.024]	[0.025]

Table 5.6 (continued)

Dep Var: Pr(*PROCESS*)	(1)	(2)	(3)	(4)	(5)	(6)
AGE²	0.002	0.034**	0.002	0.002	0.021	0.022
	[0.002]	[0.014]	[0.002]	[0.002]	[0.016]	[0.017]
R&D	0.093***	0.112***	0.093***	0.092***	0.106***	0.105***
	[0.008]	[0.013]	[0.008]	[0.008]	[0.013]	[0.013]
CORPORATION	0.062	0.065	0.053	0.049	0.070	0.071
	[0.064]	[0.075]	[0.063]	[0.063]	[0.068]	[0.069]
CONSORTIUM	0.140***	0.123**	0.140***	0.138***	0.130***	0.128***
	[0.043]	[0.050]	[0.043]	[0.043]	[0.046]	[0.047]
ISO9000	0.114***	0.111***	0.116***	0.110***	0.116***	0.112***
	[0.031]	[0.036]	[0.031]	[0.031]	[0.033]	[0.033]
EXPORT	0.125***	0.108***	0.122***	0.120***	0.116***	0.115***
	[0.031]	[0.037]	[0.031]	[0.031]	[0.034]	[0.035]
Observations	9,806	9,806	9,806	9,806	9,806	9,806
Wald test	1,161	880	1,163	1,159	1,042	1,032
CLR test	0.004	0.006	0.059	0.462	0.021	0.032
Sargan test	0.182	0.387	0.175	0.018	0.643	0.355

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. IV Probit regressions are estimated with Newey's two-step estimator (IVPROBIT using Stata 10 SE package). Additional instruments include *CCB_1936, SB_1936, BIG_1936, HHI_1971, ENTRANTS, F-DISTANCE_KM_1971* (excluding column 2), and *BRANCHES_1936* (excluding columns 3–4). The baseline for *EMPLOYEES* is the class 11–20 employees. Each regression includes (3) wave, (21) sector, and (17) regional dummies and a constant not shown for reasons of space. As diagnostic, the Table reports the Wald χ² statistic for the likelihood ratio test of the goodness of fit of the regression, the *p*-value of the conditional likelihood ratio (CLR) test of exogeneity of the endogenous regressors and the *p*-value of the Sargan test for over-identifying restrictions (the null is the validity of the instrument set). *AGE²* is divided by 100.

Table 5.7 Adoption of product innovation: IV probit estimates

Dep Var: Pr(PRODUCT)	(1)	(2)	(3)	(4)	(5)	(6)
BRANCHES	0.083* [0.047]				−0.034 [0.078]	0.015 [0.071]
RELATIONSHIP		0.896** [0.425]			0.951* [0.537]	0.821 [0.540]
F-DISTANCE_KM			−0.118** [0.052]		−0.123* [0.072]	
F-DISTANCE_SC				−0.129 [0.124]		−0.118 [0.157]
VALUE ADDED	−0.175 [0.144]	−0.136 [0.168]	−0.359** [0.163]	−0.269 [0.166]	−0.320 [0.199]	−0.217 [0.192]
21–50 EMPLOYEES	0.249*** [0.038]	0.297*** [0.049]	0.254*** [0.038]	0.252*** [0.038]	0.305*** [0.053]	0.295*** [0.052]
51–100 EMPLOYEES	0.371*** [0.047]	0.470*** [0.071]	0.372*** [0.047]	0.374*** [0.047]	0.475*** [0.081]	0.462*** [0.080]
101–250 EMPLOYEES	0.465*** [0.054]	0.598*** [0.087]	0.467*** [0.054]	0.472*** [0.054]	0.605*** [0.102]	0.588*** [0.101]
251–500 EMPLOYEES	0.567*** [0.071]	0.814*** [0.142]	0.569*** [0.071]	0.575*** [0.071]	0.828*** [0.170]	0.796*** [0.171]
MORE THAN 500 EMPLOYEES	0.629*** [0.089]	0.879*** [0.159]	0.627*** [0.089]	0.631*** [0.089]	0.893*** [0.183]	0.862*** [0.183]
AGE	0.004** [0.002]	−0.044* [0.023]	0.004** [0.002]	0.004** [0.002]	−0.047 [0.029]	−0.040 [0.029]

Table 5.7 (continued)

Dep Var: Pr(*PRODUCT*)	(1)	(2)	(3)	(4)	(5)	(6)
AGE²	−0.003	0.030*	−0.003	−0.003	0.031	0.027
	[0.002]	[0.015]	[0.002]	[0.002]	[0.019]	[0.020]
R&D	0.143***	0.164***	0.144***	0.143***	0.166***	0.162***
	[0.008]	[0.013]	[0.008]	[0.008]	[0.015]	[0.015]
CORPORATION	0.137*	0.148*	0.133*	0.129*	0.152*	0.150*
	[0.076]	[0.086]	[0.076]	[0.076]	[0.088]	[0.085]
CONSORTIUM	0.203***	0.185***	0.202***	0.202***	0.183***	0.186***
	[0.045]	[0.053]	[0.045]	[0.045]	[0.054]	[0.053]
ISO9000	0.051	0.049	0.053	0.049	0.052	0.049
	[0.033]	[0.038]	[0.033]	[0.033]	[0.039]	[0.038]
EXPORT	0.313***	0.298***	0.311***	0.310***	0.297***	0.300***
	[0.036]	[0.042]	[0.036]	[0.036]	[0.043]	[0.042]
Observations	9,806	9,806	9,806	9,806	9,806	9,806
Wald test	1,243	959	1,245	1,244	934	993
CLR test	0.121	0.009	0.044	0.957	0.032	0.086
Sargan test	0.070	0.319	0.318	0.073	0.396	0.148

Notes: *significant at 10%; **significant at 5%; ***significant at 1%. IV Probit regressions are estimated with Newey's two-step estimator (IVPROBIT using Stata 10 SE package). Additional instruments include *CCB_1936, SB_1936, BIG_1936, HHI_1971, ENTRANTS, F-DISTANCE_KM_1971* (excluding column 2), and *BRANCHES_1936* (excluding columns 3–4). The baseline for *EMPLOYEES* is the class 11–20 employees. Each regression includes (3) wave, (21) sector, and (17) regional dummies and a constant not shown for reasons of space. As diagnostic, the Table reports the Wald χ^2 statistic for the likelihood ratio test of the goodness of fit of the regression, the *p*-value of the conditional likelihood ratio (CLR) test of exogeneity of the endogenous regressors and the *p*-value of the Sargan test for over-identifying restrictions (the null is the validity of the instrument set). *AGE²* is divided by 100.

a less significant constraint to projects aimed at introducing product innovations, especially when the distance is measured in terms of social capital.

By contrast, the length of the credit relationship is negatively associated with the probability of introducing product innovations, while it has no significant effect on the likelihood of adopting process innovations. The survival of a positive correlation of *RELATIONSHIP* for product and not for process innovation in the full specification and its greater economic impact on the former confirm previous findings of Herrera and Minetti (2007), who suggest that the lower need for secrecy for product innovation makes relationship lending more effective for financing product than process innovations.[19]

5.5.2.2 Control Variables

Firm specific control variables are broadly significant and with the signs consistent with the previous studies of Ferri and Rotondi (2006), Herrera and Minetti (2007) and Benfratello et al. (2008). The dummies for size are all positive and increasing in modulus, suggesting that larger firms are more likely to adopt innovations. The coefficients on age and age squared are not always significant, but generally *AGE* has a U effect, suggesting that the transparency benefit of age allows firms to easily fund the introduction of new technologies, overcoming the negative effect on innovation capacity due to the shift toward the mature phase of the firms' life cycle. Only for product innovations, when the length of the relationship is excluded, does *AGE* exhibit an inverted U effect on product innovations (as found also by Benfratello et al. (2008)), indicating that being in the mature phase of the life cycle hampers the introduction of new products by old firms. Corporations, firms that are more efficient (ISO9000=1), invest more heavily in R&D, export part of their production abroad, and are members of a credit, export, or research consortium, are more likely to introduce innovations. More specifically, the positive effect of being international competitors, engaged in R&D and part of a consortium boosts both process and product innovations. In contrast with Herrera and Minetti (2007), *CORPORATION* is slightly significant at 10 percent level for product innovation, while it does not affect process innovation.[20]

5.6 Conclusions

This chapter investigated the channels through which the supply of finance could help spur innovation by firms. The existing literature focuses mainly on the importance of strong ties between the firm and its main bank and on the aggregate size of

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[19]When functional distance is measured by social capital, however, the full specification does not provide significant results either for distance or for the length of a bank relationship.

[20]This finding could be interpreted as another piece of evidence in favor of less need of secrecy for product innovation.

the local banking system. Relationship lending, measured by the length of the credit relationship, represents a way in which the bank can extract soft information about a firm's innovative projects (Herrera and Minetti 2007). The number of local bank branches serving the resident population, instead, is a measure of the availability of external finance for local firms: where information problems make credit markets geographically segmented, a more developed local banking system improves the selection, assessment, and monitoring of opaque investment projects like the introduction of new technologies and products (Benfratello et al. 2008).

In this chapter, we argued that the effectiveness of a local banking system in acquiring and processing soft information on local innovative firms depends on the geographical distribution of banks' decisional centers. Since transmitting information across the distant hierarchical levels of a bank is an imperfect and costly activity, a banking system which is functionally close to local firms can be expected to be better suited to overcome information asymmetries and fostering innovation adoption.

We validate this hypothesis by evaluating the relative importance of relationship lending, branch density, and functional distance on the propensity to innovate by a large and representative sample of Italian manufacturing firms. Once the endogeneity of these financial variables have been taken into account, we are able to confirm that, considered one by one, the length of the credit relationship and branch density spur innovation, while functional distance represents a hindrance. However, when we include the three variables together, we find that, generally, only functional distance remains statistically significant. Yet, when we distinguish between process and product innovation, the results point to a stronger effect of functional distance on the former, which typically requires a larger amount of lumpy investment in new machinery, and an additional impact of relationship lending on the latter, consistent with the reduced importance of secrecy and the related hold-up problems for product innovation.

Concluding, our results testify to the relevance of external finance for innovation adoption. A well-developed banking system can reduce financing constraints and improve resource allocation. However, despite improvements in information and communication technologies, the time elapsed from the beginning of bank consolidation process and the progress in the regulatory integration of credit markets, the geographical organization of banking systems and the spatial distribution of banks' decisional centers still represent key variables for the effectiveness of finance in spurring innovation diffusion across a country and the development of local economies. All this suggests that to appraise the recent changes in the geography of the banking industry – and the future prospects of financial integration – we should take care to balance the benefits of bank efficiency and competition with the costs of increasing centralization of the banking system and the risks of decline in the economic and financial power of peripheral regions.[21]

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[21] Holloway and Wheeler (1991), Meijer (1993), Pike (2006).

Appendix: List of variables

INNOVATION, by firm, is a dichotomous variable which is equal to one if the firm introduced a process and/or product innovation in the 3-year period covered by each survey. Source: Unicredit's Surveys.

PROCESS, by firm, is a dichotomous variable which is equal to one if the firm introduced a process innovation in the 3-year period covered by each survey. Source: Unicredit's Surveys.

PRODUCT, by firm, is a dichotomous variable which is equal to one if the firm introduced a product innovation in the 3-year period covered by each survey. Source: Unicredit's Surveys.

F–DISTANCE_KM, by province, is a measure of functional distance, computed as the ratio of branches weighted by the logarithm of 1 plus the kilometric distance between the province of the branch and that where the parent bank is headquartered, over total branches in province j (see Section 5.4 for details). Source: authors' calculations on Bank of Italy data.

F–DISTANCE_SC, by province, is a measure of functional distance, computed as the ratio of branches weighted by the logarithm of 1 plus the difference in social capital (computed as the average voter turnout at the 21 referenda held in Italy in 1993, 1995 and 2001 as published by the Home Department) between the province of the branch and that where the parent bank is headquartered, over total branches in province j (see Section 5.4 and equation (5.1) for details). Source: authors' calculations on Bank of Italy data.

BRANCHES, by province, is an indicator of branch density, computed as the number of bank branches in province j per 10,000 inhabitants (see Section 4 or details). Source: authors' calculations on Bank of Italy and ISTAT data.

RELATIONSHIP, by firm, is the natural logarithm of one plus the length in years of the credit relationship between the firm and its main bank. (see Section 5.4 and equation (5.2) for details). Source: Unicredit's Surveys.

VALUE ADDED, by province, is the logarithm of the real value-added. Source: ISTAT.

EMPLOYEES, by firm, is the number of workers, divided into six categories: 11–20, 21–50, 51–100, 101–250, 251–500, and more than 500, where the first class is taken as reference category. Source: Unicredit's Surveys.

AGE, by firm, is the age, in years since the foundation of the firm. Source: Unicredit's Surveys.

CORPORATION, by firm, is a dummy equal to one if the firm is a corporation. Source: Unicredit's Surveys.

R&D, by firm, is the ratio between the expenditures in research and development per-employee, deflated by the ISTAT's price index by industrial sectors. Source: authors' calculations on ISTAT data and Unicredit's Surveys.

EXPORT, by firm, is a dummy equal to one if the firm exports a share of its sales. Source: Unicredit's Surveys.

ISO9000, by firm, is a dummy equal to one if the firm is ISO9000 certified. Source: Unicredit's Surveys.

CONSORTIUM, by firm, is a dummy equal to one if the firm if the firm belongs to one or more credit, export and/or research consortium. Source: Unicredit's Surveys.

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Chapter 6
Distance and Internet Banking

Guido de Blasio

Abstract   Internet-related possibilities might reduce the importance of distance for economic activity. By using data from the Survey on Household Income and Wealth (SHIW) of the Bank of Italy, this chapter investigates the validity of this assertion for Internet banking. It shows that there is no support for the argument that isolated consumers use e-banking more intensively than their less-isolated counterparts. It also highlights that, compared to less isolated clients, geographically remote clients are more frequently supplied with a loan by their own bank and evaluate personal acquaintances as an important factor more intensively. Overall, these findings support the relevance of soft information in lending practices to families and family businesses

6.1 Introduction

A common assertion is that the Internet-related possibilities might reduce the importance of distance for economic activity. By diminishing the cost of performing isolated economic activities in isolated areas, the Internet might serve as a substitute for urban agglomeration. In this chapter, this assertion is labeled the "Internet Kills Distance" (IKD) hypothesis.[1]

The IKD hypothesis has been heavily investigated for Internet navigation. It has received, however, only weak empirical support, as navigation appears to be more frequent in urban areas rather than non-urban ones. While this could be due to differences in connectivity or to the fact that in non-urban areas individuals are relatively less educated and wealthy (Mills and Whitacre 2003), additional difficulties derive

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[1]Note that the IKD hypothesis has been variously labeled in the literature. Examples are the *global village* hypothesis, the *death of distance* hypothesis, the *death of cities* hypothesis, and the *Internet-cities substitution* hypothesis.

from the multipurpose nature of the Internet. For instance, IKD might not work for matchmaking sites, as they also spur face-to-face interactions (Gaspar and Glaeser 1998). Moreover, the IKD might not apply to information gathering, as the supply of Internet content is biased in favor of urban residents (Sinai and Waldfogel 2004).

In principle, e-banking could offer more promising ground for the IKD hypothesis, as there seems to be a clear advantage for geographically remote consumers. An isolated person can skip a costly branch visit by using e-banking. Transportation cost savings are not the only benefits for remote consumers. Savings on search costs (Ellison and Ellison 2005) and variety costs (Gehring 1998, Waldfogel 2003) represent additional sources of gains. In short, there is a clear presumption that the distance to the closest bank branch is an important determinant of the use of e-banking (see also Udell 2009: Chapter 2, this volume, Brevoort and Wolken 2009: Chapter 3, this volume). Nonetheless, potential shortcomings remain. Distance banking might be limited by consumer's preference for face-to-face interactions (Petersen and Rajan 2002) or by one-stop economies (Berger et al. 1996) that could materialize if some financial services are not available on the web and thus a trip to the closest branch is necessary anyway.

In this chapter, I use information on Italian households to check whether the IKD hypothesis receives empirical support. I study both the likelihood of navigating the Internet and that of using remote banking for households located in areas of varying sizes. I find that the relation between city size and the probability of using the Internet is increasing, rather than decreasing, as the IKD hypothesis would suggest, while e-banking bears no relationship to town size. These findings are robust: They are unlikely to be driven by spatially correlated omitted variables; they are not due to spatial sorting; they survive when the city size is treated as an endogenous variable and instrumented. Both navigation and remote banking are strongly correlated with the income and the education of the household. I also find that in choosing a bank, non-urban customers evaluate personal acquaintance as a more important factor than urban clients. This is consistent with theories that stress the role of soft information in lending practices to families and family businesses, as non-urban clients are more frequently supplied with a loan by their bank.

The chapter is structured as follows. The next section provides a brief overview of the related literature. Section 6.3 describes the features of Italy's Internet landscape that are relevant for the exercise proposed in the paper. Section 6.4 illustrates the household data used for the estimates. Section 6.5 presents the methodology. Section 6.6 illustrates the results. The final section concludes.

6.2 Related Literature

Does the diffusion of Internet-related possibilities imply a diminished role of distance? Toffler (1980) and Naisbitt (1995) were among the first to observe the rapid diffusion of information technology and, on this basis, forecast the end of the need for towns and cities. The basic idea is that cities lower the cost of transporting goods

and sharing ideas. Because information technology too lowers the cost of transportation and communication, it could replace some of the traditional functions of cities. In short, Internet users might reap some of the advantages offered by cities without having to locate there. Among the proponents of the IKD hypothesis, Cairncross (1997) is the most emphatic example, as she points out that the death of distance will be the single most important economic force shaping all of society over the next half century.

Not long after the first enthusiastic wave supporting the IKD hypothesis, many economists began to realize that the diffusion of Internet-related possibilities might not imply a diminished role of distance. For instance, Kolko (2000) uses data on commercial Internet domain (.com) registration at the county level and finds that domain density is higher in larger cities (see also Forman et al. 2005).

Why does the IKD hypothesis not work? One explanation is technology differences in Internet connectivity; that is, access to the net is biased in favor of urban areas. For instance, Internet-provider firms might find more populated areas more profitable because of economies to scale. Another explanation refers to the heterogeneity among urban and non-urban potential users, as the latter are less prone to use the Web because they are characterized by lower incomes and less education (see Mills and Whitacre 2003).

The above arguments imply that the IKD hypothesis might still be empirically verified, once one takes into account the heterogeneity in access and users' characteristics across areas. However, other views underscored that navigation could provide only a partial test for the IKD story, because of the multipurpose nature of the Internet. In this regard, Gaspar and Glaeser (1998) note that the IKD hypothesis might not apply when the Internet connects two parties, such as by e-mail or matchmaking sites. They argue that any given two-party interaction can take place either electronically or face-to-face. However, if some relationships involve both electronic and face-to-face interactions, then a decrease in the cost of electronic communication due to the Internet raises the overall level of interactions, only a fraction of which will take place face-to-face. Moreover, Sinai and Waldfogel (2004) argue that the IKD hypothesis could be undermined also in the case of information gathering. They stress that the supply of Internet content is biased in favor of urban residents. Larger markets have more locally targeted content than smaller markets, since the Internet provides information that is disproportionately more valuable for town dwellers (for instance, information related to events, restaurants, and film listings or local news).

Financial transactions are probably the most important examples of transactions where no physical product is involved. As Cairncross (1997, p. 139) writes: "Financial services need interactivity more than do most other commodities. Buying a case of wine on-line involves merely scanning the details of what is available; the process will always remain more satisfying when it is possible to test first. No such arguments apply to a customer buying stocks or making a payment". Therefore, the impact of distance on e-banking should in principle be large. That is, the rule applies that the farther the customer is from the closest offline alternative, the higher the likelihood of he or she using electronic services. Gains in accessibility (Evanoff

1988) traditionally have been considered one the major advantages of e-banking. On that basis, in the second half of the 1990s market participants forecast a rapid diffusion (see Booz-Allen and Hamilton 1996, Kennickell and Kwast 1997).[2]

Does the IKD hypothesis apply to Internet banking? Previous literature on e-banking, mostly concerned with the bank's decision to provide financial services via the Internet, provides some indirect supportive evidence. In this regard, Bonaccorsi di Patti et al. (2004) show that Italian banks tend to expand in the e-business more in the local markets where they have fewer branches, while Corrocher (2006) argues that banks with higher branching intensity adopt Internet banking more slowly than banks with only a few branches in place. Other evidence is less sanguine. Closer to the topic of this chapter, which focuses on the demand side, Kahn (2004) tests whether consumer adoption of online banking is affected by the distance to one's bank branch and fails to find any significant effect.[3]

Additional insight might come from the banking literature. For instance, some financial services might not be available on the Web, and therefore a trip to the closest branch is necessary anyway. If this is the case, then consumption economies for one-stop banking (Berger et al. 1996) might totally discourage the use of the Internet. On the other hand, information about families and small family businesses is thought to be soft or tacit (Petersen 2004, Udell 2009: Chapter 2, this volume), that is hard to communicate to others. As noted by Petersen and Rajan (2002), lending practices based on soft information require the lender to have personal contact with the borrower. In this case, a borrower from a given bank might want to stick with the same bank for the additional financial services he or she requires. For instance, Berlin and Mester (1999) show that the information generated by a deposit account may increase the probability of obtaining good terms on loans.[4]

6.3 Italy's Internet Landscape

To uncover the role of distance for the adoption of Internet-related possibilities, this chapter focuses on demand factors as reflected in household behavior. As explained by Greenstein and Prince (2006), however, Internet adoption might depend on supply factors as well. Here, two aspects are relevant. First, Internet is a nested innovation whose adoption at home strongly depends on adoption of a personal computer (PC) (Jimeniz and Greenstein 1998). Second, Internet usage might be related to the availability of high-speed connections (xDSL and cable). If the geographical distribution of PC adoption and high-speed connections varies with city size, then the

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[2] As noted by the ECB (1999, p. 14): "Internet banking is expected to have the highest future growth potential (. . .) it will expand considerably within the next two to three years."

[3] Interestingly, Kahn (2004) finds that the type of financial account that a consumer has with a bank is a significant predictor of online banking usage (see also Brevoort and Wolken 2009: Chapter 3, this Volume, and Section. 6.2 below).

[4] The effect of information technology on financial service competition is analyzed in Hauswald and Marquez (2003).

Table 6.1 PC availability and connection diffusion

	Share of households with a PC at home	Share of households with a low-speed connection	Share of households with a high-speed connection
North	47.3	19.2	15.6
Center	48.3	21.4	15.5
South	43.9	17.8	11.4
Largest MAs	46.5	16.6	18.9
Cities with more than 50,000 inhabitants	46.8	18.0	17.8
Cities from 10,000 to 50,000 inhabitants	44.8	17.0	17.4
Cities up to 10,000 inhabitants	46.4	18.1	17.2

Notes: Source ISTAT (2004). The North includes the following Italian regions: Piemonte, Valle d'Aosta, Lombardia, Trentino Alto-Adige, Veneto, Friuli-Venezia Giulia, Liguria, Emilia-Romagna. The Centre includes Toscana, Umbria, Marche, and Lazio. The South includes: Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, and Sardegna. Largest MAs refers to the following towns: Torino, Milano, Venezia, Genova, Bologna, Firenze, Roma, Bari, and Napoli. City size grouping used in this table is the one adopted by ISTAT, which is different from the one (SHIW city size grouping) adopted elsewhere in the paper.

case of the paper could be much reduced. Under this scenario, supply factors, rather than demand ones, should be at center stage.

Table 6.1 describes Italy's Internet landscape. Data are taken from the Italian National Agency for Statistics (ISTAT 2004). The table shows that disparities between North and Center on the one hand, and Southern regions on the other, are quite pronounced.[5] In the North and, especially, the Center, the availability of a PC at home is higher, while both low-speed and high-speed connections are more widespread. However, the table also illustrates that the distribution of infrastructures is much more homogeneous across city size. In other words, the distribution of supply factors does not disproportionately benefit larger urban centers.

This evidence supports the identification strategy of the paper. It highlights that focusing on the demand side, rather than the supply one, is a reasonable approach to investigate the IKD hypothesis. On the other hand, it suggests that the divide in infrastructure availability across the three areas of Northern, Center, and Southern Italy can be a relevant source of bias for the results. For instance, a household located in the South of Italy faces lower access to the Internet, irrespective of whether it is located in an urban or rural area. To make sure that this divide is not what drives our results, I will differentiate it by controlling for the location of the households across the three Italian macro-regions.

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[5]On the north-south divide in Italian ITC endowment, see Bonaccorsi et al. (2006).

6.4 Data

The main data source is the Survey of Household Income and Wealth (SHIW). This survey is conducted every two years by the Bank of Italy on a representative sample of about 8,000 households; see Brandolini and Cannari (1994) for details.[6] The SHIW collects detailed information on Italian households, such as age and education of each member and family income. An important feature of the SHIW is the fact that the *standard* information on demographic and economic aspects, which are recorded regularly every wave and are similar to those collected by other surveys such as the American PSID or CPS, are supplemented by special sections. Below, I exploit the 2002 wave of the survey, which includes a special section on information technology. The dataset contains 8,011 observations.[7] Table 6.2 gives the mean and standard deviations for Internet navigation and e-banking usage, which are the dependent variables in our regressions, as well as the other main variables used in the paper (a description of the variables is in the Appendix). In 75 % of the households interviewed at least one member of the family uses the Internet. The use of e-banking is much less widespread, however. Only 5% of the households in our sample have used it.

Households are distributed over 344 cities. I take the measures for city size from the 2001 Population Census of the National Statistical Institute (ISTAT). In addition to the city population and the log of the city population, I also make use of a series of dummies, one for each of the following categories: Villages (up to 20,000 inhabitants); Small Towns (from 20,000 to 40,000 inhabitants); Midsize Towns (from 40,000 to 500,000 inhabitants); and Large Cities (more than 500,000 inhabitants). The 8,011 households in our sample are distributed over the city size range as follows: 29% live in Villages; 18% in Small Towns; 44% in Midsize Towns; and 8% in Large Cities. For the IV estimation, I use the ISTAT city land area as an instrument for the city population. All regressions are based on appropriate weighted data.[8]

6.5 Methodology

I will investigate the role of distance by running regressions of the form:

$$y_{ip} = \alpha + \beta \text{citysize}_p + X_{ip}\gamma + Z_p\delta + \varepsilon_{ip} \qquad (6.1)$$

where y_{ip} is the outcome of interest for individual i in city p (for instance, the likelihood of using e-banking), citysize_p is a measure of the city population, X_{ip} and Z_p

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[6]SHIW micro-data are publicly available at www.bancaditalia.it.

[7]The special sections are considered quite demanding for the respondents and very expensive for the Bank of Italy. This explains why sometimes the questions included in a special section are posed only to a subset of the respondents. For instance, only 3,009 households are asked to respond to the Internet navigation question.

[8]Our coefficient estimates are not sensitive, however, to weighting or not weighting the data.

Table 6.2 Summary statistics

Variable	Mean	Standard deviation	Observations
Internet navigation	0.75	0.43	3,009
E-banking	0.05	0.45	8,011
Pop (mil.)	0.15	0.36	8,011
Log pop	−3.35	1.73	8,011
Land	114.40	164.97	8,011
Villages	0.29	0.45	8,011
Small town	0.18	0.39	8,011
Midsize town	0.44	0.50	8,011
Large city	0.08	0.28	8,011
North	0.46	0.50	8,011
Center	0.21	0.41	8,011
South and islands	0.33	0.47	8,011
Age	56.75	15.58	8,011
Children	0.51	0.50	8,011
Income	28.23	22.22	8,011
Elementary school	0.38	0.49	8,011
Junior high school	0.27	0.44	8,011
High school	0.27	0.44	8,011
College and more	0.08	0.27	8,011
Movers	0.23	0.42	7,756

Notes: The description of the variables is in the Appendix.

are vectors of control variables defined at the individual and city level, respectively. The coefficient of interest throughout the paper is β, the effect of the size of the city on the outcome of interest. Note that I do not include city fixed effects, since citysize$_p$ is fixed for each city (while spatial fixed effects at less detailed partitions of the space are introduced). However, I do adjust for within city correlations (see Moulton 1990).

6.6 Results

This section starts by studying the impact of city size on Internet navigation (para. 6.1). Then, it provides evidence on the role of distance for Internet banking (Para 6.2). In doing that, it also looks at household's revealed preference for choosing its bank, as well as the types of financial account chosen.

6.6.1 Internet Navigation

Table 6.3 reports the Probit estimates of the effects of city size on the probability of navigating the Internet for a sample of 3,009 households. I first regress (Column 1) the indicator of Internet use on the level of city population, controlling by nothing

Table 6.3 City size and Internet navigation

	(1)	(2)	(3)	(4)	(5)	(6)	(7) No interaction	(8) Interaction with dummy for movers	
Pop (mil.)	0.094***	0.083***			0.089***	0.103***	0.096***	0.035	0.077*
	(0.015)	(0.025)			(0.027)	(0.020)	(0.033)	(0.035)	(0.041)
Log Pop			0.047***						
			(0.029)						
i. Small Town				0.080					
				(0.100)					
ii. Midsize Town				0.094					
				(0.089)					
iii. Large City				0.332					
				(0.226)					
Age (×100)		−0.008	−0.048	−0.036	−0.015	−0.035	0.020	−0.025	0.035
		(0.116)	(0.392)	(0.388)	(0.113)	(0.115)	(0.130)	(0.199)	(0.113)
Children		0.049**	0.145**	0.140*	0.054**	0.055**	0.049	0.023	0.050**
		(0.023)	(0.074)	(0.073)	(0.023)	(0.024)	(0.032)	(0.053)	(0.022)
Income		0.003***	0.011***	0.011***	0.003***	0.004***	0.003**	−0.001	0.002***
		(0.001)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
i. Junior high school		0.007	0.024	0.026	0.008	0.003	0.040	−0.085	0.009
		(0.035)	(0.119)	(0.119)	(0.035)	(0.036)	(0.040)	(0.086)	(0.043)

Table 6.3 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7) No interaction	Interaction with dummy for movers	(8)
ii. High school		0.123***	0.405***	0.410***	0.125***	0.118***	0.141***	0.058	0.142***
		(0.032)	(0.117)	(0.115)	(0.032)	(0.032)	(0.039)	(0.083)	(0.038)
iii. College and more		0.168***	0.704***	0.705***	0.173***	0.168***	0.181***	0.030	0.203***
		(0.031)	(0.168)	(0.166)	(0.030)	(0.030)	(0.029)	(0.090)	(0.048)
Dummy for movers							0.014		
							(0.128)		
Geo-controls	3	3	3	3	20	103	3		3
Observations	3,009	3,009	3,009	3,009	3,009	2,960	2,931		3,009

Notes: The dependent variable is an indicator variable taking value one if a household responds positively to the following question: "Does any member of your household, at home or elsewhere, navigate on the Internet?". For a description of all the other variables, see the Appendix. For all columns except (8) the reported coefficients are Probit estimates of the effect of a marginal change in the corresponding regressor on the probability of navigating the Internet, computed at the sample mean of the independent variables. The coefficient reported in column (8) are from IV, with the city land as instrument. Regressions are weighted to population proportions. Robust standard errors in parentheses (clustered on city). *significant at 10%, ** significant at 5%, *** significant at 1%.

other than geographical dummies for the Italian macro-regions (respectively North, Center, and South and Islands). This inclusion is warranted. As is well known, the macro-regions differ in a number of aspects. For instance, the South is generally poorer and – as shown in Section 6.3 – less endowed with PCs and connections than other areas, while sharing with the northern regions the presence of large urban centers. On the other hand, the Center, which predominantly features midsize urban centers, also displays the highest endowments in PC availability and connections, as well as other aspects that could correlate with Internet usage (for instance, high social capital; see Putnam 1993). I find that the partial correlation between city size and Internet navigation is positive and statistically significant at the 1% level. Clearly, this is evidence against the IKD story. The reported coefficient is the effect of a marginal change in the level of population on the probability of navigating in Internet. Thus, I can compute the impact of city size for an individual who moves, for instance, from Florence (374,501 inhabitants) to Rome (2,281,469 inhabitants). The probability of navigating the Internet increases by 18 percentage points, almost one fourth of the sample mean.

Next, I check to what extent the correlation between city size and Internet navigation is due to observed differences in households' attributes. Following Sinai and Waldfogel (2004), the specification in Column 2 includes the following household-level controls: head of household age and education; family income, and a dummy for the presence of children in the household.[9] In this specification, the estimated coefficient for the level of city population will measure the effect of city size on the likelihood of using the Internet even after accounting for the family's characteristics. I find that both family income and the presence of children are strongly correlated to Internet navigation. I also find that education significantly affects navigation: high school diploma holders and college graduates are respectively 12 and 17% more likely to navigate the Internet than head of households with an elementary school diploma. Crucially, by controlling for households' attributes, the effect of city size on Internet use remains highly significant with a point estimate that decreases only marginally.

Columns 3 and 4 provide some robustness related to the way of measuring city size, the variable of interest. I first replace the specification in level with a specification in logs, which according to Charlot and Duranton (2004) better captures urbanization economies. As shown in the table, the effect of city size remains positive and significant. Next, I replace the population continuous variables with a series of dummy (Small Towns, Midsize Towns, and Large Cities; with Villages representing the omitted category) to check the role of nonlinearities. I find that the effect of city size is concentrated in the largest cities. The positive effect on Internet navigation found for Large Cities is four times the impact found for Midsize Towns.

The fact that the probability of using the Internet increases with city size can be interpreted as evidence against the IKD hypothesis. However, it may be that

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[9]I also replaced the dummy for the presence of children in the household with a variable indicating the number of children in the household, with no modification of the results.

transportation in larger cities is actually slower than small centers. If so, internet may still kill distance when the latter is measured in terms of transportation cost (time) rather than geographic distance. To provide some robustness in this regard, I also control for the traffic congestion at city level (number of circulating vehicles over population). The results (not shown for the sake of brevity) show that congestion is unlikely the reason behind the correlation between city size and Internet usage: vehicles over population does not enter significantly and the point estimate for city size remains undisputed.

Subsequently, I consider spatial fixed effects at increasingly finer partitions of the Italian territory. As suggested by Ciccone (2002), the introduction of increasingly detailed spatial fixed affects makes it possible to control for spatially correlated omitted variables. Thus, Columns 5 and 6 re-estimate the baseline regression of Column 2 using, respectively, 20 region and 103 province geo-controls. Remarkably, the positive effect of city size persists.

Households are not assigned exogenously to cities. Instead, it could be that the positive correlation between city size and Internet usage is generated by "selective migration" of households across cities. In particular, it might happen that households with a high (unobserved) propensity to use the Web tend to move to more populated areas. In this case, the correlation between Internet use and city size may partially reflect the unobserved propensity to use the web, rather than the true effect of the size of the municipality. To make a first assessment of the issue of spatial sorting, I exploit the SHIW data on the birthplace of household heads. This information is at the level of the 103 Italian provinces that cover the country.[10] While this is certainly not ideal, I should still be able to detect spatial sorting through the different outcomes for those who work where they were born (the stayers) and the others (the movers).[11] By relating our explanatory variables with a dummy variable equal to one for the movers (Column 7), I find that spatial sorting does not seem to be a relevant issue. The effect of the dummy movers on Internet navigation is not statistically different from zero and the interactions between households' characteristics and the dummy for movers is never significant.

So far, the results suggest that, contrary to the IKD hypothesis, there is a positive correlation between city size and Internet navigation. This correlation seems to be robust: it survives after controlling for household characteristics; it does not depend on the way city size is measured; it is not driven by spatially correlated omitted variables; and it is not due to spatial sorting. Still, one cannot be sure that this correlation can be interpreted as a causal relation running from city size to Internet use. There might still be some omitted determinants of Internet navigation that could be correlated with the size of the local market. For example, a productivity shock might have a simultaneous impact on the size of the municipality and the likelihood of using the Internet. This problem can be tackled if one has an instrument for the city size. Such an instrument must account for the observed variation in city size,

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[10] Only 2,931 households (out of 3,009) provide this information.

[11] A similar procedure is followed by Charlot and Duranton (2004).

but not be correlated with the residual of the Internet navigation equation. Ciccone (2002) proposes city land area as an instrument for city population on the basis that it is a historically predetermined variable. In Column 8, I present the IV estimation results that we obtain by using city land as an instrument. They suggest that the omitted variable bias is of limited importance for my results, as the effect of city size remains statistically significant.

Overall, the results on Internet navigation provide *strong* evidence against the IKD hypothesis. The relation between city size and the probability of using the Internet is increasing, rather than decreasing as the IKD hypothesis would suggest.[12]

6.6.2 E-Banking

Does the Internet kill the distance in the retail banking sector? I report in Table 6.4 the empirical evidence on the validity of the IKD hypothesis for a sample of 8,011 households. The table follows the structure previously adopted for Internet navigation. Overall, my results suggest that e-banking bears no relationship to city size. By controlling by nothing other than macro-region dummies (Column 1), the partial correlation between city size and the likelihood of using e-banking is not statistically different from zero. Adding the household-level controls (Column 2), the point estimate goes further down. Again, income and education are both positively correlated with the likelihood of using Internet banking. Moving to the specification in logs, Column 3 shows a positive (and significant) coefficient of city size. However, Column 4 shows that compared with Village dwellers, residents in Midsize Towns use e-banking more frequently, but this is not true for those living in a large city.[13] Allowing for spatial fixed effects at finer partition of the Italian territory (Columns 6 and 7) would suggest that the presence of spatially correlated omitted variables could have resulted in a downward bias of the effect of city size on e-banking. Literally, this would imply that the IKD hypothesis is strongly rejected, since remoteness would discourage the adoption of e-banking. Finally, the robustness check related to spatial sorting, and the instrumental variable estimates, confirm the use of e-banking is basically not affected by the size of the city in which the household lives.

By showing that that the IKD hypothesis does not hold, the above evidence suggests E-banking does not substitute for more traditional services delivered at branches. This is consistent with JP Morgan (2000) and Bank for International Settlements (2003), which suggest that e-banking is mainly perceived as additional to traditional banking services, a complement rather than a substitute. On related

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[12]As for the reasons why the IKD hypothesis does not work, our results could be consistent both with the Gaspar and Glaeser (1998) story, according to which the Internet is a complement to cities because it spurs face-to-face interactions, and the Sinai and Waldfogel (2004) argument, whereby the supply of Internet content is biased in favor of urban residents. Unfortunately, our data do not allow us to disentangle the relative merits of the two proposed explanations.

[13]As before, controlling for traffic congestion does not modify the results.

Table 6.4 City size and e-banking

	(1)	(2)	(3)	(4)	(5)	(6)	(7) No interaction	Interaction with Dummy for Movers	(8)
Pop (mil.)	0.006 (0.007)	0.001 (0.002)			0.009*** (0.003)	0.011*** (0.004)	0.003 (0.003)	−0.003 (0.004)	0.004 (0.006)
Log pop			0.002** (0.001)						
i. Small town				−0.003 (0.006)					
ii. Midsize town				0.014*** (0.006)					
iii. Large city				0.007 (0.006)					
Age		−0.068*** (0.012)	−0.068*** (0.012)	−0.066*** (0.012)	−0.066*** (0.012)	−0.064*** (0.011)	−0.079*** (0.013)	0.000 (0.000)	−0.100*** (0.021)
Children		0.010*** (0.003)	0.011*** (0.004)	0.011*** (0.004)	0.009*** (0.003)	0.010*** (0.004)	0.012*** (0.004)	−0.006 (0.006)	0.004 (0.007)
Income		0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	−0.000 (0.000)	0.001*** (0.000)
i. Junior high school		−0.003 (0.007)	−0.003 (0.006)	−0.003 (0.006)	−0.004 (0.006)	−0.003 (0.007)	−0.004 (0.008)	0.001 (0.014)	−0.021*** (0.006)
ii. High school		0.042*** (0.009)	0.039*** (0.008)	0.039*** (0.008)	0.039*** (0.008)	0.046*** (0.009)	0.048*** (0.012)	−0.013 (0.006)	0.040 (0.007)

Table 6.4 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7) No interaction	(8) Interaction with Dummy for Movers
iii. College and More		0.080***	0.068***	0.069***	0.069***	0.084***	0.073***	0.070
		(0.022)	(0.020)	(0.020)	(0.020)	(0.025)	(0.024)	(0.018)
Dummy for movers							0.004	0.003
							(0.009)	(0.013)
Geo-controls	3	3	3	3	20	103	3	3
Observations	8,011	8,011	8,011	8,011	7,701	7,041	7,756	8,011

Notes: The dependent variable is an indicator variable taking value one if a household responds positively to the following question: "During 2002, did you or another member of the household use Internet links with banks or financial intermediaries?" For a description of all the other variables, see Appendix. For all columns except (8) the reported coefficients are probit estimates of the effect of a marginal change in the corresponding regressor on the probability of using e-banking, computed at the sample mean of the independent variables. The coefficient reported in column (8) are from IV, with the city land as instrument. Regressions are weighted to population proportions. Robust standard errors in parentheses (clustered on city). *significant at 10%, ** significant at 5%, *** significant at 1%.

grounds, the supply of Internet services is limited. As underscored by ECB (2002), the financial services offered electronically only represent a subset of those available at a branch. In particular, payment and asset management services are commonly offered on the web, while loans are not supplied.

What does explain the failure of the IKD hypothesis in retail banking? A possible reason is soft information in lending (see Udell 2009: Chapter 2, this volume). As underscored by Berger and Udell (1995) and Petersen and Rajan (1994), information about families and small family businesses is thought to be "soft", whereby hard information is defined (see Petersen 2004) as quantitative, and easy to store and transmit in an impersonal way. As noted by Petersen and Rajan (2002), lending practices based on soft information require the lender to have personal contact with the borrower. This can be guaranteed by the lender's local presence (moreover, since the information is soft and difficult to communicate, the decision to offer the credit has to be made very close to where the information is gathered). On related grounds, Berlin and Mester (1999) and Kashyap et al. (2002) highlight that the information generated by a deposit account may increase the probability of obtaining good terms on loans. Finally, according to Berger et al. (1996), one-stop banking (consuming the whole bundle of financial services from the same bank) brings substantial benefits (scope economies) to consumers.

To shed some light on the reason behind the failure of the IKD hypothesis in retail banking, I perform two additional experiments. I study the relation between city size and the financial products and services supplied with a deposit account. I exploit the following question, posed to 3,542 households:[14] "In addition to your account, what other financial products/services does your (main) bank supply you with". I group the possible answers in four categories. (1) Basic banking account, which includes ordinary payment services, such as payment of utility bills and crediting of salary. (2) Deposit accounts supplied with asset management services. This category includes security custody and administration, security trading, insurance policies, and individual portfolio management. (3) Banking account supplied with a loan, either mortgage loan, consumer credit or personal loan. (4) Online services, which include both interactive services and informational services. The four possible answers (with multiple responses allowed) represent the dependent variables for the regression results presented in Table 6.5.

For each possible answer I present the results obtained by using Population, Log of Population, and City Size dummies, as measures of the city population, while the additional controls (not reported in the table) are Age, Children, Income, Education dummies, and 3 Geo-controls (for each potential motive, the three specifications correspond to Columns 2–4 of Table 6.4). As for the findings, there is strong evidence that non-urban banking customers are supplied with a bank loan more frequently than their urban counterparts. The effect of city size on the probability of having a loan from the same bank in which a consumer has an account (Column 3)

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[14]The question was posed only to households in which the head of household was born in an even numbered year.

Table 6.5 City size and household's financial products/services subscribed

Dependent variables:	(1) Basic	(2) Asset management	(3) Loans	(4) Online services
Pop (mil.)	0.005	–0.015	–0.059***	0.001
	(0.008)	(0.010)	(0.019)	(0.001)
Log pop	–0.002	–0.000	–0.007*	0.001
	(0.003)	(0.004)	(0.004)	(0.001)
i. Small town	–0.007	0.006	–0.028	0.004
	(0.018)	(0.024)	(0.016)	(0.005)
ii. Midsize town	–0.017	–0.000	–0.005	0.011**
	(0.011)	(0.020)	(0.014)	(0.006)
iii. Large city	–0.008	–0.011	–0.056**	0.005
	(0.022)	(0.027)	(0.019)	(0.005)

Notes: A fraction of the households (only those with the head of household's year of birth even) with a banking account is asked to respond to the following question: "In addition to your account, what other financial products/services does your (main) bank supply you with". The possible answers, which represent the dependent variables, are recorded as follows: (1) Basic (it includes: no additional financial product/service, payment of utility bills, and crediting of salary); (2) Asset Management (it includes: security custody and administration, security trading, insurance policies, and individual portfolio management); (3) Loans (it includes: mortgage loans, consumer credit and personal loans); (4) Online services (it includes: interactive online services and informational online services). Each dependent variable takes on the value of one if a household indicates that type of financial products/services subscribed as supplied by the bank in addition to a checking/deposit account. Each entry represents the coefficient for the city size measure obtained by running a separate regression, as, respectively, in (4.2), (4.3), and (4.4). Additional controls (not reported in Table 6.5) are Age, Children, Income, Education dummies, 3 Geo-controls. Estimation method is LS. The number of observations is equal to 3,542. For all entries, the reported coefficients are Probit estimates of the effect of a marginal change in the corresponding regressor on the probability of indicating the corresponding financial products/services as supplied by the (main) bank, computed at the sample mean of the independent variables. Regressions are weighted to population proportions. Robust standard errors in parentheses (clustered on city). *significant at 10%, ** significant at 5%, *** significant at 1%.

is negative, highly significant and independent of the way the size of the city is measured. I also find that having asset management services (Column 2) is negatively correlated with city size, even though the coefficients are not statistically significant at the usual levels. Finally, having online services attached to a banking account is slightly more frequent for urban customers (again, no statistical significance is found except for midsize towns).

In sum, having a deposit account with the same bank that supplies the loan (and perhaps that provides asset management services) features remote-area households more than their metropolitan counterparts (see Brevoort and Wolken 2009: Chapter 3, this volume). In principle, these findings could be consistent both with the soft information story and the one-stop economies interpretation.

To make an additional step in trying to identify the reasons behind the failure of the IKD hypothesis, I use information on the household's revealed preference for choosing their bank. For instance, the appeal of the soft-information interpretation relies on the role of face-to-face interactions. From the borrower's point of view,

moving to another bank (or even a change in the lending officer within the same bank!) might be very costly. On the other hand, the one-stop economies story should imply some efficiency gains that accrue to the consumer – such as convenient interest rates or low charges for services – or, even without better prices, a preference for the variety of services offered at the same place.

Table 6.6 provides a test for this argument. I make use of a question posed to the heads of household regarding the reasons for choosing the bank (What made you prefer your (main) bank when you and your household began to use it?). The possible answers are recorded as follows: (1) Distance (phrased as "it is convenient for both home and workplace"); (2) Efficiency (which includes advantageous interest rates, advantageous charges for services, rapidity of banking transactions, courteousness of the staff, quantity and variety of services offered); (3) Personal acquaintances; (4) Bank standing (phrased as "it is a famous, important bank"); and (5) Other reasons (including, "it is the bank of my employer", "it offers services that permit banking transactions to be carried out over the Internet", "don't know",

Table 6.6 City size and household's preference for choosing a bank

Dependent variables:	(1) Distance	(2) Efficiency	(3) Personal acquaintance	(4) Bank standing	(5) Other reasons
Pop (mil.)	–0.022	0.034*	–0.039***	–0.012*	–0.001
	(0.015)	(0.019)	(0.012)	(0.000)	(0.027)
Log pop	–0.008	0.009	–0.007*	–0.001	0.008
	(0.007)	(0.006)	(0.004)	(0.001)	(0.006)
i. Small town	–0.020	0.006	0.032	0.014	0.016
	(0.049)	(0.035)	(0.026)	(0.011)	(0.032)
ii. Midsize town	–0.031	0.012	0.016	0.005	0.043
	(0.037)	(0.029)	(0.021)	(0.007)	(0.026)
iii. Large city	–0.028	0.034	–0.056***	–0.005	0.058
	(0.042)	(0.047)	(0.018)	(0.008)	(0.045)

Notes: A fraction of the households (only those with the head of household's year of birth even) with a banking account is asked to respond to the following question: "What made you prefer your (main) bank when you and your household began to use it?". The possible answers, which represent the dependent variables, are recorded as follows: (1) Distance (phrased as "it is convenient with respect to both home and workplace"); (2) Efficiency (it includes: advantageous interest rates, advantageous charges for services, rapidity of banking transactions, courteousness of the staff, quantity and variety of services offered); (3) Personal acquaintance; (4) Bank standing (phrased as "it is a famous, important bank"); (5) Other reasons (it includes: it is the bank of my employer, it offers services that permit banking transactions to be carried out over the Internet, don't know, no particular reason). Each dependent variable takes on the value of one if a household indicates that type of motive as a reason for choosing the bank. Each entry represents the coefficient for the city size measure obtained by running a separate regression, as, respectively, in (4.2), (4.3), and (4.4). Additional controls (not reported in Table 6.6) are Age, Children, Income, Education dummies, 3 Geo-controls. Estimation method is LS. The number of observations is 3,535. For all entries, the reported coefficients are Probit estimates of the effect of a marginal change in the corresponding regressor on the probability of indicating the corresponding motive as reason for choosing the bank, computed at the sample mean of the independent variables. Regressions are weighted to population proportions. Robust standard errors in parentheses (clustered on city). *significant at 10%, ** significant at 5%, *** significant at 1%.

"no particular reason"). Turning to the results, I find that personal acquaintance (Column 3) is a reason for choosing the family bank that is inversely correlated with city size. In choosing a bank, non-urban customers rate personal acquaintance an important factor more often than urban clients. This effect is highly significant and survives alternative measures of city size. In contrast, I fail to find that bank efficiency (Column 2) is negatively correlated with distance.[15] My results also suggest that having a bank branch close to home or the workplace (Column 1) is a less relevant determinant of household choice in larger areas. This effect is insignificant, however. Finally, I find that compared with non-urban customers, remote households evaluate more on the bank's standing (Column 4) (again, these effects are not statistically significant at the usual levels).

On balance, these results document that the IKD hypothesis does not hold true in the retail banking sector. As to the reasons for this failure, the evidence suggests that soft information in lending could be the key. Bank account holders in remote areas are more frequently supplied with a loan by their bank. Moreover, in choosing that bank personal acquaintance is considered a key factor.

6.7 Conclusions

The popular view is that the Internet will hugely transform the economy. By creating neighborhoods connected not by roads but by wires and microwave transmission, it is expected to generate a revolution in economic geography. In short, the Internet might serve as a substitute for urban agglomeration. The paper assesses this hypothesis using Italian household level data on Internet navigation and e-banking. Overall, the paper finds that the potential for the Internet to substitute for cities appears limited. Internet navigation is more frequent among urban consumers than among non-urban ones; the use of E-banking is basically not affected by the size of the city in which the household lives.

While these results document that the death-of-distance prophecy is far from realized, I have also attempted to unravel the reasons why the prophecy fails in Internet banking. In choosing a bank, non-urban customers rate personal acquaintance a more important factor than urban clients. This also depends on the fact that bank account holders in remote areas are more frequently supplied with a loan by their bank.

A note of caution is in order, however. These results refer to 2002, a few years after the Internet-related possibilities became widely available. Innovations of all kinds tend to arise first and diffuse faster in larger cities. That is, the likelihood of learning about a new technology is greater in larger cities. In short, the results presented in this paper could be a short-term correction, rather than a long-term

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[15]This result is interesting because, in principle, congestion costs (for instance, longer queuing) could be more significant in larger areas and thus counterbalance the advantage of having a closer bank branch. However, Table 6.6 shows that banking transactions are not slower in cities, and so congestion costs do not seem to be a reason for the failure of IKD hypothesis.

adjustment. While the evidence presented in this paper does not lend support for this interpretation, the changes underway should not be underestimated. For instance, as time goes by, soft information in lending might become less relevant. As forecast by Petersen and Rajan (2002), there could be a shift from soft to hard information as a basis for lending activities. In particular, since new technology permits more (hard) information to be gathered, stored, and distributed, lenders could increasingly become less in need of the rich soft information they are currently using.

Appendix: Description of the Dependent Variables

Variable	Description
Internet navigation	Indicator variable taking value one if a household responds positively to the following question: "Does any member of your household, at home or elsewhere, navigate in Internet?"
E-banking	Indicator variable taking value one if a household responds positively to the following question: "During 2002, did you or another member of the household use Internet links with banks or financial intermediaries?"
Household's financial products/ services subscribed	Indicator variable taking value of one if a household indicates the corresponding type of financial products/services subscribed as supplied by the bank in addition to a checking/deposit account. A fraction of the households (only those with the head of household's year of birth even) with a banking account is asked to respond to the following question: "In addition to your account, what other financial products/services does your (main) bank supply you with". The possible answers are recorded as follows: (1) Basic (it includes: no additional financial product/service, payment of utility bills, and crediting of salary); (2) Asset Management (it includes security custody and administration, security trading, insurance policies, and individual portfolio management); (3) Loans (it includes mortgage loans, consumer credit, and personal loans); (4) Online services (it includes interactive online services and informational online services).
Household's preference for choosing a bank	Indicator variable taking value of one if a household indicates the corresponding motive as a reason for choosing the bank. A fraction of the households (only those with the head of household's year of birth even) with a banking account is asked to respond to the following question: "What made you prefer your (main) bank when you and your household began to use it?". The possible answers, which represent the dependent variables in Table 6.6, are recorded as follows: (1) Distance (phrased as "it is convenient with respect to both home and workplace"); (2) Efficiency (it includes advantageous interest rates, advantageous charges for services, rapidity of banking transactions, courteousness of the staff, quantity and variety of services offered); (3) Personal acquaintance; (4) Bank standing (phrased as "it is a famous, important bank"); (5) Other reasons (it includes the following: it is the bank of my employer, it offers services that permit banking transactions to be carried out over the Internet, don't know, no particular reason).

Appendix: Description of the City Size Measures and Main Control Variables

Variable	Description
Pop (mil.)	Population (in millions of inhabitants) of the municipality where the household lives (source: ISTAT).
Log Pop	Log of the city population (source: ISTAT).
Land	Squared kilometers of the municipality (source: ISTAT)
Villages	Indicator variable taking value of one if a household lives in a municipality with less than 20,000 inhabitants.
Small town	Indicator variable taking value of one if a household lives in a municipality with more than 20,000 and less than 40,000 inhabitants.
Midsize town	Indicator variable taking value of one if a household lives in a municipality with more than 40,000 and less than 500,000 inhabitants.
Large city	Indicator variable taking value of one if a household lives in a municipality with more than 500,000 inhabitants.
North	Indicator variable taking value of one if a household lives in the Northern regions.
Center	Indicator variable taking value of one if a household lives in the Center regions.
South and islands	Indicator variable taking value of one if a household lives in the South or Islands.
Age	Household head's age at the survey date
Children	Indicator variable taking value of one if there are children in the household.
Income	Net disposable income of the household.
Elementary school	Indicator variable taking value of one if the highest educational qualification of the household head is elementary school.
Junior high school	Indicator variable taking value of one if the highest educational qualification.
High school	Indicator variable taking value of one if the highest educational qualification.
College and more	Indicator variable taking value of one if the highest educational qualification.
Movers	Indicator variable taking the value of one for individuals residing in a

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Part II
Borders and Market Structure

Chapter 7
Bank Market Structure, Competition, and Stability: Issues and Concepts

Klaus Schaeck

Abstract A perceived simultaneous increase in consolidation and competition in banking systems around the world has intensified public policy debates on the nexus between consolidation and competition on one hand, and bank soundness on the other hand. In light of these developments, this paper reviews and evaluates the contemporary literature on the effect of structural and nonstructural measures of competition on bank soundness. While the established literature points toward negative trade-offs between competition and bank soundness, this review concludes that recent studies increasingly bolster the view that competition is beneficial for bank stability. This paper starts out with a survey of key studies from the literature on competition, concentration, and soundness. I then provide an assessment of the underlying concepts in the industrial organization literature and review alternatives to the Structure-Conduct-Performance paradigm that dominates the extant literature. Second, I point out several issues that have been widely ignored in contemporary studies but that are critical for public policy recommendations. Finally, I suggest some avenues for future research.

7.1 Introduction

The role of banks for mobilizing, allocating and investing society's savings suggests that the stability of individual banks and of the whole banking system has wide ranging repercussions for economic growth, industrial expansion, and economic development (Berger et al. 2004). Motivated by a quickly growing body of literature on the nexus between bank market structure, competition, and bank soundness, and

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an increasing public policy interest in achieving and maintaining banking stability,[1] I review and evaluate the contemporaneous literature on the effects of competition and concentration on bank soundness.

The literature on the relationship between competition, concentration, and bank soundness, usually focused on single countries, indicates a negative trade-off between competition and bank soundness, and a corresponding positive link between concentration and bank soundness (e.g., Keeley 1990). However, more recent studies report simultaneous increases in the levels of concentration and competition.[2] In addition, several recent studies, undertaken for cross-country samples, increasingly suggest that competition may be conducive to a safer and sounder banking system, thus challenging earlier theoretical and empirical research (Boyd and De Nicoló 2005, Schaeck et al. 2004, De Nicoló et al. 2004). In light of these considerations, this chapter seeks to broaden and deepen our understanding of the impact of different measures of competition and concentration on bank soundness, both on the bank and on the systemic level. Moreover, the observed shift from a negative trade-off between competition and bank soundness toward a positive effect of competition on bank soundness gives rise to a whole set of intriguing theoretical and empirical questions. All of them either being currently subject to thorough economic and econometric analysis or at least providing some thought-provoking avenues for future research.

Survey papers necessarily treat a number of issues. Therefore, I embark upon a review of several key studies before tackling a set of specific questions.[3] Each of those questions is addressed in one section, so as to make these sections relatively self-contained. *First,* what are the underlying concepts in the industrial organization literature? The observed shift from a detrimental effect of competition on stability toward a positive impact of competition on bank soundness may well reflect a refutation of the widely employed Structure-Conduct-Performance (SCP) paradigm in the more recent literature. This issue raises the question as to the appropriateness of the assumptions on which the SCP paradigm is based. *Second,* what constitutes bank soundness (both on the individual bank and on the systemic level), how should it be measured in the context of the literature reviewed in this chapter, and how do we measure competition and concentration? Addressing these queries will help gain deeper insights into the validity of policy inferences based upon measures of concentration, competition, and bank stability. The reliability of these measures is highly critical for deriving policy recommendations, e.g., for means of prompt corrective action and for competition policy based upon concentration measures such as the Herfindahl-Hirschman index. *Third*, what is the principal transmission mechanism by which competition tends to contribute to bank soundness in recent studies? While

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[1]Note that the terms "stability" and "soundness" are used interchangeably in this chapter.

[2]For an overview of concentration and competition in European banking see Staikouras and Koutsomanoli-Fillipaki (2006), and Bikker and Haaf (2002) for a world-wide sample.

[3]The earlier literature on competition and stability is treated in detail by Carletti and Hartmann (2003).

numerous studies provide a great deal of insight as to why competition may make banks more prone to failure, thus also having a deleterious impact upon systemic risk, the empirical literature remains largely quiet with respect to explanations for the positive effect of competition on bank stability. As detailed further below, I will argue that increased efficiency may be a potential underlying reason for increased soundness observed in more competitive banking systems. *Fourth*, having surveyed and evaluated the relevant literature, I briefly propose potential policy recommendations for regulatory oversight and regulation of financial institutions.

This chapter is organized as follows: I start out in Section 7.2 with a review of key studies. Section 7.3 focuses on the underlying concepts from the industrial organization literature, and Section 7.4 provides a discussion of the measures of stability, competition, and concentration, highlighting their particular advantages and disadvantages in light of the purpose for which they are employed. Section 7.5 presents avenues for future research and highlights public policy implications. Section 7.6 offers concluding remarks.

7.2 The Literature on Competition, Concentration, and Stability

This review of related studies on the question of competition versus stability draws from several strands in the literature. I first emphasize the link between concentration and competition. Second, I review studies on concentration and stability. Third, a discussion of key studies on the relationship between competition and stability follows.

7.2.1 Concentration and Competition

The empirical literature on the direct relationship between competitive conduct of financial institutions and its bearing on concentration is comparatively short. This is surprising, given that issues of competition and concentration in the banking industry are heavily debated by policy makers. Bikker (2004) underscores that concentration may impact on competition and that the increasing size of financial firms has substantial bearing on financial stability. Following an approach pursued in the industrial organization literature, he proposes that competition can be measured by the Panzar and Rosse (1987) H-Statistic. This indicator measures the sum of revenue elasticities with respect to factor input prices. In order to test the effect of concentration on competition, Bikker and Haaf (2002) regress the H-Statistic on a variety of concentration indices and the number of banks in a sample of 23 industrialized countries and find that increasing concentration significantly decreases competition across a number of different model specifications. Contrary to these results, drawing upon a sample of 50 countries, Claessens and Laeven (2004) use four different models to compute the H-Statistic and report that their analysis provides empirical support for a positive association of concentration and competition. Their findings are

robust to the incorporation of regulatory variables that capture contestability of the banking systems in the countries under consideration. Claessens and Laeven (2004) conclude that the degree of concentration may be a poor indicator for the competitive environment banks operate in. Likewise, Staikouras and Koutsomanoli-Fillipaki (2006) report that EU countries have experienced a substantial increase in competition (measured by the Panzar and Rosse (1987) H-Statistic) during the period 1998–2002, while they simultaneously find evidence for higher levels of concentration in European banking systems. Angelini and Cetorelli (2003) arrive at the same conclusion in their analysis of the Italian banking sector, uncovering a negative link between the Lerner index, defined as the mark-up of price over marginal cost and the Herfindahl-Hirschman index. A similar result is reported by de Guevara et al. (2005) in a study on European banking sectors in which they stress that concentration is inadequate as an indicator of competition. Carbo et al. (2009) compare different measures of concentration and competition in European banking and reiterate that there is little relationship between measures of market structure, such as the Herfindahl-Hirschman Index, and the H-Statistic. They also underscore that measures of competition cannot be substituted by measures of concentration. Finally, Cetorelli (1999) shows that merger activity among banks can break up collusive arrangements, thereby restoring market competition. Using Italian bank data, he also highlights that increases in concentration measures give rise to seriously misleading inferences regarding the exercise of market power. This is supported by his empirical results which contradict the SCP paradigm regarding the inverse relationship between concentration and competition.

Consequently, the case for using concentration as a proxy for competition can be seriously disputed. This is critical for the inference of policy implications since concentration does not necessarily imply the lack of competition as factors other than competition may drive concentration.

7.2.2 Concentration and Stability

Two distinct strands in the literature reflect contrasting views on the relationship between concentration and stability. In theoretical models, Allen and Gale (2004) exemplify that financial crises are more likely to occur in less concentrated banking systems. This is due to the absence of powerful providers of financial products that can reap benefits from high profits that serve as a cushion against asset quality deterioration. A similar view is taken by Boot and Greenbaum (1993) who highlight that increasing bank charter values arising from increased market power create incentives for bank managers to act prudently, thereby contributing to higher bank asset quality. These institutions are also considered to be easier to monitor from a regulatory perspective.

These theoretical studies have been substantiated by empirical work. Paroush (1995) argues that increases in market power arising from diversification benefits of bank mergers suggest higher bank stability. Benston et al. (1995) also investigate bank mergers in the United States and report that pre-merger variance of target bank

earnings and the pre-merger covariance between target and acquiring bank earnings show a negative association with bid prices, thereby underlining the hypothesis that increases in market power contribute to financial stability. Similar results for mergers of US banks are obtained by Craig and Santos (1997), who analyze post-merger profitability and post-merger risk. Focusing on thrift institutions in Texas in the 1980s, Gan (2004) presents evidence for increasing franchise values in more concentrated banking markets and a corresponding decrease in bank risk, proxied by investments in real estate and brokered deposits, both as a percentage of assets. Recent work by Beck et al. (2006) using a cross-country data set on 69 jurisdictions provides strong empirical evidence that is consistent with the 'concentration-stability' view. They report that increases in national bank concentration, measured by the 3-bank concentration ratio and by the Herfindahl-Hirschman index, do not feed into increased fragility of the banking system and that the results are robust subject to a broad array of sensitivity tests. In addition, they show that less contestable markets, approximated by a set of regulatory variables such as activity restrictions for banks, are more prone to experience episodes of systemic crises. However, while this study provides suggestive evidence that regulatory policies that impede competition are undesirable from a financial stability viewpoint, the study falls short in presenting evidence for the effect of financial institutions' competitive behavior on banking system stability. An analysis of the underlying mechanisms substantiates that concentration cannot be considered as a proxy for less competition, as their results hold when controlling for institutional and regulatory variables supportive of contestable markets (Beck et al. 2007).

Contrary to this 'concentration-stability' view, Boyd and De Nicoló (2005) allow for competition in loan markets and illustrate that institutions' ability to charge higher interest rates increases in more concentrated markets. This implies higher borrower default rates, a phenomenon that is amplified by a moral hazard on the part of the borrowers, who themselves then increasingly engage in risky projects. Boyd and De Nicoló (2005) show that the effect from the lending market dominates and ultimately gives rise to greater vulnerabilities. Mishkin (1999) also holds that more concentration increases systemic risk. He contemplates that banking systems with a limited number of large institutions are more likely to be subject to regulators' "too big to fail" policies that encourage the risk-taking behavior of banks.

Research by De Nicoló and Kwast (2002) scrutinizes the correlation between Large and Complex Banking Organizations (LCBOs) in the United States to draw inferences about correlated exposures and hence the presence of systemic risk. The authors detect increasing return correlations during the sampling period 1988–1999 and interpret this as a sign for increased systemic risk. This view is subsequently substantiated by De Nicoló et al. (2004). Using an alternative measure for systemic risk, an aggregate Z-index that gauges the joint probability of failure of the five largest banking firms in a country for the period 1993–2000, and drawing upon a cross-country dataset, the study presents evidence for a positive relationship between concentration, measured by the 5-bank concentration ratio, and banking system fragility. Boyd and Graham (1991, 1996) also provide weak support for this view by examining failures of large financial institutions in the United States and

test whether large banks fail more frequently than smaller institutions. They report that large banks failed more often than smaller banks over the entire sampling period of 1971–1994. However, splitting the sample in different sub-samples gives rise to a more mixed picture such that it becomes difficult to establish firm conclusions.

7.2.3 Competition and Stability

In a similar vein to the studies on concentration and fragility, where the two conflicting views hold that concentration either increases or decreases stability, we observe a similar pattern in the literature on competition and stability. Carletti and Hartmann (2003) provide an in-depth survey of this literature.

Matutes and Vives (1996) argue that instabilities can arise in any kind of market structure as depositors' propensity to run is determined exogenously by their expectations in the spirit of the Diamond and Dybvig (1983) model. In contrast, Smith (1984) puts forward a theoretical exposition of how increasing competition for bank deposits gives rise to vulnerabilities in the system. Besanko and Thakor (1993) illustrate that banks decide on risky portfolio strategies when competition stiffens. Taking the design of deposit insurance schemes into consideration, Cordella and Yeyati (2002) show that risk-based deposit insurance restrains risk-taking behavior of financial institutions even in the presence of increased competition whereas fierce competition in an environment with flat-fee deposit insurance translates into higher risk in the system. Similarly, Matutes and Vives (2000) also investigate bank risk-taking behavior and deposit insurance. They additionally consider social costs associated with bank failures and find that excessive competition gives rise to maximal bank risk in the absence of risk-based deposit insurance. Likewise, Hellman et al. (2000) contemplate that accelerating competition makes financial institutions embark upon riskier investments, but that capital requirements and deposit rate ceilings can help restore prudent bank behavior.

With the exception of the study by Matutes and Vives (1996) all the aforementioned theoretical studies imply a positive association between competition and fragility, and we therefore refer to this strand as 'competition-fragility' literature. However, using a model of mean-shifting investment technologies, Koskela and Stenbacka (2000) demonstrate that there need not be a trade-off between competition and stability. They show that permitting competition in loan markets reduces lending rates and generates higher investments without a simultaneous rise in the equilibrium borrower default rate. Caminal and Matutes (2002) illustrate that monopoly banks with intermediate monitoring costs can be more prone to originate risky loans that give rise to higher probability of subsequent failure. Similarly, Nagarajan and Sealey (1995) illustrate that forbearing regulatory policies are likely to decrease the quality of bank assets. Using a dynamic duopolistic model, Perotti and Suarez (2002) investigate potential failure of financial firms due to competition and argue that the failed institution can be either closed or merged with another agent. They show that an active merger policy by the regulatory agency

which encourages takeovers of failed institutions contributes to banking stability. This is due to the fact that the surviving bank will benefit from the failure if no new competitor enters the market. This consequence is referred to as the 'last bank standing' effect. The effect strengthens the institution's incentive to act prudently as higher rents can be generated if the competitor fails. The three latter studies can thus be assigned to the 'competition-stability' strand in the literature.

Allen and Gale (2004), however, argue that the relationship between competition and financial stability is multifaceted and that a mere consideration of the trade-off between competition and stability is inappropriate. Rather, they identify the efficient levels of both competition and stability by reviewing a number of different theoretical models and conclude that different models yield different answers. Allen and Gale (2004) maintain that perfect competition propels the socially optimal level of stability if financial markets and contracts between customers and intermediaries are complete. In a number of other instances, however, where deposit insurance is present or where institutions compete heavily for deposits due to increasing returns to scale, competition tends to weaken bank soundness. Finally, they highlight that fragility also depends on the structure of the interbank market: Contagion effects arising from small liquidity shocks in a perfectly competitive interbank market where all institutions are price takers can force all the banks to liquidate assets. Similar to Allen and Gale (2004), Boyd et al. (2004) also put forward that the probability of observing a banking crisis does not only dependent on the degree of competition. Rather, monetary policy is a major determinant as well. Monopolistic banking systems are found to be more fragile if the rate of inflation is below a certain threshold, whereas more competitive banking markets are more vulnerable if inflation is above this threshold.

The empirical literature is largely characterized by studies that focus on one or two individual countries. Influential work by Keeley (1990) finds a highly significant relationship between the erosion of bank charter values in the United States and increased competition and hence offers empirical support for the "competition-fragility" hypothesis. Bordo et al. (1995) embark on a comparison of the Canadian and US banking systems between 1920 and 1980 and report that Canadian banks failed less often than US institutions, a finding they assign to the oligopolistic structure of the Canadian banking system. Capie (1995) reviews stability and efficiency in the UK banking market between 1840 and 1940 and concludes that a less competitive environment contributed to a period during which no major disruptions surfaced. Hoggarth et al. (1998) contrast the German and UK banking systems over the past few decades and report that profits in the UK were higher, but also more variable than in Germany and infer that the less competitive German system can be perceived to be more stable. Finally, Staikouras and Wood (2000) run similar analyses for Greece and Spain and find that Spanish institutions are more profitable and more stable than Greek banks.

Assigning the empirical studies to either the "competition-fragility" literature or to the "competition-stability" literature is more ambiguous than for the theoretical research. The work by Keeley (1990), Capie (1995), Bordo et al. (1995), and Hoggarth et al. (1998) can be classified into the "competition-fragility" literature

suggesting a possible trade-off between competition and stability, while the paper by Staikouras and Wood (2000) is a prime example of empirical analysis finding no such trade-off.

7.3 What Are the Underlying Concepts?

As highlighted in the preceding section, structural (e.g., concentration ratios) and nonstructural (e.g., Lerner, H-Statistics) measures of competition have often been used interchangeably in the literature on competition in banking. However, those studies that aim to test the effect of competition on banking stability almost exclusively rely upon structural measures of competition such as the k-bank[4] concentration ratio and the Herfindahl-Hirschman index and relate proxies for banking stability to these measures (Beck et al. 2006, 2007, De Nicoló et al. 2004).

I argue that the contradicting predictions regarding the effect of competition on stability are due to the way competition was measured in many previous studies. To recap, these studies assume that a certain market structure is related to competitive conduct and proxy competition therefore with the degree of concentration, whereby a more concentrated banking system is considered to be less competitive. This is theoretically justified by some oligopoly solution concepts such as the Cournot model (Cowling and Waterson 1976). For instance, Beck et al. (2006, 2007) use a logit model to test for the presence of a systemic crisis and offer robust evidence that more concentrated banking systems, measured with the 3-bank concentration ratio, are less likely to experience a systemic crisis. Assuming that the SCP paradigm is valid, these results suggest that less competition is beneficial for banking system stability. However, this finding is reversed in the work by Boyd and De Nicoló (2005) and De Nicoló et al. (2004). As mentioned above, the latter study relates an aggregate Z-score for the probability that the five largest institutions in a country fail to the 5-bank concentration ratio as a measure of competition, indicating that less concentration is conducive to banking system soundness.

These key studies challenge the validity of the SCP paradigm, and it is therefore necessary to consider the following assumptions pertinent to the SCP: First, for the SCP paradigm to hold, a market has to be defined. Eventually, this affects the measurement of the concentration variable. While this approach may be appropriate in the absence of cross-border competition, it is widely accepted that the banking industry has become globalized (Vives 2001). Furthermore, large financial institutions, i.e., those which the 3-bank concentration ratio is based upon, tend to operate globally. The underlying fact of a positive relation between bank size and the likelihood of expanding abroad (Pozzolo 2009: Chapter. 8, this volume) further reduces the appeal of this measure to proxy competition if it is based on a national banking

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[4]The k-bank concentration ratios are the general way of referring to the ratio of the assets (or deposits) held by a certain number of banks to total assets (or deposits) in the banking system. Empirical studies usually assume $k = 3$ or $k = 5$.

market. Similarly, Shaffer (2004b) points out that banking markets in smaller countries extend beyond a single country's borders. In general, internationalization of financial institutions is not normally accounted for in the studies under consideration. Thus, the definition of a banking market may be subject to criticism in light of increasing cross-border activities of banks. Second, the direction of causality running from structure to conduct is not well established (Tirole 1988). Most importantly, game theoretic approaches view market structure and conduct as endogenous whereby entry decisions into a market are determined by the expectations of the degree of competition in the market (Vesala 1995). Third, it has been shown in the industrial organization literature that measures of market structure such as the number of institutions or concentration ratios are not necessarily related to the degree of competition (Baumol et al. 1982). This assertion is substantiated by a growing body of empirical work. Foremost, Claessens and Laeven (2004), in their study of the determinants of the Panzar and Rosse H-Statistic (1987), report evidence for a positive association of the H-Statistic with concentration. They conclude that the frequently assumed inverse relationship between competition and concentration does not hold. Likewise, Cetorelli (1999) reports that competition in banking can only be measured through direct empirical analysis, whereas Angelini and Cetorelli (2003) present evidence for a negative relationship between the Lerner index and the Herfindahl-Hirschman index, thus invalidating the SCP paradigm. Schaeck et al. (2009) distinguish explicitly between independent factors arising from competition (measured by the H-Statistic) and concentration (measured by the 3-bank concentration ratio) for banking system stability and run both logit and duration analysis and report evidence that concentration has an independent effect on both timing and probability of having a systemic crisis. However, the H-Statistic enters their regressions also significantly and with a positive sign, indicating that competition is conducive to increased bank soundness.[5] These findings indicate that the relationship between market structure and competition in banking is not trivial. In addition, Demirgüç-Kunt et al. (2004) underscore that using national bank concentration measures may be misleading as a proxy for the competitive environment in the industry, and Beck et al. (2006) underscore that concentration measures something else besides market power. Finally, the SCP paradigm views both bank soundness and competition as outcomes. However, the literature on the relationship between market structure and bank soundness is interested in a causal effect running from structure and competition to stability.

In sum, there is (i) empirical evidence that concentration is an insufficient measure of competition and that (ii) competition and concentration describe different characteristics of banking systems as they are imperfect substitutes for each other. We can therefore conclude that the application of the SCP paradigm does not help much to progress toward a better understanding of the link between competition, market structure, and stability. Therefore, it seems important to include structural and nonstructural measures in the empirical equations to test for the effect on bank

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[5] As one observer noted recently, "conduct matters, but structure doesn't".

soundness. In other words, it is pertinent to capture independent effects arising from both concentration and competition by having variables that explicitly capture information on market structure and market conduct to shed further light on this debate.[6]

7.4 Measuring Stability, Competition, and Concentration

In this section, I discuss the variables of key interest. First, I start by defining what is meant by banking stability, also pointing out the key differences in the empirical literature between measuring stability on the bank level and on the systemic level. Second, this section also discusses and evaluates a number of alternative ways of measuring competition and concentration in banking systems. Third, I elaborate upon traditional measures of concentration, such as the k-bank concentration ratio and the Herfindahl-Hirschman index and discuss them in light of advances in the new empirical industrial organization (NEIO) literature.

7.4.1 Measuring Banking Stability

Stability is traditionally assumed if bank failures are absent. However, since bank failures are frequently resolved through assisted mergers, capital injections, and other means of support, empiricists have heavily relied upon proxies for the measurement of bank stability since data on actual failures are not readily available for countries other than the US.[7] Commonly used proxies to assess bank soundness are as follows: capital ratios and variations thereof (e.g., Nier and Baumann 2006, Schaeck and Cihak 2007), the interest cost on large CDs (Keeley 1990), indices constructed as weighted averages of risky assets (Shrieves and Dahl 1992), Z-scores (e.g., Mercieca et al. 2007), large swings in bank stock prices (Nier 2005), distance-to-default (e.g., Chan-Lau and Sy 2006), and the market-value capital to asset ratio (Keeley 1990).[8] As in many other situations, the choice of the measurement variable involves trade-offs. Whereas the former four measures are all based upon accounting data, and are therefore readily available for both listed and nonlisted banks, they are frequently criticized for their backward-looking nature. By

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[6]For an application see Schaeck and Cihak (2007) and Schaeck et al. (2009).

[7]Note that failure is a regulator-induced process that may occur prior to a bank becoming technically insolvent. For instance, the Federal Deposit Insurance Corporation Improvement Act (1991) in the United States contains guidelines for prompt corrective action that require a bank being placed in receivership if its ratio of tangible equity to total assets falls to or below 2 percent.

[8]Note that Gan (2004) uses the ratios of real estate and brokered deposits to total assets as proxies for risk. However, this study is concerned with risk taking in thrift institutions that have very different business profiles in comparison to commercial banks and I therefore refrain from classifying these variables as measures of bank soundness.

contrast, the latter measures draw upon market data that are, due to their forward-looking nature, more appropriate for regulators and policy makers in their quest for averting the build-up of imbalances on the bank level. Moreover, such information is also available at a much higher frequency. Furthermore, since bank managers frequently engage in "evergreening" of loans and other types of window dressing in the run up to failure, an exclusive reliance on accounting-based measures of stability may not be advisable. Likewise, if a failure is caused by outright fraud, the information content provided in accounting statements may be misleading. The use of indicators based on market information, however, gives rise to other difficulties as market-based indicators do not sufficiently account for the fact that bank failure is a regulator-induced process, which is not addressed in the concept of a distance-to-default which associates the market value of a bank's assets with the value of its liabilities. In addition, the risk arising from leverage for a bank is considerably smaller than the risk arising from gearing for a nonfinancial institution (Chan-Lau and Sy 2006).

Finally, the distance-to-default assumes all bank capital can serve as a buffer to absorb losses and neglects the fact that supervisory authorities will take remedial action prior to a bank exhausting its capital (Chan-Lau and Sy 2006).

Stability is assumed on the systemic level if a banking crisis is absent. Therefore, the extant literature in the field frequently uses a dummy variable that indicates presence or absence of a systemic crisis, whereby a crisis is assumed to be present whenever large-scale nationalization of banks takes place, fiscal costs of the rescue operations exceed a certain threshold level, emergency measures such as deposit freezes and bank holidays are implemented, nonperforming assets reach a certain threshold level, or when a large proportion of the banking sector's capital is exhausted (e.g., Demirgüç-Kunt and Detragiache 1998, 2005, Beck et al. 2006, Eichengreen and Arteta 2000, Honohan and Laeven 2005). While the use of the dummy variable approach is convenient, there are two key limitations. First, the dating for both the onset and ending of a crisis is somewhat judgemental and, second, so is its intensity. Thus, the use of continuous measures of systemic risk is highly desirable from the point of view of policy makers. However, the literature in this field is still in its infancy. This is reflected in a recent statement in the ECB Financial Stability Review (2005, p. 131) highlighting that

> there is no obvious framework for summarising developments in financial stability in a single quantitative manner.

Trying to overcome these limitations, De Nicoló et al. (2004) use an aggregate Z-score based on the five largest institutions operating in a country to evaluate exposure to systemic risk, and Illing and Liu (2006) develop a financial stress index in order to obtain a continuous measure for the build up of vulnerabilities in the system. The difficulty with the former is its focus on five institutions, thus arbitrarily ignoring soundness of the remaining banks operating in the system. The financial stress index by Illing and Liu (2006) is difficult to implement in cross-country surveillance activities due to its demand for a large set of underlying country-specific data. Also, the International Monetary Fund (IMF) has started to calculate distance-to-default

measures to gauge banking sector soundness for its surveillance work. The use of market-based information is, however, not without drawbacks. Importantly, using distance-to-default as a measure for banking stability considerably reduces the number of data points since not all institutions have publicly traded debt or equity instruments. Consequently, a note of caution is appropriate when drawing inferences based upon market data for banking systems where only a very small proportion of institutions are publicly listed. Finally, another common problem with these widely employed measures of systemic risk is that they fail to take contagion risk and loss given default into consideration (Cihak 2007).[9]

While the literature reviewed in this paper is not explicitly concerned with the development of measures of financial stability, it nevertheless offers critical insights with respect to desirable characteristics of measures of banking stability. Such measures should be as follows:

(i)   *Quantifiable.* This reflects the desirability of having a continuous measure that mirrors the intensity of a banking problem, both on the individual bank and on the systemic risk level.

(ii) *Forward-looking.* A forward-looking measure is necessary from a supervisory point of view so as to develop appropriate response strategies to the build up of vulnerabilities in a timely manner.

(iii) *Robust to measurement bias.* Since accounting-based measures may be subject to window dressing by bank managers, it is pertinent for an effective measurement of stability to be robust to input data.

(iv) *Observable.* It should be observable in the sense that those who are responsible for achieving and maintaining stability know whether they are succeeding in their effort or not (see also Allen and Wood 2006). This can only be maintained if a certain range of this variable reflects a level of "soundness".

(v)   *Influenceable.* Since achieving and maintaining stability is perceived to be an objective of public policy, this objective should be achievable through the actions taken by policy makers (see also Allen and Wood 2006).

(vi) *All-inclusive.* The measures should be all-inclusive in the sense that it is desirable to extend the measure beyond a consideration of probability of default. Precisely, a measure of banking stability should simultaneously consider probability of default, loss given default, and correlation of defaults across institutions (Cihak 2007).

Having talked all around the pros and cons of the measures of stability employed in the empirical literature, and having established a number of desirable characteristics for measures of banking stability, we can conclude that there is still ample potential for developing measures of banking stability.

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[9]See Cihak (2007) for an in-depth analysis of measures of systemic risk.

7.4.2 Measuring Concentration and Competition

Studies that assess competition and concentration in banking systems both within and across countries tend to rely upon a small number of commonly utilized measures that are available.[10] Generally, two types of competition measures have been used in the extant literature on competition and concentration – these are referred to as structural and nonstructural indicators (see Section 7.3, Bikker 2004, Carbo et al. 2009).

As alluded to previously, among the standard market structure indicators used in the empirical literature are the k-bank concentration ratio and the Herfindahl-Hirschman index (e.g., Beck et al. 2006, De Nicoló et al. 2004, Angelini and Cetorelli 2003). The latter plays an important role in the enforcement of anti-trust laws in the United States (Bikker 2004). While these indicators are often used to proxy competition due to an assumed inverse relationship between competition and concentration, their reliability is not undisputed. The k-bank concentration ratio, one of the most widely used concentration measures due to its simplicity and limited data requirements, sums the market shares over the largest k-banks in the market and assigns equal weight to the k leading banks. The arbitrary cutoff means, however, that this ratio neglects many small banks operating in the market, and there is no rule as to how to determine this cutoff point. For instance, recent banking statistics show that 2,344 credit institutions operate in Germany.[11] If competition is proxied with the 3-bank concentration ratio for Germany, we neglect competition arising from 2,341 institutions. Alternatively, competition can be gauged using the Herfindahl-Hirschman index. This index is calculated as the sum of the squared market shares of the banks and consequently gives more weight to larger institutions. Contrary to the k-bank concentration ratio, this index extends to all banks in the system, thus avoiding arbitrary cutoffs. However, Alegria and Schaeck (2008) illustrate that these two commonly used concentration measures are sensitive to the number of institutions in the sample. They find that both the Herfindahl-Hirschman index and the 3-bank concentration ratio exhibit high elasticities to changes in the number of banks in the sample. Furthermore, Bikker (2004) argues that the results obtained with concentration measures are not reliable in instances where the number of institutions operating in a country is small.

Whereas these concentration indices are considered to be structural measures of competition, the NEIO literature has provided alternative, nonstructural measures of competition that are increasingly utilized in the empirical banking literature. Such measures were developed as a response to the empirical deficiencies associated with the structural measures of competition. NEIO measures do not take market structure into consideration; rather, they provide "realized" measures of the degree of competition (Carbo et al. 2009).

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[10]For detailed reviews see Bikker (2004), Carbo et al. (2009), and Berger et al. (2004).

[11]See Bankstellenstatistik, Deutsche Bundesbank, accessed on February15 2007, available on http://www.bundesbank.de/download/presse/pressenotizen/2006/20060413.bankstellennetz.pdf.

In particular, the Panzar and Rosse (1987) H-Statistic, the measures developed by Breshanan (1989), Lau (1982), and Iwata (1974) are all based on the theory of the firm models under equilibrium conditions and use some form of price mark-up over a competitive benchmark. The Iwata (1974) model offers a framework for the estimation of conjectural variation values (i.e., firms' reactions to changing market shares and pricing by rivals for banks that supply homogeneous products). Shaffer and DiSalvo (1994) provide one of the few applications of this model to banking and present evidence for imperfectly competitive behavior in a locally concentrated duopolistic banking market. The models by Breshanan (1989) and Lau (1982) have been more widely employed in the banking literature. They yield a conduct parameter λ that measures bank market power reflecting the extent to which the average firm's marginal revenue varies from average revenue indicating the slope of the demand curve. This, in turn allows inferences for the implied market power of firms over price. Shaffer (1993), Neven and Roeller (1999), Bikker and Haaf (2002), and Angelini and Cetorelli (2003) apply this method to banking data in the United States, Canada and Europe, respectively. With the exception of Neven and Roeller (1999), these studies find little evidence of market power in European banking. The most widely used method in the empirical banking literature is the Panzar and Rosse (1987) H-Statistic. Shaffer (1982, 2004b), Molyneux et al. (1994, 1996), Vesala (1995), Nathan and Neave (1989), De Bandt and Davis (2000), Bikker and Haaf (2002), Coccorese (2004), Staikouras and Koutsomanoli-Fillipaki (2006), Al-Muharrami et al. (2006), Carbo et al. (2009), Schaeck et al. (2009), Trivieri (2007), and Schaeck and Cihak (2007) also use this approach. The majority of these studies report evidence for monopolistic competition in the banking systems under consideration. Finally, Angelini and Cetorelli (2003), Fernandez de Guevara and Maudos (2004), and Fernandez de Guevara et al. (2005) use the Lerner index to determine the level of competition over time. This index provides information about the mark-up of price over marginal cost. Contrary to the research based upon the H-Statistic, these studies report a decline in the competitiveness of the European banking industry.

In terms of their specific advantages and disadvantages, it is widely acknowledged that the strength of the Panzar and Rosse (1987) test stems from its derivation from firm-level data (e.g., Shaffer 2004a). As a result, it is therefore also robust to the extent of the market in the sense that no assumptions about market structure are necessary. Furthermore, bank-level data are normally readily available for empirical work (e.g., BankScope, Call reports). Additionally, the H-Statistic only requires a few variables and can be estimated easily using linear single-equation models. By contrast, the Breshanan (1989) and Lau (1982) method requires a nonlinear system estimation. Moreover, it also necessitates the availability of aggregate demand data as no firm-level data are utilized in this method. According to Shaffer (2004a) the models based on the work by Breshanan (1989) and Lau (1982) are also likely to exhibit a serious anticompetitive bias, if the dataset fails to span complete markets, a serious drawback in cross-country samples if it is assumed that a small, open economy constitutes a single market and the empirical approach fails to correct for cross-border competition in estimating market demand. Its strength lies in the fact

that it can handle monopsony power and that it maps into all oligopoly solution concepts. The Lerner index is also not without limitations. For instance, it is likely to be affected by the banks' responses to the business cycle or by technological change, which tends to lower marginal cost faster than prices, thus indicating a greater mark-up and suggesting increased market power. This may be due to shifts from expensive branch offices to ATMs and more widespread use of electronic payments. In such instances, inferences based upon the Lerner index may be misleading if costs have declined at a faster rate as have profits. The Lerner index derives its strength from the derivation from bank-level data. Moreover, in the case of a Cournot oligopoly, the Lerner index directly links the number of firms operating in a market to competition.

The review of structural and nonstructural measures of competition suggests that varying results regarding the degree of competition will be obtained, depending upon which measure is being chosen. Moreover, an econometric analysis of different measures of competition by Carbo et al. (2009) indicates that popular measures such as the Herfindahl-Hirschman index and the Panzar and Rosse (1987) H-Statistic cannot be substituted for each other, a result that is also corroborated by Cetorelli (1999).

7.5 Avenues for Future Research and Policy Implications

The review of the literature provides numerous appealing avenues for future research. First, M&A activities in the banking industry around the world trigger the question as to what are the effects for the likelihood of observing a systemic banking crisis. While this is an issue that has received widespread attention in studies that use national measures of competition and concentration (e.g., Beck et al. 2006), the increasing number of cross-border mergers in Europe requires a pan-European perspective which could shed new light into the build up of banking system vulnerabilities across national boundaries. In that respect, it is not sufficient to only develop measures of concentration and competition that account for cross-border activities. Rather, it is pertinent to also propose measures of bank soundness that extend beyond the domestic banking system. Second, given the many different measures of concentration, competition, and stability, each one having its strengths and weaknesses, it is pertinent to continue empirical research with alternative measures so as to deepen our understanding of the linkages to draw appropriate policy inferences. Likewise, the current measures of stability normally only focus on the probability of default (of either one institution or the banking sector), but do not take loss given default and correlation of defaults into consideration. Recent advances in the literature on measuring concentration (e.g., Alegria and Schaeck 2008), competition (Carbo et al. 2009, Boone 2001), and stability (Cihak 2007) provide a good starting point for such analyses. Third, previous studies provide many reasons for why enhanced competition will give rise to a more vulnerable banking system with a larger number of failures of individual financial institutions. Unfortunately, there is no empirical work devoted to the question of why competition might increase

bank soundness. However, such work is important to understand the driving forces behind the mechanism that underlies the results obtained in Boyd and De Nicoló (2005), Schaeck et al. (2009), and Schaeck and Cihak (2007). Importantly, economic welfare theorems suggest that competition promotes efficiency (Allen et al. 2001), indicating that more efficient banks tend to operate at lower costs and therefore increase market share (Demsetz 1973). It therefore appears intriguing to empirically test whether efficiency is the mechanism behind the conclusion that competition is contributing to bank soundness. Such research will add a new dimension to the study of the nexus between market structure, competition, and stability.

In terms of public policy implications, the review of the empirical literature indicates that a note of caution is appropriate when concentration indices are used to draw inferences regarding the competitiveness of a banking sector. Precisely, decisions of accepting or denying a bank merger based on the effect on concentration ratios lack a solid justification in light of these ratios' limitations. These findings are of particular importance given that regulatory authorities in the United States and elsewhere justify decisions regarding merger approval or denial largely on concentration ratios.

For instance, concentration indices are commonly used to guide merger decisions by the US antitrust authority. According to the Department of Justice, possible change of market concentration through a bank merger is assessed by using the Herfindahl-Hirschman Index. Any merger resulting in an HHI ratio below 1,800 with an increase in the neighborhood of 200 points can proceed as planned. The 1800/200 measure is used purely to distinguish mergers that could raise competitive problems and need further analysis, which might result in divestitures or the proposed merger being rejected. On average, only 5 percent of the mergers present serious concerns and are consequently followed by negotiations regarding divestitures.

In contrast, direct responsibility for approving a bank merger in Europe is generally held by the authorities of each member state in the European Union. The current discussion about a takeover of Dresdner bank by Commerzbank in Germany, which would create Germany's largest consumer bank, reiterates the need to appropriately assess the competitive ramifications of a bank merger. The merger would raise the group's market power tremendously with 2,750 branches combined and more than 20 million German clients, compared with Deutsche Bank's 987 branches and 9.7 million customers (Tromm 2008). Similar to EU countries, Switzerland does not officially use the concentration indices. However, Neven and von Ungern-Sternberg (1998), who also use the Herfindahl-Hirschman Index to assess the concentration level of the Swiss retail market through the merger of UBS and SBC, raised serious concerns about the competitive impact of the merger. They found that the Swiss retail markets are already very highly concentrated, and the merged entity would hold 90 % of the market share in eight cantons. Such findings led the Swiss Antitrust authority to impose divestitures, forcing the new entity to dispose of 25 branches.

Finally, since recent studies indicate that there is not necessarily a negative trade-off between competition and stability, policy and regulation geared toward curtailing competition in banking systems may have to be reexamined.

7.6 Concluding Remarks

This paper reviews the relationship between structural and nonstructural measures of competition and bank soundness focusing primarily on empirical work. While the established literature points to a negative effect of competition for bank soundness, thereby deeply influencing policy and regulation in banking systems all around the world, an increasing number of recent empirical counter-examples reverses these findings and presents evidence for a positive effect of competition on bank soundness.

Starting with a review of the key studies, I hone in on a set of important questions to delineate the reasons for why this vast literature has failed to date to consistently agree on either a positive or negative effect of concentration and competition on bank soundness. In particular, the findings in the early studies seem to be driven by the assumption that concentration can serve as a good proxy for competition. This conclusion is, however, only appropriate under a set of highly restrictive assumptions that are difficult to justify in an increasingly globalized banking industry. In that respect, existing published work falls short in its recognition that competition and concentration capture different characteristics of banking systems. Further reasons for the contradicting conclusions are measurement problems concerning the key variables that aim to capture stability, concentration, and competition. This review therefore also highlights desirable characteristics of the key variables of interest and proposes a list of possible avenues for future research. These topics can further enhance our understanding of the relation between market structure and banking stability. In sum, the widely held perception that competition is dangerous for bank soundness is not generally justified.

Finally, the inferences for competition policy based on concentration ratios seem to deserve some caution since a large degree of concentration in a banking market does not necessarily imply the absence of competition. It is therefore of great importance that future work clearly establishes (i) the ramifications of relying on certain ways of measuring concentration, competition, and stability and (ii) the implications of increasing competition and concentration on bank soundness so as to draw policy inferences in a more reliable manner. While recent advances in the literature that simultaneously test for the effect of concentration and competition on bank soundness appear promising, there remains a considerable degree of ambiguity. This ambiguity can only be eradicated with additional work, or, in the words of Berger, Demirgüç-Kunt, Levine, and Haubrich (2004, p. 445)

More research is clearly needed on the topic of bank concentration and competition.

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Chapter 8
Bank Cross-Border Mergers and Acquisitions: Causes, Consequences, and Recent Trends

Alberto Franco Pozzolo

Abstract   In the past 15 years, cross-border mergers and acquisitions have had an ever-increasing role in the process of bank internationalization. Although a consensus view has developed on the determinants of a bank's decision to expand abroad and on the determinant of the patterns of expansion, the debate on the consequences of foreign bank presence is still open. The aim of this chapter is twofold. First, I discuss the major results of the literature studying the determinants and the patterns of bank foreign expansion. Second, I confront the available evidence with the most recent evolution in cross-border bank M&As. At the end I suggest some possible lines for future research.

8.1 Introduction

International banking has grown substantially in recent years, as part of the ongoing process of the globalization of economic activities. Historically, it is not the first time that the banking sector has experienced an acceleration in its internationalization process. At the end of the 19th century, for example, foreign banks were already deeply involved in large investments abroad, in particular toward colonies. After nearly 50 years of quiescence, the surge in sovereign lending has again fostered international banking activities, starting from the beginning of the 1960s and progressively gaining momentum. However, between 2001 and 2003 cross-border bank mergers and acquisitions (M&As) witnessed a striking drop. Although this evolution has mirrored that of national M&As, some observers have suggested that this might have determined a change in the model of bank cross-border expansion.

Based on these stylized facts, this chapter has two main objectives. First, it discusses the major results of the literature studying the determinants and the patterns

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of bank foreign expansion. Second, it tests whether the traditional explanations of the patterns of bank internationalization are capable of explaining also the most recent evolutions, estimating an econometric model of the patterns of cross-border bank M&As between 1990 and 2006.

The empirical analysis concentrates on cross-border M&As, the expansion strategy that has had the most relevance in recent years. Indeed, as pointed out by Goldberg and Saunders (1981), banks can follow a number of different approaches in order to extend their activities abroad;[1] in recent years cross-border banking activities have increasingly taken the form of international acquisitions, especially acquisitions in developing countries effected by large and strong institutions in developed countries. While from the beginning of the 1960s to the mid-1980s the number of banks' foreign branches in the developed countries increased rapidly, in the subsequent years foreign branching became less and less popular. For example, the number of foreign institutions directly operating in New York fell from 323 at the end of 1985 to 205 in 1998 (Brealey and Kaplanis 1996), while the number of cross-border mergers and acquisitions increased sharply (Berger et al. 2000). Subsequently, the process of bank internationalization gathered further speed, especially toward developing countries. The entry of foreign banks has been especially prominent but with a pattern that has not been geographically uniform. In some Latin-American and Central and Eastern European countries (CEECs), over 50 percent of total banking assets are now foreign-controlled. In the CEECs, foreign entry has been enhanced by a market-oriented process (Papi and Revoltella 2000). In Asia, Africa, the Middle East, and the former Soviet Union progress has been slower, possibly due to stronger formal and informal entry barriers and a less intense integration process. Overall, according to Claessens and Lee (2002), in 2002 foreign banks accounted for about 7 percent of total bank assets in low-income countries, up from 3 percent of 7 years prior.

The surge in international banking activities has attracted the interest of the academic community, which has analyzed the phenomenon from an empirical point of view. A large number of studies has helped us reach a consensus on several issues, such as which banks tend to expand abroad, where they go, and what institutional form they adopt when entering foreign markets. On the contrary, to date the available evidence is less conclusive on whether entry is beneficial to the host country.

The rest of the paper is organized as follows. Section 8.2 discusses the available evidence on the patterns of bank internationalization, focusing on which banks are more likely to internationalize, where they will invest, and which institutional form

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[1]Banks can provide services to foreign counterparts, directly or through representative offices or agencies, open a foreign branch, open a brand new bank abroad or acquire shareholdings in a foreign bank (subsidiary). Direct lending is typically offered to large-scale borrowers, often in the form of syndicated loans which can be managed directly from abroad or through representative offices or agencies. Foreign branches can offer a broad range of banking services, although traditionally their activity is primarily concentrated in the wholesale market. Subsidiaries have the same banking powers as domestic banks, and are typically used to access foreign retail markets.

they will choose. Section 8.3 describes the most recent trends in bank cross-border M&As and presents the estimates of an econometric model on the determinants of bank cross-border M&As; the model aims at verifying whether the acceleration of M&A activity in the last years differs from the past. Section 8.4 discusses the effects of bank internationalization. The final section draws implications from available evidence and advances some remaining issues.

8.2 Evidence on Bank Internationalization

8.2.1 Which Banks Expand Abroad?

As mentioned in the introduction, the pattern of bank internationalization, although widespread, is unevenly distributed with respect to a wide number of characteristics: size of the banks involved, geographical patterns of foreign presence, and institutional form of the presence abroad. My first step is to describe the characteristics of the banks that are most likely to expand abroad.

A widely accepted result of the empirical literature is that banks with foreign asset participation tend to be larger, better managed, and located in countries that are open to international trade and with a developed banking system. Tschoegl (1983), Ursacki and Vertinsky (1999), and Focarelli and Pozzolo (2001), for example, found a positive correlation between the size of a bank and the probability of foreign interests. This result might be related to the presence of fixed costs in bank internationalization, stronger incentive for asset diversification, and the fact that larger banks have larger clients who are more likely to benefit from having their home country bank follow them abroad.[2] Focarelli and Pozzolo (2001) also found that banks with higher profitability and a larger share of noninterest over total income are more likely to hold foreign interests. More recently, Tschoegl (2004) has noted that multinational banks are typically large in their home country, suggesting that the decision to expand abroad may be related to diminishing opportunities of expansion at home, including also antitrust reasons. Most importantly for the host economy, banks with a stronger propensity to internationalize have on average higher returns on assets, a higher share of noninterest income and lower overhead costs.

Also the characteristics of the country of origin affect the probability that banks expand abroad. Grosse and Goldberg (1991), Magri et al. (2005), and Focarelli and Pozzolo (2001, 2008) found that banks from countries with more developed banking sectors are more likely to be active in foreign markets. Further, Focarelli and Pozzolo (2001) found that average country level bank profitability and the incidence of nontraditional banking activities have a positive effect on bank internationalization. Magri et al. (2005) show that foreign banks in Italy are more likely to come

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[2]See also Ball and Tschoegl (1982), Tschoegl (1983), Williams (1996), Williams (1998), De Felice and Revoltella (2003), Focarelli and Pozzolo (2005), Piscitello and Pozzolo (2006).

from countries where the cost of provision is lower. The impact of stock market development on internationalization seems instead to depend on sample selection and on the definition of bank internationalization (Focarelli and Pozzolo 2001, 2008). This is not too surprising since a more developed stock market is typically associated with more efficient financial institutions and wider profit opportunities; therefore, local banks have a lower incentive to expand abroad. Finally, ter Wengel (1995), Buch and DeLong (2004), and Berger et al. (2004) found that banks from countries with higher total GDP are more likely to be present in foreign markets; however, this result is not confirmed in the specification adopted by Focarelli and Pozzolo (2008).

In sum, the available evidence seems to suggest that foreign banks are likely to be among the most efficient in their home country and to come from the most developed banking markets. However, as pointed out by Chang et al. (1998), and confirmed by Berger et al.'s (2000) study of foreign subsidiaries in France, Germany, Spain, United Kingdom and United States, this might not be sufficient to make them more efficient than their local competitors when they operate abroad.

8.2.2 Where Do Banks Expand Abroad?

The obvious next step it to try to explain the patterns of expansion. Many empirical studies have addressed this issue, identifying in the process a set of major determinants. I shall discuss this literature by considering measures of bilateral integration and characteristics of the host countries.

The literature has measured the degree of economic integration between home and destination countries in a number of different ways, ranging from geographical distance to the volume of bilateral trade flows and bilateral foreign direct investment.[3] More recently, the empirical research has focused on the role of cultural and institutional proximity (e.g., sharing the same language or the same legal system) and of similarities in the degree of economic development. Berger et al. (2004), Buch and DeLong (2004), and Focarelli and Pozzolo (2008) show that countries sharing the same legal system and the same language are more likely to have cross-border bank M&As. Berger et al. (2004) also show that country pairs with similar levels of total and per capita GDP are more likely to have cross-border bank participations, but this result is not robust with respect to the specification adopted by Focarelli and Pozzolo (2008). Participation in a currency area raises the probability of bank cross-border participations (Allen and Song 2005, Focarelli and Pozzolo 2005). Claessens and van Horen (2007) have shown that banks located in countries with a high institutional framework are more likely to expand in countries with a

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[3]A nonexhaustive list includes Goldberg and Saunders (1980, 1981), Ball and Tschoegl (1982), Nigh et al. (1986), Goldberg and Johnson (1990), Grosse and Goldberg (1991), Sagari (1992), ter Wengel (1995), Brealey and Kaplanis (1996), Miller and Parkhe (1998), Yamori (1998), Williams (1998), Berger et al. (2003), Buch (2000, 2003), Buch and Delong (2004), Berger et al. (2003, 2004), Magri et al. (2005), Focarelli and Pozzolo (2005, 2008).

similar institutional setting, while banks located where institutions are weak have a competitive advantage to expand in countries with a relatively low institutional environment.

With regard to host country characteristics, the high degree of correlation between the explanatory variables and the differences in the measures of adopted internationalization (e.g., flow measures such as M&As, as opposed to stock measures, such as foreign shareholdings), and in sample selection, weaken the robustness of the results. Berger et al. (2004) find a negative effect of realized GDP growth on the probability that a country is the destination of foreign acquisitions. Buch and DeLong (2004) show that target banks are more likely to be located in countries with a higher GDP, while the evidence on the effect of per capita GDP is less clear. Focarelli and Pozzolo (2005) suggest instead that foreign banks are more likely to be present in countries with higher expected economic growth. They argue that this happens when per capita GDP is lower (and therefore growth is going to be faster according to the convergence hypothesis), the level of education is higher, credit and financial markets are deeper, and the rate of inflation is lower. Finally, in their interesting European study, Affinito and Piazza (2009: Chapter 9, this volume) show that regions hosting linguistic minorities and with a smaller average size of manufacturing firms have a higher incidence of local banks.

Other studies suggest that banks prefer to expand in countries where competition with domestic banks is less intense: either because local banks are less efficient (Focarelli and Pozzolo 2005) or the institutional framework is more favorable to banking activities resulting from high-quality legal and institutional set-up, low regulatory restrictions and higher disclosure requirements on banking activities (Berger et al. 2004) and more reliable supervisory authorities. Indeed, Focarelli and Pozzolo (2008) provide evidence consistent with the hypothesis that not only explicit regulatory and competitive barriers, but also implicit government barriers, affect the patterns of bank internationalization. Furthermore, Berger (2007) argues that the presence of implicit government barriers to entry, together with the comparative disadvantages found by Berger et al. (2000), are likely to be the most important reasons for the low presence of foreign banks in developed countries.

This evidence confirms that the choice to expand abroad can be motivated by a large number of possibly interlinked reasons. In some cases it seems clear that banks simply follow their clients abroad and set up branches in order to offer supporting services, as shown by the relevance of the level of bilateral trade. At the same time, there are instances when the bank's expansion depends purely on the possibility it has to exploit a competitive advantage with respect to local competitors, as is likely to be with foreign banks operating in the transition economies of Eastern Europe.

8.2.3 How do Banks Expand Abroad?

Banks can choose a number of different ways to access foreign markets; see Goldberg and Saunders (1981). A branch is less organizationally demanding but

allows the bank to run a limited set of operations in the foreign country and makes the holding institution liable with the entirety of its capital. Instead, a foreign subsidiary permits an international bank to have complete access in the host country market and limits liability to the size of capital invested in the foreign corporation; the downside is that a subsidiary normally incurs far higher set-up costs. The choice between foreign expansion through branches or subsidiaries is therefore the result of a trade-off between these factors, in addition to a number of other institutional characteristics.

Focarelli and Pozzolo (2005), for example, suggest that branches are more often used to provide financial services to local clients when they operate abroad, especially in financial centers, while subsidiaries are more often chosen in order to operate with local clients.[4] Studying this issue in more detail, a recent contribution by Cerutti et al. (2007) shows that branches are more likely to be set up when foreign operations are smaller in size and are wholesale oriented; they also occur in countries that are poorer and have higher corporate taxes. Subsidiaries are more common in countries where macroeconomic risk is high, because they ensure limited liability to the parent company. However, when risks arise from government interventions, foreign banks prefer to expand using branches, because their financial assets are harder to confiscate.

This pattern of bank internationalization is supported by a number of explanations over which there is broad consensus. On the other hand, the role of many other potential factors remains poorly understood. Indeed, the characteristics driving the process of bank internationalization are unlikely to remain the same through time. In what follows, I provide some evidence on the most recent evolution in international banking.

8.3 Recent Trends in International Banking

As argued in the introduction, in recent years international banking has expanded rapidly, both in developed and in developing countries. There has been a substantial rise in the number of cross-border M&As in banking between 1990 and 2000; see Fig. 8.1. Moreover, although between 2001 and 2003 a number of factors have determined a drop in the number of cross-border M&As, in the subsequent 3 years bank cross-border expansion has returned to the previous trend of growth.

The increase in the number of cross-border M&As is not only due to a more intense merger activity but also to a stronger degree of internationalization. The share of cross-border M&As has nearly doubled between 1990 and 2006. Also, the collapse in the number of cross-border M&As in the 2001–2003 period was not

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[4]In a recent contribution, available only in Italian, Piscitello and Pozzolo (2006) showed that bank specific characteristics, and size in particular, have a stronger explanatory power with respect to the patterns of internationalization through branches and subsidiaries, less in the case of representative offices, and that longer distance and sharing a common language increase the probability that banks choose to expand abroad using more complex organizational structures.
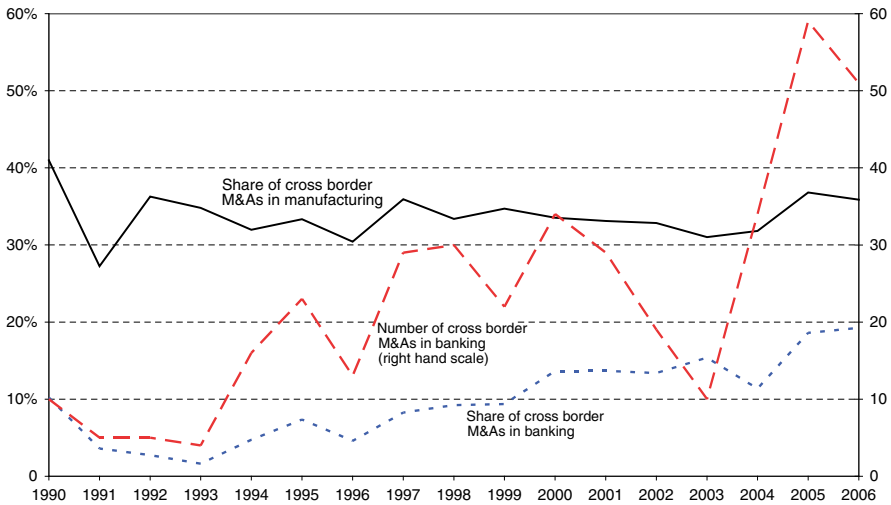
Fig. 8.1 Cross-border M&As in the banking and manufacturing sectors (number of operations and percentage values)

mirrored in a drop in the share of cross-border over total M&As, but was instead the result of the reduction in the overall number of M&As.

To better understand the most recent evolution of bank cross-border M&As and to verify if its resurgence in the last 3 years has happened along new patterns, I proceed in two steps. First, I analyze in more detail the descriptive evidence on the patterns of bank international expansion, also in comparison with manufacturing. Second, I estimate a simple model of the determinants of bank internationalization and verify whether the empirical specification is robust across different time periods.

8.3.1 Stylized Facts

Although bank internationalization has increased in recent years, it has still been far slower than that in the manufacturing sector. According to figures reported by Focarelli and Pozzolo (2001), in the 1990s the average share of mergers and acquisitions involving a foreign counterpart was 12.9 percent in the banking industry as opposed to 29.6 percent for the entire nonfinancial sector and 35.3 percent for the internationally sensitive manufacturing sector. However, Fig. 8.1 shows that the lower degree of internationalization in the banking sector relative to the nonfinancial sector has decreased through time, while the share of cross-border M&As in the manufacturing sector remained substantially constant during the same period, although at a significantly higher level. This evidence suggests that impediments to cross-border M&As have decreased substantially in the financial sector, although they have remained higher than in manufacturing.

Many reasons can be found to explain such a pattern. Focarelli and Pozzolo (2001) point to two major factors: the far greater importance of information asymmetries in banking relationships than in other transactions, and the presence of stronger regulatory restrictions in banking than elsewhere in the economy. Relative to the first issue, it is much more difficult to judge the value of a bank than that of a manufacturing firm, given that bank assets include loans to opaque small firms (Morgan 2002).[5] With respect to the second issue, in addition to the much tighter regulation that characterizes banking and financial sectors, it is widely recognized that regulatory agencies use various means, ranging from moral pressure to discretional powers, to create additional entry barriers to foreign players. Such a behavior is often justified on the assumption that banking is a strategic sector and that foreign players may be harmful for the host economy.

The degree of integration in the market for corporate control in the banking sector shows different patterns depending on the geographical areas being considered. The share of bank cross-border M&As within the G10 countries is much lower than the average value for the world as a whole. It confirms that the G10 has higher explicit and implicit barriers to foreign entry, as argued by Focarelli and Pozzolo (2008). The same share is higher and is increasing faster when one considers operations within the OECD countries. Within EMU, despite a much higher variability, the share is substantially higher, although on average is lower than for the world as a whole. Banks from G10 countries, OECD countries and, especially, from the EMU are much more likely to participate in cross-border M&As with banks in less developed countries than among themselves. Moreover, this share is higher and is increasing faster for the OECD countries than for the G10 countries (Fig. 8.2).

Figure 8.3 shows that the number of cross-border M&As has followed a similar pattern for operations generated in different geographical areas, although it has been increasing faster for less developed countries than for the G10 and the OECD countries.

At the same time, Fig. 8.4 shows that the share of cross-border M&As from and to G10 and OECD member states reached a peak in 2000 and then decreased substantially in the following years. The drop has been larger when considering operations from more developed countries, thus leaving more space to less developed countries in the international market for bank corporate control.

Finally, and most interestingly, the average nominal value of bank M&As has remained substantially constant in the last 16 years, therefore decreasing quite substantially in real terms. This evidence is consistent with the hypothesis that fixed costs in cross-border M&As have decline, making operations of smaller size profitable.

The average value of cross-border operations is surprisingly smaller than that of national operations, suggesting that the limits to acquisition of foreign control

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[5]Indeed, this difficulty is confirmed by the financial crisis that took motion from the surge in US subprime mortgage defaults in the summer of 2007 and evolved as investors realized that it may be very difficult to assess the exposition of banks toward risky assets.
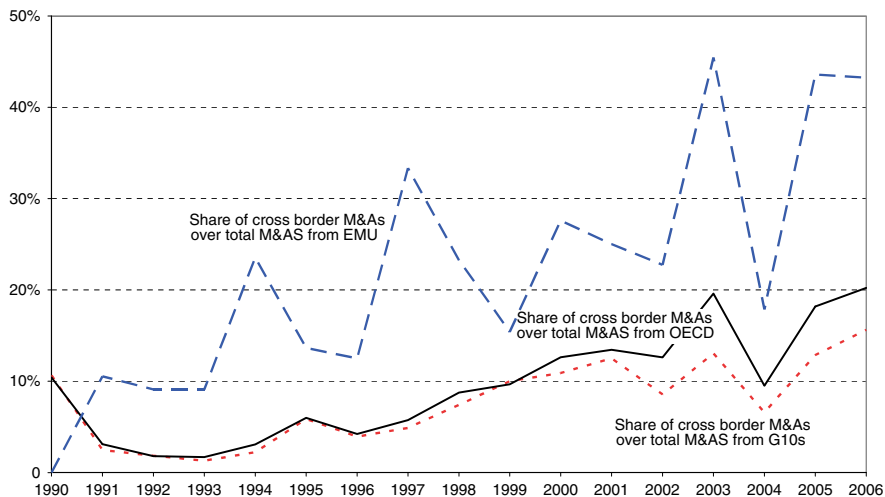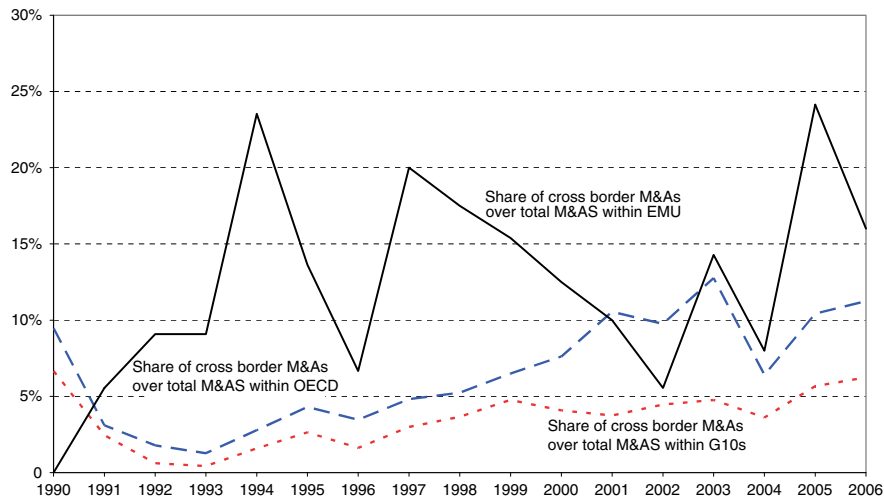
Fig. 8.2   Share of cross-border M&As in the banking sector by geographical areas (percentage values)

are an increasing function of the size of the operation. This is consistent with an explanation based on implicit barriers to substantial foreign entry. As expected, the value of operations originating within the G10 and the OECD is larger than the world average, because banks in these countries are typically larger than banks in less developed countries (Fig. 8.5).

The evidence presented so far suggests that some changes took place in the pattern of bank cross-border expansion; although apparently only the drop in the share of cross-border M&As from and within the most developed countries seems to be
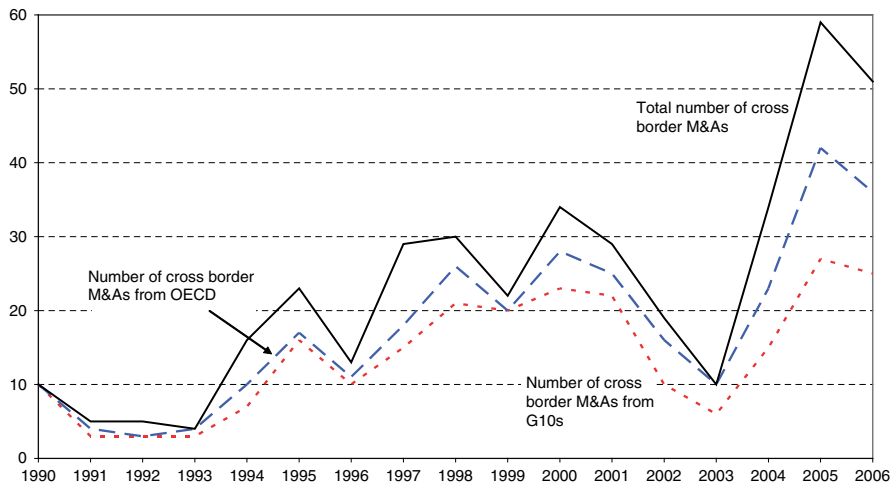
Fig. 8.3 Cross-border M&As by area of origin (number of operations)
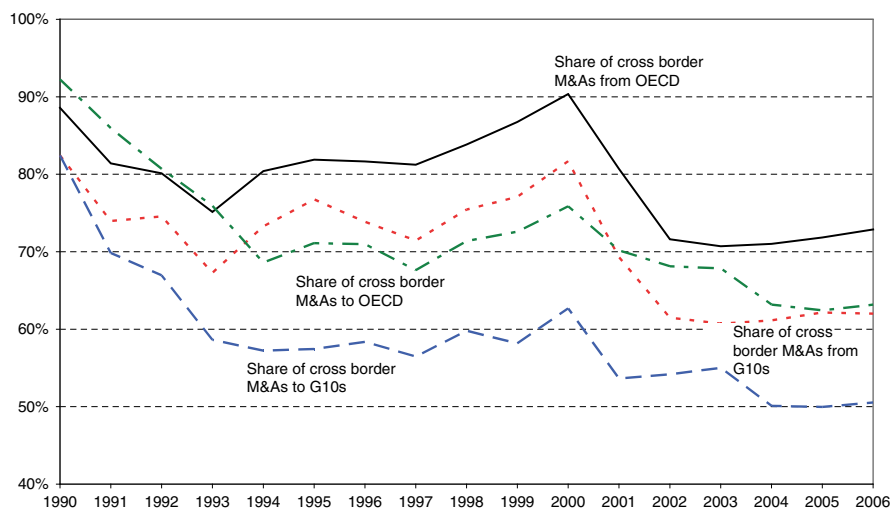
Fig. 8.4 Share of cross-border M&As by area of origin (percentage values)

linked, at least chronologically, with the reduction in merger activities that took place at the beginning of the century. Whether this evolution calls for a new empirical model of the determinants of bank cross-border expansion will be discussed in more detail in the following section.
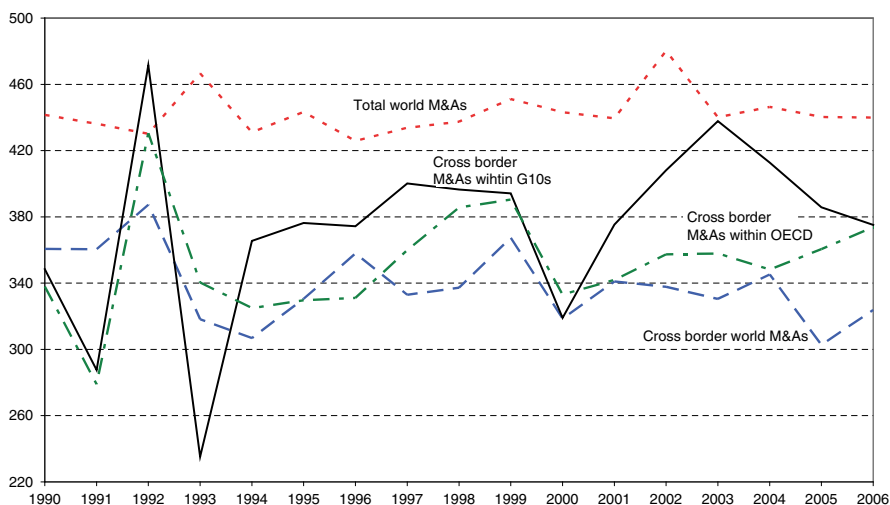
Fig. 8.5 Average value of operations by area (million of US dollars)

8.3.2 The Determinants of Cross-Border M&As Across Time: An Empirical Investigation

In order to verify whether the determinants of bank cross-border M&As have changed through time, I borrow the empirical framework proposed by Berger et al. (2004), who consider among potential explanatory factors both similarities and differences between home and host countries. The rationale for this setting can be found in the works that extend the analysis of foreign direct investment (FDI) of the traditional Ricardian theory of comparative advantages, on the one side, and of the new trade theory on the other (Markusen and Venables 1998).

According to the Ricardian view, firms in one country will produce and export the goods for which they have comparative advantages over firms in other countries. Extending this idea to FDI in the credit sector, banks should find it more profitable to expand in countries that are dissimilar from their home country; this is because they are more likely to have a comparative advantage in providing financial services. The new trade theory, on the contrary, emphasizes the importance of trade among similar areas. According to this view, one would expect that banks expand their activities in countries that are similar to their home nation. Broadly, the empirical predictions of the two theories are that firms operating in countries with more developed banking and financial systems should acquire firms in financially less developed countries (Ricardian advantage theory), while countries with similar national characteristics should be more likely to have cross-border M&As (new trade theory).

To test these alternative hypotheses, I follow the empirical specification in Focarelli and Pozzolo (2008) but expand the time dimension. In particular, instead

of collapsing all information to a cross-section specification, I exploit the panel dimension of the data, which span the period 1990-2006. With respect to the set of explanatory variables, I include both time-invariant and time-varying information. More specifically, I proxy comparative advantage in the banking and financial activities by stock market capitalization and credit to the private sector. Moreover, I introduce in the specification the interaction between these two measures, so as to capture nonlinear effects. Further, I include total and per capita GDP in the origin and destination countries: Banks operating in larger and richer countries are more likely to have the required size to expand abroad and to enjoy the political backing that is necessary to either acquire a foreign bank or impede a foreign entry.[6] According to the Ricardian view, banks from countries with a higher ratio of credit to the private sector and stock market capitalization over GDP, and with higher total and per capita GDP, would be more likely to expand in countries in the opposite condition. Positive coefficients on these variables would therefore provide support to the theory's implications.

The degree of similarity is measured by an index analogous to that used by Berger et al. (2004),[7] an index computed with reference to the same characteristics used to measure comparative advantage—the development of banking and financial markets and the levels of total and per capita GDP. Positive coefficients on these variables can be interpreted as evidence in favor of the new trade theory.

Finally, as is customary in the literature, the degree of geographic, economic, and cultural integration between the origin and destination countries is measured by geographical distance, the volume of real bilateral trade, and dummies for countries sharing a common language and a common border. However, as argued by Berger et al. (2004), positive coefficients on measures of bilateral integration are consistent with the Ricardian as well as with the new trade theory, because they proxy for the costs of foreign expansion.

8.3.2.1 The Econometric Setup

As is done in Focarelli and Pozzolo (2008), the choice of the econometric set-up is different from that of Berger et al. (2004) and follows instead the empirical literature on FDI (e.g., Blonigen 1997): The dependent variable is the number of M&As from

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[6]The concept of political endorsement is quite difficult to define from a theoretical viewpoint or to measure empirically. It is nonetheless highly relevant, as is proved for example by the harsh debate on the contestability of European corporations in many so-called strategic sectors of economic activity (e.g., the cases ENEL/Gaz de France for energy, Financial Times, February 27th, 2006; ABN Amro/Antonveneta for banking, Financial Times, April 15th, 2005; Abertis/Autostrade for services, Financial Times, May 16th, 2006).

[7]For a generic characteristic x, measured in countries i and j, the index is equal to: $1-[abs(x_i-x_j)/max(x_i,x_j)]$; it has a maximum value of 1 when the two countries are identical with respect to that characteristic and declines toward zero as they become more and more dissimilar.

country i to country j, and the model adopts a negative binomial specification to account for variance over dispersion.[8]

The dependent variable Y_{ijt} is defined as the number of cross-border M&As between country i of the bidder company and country j of the target company in year t. I therefore estimate the following model:

$$Pr(Y_{ijt} = y_{iyt}) = \frac{e^{-v_{ijt}\mu_{ijt}}(v_{ijt}\mu_{ijt})^{y_{ijt}}}{\Gamma(y_{ijt}+1)} \quad y_{ijt} = 0, 1, 2, \ldots, \quad (8.1)$$

and:

$$\mu_{ij} = e^{\beta' x_{ijt}} \quad (8.2)$$

where $\Gamma(y_{ijt}+1)$ is a Gamma distribution with mean 1 and variance α; x_{ijt} is a matrix that includes vectors of characteristics, at time t, of the bilateral relationship between country i and country j, of the country of the bidder company i, and of the country of the target company j. The product of the number of countries of origin, the number of potential countries of destination of the M&As and the number of years gives the number of observations used in the estimation.

To test for differences between the determinants of internationalization across time, I also estimate a unified model with dummies to allow for the effects of each variable to differ across the three periods under consideration.[9]

8.3.2.2 Data and Summary Statistics

Data on M&As

Data on M&As are from the Platinum Worldwide Mergers and Acquisitions Database of the Security Data Corporation (SDC). These data include information about the target and acquiring firms, such as their country of residence and SIC code of primary economic activity, and, if conditions and terms of the transactions are disclosed, about the value of the deal, the effective date of realization, and the percentage acquired by the bidder. In the analysis, I include all the completed transactions reported in SDC for which information is disclosed, such as significant acquisition of value (acquisition of a major interest) or change in control (an acquisition that increases the stake of the acquiring institution from less than 50 percent to 50 percent or more of the ownership shares of the target institution).

I consider deals between 1990 and 2006, restricting the sample of countries to those where at least one deal took place between 1990 and 2006. In total, I have over 80,000 possible year, home- and host-country combinations. Finally, I define a

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[8] See Cameron and Trivedi (1998) and, for a textbook description, Wooldridge (2001).

[9] In practice, I pool the data and include the vector of right-hand-side arguments three times, multiplied by a dummy that equals one for each time period.

deal as cross-border when the nationalities of the target and the acquiring firms are different.[10]

Data on Countries

Data on GDP are from the Penn World Tables, version 6.2 (Heston et al. 2006). Data on bank credit and stock market capitalization are from the World Bank database. Data on geographical distance, bilateral trade (the logarithm of the volume of bilateral trade) and common language are from Andrew Rose's Web site.[11]

8.3.2.3 Econometric Results

Table 8.1 presents the results of the estimates of the empirical model described by Equations (8.1) and (8.2). Panel A reports the marginal elasticities of the total number of bilateral cross-border M&As in the financial sector with respect to a change in each dependent variable, including time dummies; panel B presents the result of a specification excluding time dummies and including a linear trend.[12] Standard errors are calculated using the delta method.

The results of panel B confirm the existence of a positive and significant trend in the number of cross-border M&As, despite the drop registered at the beginning of the century. Moreover, the exclusion of the time dummies has left all other coefficients substantially unchanged. I will therefore concentrate my comment on this second specification.

Financial sector M&As are more common between countries that are geographically closer and have stronger economic and cultural relationships. Cross-border M&As are more likely when the geographical distance between countries is smaller (with an elasticity of –0.46), trade relationships are stronger (0.64), the same language is spoken (0.12). The effect of sharing a common border is positive but not significantly different from zero. These findings confirm the results found by Focarelli and Pozzolo (2008) and are in line with those by Berger et al. (2004). Clearly, these results cannot discriminate between the traditional Ricardian theory of comparative advantage and the new trade theory, because both theories share the same implications with respect to measures of bilateral integration.

The next set of variables is related to tests of the new trade theory, meaning that cross-border M&As should be more likely between countries sharing similar characteristics in terms of financial and economic development. The results reported in column B provide some support for this view. Countries with similar levels of

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[10]The definition does not coincide with that of SDC, which refers to the nationality of the ultimate parent firm of the bidder institution.

[11]Missing observations on bilateral trade are replaced by the most recent available information.

[12]The marginal elasticities measure the percentage change in the number of cross-border M&As caused by 1 percentage-point change in the level of the dependent variable considered, all else being equal. As is customary in the literature, when the dependent variable takes values zero and one, the elasticity is calculated with respect to a discrete change.

Table 8.1 The Determinants of Cross-border M&As

VARIABLES	Panel A: Time dummies		Panel B: Time trend	
	Marginal effect *(Standard error)*	Significance	Marginal effect *(Standard error)*	Significance
Bilateral characteristics				
Common language (dummy)	0.10 *(0.02)*	***	0.12 *(0.02)*	***
Common border (dummy)	–0.01 *(0.01)*		0.00 *(0.01)*	
Bilateral trade	0.62 *(0.07)*	***	0.64 *(0.08)*	***
Distance	–0.60 *(0.11)*	***	–0.46 *(0.12)*	***
Similarity in GDP	0.25 *(0.07)*	***	0.26 *(0.07)*	***
Similarity in GDP per capita	0.13 *(0.12)*		0.02 *(0.15)*	
Similarity in credit/GDP	0.21 *(0.13)*		0.29 *(0.14)*	**
Similarity in stock market capitalization/GDP	0.08 *(0.10)*		0.09 *(0.11)*	
Origin country characteristics				
GDP	–0.14 *(0.08)*	*	–0.27 *(0.09)*	***
GDP per-capita	0.07 *(0.11)*		–0.12 *(0.14)*	
Credit/GDP	0.70 *(0.16)*	***	0.54 *(0.18)*	***
Stock market capitalization/GDP	0.72 *(0.13)*	***	0.62 *(0.15)*	***
Credit and Stock market capitalization (interaction term)	–0.54 *(0.09)*	***	–0.44 *(0.10)*	***
Domestic bank M&As	0.39 *(0.07)*	***	0.38 *(0.07)*	***
Destination country characteristics				
GDP	–0.45 *(0.07)*	***	–0.38 *(0.08)*	***
GDP per capita	–0.42 *(0.10)*	***	–0.41 *(0.13)*	***
Credit/GDP	–0.57 *(0.20)*	***	–0.62 *(0.21)*	***
Stock market capitalization/GDP	–0.83 *(0.20)*	***	–0.73 *(0.21)*	***

Table 8.1 (continued)

VARIABLES	Panel A: Time dummies		Panel B: Time trend	
	Marginal effect *(Standard error)*	Significance	Marginal effect *(Standard error)*	Significance
Credit and Stock market capitalization (interaction term)	0.47 *(0.15)*	***	0.45 *(0.15)*	***
Domestic bank M&As	0.73 *(0.08)*	***	0.67 *(0.08)*	***
Time trend			0.84 *(0.15)*	***
Years 2001–2003 (dummy)			–0.12 *(0.04)*	***
Wald test of joint significance of the parameters *(p-value)*	4998.03	*(0.00)*	5026.77	*(0.00)*
Number of observations	84,006		84,006	

Marginal effects calculated from a negative binomial estimation of the empirical model in equations (8.1) and (8.2). The dependent variable is the number of cross-border M&As in the banking sector between each country pair, where at least one merger has taken place in the sample period (1990–2006). Data on GDP are from the Penn World Tables, version 6.2 (Heston et al., 2006). Data on bank credit and stock market capitalization are from the World Bank database. Data on geographical distance, bilateral trade (the logarithm of the volume of bilateral trade), and common language are from Andrew Rose's Web site. For each a generic variable x, measured in countries i and j, the similarity index is calculated as: $1-[abs(x_i - x_j)/max(x_i,x_j)]$. Estimates in Panel A also include unreported time dummies. Standard errors are corrected for heteroskedasticity using the White (1980) procedure and are reported in parenthesis. The symbol *** indicates a significance level of 1% or less; ** between 1 and 5%; * between 5 and 10%.

GDP (with an elasticity of 0.26) and banking sector development (0.29) are more likely to be involved in cross-border M&As. Similarities in per capita GDP and the development of the stock market also have positive effects, but the coefficient is not statistically different from zero. The overall evidence is therefore mildly supportive of the new trade theory.

Turning to the set of variables related to the Ricardian theory, which suggests that cross-border M&As are determined by comparative advantages (disadvantages) of the bidders (targets), I find that banks in countries with higher total GDP are less likely to acquire foreign credit institutions, while the effect of per capita GDP is not statistically significant. This result is consistent with the explanation given by Tschoegl (2004) that the decision to expand abroad is related to diminishing opportunities of expansion within the national borders. A higher level of development of the origin country banking sector is associated with a higher probability that banks acquire foreign institutions, although the negative coefficient of the interaction term between bank and stock market development shows that the effect is decreasing as the stock market gets larger. This effect is consistent with the hypothesis that a more developed stock market offers larger expansion opportunities within national borders and hence reduces the benefits to go abroad. Similarly, banks coming from

countries with a more developed stock market are more likely to expand abroad – possibly because they have a comparative advantage in a broad range of financial activities – but again this effect is decreasing in the development of the banking sector.

Additional evidence consistent with the Ricardian theory is provided by the characteristics of the destination countries. Having a lower total and per capita GDP increases the probability of being a target of foreign acquisitions (with an elasticity of –0.38 and –0.41, respectively), as well as having a less developed banking sector and stock market.

The number of cross-border M&As is also significantly affected by the number of domestic operations in the origin and destination countries. The former is a push factor, suggesting that domestic and cross-border M&As share to some extent common determinants, such as the availability of financial resources to expand or favorable stock market conditions. The effect of a more active domestic market is indeed positive, although the elasticity is significantly smaller than one (0.38). The total number of domestic M&As in the destination country is a pull factor, and it can be seen as a proxy of the degree of contestability in corporate ownership. It also has a positive effect, with a marginal effect of 0.66 that is significantly different from unity – as it would be if contestability had no asymmetric effects for domestic and foreign acquirers (see also Focarelli and Pozzolo 2008).

Table 8.2 presents the results of the estimates of the same model, conducted on sub samples restricted to three different periods, 1990–2000, 2001–2003 and 2004–2006, and including time dummies. The three sub periods have been chosen with the intent to test the hypothesis that the drop in the number of cross-border M&As between 2001 and 2003 implies a change in the model of bank cross-border expansion.[13] Although the coefficients estimated using the smaller samples tend to be less significant than those of the longer time span, the overall evidence shows some interesting patterns. As expected, the coefficients of the estimates on the first sub sample (1990–2000) are very similar to those obtained from the entire sample, with the only major exception of the effect of distance.

Turning to the differences within the three sub samples, the effects of the measures of bilateral integration seems to have changed through time. After the beginning of the century, the effect of geographical distance has become particularly strong, with no significant differences between the two sub periods, while the effect of shared language has become irrelevant. Similarly, the effect of bilateral trade has declined in the last sub period. Surprisingly, sharing a common border seems to

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[13]The first sub period is much longer than the following two. Although cross-border M&As have grown at a fairly constant rate between 1990 and 2000, it is still possible that their determinants have changed during this longer time span. Moreover, from a strictly statistical point of view, coefficients estimated on a larger number of observations have smaller standard errors and are therefore more likely to be significantly different from zero. In order to verify the possible impact of considering this longer sub-period, I have also estimated the model on a first sub period of the same length of the following two (1998–2000), finding results qualitatively identical to those reported in Table 3. I thank Dario Focarelli for suggesting this control.

Table 8.2 The Determinants of Cross-border M&As by time sub-periods

	Sample period						Difference tests			
	1990–2000 (a)		2001–2003 (b)		2004–2006 (c)		(a) = (b)	(b) = (c)	(a) = (c)	(a) = (b) = (c)
VARIABLES	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance				
Bilateral characteristics										
Common language (dummy)	0.10 (0.02)	***	0.02 (0.01)		0.01 (0.01)				***	**
Common border (dummy)	0.00 (0.00)		−0.01 (0.00)	***	0.00 (0.00)		***	***	***	**
Bilateral trade	0.87 (0.11)	***	0.74 (0.18)	***	0.25 (0.11)	**		**	***	***
Distance	−0.07 (0.17)		−0.68 (0.27)	**	−0.90 (0.18)	***	*		***	***
Similarities in GDP	0.23 (0.05)	***	0.05 (0.04)		0.02 (0.03)				**	*
Similarities in GDP per capita	0.07 (0.10)		0.10 (0.12)		−0.10 (0.07)					
Similarities in credit/GDP	0.24 (0.12)	**	−0.06 (0.10)		0.11 (0.05)	**				
Similarities in stock market cap./GDP	0.01 (0.09)		0.03 (0.06)		0.06 (0.04)					
Origin country characteristics										
GDP	−0.44 (0.09)	***	0.01 (0.06)		0.01 (0.20) (0.04)				***	**

Table 8.2 (continued)

VARIABLES	Sample period						Difference tests			
	1990–2000 (a)		2001–2003 (b)		2004–2006 (c)		(a) = (b)	(b) = (c)	(a) = (c)	(a) = (b)= (c)
	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance				
GDP per capita	0.04 (0.22)		1.68 (1.01)	*	0.86 (0.42)	**	**	**		*
Credit/GDP	0.24 (0.16)		–0.06 (0.15)		0.02 (0.08)					
Stock market cap./GDP	0.30 (0.16)	***	0.06		0.02					
Credit & Stock market cap. (int.)	–0.19 (0.07)	***	–0.05 (0.06)		–0.02 (0.06)				*	
G10 country	0.08 (0.03)	**	–0.01 (0.02)		0.00 (0.01)					
OECD country	0.07 (0.07)		0.07 (0.07)		–0.04 (0.04)					
Domestic bank M&As	0.27 (0.10)	***	0.38 (0.20)	*	–0.01 (0.16)					
Destination country characteristics										
GDP	–0.44 (0.12)	***	–0.43 (0.26)		0.21 (0.16)				*	
GDP per capita	–0.37 (0.16)	**	–0.54 (0.59)		0.45 (0.37)					
Credit/GDP	–0.42 (0.18)	**	–0.24 (0.15)		–0.16 (0.09)	*				
Stock market cap./GDP	–0.36 (0.16)	**	–0.64 (0.21)	***	–0.30 (0.10)	***	**	*		

Table 8.2 (continued)

VARIABLES	Sample period						Difference tests			
	1990–2000 (a)		2001–2003 (b)		2004–2006 (c)		(a) = (b)	(b) = (c)	(a) = (c)	(a) = (b) = (c)
	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance				
Credit & Stock market cap. (int.)	0.17 (0.12)		0.42 (0.14)	***	0.22 (0.07)	***	**	*		*
G10 country	−0.01 (0.03)		−0.03 (0.03)		0.00 (0.02)					
OECD country	−0.02 (0.07)		0.13 (0.06)	**	−0.07 (0.04)	*	**	**		*
Eastern country	0.02 (0.01)		0.00 (0.01)		0.01 (0.01)					
Domestic bank M&As (log)	0.59 (0.10)	***	0.49 (0.29)	*	0.17 (0.18)					
Time trend	0.48 (0.15)	***	−0.93 (0.63)		0.68 (0.46)		**			*
Wald test (p-value)	985.07 (0.00)		451.99 (0.00)		395.91 (0.00)					
Number of observations	44,797		19,475		19,734					

The dependent variable is the number of cross-border M&As in the banking sector between each country pair, where at least one merger has taken place in the sample period (1990–2006). Data on GDP are from the Penn World Tables, version 6.2 (Heston et al., 2006). Data on bank credit and stock market capitalization are from the World Bank database. Data on geographical distance, bilateral trade (the logarithm of the volume of bilateral trade), and common language are from Andrew Rose's Web site. For each a generic variable x, measured in countries i and j, the similarity index is calculated as: $1-[abs(x_i - x_j)/max(x_i,x_j)]$. Standard errors are corrected for heteroskedasticity using the White (1980) procedure and are reported in parenthesis. The symbol *** indicates a significance level of 1% or less; ** between 1 and 5%; * between 5 and 10%. The difference tests verify the null hypothesis that the coefficients in the subperiods are identical, i.e., that the differences are significantly different from zero; *** indicates that the probability of incorrectly rejecting the null cannot be rejected at the 1 percent level or less; ** between 1 and 5 percent; * between 5 and 10 percent.

have had a negative impact on the number of cross-border M&As between 2001 and 2003, although the marginal effect is negligible. In the following period, the effect has once again become positive, but insignificantly different from zero.

As to the variables related to the new trade theory, at the turn of the century the effect of the similarities in total GDP has become insignificant. The similarities between the degree of development of the credit market has no effect on the number of M&As between 2001 and 2003, but their positive impact has been the same both before and after that period.

The effect of the variables related to the Ricardian theory has changed substantially through time. The negative effect of a higher total GDP in the origin country is statistically insignificant between 2001 and 2003 and is positive between 2004 and 2006. Similarly, starting from 2001, banks in countries with a higher per capita GDP have become more likely to acquire foreign credit institutions. At the same time, the effect of the development of the banking sector and of the stock market has become insignificant since 2001. Banks from the G10 countries had a comparative advantage in expanding abroad in the first part of the period, but this effect has also become insignificant. Finally, in the last period, the effect of domestic bank M&As is insignificant, suggesting that internationalization has become a strategic choice per se, and not simply as one of the possible ways of realizing corporate deals.

Looking at the characteristics of the destination country, the effect of total and per capita GDP has become progressively insignificant, while that of the development of the financial markets has decreased slightly. Finally, the effect of the number of domestic M&As in the destination country has also become insignificant.

Overall, the evidence seems to point to a general reduction in the ability of the model to explain the patterns of cross-border M&As, as if the role of bilateral linkages and of comparative advantages at the country level had become less relevant. In a more progressive and integrated world, it is likely that cross-border M&As are better explained by firm-specific opportunities than by country level characteristics.

8.4 What are the Effects of Bank Internationalization?

The effects of bank internationalization can be assessed from at least three different points of view: that of the acquirer, that of the acquired and, more generally, that of the host country. In what follows, I discuss the major findings of the literature according to each of the three points of view.

8.4.1 Effects of Internationalization for Acquiring Banks

With respect to the first issue, which has not been analyzed thoroughly in the literature, the empirical research has focused almost exclusively on the effects of cross-border M&As on stock price returns of bidder banks. Amihud et al. (2002) and

Cybo-Ottone and Murgia (2000) found weak evidence of significant positive effects of cross-border M&As on the value and risk of the acquiring bank. Campa and Hernando (2006), on the contrary, found that cross-border deals within European countries have nearly no effects on the acquirer's excess returns. Amihud et al. (2002) also found that total and systematic risk, measured by the variance of bank stock returns and their β coefficient, are substantially unchanged after the merger. This result is partly confirmed by Focarelli et al. (2008), who show that the acquirers' systematic risk increases as a result of mergers, but less so for cross-border operations. On a similar note, Choi et al. (2007) found that bondholders perceive bank internationalization as a risk-increasing activity, as shown by the significant rise in bond yield spreads after the announcement of a cross-border M&A.

While mixed, these results are slightly different from the findings of the studies focusing on domestic deals. These M&A deals typically show that the bidder suffers a loss, which is offset by the target's gain (Amel et al. 2004), and that geographically diversfying mergers within the US either fail to create value (De Long 2001), generate negative returns (Cornett et al. 2003) or produce a deteriorating performance (Cornett et al. 2006).

8.4.2 Effects of Internationalization for Acquired Banks

The effects of M&As on acquired banks have been studied in more detail. Campa and Hernando (2006) found slightly negative short-run excess returns for target banks in the case of cross-border deals, and significantly negative excess returns in the longer run. The evidence is more favorable when considering balance sheet measures of bank performance. The Latin American case study done by Crystal et al. (2001) shows that foreign banks are sounder and have higher loan growth than their domestic counterparts. Claessens et al. (2000, 2001) and Claessens and Lee (2002) show that foreign banks operating in developing countries are more profitable and have lower costs than domestic banks. Berger et al. (2004), studying a sample of Argentine banks, found weak evidence of performance improvements for targets of cross-border M&As. Micco et al. (2007), studying a larger sample, found that in developing countries targets of cross-border M&As have on average lower return on assets, but after the acquisition tend to reduce their costs relative to their domestic counterparts, with a positive albeit insignificant effect on profitability. Interestingly, they found a negative effect on profitability when the target is in an industrial country. Lastly, Altunbas and Ibanez (2004) studied the change in total profitability of cross-border bank mergers within European countries, finding that it is higher in the case of cross-border mergers within banks that are less similar with respect to loss provision policy and the weight of loans in their balance sheets, and more similar in capitalization and in their attitude toward financial and technological innovation.

Overall, although more research is needed on this issue, there is no clear evidence that cross-border consolidation in the financial sector is beneficial for either acquiring or acquired banks, a result that mimics the findings on domestic M&As (Amel et al. 2004).

8.4.3 Effects of Internationalization for Countries Hosting Foreign Banks

Summarizing the empirical findings discussed above and in the previous sections, it is clear that banks expanding abroad are typically more efficient, come from countries with more developed banking systems, and typically expand in countries with an overall less efficient banking system. In other words, better banks tend to expand to countries with worse banks. As to the effects of foreign banks for the host country, one would expect that the efficiency of the host country's financial system and its overall performance should improve as a result of the entry of foreign banks. Indeed, the position that foreign banks are beneficial for the host economy, recently advocated also by Focarelli and Pozzolo (2005) and Goldberg (2007), is at odds with the traditional view (blatantly against the access of foreign banks).[14] Historically, policy makers have been patently hostile toward foreign banks, fearing that they might worsen the allocation of credit with respect to the autarchy equilibrium and increase the risk of financial crisis and the business-cycle sensitivity of lending.

However, the available empirical evidence is far from confirming this view. Cross-section analyses show that foreign bank entry has positive effects on developing country economies. Claessens et al. (2000, 2001), Claessens and Lee (2002), and Bayraktar and Wang (2005) show that foreign entry helps to improve the efficiency of local banks, determining a reduction in profitability, interest margins, and overhead costs.[15] Given the causal link between a country's financial sector development and its rate of real economic growth, inflows of foreign bank direct investment are likely to be welfare enhancing for the host economy. Bayraktar and Wang (2006) provide some evidence that foreign bank presence causes higher per capita GDP growth.

One of the major criticisms aimed at foreign banks is that they typically focus on larger clients, reducing the availability of credit to small and medium size enterprises. The evidence on this issue is not conclusive. Recent empirical analysis has found evidence both in favor and against this view. Crystal et al. (2001) show that foreign banks in Latin America in the second half of the 1990s had stronger loan growth and a greater ability to absorb losses than their national counterparts. Clarke et al. (2002), studying a large sample of over 2,000 firms in 38 developing countries, found that the presence of foreign banks improves the amount of credit available and reduces the prices for firms of all sizes, although the effect is indeed stronger for larger firms. Similarly, Martinez Peria and Mody (2004) found that foreign banks typically charge lower interest rate spreads than domestic banks. Claeys and Hainz (2007) distinguish between internationalization through acquisitions and through greenfield investment and found that the presence of foreign banks is typically

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[14]Noticeably, until recently, many economists and policy makers had a negative attitude also toward foreign direct investment inflows in the manufacturing sector.

[15]Similar results are found in a number of country studies, for example by Barajas et al. (2000), Clarke et al. (1999) and Unite and Sullivan (2001). Yeyati and Micco (2007) instead found evidence that foreign banks in Latin American countries tend to be more risky and to have higher market power than local banks.

associated with lower average lending rates; however, only newly established banks charge lower interest rates than the average. On a related note, Bonin and Abel (2000) find strong empirical evidence of the positive effect of foreign banks operating in Hungary, showing that their presence also forced the only major bank without foreign shareholders to develop new products and better services. Giannetti and Ongena (2007) showed that the presence of foreign banks in Eastern European countries favored firm sales, asset growth, and entry and exit from the market, although these effects were weaker in the case of smaller firms.

Despite this evidence pointing to a positive role of foreign banks for the host economy, a less positive picture emerges from a recent influential paper by Mian (2006), based on detailed information on bank-firm relationships. Quoting the author's own words, "informational and agency costs related to cultural and geographical differences can lead foreign banks to shy away from lending to soft information firms," even if they are potentially sound. Consistent with this result, Berger et al. (2007) found that foreign banks tend to serve as the main bank especially for transparent firms.

Another strand of criticism of foreign banks comes from their supposed propensity to leave the country in cases of financial distress, thus increasing the risk of a financial crisis. However, Demirguc-Kunt et al. (1998) and Levine (1999) found that, if anything, the presence of foreign banks reduces the probability of banking crises. This result is consistent with the findings of Goldberg (2002), who showed that foreign banks from the US do not reduce their lending during periods of crises, and Goldberg et al. (2002), who found that foreign bank presence does not increase the business-cycle sensitivity of lending. Furthermore, Cull and Martinez-Peria (2007) showed that the share of domestic credit granted by foreign banks increases after a banking crisis. Last, Arena et al. (2007) analyze a large sample of banks from Asian and Latin American countries showing that the lending policies of foreign subsidiaries are less sensitive to the host country's monetary conditions. In addition, while subsidiaries' deposit and lending rates growth during financial crises are not different from those of domestic banks, their interest rate reaction tends to be less pronounced.

Although this is still an open area for research, the evidence so far available is therefore unsupportive of the traditional view that the presence of foreign banks harms the financial stability and the overall economic performance of the host country.

8.5 Conclusions

In recent years, the lower degree of internationalization in the banking sector relative to the nonfinancial sector has progressively decreased. At the same time, some changes have taken place in the pattern of bank cross-border expansion. The share of bank cross-border M&As within the G10 countries has decreased, while it has increased within the OECD countries. Moreover, banks from the G10, OECD, and

especially the EMU countries are increasingly more likely to do cross-border M&As with banks located in less developed countries than among themselves.

Standard empirical models of the determinants of cross-border bank M&As show a decreasing ability to explain the patterns of the most recent years as if, in a progressively more integrated world, the role of bilateral linkages and of country comparative advantages has become less relevant than firm specific characteristics.

The available empirical literature suggests that typically better banks from developed countries acquire worse banks in financially less developed countries, suggesting a positive effect of foreign banks in the host country. But this picture may look too favorably on foreign banks. Indeed, there are many issues that remain open and need to be addressed carefully. One of the major problems is that local authorities need to adapt the regulatory and institutional framework to the changed environment once foreign banks become important players in the country's financial market. The reluctance of local authorities to change their regulatory framework and the fear that their moral persuasion powers may be substantially lessened is a likely reason why policy makers and supervisory authorities do not welcome foreign banks. As suggested by Garber (2000), local regulators are often not ready to control the operations of the more sophisticated foreign banks. Although this may be an occasion for the growth of local institutions, it is at the same time a challenge that such an opportunity, if squandered, might create problems in the functioning of the financial markets.

A second issue is the possibility that a rapid entry of foreign banks might cause a loss of potential profit opportunities for local entrepreneurs. This is an infant-industry-protection argument. The trade-off facing policy makers is in the case between a slower development in the financial sector, with its consequences for the growth of the real economy, and the loss of future profit opportunities.

Finally, a word of caution on the long-term prospects for globalization of the banking sector. As argued by Stulz (2005) on theoretical grounds, and as is clear from the evidence presented by Berger et al. (2003), country attributes are still so critical to financial decision making that the extent of globalization may remain limited. As Boot (2009) points out in chapter 7 of this book, 'the nature of the banking activity may be such that banks may face more favourable competitive conditions in their home market'.

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Chapter 9
What Are Borders Made of ? An Analysis of Barriers to European Banking Integration

Massimiliano Affinito and Matteo Piazza

Abstract   Linguistic and cultural differences, different legal and supervisory frameworks, and relationship lending have been repeatedly mentioned as barriers to European retail banking integration. We investigate whether these barriers have affected integration within national boundaries, using an index of localism of regional banking systems as a measure of market integration. If local banks are established and flourish because asymmetric information makes entry difficult for non-incumbents (Dell'Ariccia 2001) or regulatory and governance rules prevent entry from outside (Berger et al. 1995), we should find a significant relationship between indicators of these barriers and measures of the localism of banking systems. Our results show that this is indeed the case for asymmetric information, while findings are more blurred for supervisory practices.

9.1 Introduction

The nature of European banking systems and the prospects for their integration have received much academic and institutional attention over the last two decades or so. A substantial consensus has been reached that small corporate and retail banking markets are still far from being fully integrated across Europe. Available evidence supporting this conclusion seems to be robust across different measures of integration. As summarized by Degryse and Ongena (2004), the "European banking market should be open for business for all banks chartered in the European Union [. . .]. In practice, things are not that simple as both exogenous and endogenous economic borders remain formidable barriers".

   Factors that contribute to the segmentation of the European retail banking market have been alternatively called borders or barriers and include such different phenomena as linguistic and cultural differences, relationship lending, corporate

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governance rules, and supervisory and lending practices. A distinction is often drawn between barriers due to asymmetric information (linguistic differences, lending relationship) and those due to legal and regulatory provisions (Buch 2003). However, the concept of barriers remains a comprehensive one, and the jury is still out on which factors are prominent in hampering retail banking market integration in Europe.

In this chapter, we evaluate the role of these different barriers across the continent by examining banking systems in 147 European regions. On the one hand, the regional perspective provides some distinct advantages, as we argue in the next paragraphs. On the other hand, this sub-national focus forces us, because of data availability, to rely on a quantity-based indicator of financial integration that, as such, lacks a clear theoretical underpinning. Nonetheless, quantity-based indicators (e.g., the share of foreign banks over the total number of banks) may have some informative content, as discussed in a very comprehensive study on the measures of capital market integration in the European Union (Adam et al. 2002). According to Pagano (2002), "[w]e should stress that we look at quantities despite the fact that the law of one price has nothing to say about them. Nevertheless, we feel that these measures are of interest. In a system with no financial barriers, the domicile of assets issuers and holders should play a decreasing role over time."

In this perspective, we verify whether different barriers have a significant effect on an index of localism of regional banking systems that resembles the quantity-based measures just mentioned. The logic underlying our work is similar to Buch's (2003): while she shows how lower barriers (achieved through either deregulation or reduction of information costs) induce higher international asset holdings, we look at whether lower barriers are associated, across regions, with a lower degree of localism of the regional banking system.

We complement this analysis with an investigation of cross-border *branching* among all regions in our sample. While a cross-border analysis has some well-known limits and branching may not always be the favorite way for a bank to go abroad (see Pozzolo 2009: Chapter 9, this volume), we believe, for reasons explained later on, that this analysis may be useful to cross-check our results and possibly grasp the role, if any, of specific factors operating cross-border.

In the next section, we review the literature on the state of European financial integration. In Section 9.3, we illustrate our approach, while in Section 9.4 we describe the methodology used. Section 9.5 reviews data sources and some descriptive statistics. Section 9.5 summarizes our results. The last paragraph concludes.

9.2 Integration of European Retail Banking Markets: A Review of the Literature

European financial convergence is one of the main goals of European supranational organizations. Rightly so, as both economic theory and empirical findings suggest that the integration of financial markets contributes to the smooth functioning of the single monetary policy and to financial stability and economic growth (e.g., Gaspar et al. 2003, Guiso et al. 2004b, ECB 2007). Since the 1970s, policy makers tried to

ensure a level playing field for banks and other intermediaries fostering the harmonization of regulation: banking coordination directives, the Single European Act, the launch of the Single Market Programme, the Council directive on the liberalization of capital movements, the Treaty on European Union, the inception of the Economic and Monetary Union and the transition to the euro, the Financial Services Action Plan, and the adoption of the Lamfalussy approach.

This process stimulated a huge amount of literature monitoring the convergence of European financial markets.[1] This literature looks at financial convergence almost uniquely from an empirical point of view. Financial convergence is discussed examining the various sectors and products that are part of the financial system and using price and quantity indicators. To date, the general conclusion of these analyses is that some segments of euro-area financial markets – mainly money and government bond markets – have made great progress in terms of integration, while there is little evidence of a comparable integration having taken place in retail banking. Adam et al. (2002) reach this conclusion using a wide range of measures of integration. Several factors, borders or barriers, explain why the retail banking integration is far from being complete: linguistic and cultural differences, relationship lending, corporate governance rules, and supervisory and lending practices (e.g., ECB 1999, 2000, Artis et al. 2000, Degryse and Ongena 2004).

The high integration of bond and equity markets and the lower degree of integration of the banking markets has been flagged by several authors (e.g., Centeno and Mello 1999, Danthine et al. 2001, Baele et al. 2004, Manna 2004, Guiso et al. 2004b, European Parliament 2005, European Commission 2005, Cappiello et al. 2006, ECB 2007). Several analysts remark that the process of integration has advanced further in wholesale than in retail banking (e.g., Cabral et al. 2002, Barros et al. 2005).

Others (ECB 1999, De Bandt and Davis 2000, Artis et al. 2000, Buch and Heinrich 2002) found no signs of an increase in the presence of foreign banks in individual EU retail banking markets. Dermine (2003), comparing EU with US benchmark, concludes that the persistence of the use of subsidiaries in Europe may reflect incomplete integration. Gual (2004) points out that some integration of banking markets has taken place, albeit at different paces depending on the market segment, and that integration was far from complete in retail markets. Cross-border M&As were relatively scarce (e.g., Boot 1999, De Bandt and Davis 2000, Belaisch et al. 2001, Walkner and Raes 2005). More recently, Dermine (2006) signalled that European banking integration is gaining momentum, in terms of cross-border flows, market share of foreign banks in several domestic markets, and cross-border M&As of significant size. Likewise, using cluster analysis to assess the extent of banking sector integration within the euro-zone between 1998 and 2004, Sørensen and Gutierrez (2006) conclude that the introduction of the euro has increased the degree of homogeneity across countries. By contrast, Dahl et al. (2006), studying product lines and financial structure for a sample of European banks in the period

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[1]For example, the European Central Bank is now publishing an annual report on the EU banking structure and has co-launched a research network on capital markets and financial integration in Europe (ECB-CFS 2004).

1994–2002, reject the hypothesis that banks in different European countries have common activities. Affinito et al. (2006) show the persistence of a country-effect in the composition of national banks' balance sheets. Goddard et al. (2007) conclude that the process of transition toward a fully integrated single European banking market is multi-faceted and ongoing. Affinito and Farabullini (2009) verify if the law of one price, the only theoretical background existing on financial convergence, holds in euro-area retail banking. Their results signal that rates differ and banking markets are still segmented. However, rates are more homogeneous where bank customers are stronger. Moreover, as banking services are still differentiated by supply factors, not linked to the characteristics of bank depositors and borrowers, there seems to be room for more integration. Gropp and Kashyap (2008) propose a test of integration based on convergence in banks' profitability. European listed banks' profitability appears to converge to a common level, while unlisted European banks differ markedly, and the banking market in Europe appears far from being integrated. In contrast, in the United States both listed and unlisted commercial banks profits converge to the same target.

A few works analyze financial convergence by using financial accounts data. For example, analyzing a long period from 1980 to 2000, Byrne and Davis (2002) find evidence of σ-convergence, toward a more market-oriented financial system, for the balance sheet structures of UK, France, Germany, and Italy. Examining components of financial assets and liabilities in euro-area countries, Hartmann et al. (2003) find that the dispersion of currency, deposits, and loans increased between 1995 and 2001, while bond investment and financing became more uniform. Using flow of funds statistics of seven European countries, for the years 1972–1996, Murinde et al. (2004) find convergence of equity issues and internal firm finance but not of bank loans.

Finally, a few papers deal with financial convergence by studying contagion risk. Hartmann et al. (2006) find large US banks are more prone to contagion risk than their European counterparts, mainly due to weak EU cross-border linkages. Brasili and Vulpes (2005) analyze co-movements in bank risk for large European banks during the period 1994–2003. They find that the EU-wide component increased in importance following the introduction of the euro in 1999, especially for large banks. Similarly, Gropp and Moermann (2004) report that correlations between stock price returns for large banks increased during the 1990s.

Summing up, there is significant consensus that retail banking integration across Europe is still lagging behind. What remains to be understood is which factors are prominent in hampering integration; this is precisely the focus of our analysis.

9.3 Why Do We Focus on *Regional* Banking *Structures*?

Our approach is somewhat novel and has to be motivated in some detail, with regard to both (a) the relationship between barriers and our quantity-based measure of integration (the degree of localism of a banking system) and (b) the focus on regional data.

Dell'Ariccia (2001), Marquez (2002) and Hauswald and Marquez (2006) all provide a convenient framework to understand the relationship between informational barriers and local banking structures. As incumbent banks gather information about borrowers through lending, they have an informational advantage over new entrants (Broecker 1990, Sharpe 1990, Petersen and Rajan 1994, Shaffer 1998). This informational asymmetry generates endogenous fixed costs for potential entrants, which represent a barrier to entry in the banking industry. Dell'Ariccia (2001) shows that differences in endogenous costs increase with the degree of asymmetric information among banks, and this could explain why financial institutions have limited their cross-border activities to wholesale banking, as the "informational costs" per dollar lent are presumably lower in that segment of the market. In his words, "deregulation [. . .] is more likely to induce entry on those segments of the market where asymmetric information is less important [. . .] Evidence from the European Union confirms this view [. . .] retail markets have remained concentrated and dominated by domestic banks". In this vein, we argue that a testable implication of these theoretical models is that regional markets where asymmetric information is more pervasive should have a prevalence of local banks (incumbents). In paragraph 4, we tackle the issue of how to define these variables for our empirical exercise.

Similarly, the survival of small local banks should have been favored by tighter regulation, especially given the strong trend toward consolidation affecting banking systems across Europe.[2] Several papers (e.g., Berger et al. 1995, Jayaratne and Strahan 1996, Mishkin 1996) underline the relevant effects triggered in the United States by the lifting of restrictions on both interstate and within-state branching. Regulatory barriers may take, for instance, the form of different legal provisions or regulatory requirements for different types of banks. We assume that, *ceteris paribus*, regulatory barriers (as described in detail in paragraph 4) are positively related to an index of localism of the banking system.

The use of regional data is particularly suitable for our goals on several grounds. First, most factors frequently mentioned as barriers can be better investigated at a regional level. One may think, for example, of linguistic and cultural differences, which are often mentioned as an important obstacle to cross-border activity in Europe. In the EU-15 countries, not less than eleven official languages are spoken, meaning that linguistic dummies are hardly distinguishable from a country fixed-effect in a cross-country panel regression.[3] At a regional level, instead, we can control for country fixed-effects while taking advantage of the existence of a non-negligible number of regions (about 10% of our sample) with linguistic minorities. If linguistic differences are such a serious issue as to require separate financial institutions for different linguistic communities, we should expect regions with linguistic

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[2]From 1999–2003, our sample period, the number of banks in the euro area diminished from 9,802 to 8,538, falling in all countries but Finland. In Italy, for example, the number of banks fell by more than 200 between January 1990 and January 1999 and by more than 100 between that date and January 2003.

[3]It is customary to refer to the 15 countries that were already EU members prior to the May 2004 enlargement as EU-15 countries.

minorities to have, *ceteris paribus*, a larger number of local banks. A local focus may be more suitable also for analyzing the hypothesis, backed by some evidence (e.g., Angeloni et al. 1995, Cetorelli 2001, Petersen and Rajan 2002, Berger et al. 2003), that a matching of small firms and local banks may occurs endogenously in banking systems as only small local banks can process the "soft" information about small firms (a nice discussion of this point and some related issues are given in Udell, Cerqueiro et al. and Alessandrini et al. (2009: Chapters 2, 4, 5, this volume)). A higher level of geographical aggregation could, in fact, cancel out some within-country variability.

A second strength of our sub-national focus is that the resilience of local characteristics may be more safely assumed at a regional level. In fact, European economic integration is still very much a work in progress, all the more so when compared with unifications within European countries that took place centuries ago.[4] Regional characteristics have already been tested by national integration and, if they survived, it is likely that they will also prove resilient to European integration.

Last but not least, a regional analysis allows the inclusion of country fixed-effects in our regressions, something that cross-country exercise comparing banking structures can hardly omit without incurring a potentially serious bias.

9.4 Methodology

9.4.1 An Analysis of Regional Banking Systems

We chose as our dependent variable the ratio between total banks and total branches for each European region, arguing that this ratio, which is bounded between zero and one by construction, is a good indicator of the degree of localism of a regional banking system. To understand why, consider first the case in which the ratio is equal to one in a region. This means that, in that region, there are no branches from outside and all the credit institutions incorporated in that region have just one branch, being local almost by definition.

Next, consider the case in which the index is equal to zero. This lower bound will be reached only in those regions where no banks are incorporated, whatever the number of branches from outside regions. This is not only a reasonable representation – from an abstract point of view – of a system with no local components but also a reflection of the actual situation of banking systems in some European regions. Between the lower and upper bounds, the larger the number of branches present in a region, with respect to the number of banks incorporated there, the smaller the index.

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[4]In a similar vein, Guiso et al. (2004) noted that as Italy "has been unified, from both a political and a regulatory point of view, for the last 140 years [. . .] the level of integration reached within Italy probably represents an upper bound for the level of integration international financial markets can reach."

As we cannot distinguish between branches owned by credit institutions established outside or inside the region, our ratio could take on low values also when a regional banking system is dominated by a very large regional bank, but this feature is less of a nuisance than one may expect. In fact, several contributions, both empirical and theoretical (thoroughly reviewed by Cerqueiro et al. 2009: Chapter 4, this volume), show that the organizational structure of a bank impacts on its lending decision, meaning in particular that a large regional bank headquartered at some distance from its branches is very unlikely to behave as a local unit credit institution (e.g., Petersen 2004, Liberti and Mian 2008, Mian 2006). As Alessandrini et al. (2009: Chapter 5, this volume) put it, "the local branch of a large, nationwide bank competes and allocates resources differently from the branch of a small, local bank." Berger and Udell (2002) note that large local banks may be less keen to engage in relationship lending because they are headquartered at a considerable distance from potential relationship customers, and this aggravates the problems associated with transmitting soft, locally based relationship information to senior bank management.[5]

Finally, we check how our index of localism relates to the consolidation process within national boundaries by computing a rank correlation between our index and the percentage change in the number of banks in our sample period (October 1998–December 2003). We expected that banking systems with a stronger local component were less prone to consolidation (including out-of-the-market mergers that are a possible way to achieve integration). Indeed, the correlation has a positive sign (i.e., banking systems with a stronger local component "lost" fewer banks) with a coefficient of 0.18, significant at the 5% level. The correlation is also robust to outliers as size and significance of the correlation remain pretty much unchanged, if we exclude the top and bottom deciles of the distribution.

Our general specification is as follows:

$$Y_{rc} = f(X_{rc}; Z_c);$$

where Y_{rc} is our indicator of localism, r and c are indexing, respectively regions and countries. Covariates are defined either at regional (X_{rc}) or country (Z_c) level. We include in our list of variables all the factors that could affect either demand or supply of banking services. Our list of potential variables includes the following[6]:

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[5]Berger et al. (2001) note that bank holding companies may have problems in controlling small banks that are located far from their headquarters, consistent with the idea that relationship lending may become more difficult as distance increases. Ferri (1997) shows how turnover of branch managers (typically adopted by large banks and clearly not applying to unit credit institutions) may have been used in Italy as a mechanism to control collusions between them and borrowers, with the side effect of hampering the development of lending relationships in large banks.

[6]Given the potential for multicollinearity, we check correlations among variables (e.g. share of employees in agriculture and GDP per capita), and we perform standard tests (e.g. variance inflation factor) to detect any problem with multicollinearity.

X_{rc} = {*population$_{rc}$, GDP per capita$_{rc}$, firm size$_{rc}$, dummy for linguistic minorities$_{rc}$, number of workers employed in agriculture$_{rc}$, students/ population$_{rc}$, R&D$_{rc}$, dummy for the region of the country capital$_{rc}$, roads' length/surface area$_{rc}$, weight of service sector$_{rc}$*};

Z_c = {*supervision practices indexes$_c$, share of assets held by government-owned banks in 1995$_c$ and in 2003$_c$, country fixed effects$_c$*}.

Our interest is mainly focused on four regressors: (i) firm size as a proxy for barriers relating to asymmetric information and relevance of relationship lending; (ii) a dummy for linguistic minorities as a proxy for linguistic and cultural barriers; (iii) indexes of supervisory practices as a proxy for regulatory barriers; and (iv) the share of total assets held by government-owned banks as a proxy for possible legal barriers. Remaining covariates are basically included as controls.[7]

We expect firm size to be negatively related to our dependent variable, while the remaining three variables should be positively related to the ratio index. We summarize the degree of asymmetric information in the borrower-lender relationship with the average firm size, in line with a vast literature on this topic (already reviewed in previous paragraphs) claiming that services to small firms are likely to be provided by small banking institutions. Although there is still some discussion on this issue,[8] there is some evidence, that not only "... the impact of technology on informational borders is unclear *a priori* from a theoretical point of view. But Europe further faces specific problems when it comes to reducing informational asymmetries. Hardening of information, for example, could in principle alleviate some of the informational asymmetries. But hardening of information may also be more problematic in Europe than in the US as it is not clear that all the information that is already hardened is equally reliable across Europe" (Degryse and Ongena 2004).

In order to handle the possible endogeneity of firm size (e.g., Demirgüç-Kunt and Maksimovic 1998, Shan et al. 2001, Allen et al. 2005), we also employ instrumental variables (IV) estimators.[9] We use instruments for firm size that satisfy two

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[7]The inclusion of most of them is self-explanatory. The impact of the share of students is *ex-ante* debatable. It could indicate a weaker current demand, as typically students do not demand a significant amount of banking products, but also a higher prospective demand if returns to schooling are sizeable. We also add a dummy for the region of the country capital to control for the fact that some banks (typically foreign ones) tend to locate their headquarters there. National and regional differences seem to be properly accounted for by our variables. Residuals for each European region from a log-linear regression do not show any systematic pattern. The comprehensive set of regional variables – X_{rc} – should mitigate the risk of omitted regional variables, although we cannot control for regional effects. However, we lack data on within-country differences in regulatory and legal systems, if any. We believe that this could actually be an issue only in the case of Germany where the federal structure leaves some degree of autonomy to Länder. We repeat our regression excluding Germany without any significant difference in our results.

[8]Berger and Udell (2006) suggest that the accepted view that financial structures have to include a substantial market share for small institutions to meet the demand of opaque SMEs could be outdated due to new transaction technologies.

[9]We carry out both fractional logit and IV regressions in order to exploit the merits of both methodologies.

conditions: (i) they are suggested by the literature (Kumar et al. 1999 provide a useful review) and (ii) they are available at a regional level. Accordingly, we select three instruments: R&D (the number, in log scale, of patent applications to the European Patent Office by firms in each region), the weight of the service sector (the share of employees in the tertiary in each region), and the infrastructure endowment (the ratio between the length of regional roads and the regional surface area).

9.4.2 Cross-Border Branching

To complement the exercise described in the previous subsection, we also test the determinants of cross-border branching across European regions. It is broadly recognized in the literature that this is not the only way for foreign banks to enter a national market (e.g., Focarelli and Pozzolo 2005), and there are some claims that branching is probably not the preferred one when information asymmetries are large (e.g., Dell'Ariccia 2001). Precisely for this reason, an analysis of cross-border branching may shed further light on the size of the barriers we are investigating. In other words, we expect that the role of informational barriers should be magnified in this kind of exercise.

The dependent variable here is the number of foreign branches established in each region by banks from every other foreign region of our sample. Therefore, in this exercise we have a much larger number of observations, even if zeros are predominant.

Count data models are a natural choice for this exercise as standard linear models ignore the discrete and non-negative nature of dependent variables and the heteroskedasticity inherent in count data (Winkelmann 2003). In order to account for the excess zeros in the sample, we use a two-step model, known as Zero Inflated Poisson model.[10] In the first step, a binary probability logit model determines the probability of a zero outcome; in the second step, a Poisson distribution describes the positive outcomes. As in the previous exercise, we carry out an IV estimate to control for the possible presence of endogeneity.[11]

The set of independent variables is slightly different from our previous exercise. We include three different categories of variables that describe, respectively, some characteristic of the host and the home region (or country) and their links. For the host regions, we use the same set of covariates as in the previous exercises. For the home region, we include country dummies and regional GDP per capita. The third set of regressors includes variables linking each pair of regions: trade flows between their countries; measures (drawn from Guiso et al. 2004a) of the reciprocal trust between the citizens of the host country and those of the foreign bank's country;

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[10]See Lambert (1992) and Gobbi and Lotti (2004) for a recent application on Italian banking data.

[11]In this case, too, since IV techniques have not been developed, to our knowledge, for the Zero Inflated Poisson model, we adopt a log transformation of data after adding a small positive constant to each count, due to the presence of a great number of zeros.

and three dummies: existence of a common language between each pair of regions (or, in alternative, country), a dummy for common borders between countries, and a dummy for common borders between regions.

9.5 Data Sources

This work relies on both regional and national data across Europe. We assemble data on the number of banks and branches, and on a large set of real economy and structural data in 147 regions across Europe, covering all the regions in the EU-15 countries except Luxemburg and Sweden due to some missing data. Regions are identified using the NUTS2 territorial breakdown (with the exception of Germany and the UK, where the NUTS1 level – Laender and Regions – has been used).[12] The following countries are included in the dataset: Austria (9 regions), Belgium (11), Denmark (1), Finland (5), France (22), Germany (16), Greece (13), Ireland (2), Italy (20), Netherlands (12), Portugal (7), Spain (17), United Kingdom (12).[13] Our sample therefore includes 11 euro area countries and 2 EU countries not belonging to the euro area. Table 9.1 lists the countries and regions included in our sample.

The number of credit institutions in each region is drawn from national data included in the List of Monetary Financial Institutions for five dates (October 1998, June and December 2002, June and December 2003).[14] We map banks to their region of establishment using postal codes as a key. The number of branches of credit institutions in each European region is drawn from the regional database Regio, maintained by Eurostat. The same source also provides data on regional GDP, number of firms, firm size, R&D (number of patent applications), number of employees in the agricultural sector, industry and services, households' disposable income, surface areas, population, education (number of students), transport (number of vehicles and motorways). We collect annual data from 1996 to 2001, where available. Data on linguistic minorities are inferred from the "Report on the linguistic rights of persons belonging to national minorities in the OSCE area" published by

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[12]NUTS is the French acronym for Nomenclature of Territorial Units for Statistics. It was defined by Eurostat more than two decades ago to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union. For details, see europa.eu.int/comm/eurostat/ramon/nuts/introduction_regions_en.html.

[13]We do not consider six regions that are usually included in the NUTS2 breakdown but that are geographically separated from the mainland. They are the four French départements d'outre-mer and the two Spanish enclaves in North-Africa (Ceuta and Melilla). We also consider jointly the two autonomous provinces of Trento and Bolzano in Italy that are separately coded in NUTS2.

[14]The Monetary Financial Institutions – MFIs – are central banks, resident credit institutions as defined in Community law, and other resident financial institutions whose business is to receive deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account (at least in economic terms), to grant credits and/or make investments in securities. Our dataset is limited to the subset of credit institutions. The List of MFIs can be downloaded from the European Central Bank Web site. October 1998 was a test date as the MFI List started in 1999.

Table 9.1 Countries and regions included in our sample

Countries	N.	Regions
Austria	9	AT11 Burgenland
		AT12 Niederösterreich
		AT13 Wien
		AT21 Kärnten
		AT22 Steiermark
		AT31 Oberösterreich
		AT32 Salzburg
		AT33 Tirol
		AT34 Vorarlberg
Belgium	11	BE1 R. de Bruxelles Hoof. Gewest
		BE21 Prov. Antwerpen
		BE22 Prov. Limburg (B)
		BE23 Prov. Oost-Vlaanderen
		BE24 Prov. Vlaams Brabant
		BE25 Prov. West-Vlaanderen
		BE31 Prov. Brabant Wallon
		BE32 Prov. Hainaut
		BE33 Prov. Liège
		BE34 Prov. Luxembourg (B)
		BE35 Prov. Namur
Denmark	1	
Finland	5	FI13 Itä-Suomi
		FI18 Etelä-Suomi-South
		FI19 Länsi-Suomi-West
		FI1a Pohjois-Suomi
		FI2 Åland
France	22	FR1 Île de France
		FR21 Champagne-Ardenne
		FR22 Picardie
		FR23 Haute-Normandie
		FR24 Centre
		FR25 Basse-Normandie
		FR26 Bourgogne
		FR3 Nord - Pas-de-Calais
		FR41 Lorraine
		FR42 Alsace
		FR43 Franche-Comté
		FR51 Pays de la Loire
		FR52 Bretagne
		FR53 Poitou-Charentes
		FR61 Aquitaine
		FR62 Midi-Pyrénées
		FR63 Limousin
		FR71 Rhône-Alpes
		FR72 Auvergne
		FR81 Languedoc-Roussillon
		FR82 Prov.-Alpes-Côte d'Azur
		FR83 Corse
Greece	13	GR11 Anat. Makedonia, Thraki
		GR12 Kentriki Makedonia
		GR13 Dytiki Makedonia
		GR14 Thessalia
		GR21 Ipeiros
		GR22 Ionia Nisia
		GR23 Dytiki Ellada
		GR24 Sterea Ellada
		GR25 Peloponnisos
		GR3 Attiki
		GR41 Voreio Aigaio
		GR42 Notio Aigaio
		GR43 Kriti
Germany	16	DE1 Baden-Württemberg
		DE2 Bayern
		DE3 Berlin
		DE4 Brandenburg
		DE5 Bremen
		DE6 Hamburg
		DE7 Hessen
		DE8 Mecklenburg-Vorpommern
		DE9 Niedersachsen
		DEA Nordrhein-Westfalen
		DEB Rheinland-Pfalz
		DEC Saarland
		DED Sachsen
		DEE Sachsen-Anhalt
		DEF Schleswig-Holstein
		DEG Thüringen
Ireland	2	IE01 Border, Midlands, Western
		IE02 Southern and Eastern
Italy	20	ITC1 Piemonte
		ITC2 Valle d'Aosta
		ITC3 Liguria
		ITC4 Lombardia
		ITD1 Trentino-Alto Adige
		ITD3 Veneto
		ITD4 Friuli-Venezia Giulia
		ITD5 Emilia-Romagna
		ITE1 Toscana
		ITE2 Umbria
		ITE3 Marche
		ITE4 Lazio
		ITF1 Abruzzo
		ITF2 Molise
		ITF3 Campania
		ITF4 Puglia
		ITF5 Basilicata
		ITF6 Calabria
		ITG1 Sicilia
		ITG2 Sardegna
Netherlands	12	NL11 Groningen
		NL12 Friesland
		NL13 Drenthe
		NL21 Overijssel
		NL22 Gelderland
		NL23 Flevoland
		NL31 Utrecht
		NL32 Noord-Holland
		NL33 Zuid-Holland
		NL34 Zeeland
		NL41 Noord-Brabant
		NL42 Limburg (NL)
Portugal	7	PT11 Norte
		PT15 Algarve
		PT16 Centro
		PT17 Lisboa
		PT18 Alentejo
		PT2 R. Autónoma dos Açores
		PT3 R. Autónoma da Madeira
Spain	17	ES11 Galicia
		ES12 Principado de Asturias
		ES13 Cantabria
		ES21 Pais Vasco
		ES22 Com. Foral de Navarra
		ES23 La Rioja
		ES24 Aragón
		ES3 Comunidad de Madrid
		ES41 Castilla y León
		ES42 Castilla-la Mancha
		ES43 Extremadura
		ES51 Cataluña
		ES52 Comunidad Valenciana
		ES53 Illes Balears
		ES61 Andalucia
		ES62 Región de Murcia
		ES7 Canarias (ES)
U. Kingdom	12	UKC North East
		UKD North West
		UKE Yorkshire and The Humber
		UKF East Midlands
		UKG West Midlands
		UKH Eastern
		UKI London
		UKJ South East
		UKK South West
		UKL Wales
		UKM Scotland
		UKN Northern Ireland
13 countries		147 regions

the Organization for Security and Co-operation in Europe (OSCE 1999). Table 9.2 reports the regions identified as linguistic and cultural minority areas.

Three indexes of supervisory practices are taken from Barth et al. (2006) and are based on a cross-country database on Bank Regulation and Supervision, originally maintained by the World Bank. The database collects the answers of many supervision authorities around the world to a set of questions on regulatory issues.[15] The

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[15] The database can be found on the World Bank Web site or in a CD-ROM attached to the book by Barth et al. (2006).

Table 9.2 Linguistic and cultural minorities in the EU countries in our sample

Regional Code	Region
AT11	Burgenland
AT21	Kärnten
DE4	Brandenburg
DED	Sachsen
ITC2	Val d'Aosta/Vallée d'Aoste
ITD1	Trentino Alto-Adige
ITD4	Friuli-Venezia Giulia
ES11	Galicia
ES21	Pais Vasco
ES51	Cataluña
ES52	Comunidad Valenciana
UKL	Wales
UKM	Scotland
UKN	Northern Ireland

Source: Authors' calculations based on OSCE (1999).

values of the three indexes for each country are reported in Table 9.3 . The three indexes summarize the restrictiveness of supervision by defining, respectively, the scope of credit institutions' activities (e.g., if they are allowed to deal with securities, to sell insurance, etc.), as the attractiveness of entry into a national market may depend on this aspect; the set of general supervisory powers; and the rules applied to entry. While the latter index seems clearly the most relevant for the issues dealt with in this chapter, and it properly focuses on questions dealing with both *ex-ante* rules and effective outcomes, it has some distinctive weaknesses because some of the questions are not answered by all the European countries and formal rules for

Table 9.3 Supervision restrictiveness indexes in the EU countries in our sample

Country	Overall financial restrictiveness	Entry into banking requirements	Official supervisory power
Austria	11	8	13
Belgium	13	8	10
Denmark	14	8	9
Finland	12	6	6
France	9	6	7
Germany	11	7	9
Greece	12	7	12
Ireland	11	0	11
Italy	15	8	7
Netherlands	10	8	5
Portugal	14	7	14
Spain	10	8	9
United Kingdom	7	8	11

Source: Barth et al. (2006).

entry are basically defined at the European level. As a check for robustness, we include alternatively all the indexes in our regressions.

Finally, we use data (reported in Table 9.4) on government ownership of banks, drawn by La Porta et al. (2002) for 1995 and by Barth et al. (2006) for 2003. The share of total banking assets held by state-owned banks in each country is used as a proxy of the government's stake in the banking sector and therefore of its incentives to try to influence (e.g., through legislation) the structure of the banking system. For example, if government-owned banks are not maximizing profits, as suggested in part of the literature (e.g., La Porta et al. 2002, Sapienza 2004), branching decisions could reflect attempts to establish or consolidate influence in certain geographical areas.

Table 9.4 Percentage of bank assets of government-owned banks in the EU countries in our sample

Country	1995	2003
Austria	50.36	0.00
Belgium	27.56	0.00
Denmark	8.87	0.00
Finland	30.65	0.00
France	17.26	0.00
Germany	36.36	42.20
Greece	77.82	22.80
Ireland	4.48	0.00
Italy	35.95	10.00
Netherlands	9.20	3.90
Portugal	25.66	22.80
Spain	1.98	0.00
UK	0.00	0.00

Sources: La Porta et al. (2002) and Barth et al. (2006).

As our variables span only a limited period of time and are not available in every period, we average our observations over our sample period; accordingly, our first dataset is a cross-section of 120 regional observations.[16] Table 9.5 provides summary statistics for the regional variables, broken down by countries. Data confirm that banking structures in Europe exhibit a significant variability not only across but also within countries.[17] The distribution of the ratio across the 120 European regions over our sample period goes from 0 to 0.32, implying that in at least one region the average number of branches per bank is as small as three. A second dataset

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[16]Data on branches are missing for Greece, Ireland, and The Netherlands. Our cross-sectional observations are therefore reduced when using the ratio between banks and branches as the dependent variable.

[17]The standard deviation in the number of banks within European countries (i.e. across regions in a country) is, on average, greater (61.30) than the standard deviation of national averages across countries (43.85).

Table 9.5 Summary statistics for the within-country regional variables in our dataset

statistics	Banks	Branches	Banks/Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Austria									
N. regions	9	9	9	9	9.0	9	9	9	9
mean	93.6	594.0	0.17	8.66	22.7	896.8	3.07	9,318	186.42
min	34.0	244.5	0.12	7.23	15.2	276.3	1.80	415	106.83
max	153.0	1,202.2	0.25	11.66	32.4	1,598.7	6.63	19,173	377.35
sd	42.0	324.7	0.04	1.37	5.0	527.4	1.79	6,354	113.78
p25	68.6	364.8	0.14	7.53	19.7	511.3	1.80	3,966	106.83
p50	92.8	551.3	0.16	8.68	22.3	662.2	2.68	9,533	155.68
p75	118.4	707.3	0.18	9.10	24.2	1,379.8	3.97	12,648	273.32
Belgium									
N. regions	11	11	11	11	11	11	11	11	11
mean	10.3	567.0	0.02	5.74	21.3	925.7	2.62	2,774	237.50
min	0.0	111.5	0.00	4.44	14.5	243.3	0.40	161	68.04
max	71.4	1,130.0	0.12	7.34	45.2	1,636.5	7.52	4,440	391.53
sd	21.3	336.3	0.03	0.97	8.5	440.0	2.32	1,272	108.52
p25	0.2	154.0	0.00	4.79	16.1	438.5	0.70	2,106	120.55
p50	2.6	566.0	0.01	5.51	19.1	1,005.7	1.30	2,982	260.12
p75	7.0	858.0	0.01	6.75	22.3	1,283.2	4.35	3,786	333.95

Table 9.5 (continued)

statistics	Banks	Branches	Banks/Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Denmark									
N. regions	1	1	1	1	1	1	1	1	1
mean	193.8	2316.3	0.084	7.972	29.11	5280.2	48.3	43094	1258.43
Finland									
N. regions	5	5	5	5	5	5	5	5	5
mean	72.8	343.9	0.20	5.00	22.5	1,027.5	7.75	67,629	259.06
min	3.0	31.0	0.10	3.42	13.0	25.3	0.35	1,527	513.30
max	145.4	615.5	0.32	5.77	34.3	2,033.8	11.68	128,294	505.91
sd	55.5	246.7	0.09	1.10	8.8	860.5	4.63	46,361	226.65
p25	46.4	187.0	0.14	4.25	16.2	564.2	6.18	52,636	129.12
p50	60.0	325.7	0.18	5.77	20.7	698.0	9.92	70,294	163.55
p75	109.2	560.5	0.26	5.77	28.5	1,816.0	10.63	85,395	491.56
France									
N. regions	22	22	22	22	22	22	22	22	22
mean	45.0	1,150.9	0.02	5.87	19.4	2,657.2	15.85	24,726	655.63
min	4.2	360.0	0.01	2.53	15.8	260.8	1.85	8,280	54.32
max	607.6	4,433.0	0.14	7.90	33.1	11,012.3	39.28	45,348	2,857.53
sd	126.2	893.0	0.03	1.47	3.4	2,245.5	9.44	11,212	589.62
p25	8.6	613.0	0.01	4.91	17.8	1,421.0	7.48	16,202	348.23
p50	17.2	1,026.0	0.02	6.04	18.8	2,067.7	14.96	25,708	500.92
p75	27.8	1,359.0	0.02	6.95	19.6	2,895.3	19.77	31,582	724.79

Table 9.5 (continued)

statistics	Banks	Branches	Banks/Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Germany									
N. regions	16	16	16	16	16	16	16	16	16
mean	158.3	3,898.4	0.04	10.67	22.7	5,120.7	30.45	22,314	1,054.44
min	18.0	320.3	0.01	8.03	14.9	673.8	1.12	404	141.50
max	592.2	11,658.2	0.10	16.24	40.0	17,933.0	63.65	70,548	3,857.91
sd	181.9	3,750.4	0.02	2.01	6.9	4,732.3	20.09	18,687	1,005.85
p25	34.0	1,092.3	0.02	9.54	15.7	2,147.5	13.84	9,171	440.59
p50	62.8	1,931.0	0.04	10.28	21.8	3,090.6	34.89	20,147	629.91
p75	269.2	6,055.7	0.05	11.11	26.8	6,920.8	47.52	31,778	1,396.30
Greece									
N. regions	13	13	13	13	13	13	13	13	13
mean	4.6	n.a	n.a	13.68	9.7	807.4	7.31	10,125	151.38
min	0.0	n.a	n.a	5.50	6.9	184.3	1.45	2,307	30.51
max	45.0	n.a	n.a	23.58	12.3	3,455.7	17.15	18,811	739.62
sd	12.2	n.a	n.a	4.90	1.6	896.1	5.03	5,285	195.55
p25	0.8	n.a	n.a	11.11	8.4	302.7	2.80	5,286	62.39
p50	1.0	n.a	n.a	13.90	9.7	561.8	7.25	9,452	87.71
p75	2.0	n.a	n.a	16.29	10.4	735.3	10.67	14,158	121.57

Table 9.5 (continued)

statistics	Banks	Branches	Banks/Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Ireland									
N. regions	2	2	2	2	2	2	2	2	2
mean	41.2	n.a	n.a	12.76	18.7	1,840.8	12.27	35,143	493.40
min	0.0	n.a	n.a	12.02	15.2	964.5	7.83	26,527	255.77
max	82.4	n.a	n.a	13.50	22.2	2,717.2	16.70	43,758	731.02
sd	58.3	n.a	n.a	1.04	4.9	1,239.3	6.27	12,184	336.05
p25	0.0	n.a	n.a	12.02	15.2	964.5	7.83	26,527	255.77
p50	41.2	n.a	n.a	12.76	18.7	1,840.8	12.67	35,143	493.40
p75	82.4	n.a	n.a	13.50	22.2	2,717.2	16.70	43,758	731.02
Italy									
N. regions	20	20	20	20	20	20	20	20	20
mean	42.1	1,383.0	0.03	3.34	17.5	2,874.4	29.00	15,066	509.30
min	3.4	89.3	0.01	2.12	10.7	119.5	6.33	3,264	14.46
max	178.8	5,322.5	0.14	4.40	24.0	8,979.7	12.23	25,707	1,393.24
sd	43.8	1,265.2	0.03	0.65	4.6	2,317.1	33.40	7,412	420.26
p25	10.7	500.4	0.02	2.82	13.0	1,054.3	6.33	9,075	171.46
p50	29.2	885.1	0.03	3.36	18.3	1,863.8	12.23	14,344	370.67
p75	56.5	2,060.2	0.03	3.96	21.0	4,377.1	34.42	22,559	755.13

Table 9.5 (continued)

statistics	Banks	Branches	Banks/Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Netherland									
N. regions	12	12	12	12	12	12	12	12	12
mean	45.0	n.a	n.a	8.90	21.4	1,302.3	6.70	2,824	270.40
min	9.2	n.a	n.a	7.76	16.7	289.0	1.75	1,364	65.80
max	131.4	n.a	n.a	9.88	27.7	3,356.5	24.60	4,989	73.97
sd	36.2	n.a	n.a	0.73	3.6	988.5	6.58	1,190	212.86
p25	16.8	n.a	n.a	8.28	18.8	510.8	2.71	1,979	109.98
p50	39.8	n.a	n.a	8.97	19.8	1,073.7	4.08	2,656	201.39
p75	61.5	n.a	n.a	9.43	24.7	2,102.7	10.12	3,349	402.0y4
Portugal									
N. regions	7	7	7	7	7	7	7	7	7
mean	29.7	735.5	0.04	5.39	9.4	1,442.4	13.17	13,129	n.a
min	0.0	141.7	0.00	3.71	7.3	238.5y	3.57	779	n.a
max	72.6	1,852.0	0.09	6.26	11.5	3,579.8	26.85	26,931	n.a
sd	27.0	718.2	0.03	0.86	1.4	1,528.6	9.86	10,838	n.a
p25	8.4	142.5	0.03	4.89	8.1	247.5y	5.15	2,330	n.a
p50	22.8	300.0	0.03	5.59	9.8	480.5	7.28	11,931	n.a
p75	53.2	1,589.3	0.08	6.11	10.1	3,552.2	22.55	23,668	n.a

Table 9.5 (continued)

statistics	Banks	Branches	Banks/Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
				Spain					
N. regions	17	17	17	17	17	17	17	17	17
mean	22.1	2,260.9	0.01	4.42	13.2	2,309.7	24.62	29,692	520.69
min	1.0	415.7	0.00	3.37	8.4	261.5	2.52	5,014	52.74
max	171.2y	7,199.8	0.04	5.71	17.6	7,140.7	155.62	94,193	1,787.13
sd	40.6	1,953.0	0.01	0.66	2.7	2,058.4	36.25	30,418	487.61
p25	4.0	990.0	0.00	3.87	11.1	1,066.3	4.10	7,261	212.31
p50	7.8	1,648.2	0.00	4.40	12.7	1,595.0	15.95	11,317	369.5y6
p75	18.8	2,924.2	0.01	4.99	15.9	2,715.0	25.88	41,602	563.01
				United Kingdom					
N. regions	12	12	12	12	12	12	12	12	12
mean	37.9	1,252.9	0.02	10.66	19.4	4,920.1	26.03	20,318	1,290.44
min	4.8	321.8	0.01	9.32	15.9	1,677.2	3.47	1,584	458.23
max	315.8	3,019.2	0.10	12.50	29.5	7,955.3	47.83	78,132	2,042.43
sd	87.7	829.0y	0.03	1.07	3.7	1,880.0	13.90	19,119	492.10
p25	8.2	578.2	0.01	9.65	17.1	3,542.3	17.98	13,582	935.99
p50	12.3	1,149.6	0.01	10.80	18.6	5,081.9	24.12	15,597	1,223.86
p75	17.1	1,505.1	0.02	11.52	20.3	6,113.9	39.56	19,944	1,696.82

of 19,442 observations (with the dependent variable being the number of *foreign* banks for the 147 pairs *home region– host region*) is used to study the determinants of cross-border branching.[18]

9.6 Results

This section presents the results of our empirical exercise on the role of different barriers on our index of localism.[19] The idea to be tested is that higher barriers, either due to asymmetric information or to different regulatory regimes, may preserve the local nature of banking systems and be associated with a higher level of our index. Being based on the weight of local versus outside banks in each regional banking system, this index is a reasonable quantity-based measure of integration of banking systems within European countries, quite close to measures such as the share of foreign banks in a national banking system. As asymmetric information and relationship lending constitute a barrier to entry for outside banks, they end up hampering integration.

Our results support this idea. Table 9.6 shows the results obtained running both a fractional logit model (second column) and a IV estimate (third column). The negative coefficient for the (log) firm size and the positive coefficient for the linguistic minority dummy are both strongly significant. Regions where firm size is smaller and cultural differences matter tend to have a strong degree of localism, supporting the idea that these factors may act as barriers to integration. A lower size of firms magnifies the role of asymmetric information and the relevance of relationship lending, and it is, accordingly, associated with a higher ratio between banks and branches. Estimates of instrumental variables confirm the results. The effect and the significance of firm size remain stable when alternative instruments are included.

In a similar way, linguistic minorities also require local (i.e., established in that region) banks, as the presence of such minorities aggravates the problems of asymmetric information and therefore hampers integration. If we exclude from the sample the Italian region Trentino-Alto Adige, which has a significant German-

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[18]We deal exclusively with the determinants of the presence of banks from other European countries in each European region of our sample because this is what our regional data allow for (i.e. no banks from the Rest of World are considered). With regard to this exercise, it should be noted that there is some potential for confusion in the terminology. The List of MFIs does not report, as foreign banks, subsidiaries of foreign banks (i.e. national banks controlled by foreign shareholders, either banks or other entities), but only branches of foreign banks. However, in line with standard reporting practices, only headquarters are reported: in other words, if, say, a French bank should decide to open more than one branch in Italy, this would still imply just one record for that French bank in the Italian List of MFIs. This induces a potentially significant bias: however, we included a dummy for the capital city to take into account this effect, and we check how relevant this problem is in Italy, for which we have additional information. It turns out that 72 percent of the foreign banks have only one branch in Italy, and another 18 percent have just two branches.

[19]As our index is bounded between 0 and 1, we use a fractional logit regression model (e.g. Papke and Wooldridge 1996) that fits naturally within our setting.

Table 9.6 Determinants of the degree of localism (ratio banks/branches) at regional level

Regressors	Fractional logit model	IV model
GDP per capita (log)	0.679 **	0.086 ***
	0.290	0.024
Population (log)	0.590 **	0.023 ***
	0.236	0.009
Firms' size (log)	−0.685 **	−0.136 ***
	0.335	0.044
Linguistic and cultural minorities	0.664 ***	0.025 **
	0.192	0.011
Farmers (log)	−0.544 ***	−0.016 **
	0.174	0.007
Capital	−0.365	−0.023
	0.343	0.019
Students/population	13.186 ***	0.704 ***
	3.856	0.185
Entry into banking requirements	1.016 ***	0.052 ***
	0.159	0.012
Government-owned banks '95	0.012 *	0.003 ***
	0.007	0.000
Constant	−17.221 ***	−0.664 ***
	1.226	0.115
Country dummies		
Number of observations	113	112

Coefficients and robust standard errors (in italics) of, respectively, a fractional logit and an Instrumental Variable (IV) estimation. Standard errors in the fractional logit regression are also corrected for country clusters. The dependent variable is an indicator of the degree of localism of the regional banking systems: the ratio between total banks and total branches in each region, which is bounded between 0 and 1 by construction. Apart from self-explanatory covariates, Linguistic and cultural minorities are detailed in Table 9.2; Farmers is the regional share of employees in agriculture; Capital is a dummy for the region of country capital; Entry into banking requirements is an index measuring the restrictiveness of rules applied to entry (Table 9.3); Government-owned banks '95 is the share of total bank assets held by state-owned banks in 1995 (Table 9.4). ***, **, * denote, respectively, statistical significance at the 1%, 5% and 10% level.

speaking population and a large number of small local banks, the size of the coefficient decreases by about one third, but its significance (at 1 percent level) does not change.

Moving to the national variables, we find that the government's share is significantly positive, suggesting that a stronger presence of public banks, everything else being equal, raises the degree of localism of banking systems. The picture is more blurred when we come to the supervisory variables. As we said in the previous paragraph, we consider alternatively three different variables; unfortunately, results are not consistent across all the indexes. While sign and significance are those expected on the indicators based, respectively, on the entry rules and on the scope of allowed activities, the index based on the amplitude of supervisory powers is significant but has the wrong sign. This result may reflect the fact that in a prudential supervision

framework, supervisory powers are not necessarily limiting markets (as suggested, for example, by the value taken by this index for the United Kingdom[20]). More likely, in our view, it could simply be linked to the methodological weakness of our indexes. Actually, although the World Bank database on which these indexes are based is to our knowledge the most complete attempt to deal with the issue, we are unsure about the ability of these indexes (and more generally of a survey designed for more than 150 countries across the world) to discriminate among European countries. In particular, there is not much variance of these indexes across EU countries (their average coefficient of variation is around 0.2). The sum of the three different indexes (after a proper normalization) produces an index that shows almost no variability across Europe.

9.6.1 Number of Foreign Banks

The number of observations for all possible pairs *host region–home region* is 19,442 (Table 9.7) . Not surprisingly, zeros are largely predominant (but we still have 226 non-zero observations). Results applying the Zero Inflated Poisson model are presented in Table 9.8. The lower panel (logit model) shows the determinants of the decision by foreign banks not to locate in a region (i.e., empty cells); the upper panel (Poisson model) shows the determinants of the number of foreign banks (when

Table 9.7 Observations in the exercise on number of foreign banks for all possible cross-border pairs *host region–home region*

	Domestic regions (a)	Other countries' regions (b)	Observations (c = a*b)
Austria	9	138	1,242
Belgium	11	136	1,496
Denmark	1	146	146
Finland	5	142	710
France	22	125	2,750
Germany	16	131	2,096
Greece	13	134	1,742
Ireland	2	145	290
Italy	20	127	2,540
Netherlands	12	135	1,620
Portugal	7	140	980
Spain	17	130	2,210
UK	12	135	1,620
Total	147	1,764	19,442

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[20]Indeed, on the basis of a recent survey by the Committee of European Banking Supervisors (CEBS 2005), supervision is no longer perceived as a major obstacle to cross-border consolidation.

Table 9.8 Determinants of the number of foreign banks at regional level

Reference region	Regressors	Coef.	Robust Std. Err.	
host	Population (log)	0.444	*0.200*	**
	GDP per capita (log)	3.291	*1.134*	***
	Firms' size (log)	−1.63	*1.61*	
	Entry regulation	−0.345	*0.045*	***
home	GDP per capita (log)	3.82	*0.905*	***
inter-countries	Trade (log)	0.433	*0.141*	***
	Common language	−0.283	*0.203*	
	Common border regions	−0.055	*0.331*	
	Constant	−25.64	*5.79*	***
	Inflate			
host	Firms' size (log)	−3.883	*1.49*	***
	Population (log)	−1.404	*0.375*	***
	GDP per capita (log)	−3.179	*1.263*	***
	Capital	−1.893	*0.519*	***
	Entry regulation	0.216	*0.123*	*
	Government share	−0.085	*0.020*	***
home	GDP per capita (log)	−3.934	*1.441*	***
inter-countries	Trust inter countries	−0.400	*0.73*	
	Common language	−0.580	*0.509*	
	Trade (log)	−1.129	*0.245*	***
	Common border regions	−11.27	*3.64*	***
	Constant	57.95	*7.46*	***
Number of observations		19,442		
Non-zero observations		226		
Zero observations		19,216		

Coefficients and robust standard errors (in italics) of a Zero Inflated Poisson estimation. Standard errors are also corrected for country clusters. Dependent variable: number of foreign banks in each cross-border pair host region−home region. The upper panel shows the results of the Poisson model (for non-zero observations). The lower panel reports the results of the inflation model = logit. Country dummies are included for both the upper and the lower panel regressions. Covariates are split up on the base of the characteristics of host and home regions and their links. Apart from self-explanatory regressors, Capital is a dummy for the region of country capital; Government-owned banks '95 is the share of total bank assets held by state-owned banks in 1995 (Table 9.4); Trade is the trade flows between each pair of countries; Farmers is the regional share of employees in agriculture; Official supervisory power is an index measuring general supervisory powers (Table 9.3); Trust inter countries is a measure of the reciprocal trust between the citizens of the host and home country (Guiso et al. 2004). ***, **, * denote, respectively, statistical significance at the 1%, 5% and 10% level.

observations are non-zero). We use a slightly different set of covariates respectively in the logit and in the Poisson model, excluding from the latter the dummy for the capital region and the government's share.

In the logit model, localization decisions are affected positively[21] by population and GDP per capita of the host region and by the GDP per capita of the home region.

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[21] That is, the coefficients are negative.

Geographical contiguity also seems to matter as the dummy for neighboring regions is strongly significant. The same holds for bilateral trade relationships. Capital cities also significantly lure foreign branches.

Consistent with the idea that small firms may be less transparent to outsiders, foreign banks also tend to avoid, *ceteris paribus*, regions where the average size of firms is small. This confirms our previous findings on the role of asymmetric information. Finally, entry regulation affects branching decisions negatively (albeit only at a 10 percent confidence level), while government's share in the banking system affects these decisions positively, but counter-intuitively, perhaps suggesting that the systems present more opportunities for foreign banks.

In the Poisson model, regional income per capita, in both the host and the home country, affects the number of foreign banks positively and the same holds for population and bilateral trade. Tighter regulation lowers the number of foreign banks while firm size is not significant. As this regression explains the *number* of banks in each region where foreign branches are located rather than the decision to locate there, and it is run with 226 observations vis-à-vis the more than 19,000 used in the logit regression, we do not see the result as a significant drawback. IV regressions broadly confirm these results.

9.7 Summing Up

In this chapter, we investigated the role of barriers in the European credit markets using an indicator of the degree of localism of regional banking systems and the number of foreign branches in each European region. We argue that this regional analysis may indeed help to better understand the role of those factors that are frequently mentioned as hindering integration in the EU retail banking markets, namely, information asymmetries – originated by linguistic and cultural differences and by the underlying economic structure – and national supervision practices and corporate governance rules. Econometric results support the idea that different languages, an economic structure made of smaller firms, and the weight of the government in the banking system favor, *ceteris paribus*, a more local character of a regional banking system. Broadly in line with these findings, the complementary exercise on cross-border branching shows that foreign banks tend to avoid regions where the average size of firms is small.

According to our results, some barriers to European integration are here to stay, at least to a certain degree, as they are related to aspects that are not likely to change in the near future. Less clear is the role that policy measures could have on regulation as our data do not allow for a firm conclusion about the role of supervision rules. For sure, and not surprisingly, a lesser presence of government ownership could add positively to the integration process.

and at the conference on "The Changing Geography of Banking" held at the Università Politec-
nica delle Marche (Ancona, September 2006). The opinions expressed in this contribution do not
necessarily reflect those of the Bank of Italy.

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Part III
Regulatory Framework and Financial Centers

Chapter 10
Designing a Regulatory and Supervisory Framework for Integrated Financial Markets

Giorgio Di Giorgio and Carmine Di Noia

Abstract   The financial crisis that started in 2007 casts doubt on the ability of national laws and competent authorities to manage the stability of the financial system and to protect investors. This is due to the relevant evolving features of financial intermediation – like the cross-border strategies in banking – with many M&As undertaken, especially in Europe, and more in general the globalization of finance, also through the many recent operations among exchanges. The associated regulatory and supervisory challenges have proved to be difficult to tackle. An international perspective is needed on single banking regulatory instruments, even if it is impossible at this stage to imagine unique rules and single international authorities managing capital ratios, deposit insurance, reserve requirements and lending of last resort, as well as other tools for ensuring financial markets stability. However, some common principles on regulation and the structure of supervision may be stated both in US and in Europe: we suggest a "four peak" approach to the matter.

10.1 Introduction

In modern industrial countries, financial markets have rapidly evolved in the last decades. The new technologies and the progress in information communication and disclosure have also induced a growing globalization of finance. This path can be observed with regard to banking and financial intermediaries, capital markets and financial instruments. On one side, there is an increasing integration of functions, instruments and agents in the financial sector. Banks, capital markets, insurance companies and other financial institutions like investment, hedge and pension funds

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show increased interdependence and multidimensional linkages. Large groups are emerging offering a full range of financial services and products. On the other side, such integration, which had previously a largely intra-national path, has become increasingly international: this has been favored by the adoption of a single currency in the euro area, but also by the increasing consolidation among securities exchanges as well as post-trading operators in the world. Mergers offer more opportunities and allow to exploit economies of scale and scope. At the same time, they could lead to excessive risk concentration.

In the summer of 2007, the subprime crisis, announced by the difficulties of some leading US hedge funds, has had an impact on monetary and financial markets throughout the world. Risk premia have increased everywhere. Rating agencies have been blamed for having failed to warn the market. The awkwardness of supervisors and the failure of the tripartite agreement of the three UK financial regulatory authorities at its first stress test has been accompanied by a true bank run in the UK: an event that probably no one would have ever imagined could happen again.

The crisis of Autumn 2008 (still running while we are writing) is changing the structure of the financial industry. We have seen: a hysterical run by the regulatory authorities in stopping short selling; late night meetings of EU ministers to bail-out transnational banks; the frantic decision throughout Europe of raising deposit insurance coverage up to non-credible limits (many times the GDP); repeated crashes of indexes despite massive liquidity injections by central banks; the complete freezing of the interbank market; brutal exchanges downsizing; and panic of the regulators. A plausible (and likely) outcome is the nationalization of an entire industry, with some big investment banks disappearing and others being transformed into commercial banks. For the industry to survive, international steps to avoid that something like this will happen again must be taken. In fact, despite the continuous reforms in financial regulation in different countries (described in the following section) national policy makers and authorities resist and are actually reluctant to accept more stringent links with foreign authorities and considerable transfer of powers.

The problem must clearly be tackled in different ways for different geographical areas. It is not realistic at this moment to think about world regulators or world rules even if regulatory and supervisory cooperation is no longer sufficient. It has been widely argued, however, that a reorganization in the structure of regulators in the United States (GAO 2007, US Treasury 2008) as well as in Europe is necessary (Di Giorgio and Di Noia 2005).

The paper is organized as follows. In Section 10.2 we describe some regulatory features that have emerged in connection both with the process of cross border and cross sector integration in finance and with the recent financial crises. In Section 10.3, we briefly present the current state of financial regulation and supervision in Europe and US, as well as some recent regulatory initiatives which have been proposed in those countries. We discuss our own proposal for the reorganization of the architecture for financial regulation and supervision in Section 10.4. Finally, we summarize and conclude in Section 10.5.

10.2 Integrated Financial Markets, Regulation, and Crises

The definition of the term "financial market" has traditionally included banking, financial and insurance segments of the industry. In the past, the boundaries dividing institutions, instruments and markets were clear-cut, so that further distinctions were drawn within the different classes of intermediaries (with banks specialized in short or medium/long term maturities, functional/commercial operations, deposits and investments; with financial intermediaries handling broker-dealer negotiations, asset management and advisory functions, and with insurance companies dealing in life and other insurance policies).

The process of financial integration has produced a common space where all financial activities are now undertaken by entities that, although sometimes legally different, do actually perform the same economic functions and manage similar products. The situation is extreme in the case of large intermediaries that have been called "conglomerates." Probably, a distinction must be made between "financial conglomerates" whose interests are exclusively or predominantly in financial activities and "mixed conglomerates." Mixed conglomerates are predominantly commercially or industrially oriented and contain at least one regulated financial entity in some part of their corporate structure. Here, we deal with financial conglomerates, defined as "any group of companies under common control whose exclusive or predominant activities consist of providing significant services in at least two different financial sectors" (banking, securities, insurance) (Bank for International Settlements 1995). Many of the world's prominent financial firms are indeed conglomerates. In 2000, over 80% of the assets of the largest 500 banking organizations were controlled by conglomerates. Among the largest 50 banking organizations, the proportion of conglomerates was 94%. The share of banking assets controlled by conglomerates has been increasing in both developed and developing countries. Most of these large conglomerates are active internationally (Huertas 2005). If we take a look at the EU, we can find about 68 conglomerates[1]; according to the 2002/87 directive, two are in Switzerland, six in the US and one in Australia. In general, these conglomerates operate in two countries; with a few exceptions they are present in more countries (Allianz, for example, is an insurance group operating in 10 EU countries). The EU Directive sets out requirements on solvency, in particular to prevent the same capital being used more than once as a buffer against risk in different legal entities in the same conglomerate (multiple gearing of capital). It also tries to ensure that the concentration of risk at group level, and transactions between entities in the same conglomerate, are appropriate. It also focuses on risk management and internal control systems. But the most important feature deals with the lead supervisor function: a single supervisory authority should be appointed to coordinate the overall supervision of a conglomerate. Many events in the last years show the difficulty of such arrangements and provide evidence of a multidimen-

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[1]See http://ec.europa.eu/internal_market/financial-conglomerates/docs/200711_conglomerates_en.pdf.

sional problem that includes geography, type of business, type of regulator, size of the supervised entities, and bankruptcy arrangements. Some problems clearly arise from regulation and supervision. Even in federal systems, like the US, or in common economic areas, like the EU where a subset of countries has adopted a common currency, day-to-day regulation is never truly harmonized and financial conglomerates must set up different compliance arrangements and thus lose many of the advantages of integration. In the EU, the situation is even worse: the implementation tables by the EU Commission show an excellent track record of all the Member States.[2] However, despite the adoption of the Lamfalussy procedures for many of the financial services directives,[3] in practice regulation is quite different in different countries. Some pieces of Level 1 directives are in the Member States' legislation, others in secondary regulatory arrangements (Level 2). At the same time, pieces of Level 2 are in the national laws while others in the secondary regulations. Sometimes, the national Parliament and the competent authorities substantially change the Directives (going "beyond the floor" in the case of minimum harmonization, or "beyond the roof" in the case of maximum harmonization).[4] The recent crisis also tested the EU supervisory arrangements in relation to financial conglomerates. Despite the absence of a political and fiscal union, policy makers were relatively efficient in solving overnight the crisis of Fortis, even if the net result was the separation of the bank into different domestic entities.

It is wise to stress that even in a single country coordination mechanisms among different agencies prove to be difficult, especially during a crisis. Different existing regulatory models – "single regulator," "twin peaks," "institutional," or by nature of the intermediary (bank, insurance or securities) – create frictions given the different objectives that an agency pursues. Even in the case of a single regulator, it is possible that different departments try to maximize different utility functions. A crisis acts as a stress test of a regulatory model. At the national level, typically the lender of last resort is the central bank providing liquidity to the whole market and/or to the (illiquid but not insolvent) commercial banks. In the Euro countries, it is no longer clear who is in charge of the lender of last resort function. Different arrangements can be stipulated between the prudential supervisor and the central bank – but which one? The national one, the European Central Bank (ECB) or the European System of Central Banks (ESCB) as a whole? In the case of the recent bail-outs, all traditional instruments have been exploited (sometimes in a creative way): direct government intervention, central bank intervention, deposit insurance. And all types

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[2]See http://ec.europa.eu/internal_market/finances/docs/actionplan/index/transposition_en.pdf.

[3]Level 1 of the Lamfalussy approach consists of framework Directives or Regulations. At Level 2, four regulatory Committees assist the Commission in adopting implemention measures, ensuring that technical provisions can be kept up to date with market developments. Committees of national supervisors are responsible for Level 3 measures, which aim to improve the implementation of Level 1 and 2 acts in the Member States. At Level 4, the Commission will strengthen the enforcement of EU law.

[4]See the problems in the implementation of the market abuse in the report by ESME at http://ec.europa.eu/internal_market/securities/esme/index_en.htm.

of intermediaries have been involved: commercial and investment banks, investment and hedge funds, investment firms, insurance firms; the traditional segmentation of banking, capital markets, and insurance has been finally defeated by events.

The current crisis does not seem to have been started by conglomerates per se: the big investment banks that were bailed out or failed were not conglomerates. Some big commercial banks have *de facto* become hedge funds because of their high leverage. Mistakes in financial regulation and supervision have been underlined: from pro-cyclical capital ratios, arising from both Basle 1 and 2, to the new accounting rules on fair value and mark to market; from the key role given to rating agencies by central banks (who wrote Basle 2 rules?) to excessive leverage ratios (by permitting to hold unlimited amounts of AAA-rated structured financial products). All this is relevant for a broad class of financial intermediaries. However, although in integrated financial markets financial conglomerates have a leading role and contribute either to spread out faster or to better absorb the crisis, no dedicated intervention has been produced in the form of any new and special supranational rule and supervisory measure explicitly tailored for these players. In an international context, and also with respect to conglomerates, the big cases of the past few years (although in a different way) (Herstatt, Drexel Burnham Lambert, BCCI, Barings and LTCM) show a "too complex to fail issue" (Herring 2005) where the lack of an international lender of last resort (Guttentag and Herring 1983) or of a global deposit insurance scheme deserve further analysis (Fisher 1999).[5] But the events of autumn 2008 (the bail out of Bear Sterns and AIG, the default of Lehman, the intervention of Bank of America in Merrill Lynch in the US; the near nationalization of the entire banking system in the UK and Germany; full guarantee provided on deposits and maybe other kind of liabilities) show much bigger problems than those specific to conglomerates. The enormous provision of fresh capital (through direct injection of capital, government loans or the purchase of toxic assets) and the new rules on deposit insurance show an elementary concept: a bail out, in any particular form, is (and must be) a decision whose responsibility falls only on the policy maker. The policy maker can be assisted by the financial market authorities and the central bank, but in a way that makes explicit that these entities are independent agencies. On the contrary, in the recent past bail out decisions have been taken by central banks, as lender of last resort, or by the competent supervisory authorities (sometimes central banks). The intervention of an independent authority for bailing out carries a relevant risk: the loss of independence and reputation. The net result of Federal Reserve intervention in the AIG case is the loss of independence with respect to the US Treasury. The summer events of Northern Rock show not only a "bank" panic but a "central bank panic" and the crash of any residual credibility of the UK authorities. The latter, scared by the queues at the bank, have publicly declared that they would have guaranteed all depositors

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[5]The management of the August 2007 subprime crisis resulted in a voluntary initiative by Citi and other US big banks to create a new and dedicated fund to give liquidity to the subprime market.

and basically the bank, which was, *inter alia*, a listed company, thus introducing an asymmetry in the treatment of external investors that poses new and difficult questions.

While in the US the policy maker is federal (as well as the taxpayer), in Europe both of them are still national.[6] This is the reason for the stubborn existence of national authorities that while the ECB acts more or less in coordination with other central banks, do not show sufficient coordination in the analysis of the situation and in the sharing of confidential information. Current arrangements for coordinating national supervisory activities are overly complex and burdensome. They have proved incapable of ensuring efficient area-wide supervisory teamwork during a crisis. The Level 3 Committees (Committee of European Banking Supervisors, Committee of European Securities Regulators and Committee of European Insurance Occupational and Pension Supervisors), in spite of excellent but limited permanent staff, depend wholly on their constituent authorities. They have rigidly tripartite competence (banks, securities and insurance) according to an obsolescent view of the regulatory and supervisory framework. This has two regrettable consequences. It creates an extra regulatory burden entailing a loss of competitiveness for Europe's financial industry and it offers inadequate protection for investors. We must therefore now act decisively to enhance European supervisory structures. This applies in particular to the euro area, where a single payment infrastructure and a single liquidity source are in place.

10.3 The Current State of Financial Regulation and Supervision in Europe and the United States

In each country, financial market regulation has been affected by the structure and the evolution of the domestic financial system as well as by the legal system in place. Table 10.1 summarizes the current state of financial market regulatory and supervisory arrangements in the European Union and the United States.

10.3.1 The US Situation

In the US, the structure of financial regulators and supervisors is quite complex. On the banking side, there are four Federal banking agencies: the Federal Reserve, the Office of the Comptroller of the Currency (OCC), the Office of Thrifts Supervision (OTS) and the Federal Deposit Insurance Corporation (FDIC). Furthermore there are fifty state banking departments. On the securities side, regulation and supervision are split among two federal entities: the Securities and Exchange Commission

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[6]Boot and Marinč (2009: Chapter 11, this volume) elaborate on how the lender of last resort facility in the EU is divided between the center (the European Central Bank) and the periphery (the national central banks).

Table 10.1   Current assignment of responsibilities for supervision in banking, securities, and insurance markets in the EU and US

Country	Banking	Securities	Insurance and pension funds
Belgium	U	U	U
Denmark	U	U	U
Germany	U	U	U
Greece	CB	S	G
Ireland	U (CB)	U (CB)	U (CB)
Italy	CB	CB, S	I/FP
Luxembourg	U	U	U/FP
France	CB,B	B,S	I
Spain	CB	CB,S	G
Netherlands	CB,S	CB,S	CB,S
Portugal	CB	CB,S	I
Austria	U	U	U
Finland	BS	BS	I
Sweden	U	U	U
United Kingdom	U	U	U/FP
USA	CB, B	S,S	I

CB: Central Bank, BS: banking and securities supervisor, B: banking supervisor, S: securities supervisor, I: insurance supervisor, G: government department, U: single financial supervisor.
Sources: Updated from Di Giorgio and Di Noia (2003).

(SEC) and Commodity Futures and Trading Commission (CFTC). The former protects investors; maintains fair, orderly, and efficient markets; and facilitates capital formation through oversight of the key participants in the securities world (including securities exchanges, securities brokers and dealers, investment advisors, listed companies and mutual funds). The SEC promotes the disclosure of important market-related information, maintaining fair dealing, and protecting against fraud. The SEC outsources much of its oversight responsibility to two self-regulatory organizations, the NYSE and the NASDAQ. The CFTC is in charge of derivatives markets. On the insurance side, there is no federal entity: fifty state insurance departments are in charge of regulation and supervision. Some sort of coordination on financial markets is ensured by the President's Working Group on Financial Markets whose members are the Secretary of the Treasury, the Chairman of the Federal Reserve, the Chairman of the SEC and the Chairman of the CFTC.

The current structure of financial regulation and supervision is cumbersome with overlapping agencies and increasing cost for the industry (Dearie and Vojta 2007). In October 2007, the US Department of Treasury (Treasury for short) has sought comments on a document[7] that asks how the regulatory structure of the US financial system should be changed. According to this document, much of the basic regulatory structure associated with financial institutions was established decades ago.

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[7]http://www.treasury.gov/press/releases/reports/federalregisternoticehp602.pdf

While there have been important changes over time in the way financial institutions have been regulated, the US regulatory structure has basically remained the same.[8]

The recent GAO report on financial regulation underlines that the current US regulatory structure, with multiple agencies that oversee segments of the financial services industry, is challenged by a number of industry trends.[9] The development of large, complex, internationally active firms – whose product offerings span the jurisdiction of several agencies – creates the potential for inconsistent regulatory treatment of similar products, gaps in consumer and investor protection, or duplication among regulators. GAO has recommended several options to accomplish modernization of the federal financial regulatory structure; these include consolidating certain regulatory functions as well as having a single regulator for large, complex firms. Finally, as part of Secretary H. Paulson's initiative to strengthen US financial markets' competitiveness in the global economy,[10] the Treasury has published the "Blueprint for a modernized financial regulatory structure."[11] The document proposes a new architecture for US financial regulation recommending a regulatory model based on objectives, to more closely link the regulatory structure to the reasons of regulation. The model is inspired by the Australian model and some academic literature (Herring and Carmassi 2008, Di Giorgio and Di Noia 2003). The model proposes three regulators: one focused on market stability across the entire financial sector, another on safety and soundness of those institutions supported by a federal guarantee, and a third on protecting consumers and investors. The market stability regulator would be the Federal Reserve, whose role would be implemented through the traditional channels of monetary policy and liquidity provision to the financial system. In addition, the Federal Reserve would be given new and critically important regulatory powers dealing with the overall financial system and would have access to information about a broad range of intermediaries including insurance firms. It would also have the responsibility regarding OTC derivatives markets, and clearing and settlement functions. Also contemplated is the creation of a Federal Prudential Financial Regulator that would combine all federal bank charters into one charter and would consolidate all federal bank regulators into a single prudential regulator. For increased regulatory efficiency, the Blueprint recommends a federal insurance charter and puts oversight of these guaranteed products within the jurisdiction of the Federal Prudential Financial Regulator. This should replace the OCC, the OTC and the FDIC. The Conduct of Business Regulator would have

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[8]In particular, the Treasury has asked for input on a number of "General Issues" about the financial system at large, including whether the current regulatory structure adequately addresses consumer or investor protection and if the eventual creation of a single financial market regulator or otherwise consolidating financial regulation would be advisable. Furthermore, the Treasury wants to discuss in-depth specific issues like the central bank's role in regulatory supervision and setting monetary policy, the deposit insurer's proper level of authority and a greater federal involvement in insurance regulation.

[9]GAO report on Financial Regulation, October 2007 (http://www.gao.gov/new.items/d0832.pdf)

[10]http://www.treas.gov/press/releases/hp476.htm

[11]http://www.ustreas.gov/press/releases/reports/Blueprint.pdf

the power and the responsibility to monitor business conduct regulation across all types of financial institutions and entities. Business conduct regulation in this context includes several key aspects of consumer protection such as disclosures, business practices, chartering and licensing of certain types of financial institutions, and rigorous enforcement programs. This agency would assume many of the roles of the CFTC, the SEC, and the different consumer protection and enforcement roles today assigned to insurance and banking regulators.

10.3.2 The EU Situation

In the EU, in general, regulation focuses first on banking intermediaries, given their traditional dominant role in the financial sector in continental Europe. Most of the recent changes have been induced in member countries under the pressure of EC directives and of increasing cross-border financial market integration that first stimulated and then followed the 1992 single market program and the adoption of the Euro. However, apart from member countries' implicit commitment to ensure that all financial sectors were adequately regulated and supervised, no European law explicitly deals with the problem of regulation and supervision of financial markets and intermediaries. As a consequence, the current picture in the EU is that of a combination of different regulatory approaches. Moreover, in many member countries there is no "pure" regulatory model adopted throughout the national financial system.

   The Nordic countries, the UK and more recently Austria, Belgium and Germany, have chosen to delegate financial regulation and supervision to a unique agency, separated by the central bank. This is a coherent and integral application of the "Single-Regulator" supervisory model, based on just one control authority with responsibility over all markets and intermediaries. This authority is concerned with all aspects of regulation, but in particular with microeconomic stability and investor protection. In a few other countries, the traditional "institutional" model is still in place for the insurance sector. In Luxembourg and Finland, a unique agency is responsible for supervision of banking activities, securities markets and investment funds and firms, but not for insurance. Contracts involving life insurance and capitalization provide services that are directly tied to investment funds or to stock exchange or other financial indices (unit-linked or index-linked contracts). The inclusion of the life insurance segment would be a welcome change given that the distinctiveness of most schemes of life insurance compared to other financial products has been considerably lessened. A specialized "institutional" supervisor is also widely in place for the securities markets: in countries like Italy, Portugal and Spain, this security supervisor is responsible for investor protection, while the objective of safeguarding stability is assigned to the central bank; in this case, we may say that we have a partial application of the regulatory model by objective. A full application of the twin-peak model is found in the recent Dutch reform, establishing a single authority for financial market transparency and investor protection, while leaving

the supervisory responsibility for microeconomic stability to the central bank. In many countries, banking supervision is one of the functions of the national central bank, but only in a very few cases is the central bank still a "monopolist" in the prudential regulation business (Italy, Portugal and Spain).[12]

There is no point in having a common monetary policy in the Euro area while keeping different financial regulations and supervisory rules in each member country. As a matter of fact, these institutional differences are an important barrier to further financial integration and could also prove to be an impeding factor to smoother transmission of the single monetary policy. In the field of financial regulation, the principle of minimum harmonization and mutual recognition, which was originally thought to be able to naturally induce over time a convergence of regulatory behavior and more uniform rules, did not work. Moreover, there is a concrete risk that competition in this area will not generate the more efficient outcome. On one hand, there exists an incentive to promote less demanding domestic financial regulations and supervision in order to let each country become more attractive for running financial business; on the other hand, it is not clear who will pay the costs of potential insolvency following excessive risk taking behavior and financial misconduct in a member country. Finally, with increasing international banking activities and a European settlement system in place (Target and the planned Target2 Securities), the argument that domestic regulators and supervisors have better knowledge and can exercise more efficient control becomes less and less effective (Prati and Schinasi 1999). We have already mentioned that there are neither clear tools nor responsibilities assigned to counter and/or manage the risk of financial instability and crisis in Europe (Bruni and de Boissieu 2000); the Treaty is silent on this topic. The role of lender of last resort will be performed by the ECB only in the case of a widespread liquidity crisis affecting the whole Euro area, as happened in the Summer 2007 and in the Fall 2008. What about a liquidity crisis in a single country? And a solvency crisis? Suppose we face a situation in which a single financial institution located in a member country is in trouble. What kind of intervention, if any, is currently allowed? The ECB will not intervene in favor of a single institution, especially if it is interconnected only domestically. It can always assign some of the responsibility for the crisis to the domestic financial regulator-supervisor. The domestic central bank cannot intervene by providing funds without an explicit authorization by the ECB. In this case, it will have to convince the latter that the institution is facing a liquidity and not a solvency crisis, according to the old Bagehot's doctrine, and/or that the risk of potential spread and contagion of the crisis is high. This requires time and resources.

Another aspect which has been brought back to the center of the debate in the recent crisis is that of deposit insurance. Explicit deposit protection may be designed to achieve different policy targets. However, the two main objectives are consumer

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[12]This classification follows Di Noia and Di Giorgio (1999) and it is based on observing the composition of the Basle Committee of Banking Supervision. Another possibility in the EU would be using the composition of the Committee of European Banking Supervisors (CEBS).

protection and macroeconomic stability. Small depositors have to be (preferably partially) insured against losses, as they lack the ability to monitor the banks where they place their money. Furthermore, they have to be provided with a mechanism to quickly recover the funds they use for transactions. In addition, given the strong links among banks due to the working of the payment system and the management of monetary policy, it is necessary to avoid or at least minimize the risk that a bank failure fosters fear of financial contagion in the system and induces depositors to withdraw their funds even from safe and solid banks (bank runs). Deposit protection is hence viewed as an essential component in the financial safety net, together with the lending of last resort provided by the central bank, standard banking regulation and supervisory controls.

Deposit protection, however, is not offered homogeneously to depositors across countries. The currently adopted schemes differ widely in many dimensions. Deposit insurance is surely a function of public interest. But its provision can be assigned either to a public or to a private (or mixed) agency. Participation in the system can be mandatory or voluntary, and financial resources devoted to payouts can be collected via ex-ante contributions or by raising funds only when needed (ex-post). The deposit insurer can be given only the task of reimbursing depositors or can be assigned a broader mandate and participate in information collection, crisis management and supervisory activities in the banking sector. Only some categories of deposits can be considered to be insured (or all types), and each deposit account or each depositor can be considered eligible for partial or full payout. In the recent crisis both US and the EU countries decided to raise the limits of coverage: in the US from 100,000 to 250,000 dollars, in Europe going up to 100,000 euro and /or adding explicit State guarantee, as in Germany, UK, Ireland, Italy, Greece.

10.4 A New Architecture for Financial Market Regulation and Supervision in Europe and the US

The selection of a new regulatory model is not easy. However, as already stated, the old "institutional" model could be considered a good candidate only in a context with rigidly separated financial segments, and where no global players are at stake. This picture does not apply either to Euroland or to the US, where we already observe a high degree of integration in financial markets and intermediaries and where multifunctional groups and conglomerates are rapidly growing. A more efficient way to regulate financial intermediaries, including financial conglomerates, would be the explicit adoption of an approach by objective at a federal level. While this would probably be more natural in the US, we think it could also be applied in the Eurosystem. At the same time, it is likely that the chaotic attribution of regulatory powers in the US could be considerably improved by deciding to adopt a new regulatory framework explicitly based on precise coordination devices, along with some of the rules (or better the supervisory practices) already experimented in Europe.

One should stress that harmonization and delegation at a federal level does not necessarily means full centralization. If it is too late to continue with different national (or state) regulators and supervisors, it is probably *too early to adopt a central regulator (s) and supervisor (s) at the Euro or US federal level.* In fact, only the Euro or the Federal zone too large, but still too many different rules exist (commercial codes, company laws, failure procedures, corporate governance) and fiscal policies are not completely harmonized. Also, in most cases, state enforcement might still be desirable. In our opinion, a feasible solution is based on a federal approach to financial regulation and supervision, which could be organized with a structure similar to the one established for monetary policy within the ESCB.

The regulatory and supervisory model by objectives could be the right model. This postulates that all intermediaries and markets be subjected to the control of more than one authority, each single authority being responsible for one objective of regulation regardless of both the legal form of the intermediaries and of the functions or activities they perform. According to this scheme, an authority possibly different from the central bank, which remains in charge for monetary policy and macro-stability, is to watch over prudential regulation and micro-stability of both markets and all intermediaries. This agency is to supervise the stability of the entire financial market and of individual financial intermediaries, by licensing authorizations, controlling professional registers, performing inspections, giving sanctions and managing crises. This authority should cooperate with the central bank in supervising security settlement and payment systems and clearing houses, and in monitoring the use of financial instruments in wholesale markets. An authority responsible for transparency and investor protection should supervise disclosure requirements and the proper behavior of intermediaries and the orderly conduct of trading in all financial intermediation activities performed by banking, securities, and life insurance intermediaries (including discipline and control in the area of transparency in contracts). Moreover, this authority would be assigned powers over the area of misleading advertising by financial intermediaries. Finally, it should control macro-transparency in financial markets (including the discipline of insider trading, takeovers and public offers). A fourth authority should guarantee fair competition, prevent abuses of dominant position and limit dangerous concentrations.

A sketch of this "4-peak" model for financial regulation is provided in Fig. 10.1. This solution seems particularly effective in a highly-integrated market context[13]

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[13]In Australia, the Financial Sector Reform Act of 1999 harmonized at the Commonwealth level financial rules and supervision assignments. The Australian Securities and Investments Commission (ASIC) protects investors, depositors and insurance policy holders (2001). It regulates and enforces laws that promote fairness and proper behavior in financial markets and exchanges, and of financial firms and advisors. It cooperates with other 3 main regulatory bodies (always at Commonwealth level). The Australian Prudential Regulation Authority (APRA) is responsible for ensuring that financial institutions will honor their commitments. It safeguards the soundness of deposit taking institutions, life and general insurance companies, and other financial firms after having
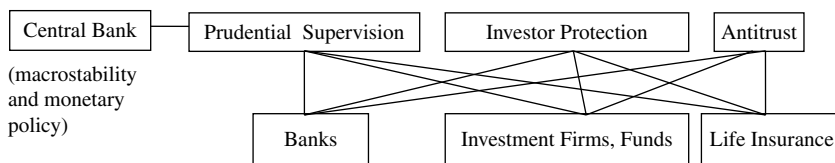
Fig. 10.1   A 4-peak regulatory model by "objectives" for the financial sector

and in the presence of multifunctional operators, conglomerates and groups operating in a variety of different business sectors. Its most attractive feature is that it provides uniform regulation for different entities engaged in the same activities. At the same time, it does not require an excessive proliferation of control units. Compared to the "institutional" or the "single regulator" model, a regulatory framework organized by objectives obviously produces a certain degree of overlaps. It could also lead to a lack of controls, given the ambiguity of specific competencies. Since each intermediary is subject to the control of more than one authority, this model might prove more costly than the single regulator model. The intermediaries might in fact be required to produce several reports relating to supervision, often containing identical or similar information. At the same time, the intermediary may have to justify its actions to a whole set of authorities contemporaneously, although for different reasons. A deficit of controls might occur whenever the exact areas of responsibility are not clearly identifiable in specific cases. Moreover, to be effective and to avoid conflicts of interest among the different objectives, this regulatory model needs a coordination committee composed of members from the three regulators and the central bank. In practice, however, the differences between the single regulator model and the one by objectives may be smaller. We could view the single regulator model as a 3-peak regulatory model by objective, in which the two objectives of prudential supervision and investor protection are given to a single agency.

The horizontal 3 or 4-peak proposal would be inserted into a vertical structure in Europe, and probably also in the US. As already stressed, whether financial "regulation" in the Euro area would be fully centralized at the European level, in alternative to a harmonized regional architecture, is a challenging issue. Many arguments support the view of centralizing and unifying financial regulation in the Eurosystem (in particular, an integrated supervision in a scenario dominated by conglomerates and characterized by the expansion of electronic communication networks, market manipulation and trades on the net). However, the feasibility of a European central-

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inherited the powers and duties previously given to the central bank and to the Insurance and Superannuation Commission. Monetary policy and systemic stability are assigned to the Reserve Bank of Australia, which is the third institutional member represented in the Council of Financial Regulators, the official site where coordination efforts are pushed and conflicts resolved. Finally, the Australian Competition and Consumer Commission is charged with antitrust powers and responsibilities.

ized "supervisory" solution is made less likely by the fact that the Euro area might be too large to be controlled by one (or two) central agencies, that many different rules are still in place with respect to commercial codes, company laws, corporate governance schemes, and bankruptcy procedures. The EU directives, when they exist, only establish a common floor; and even with a single currency and a common monetary policy, fiscal policies and taxation of financial services and other items are heterogeneous among member countries of the European Union. Besides, some form of national enforcement is probably still needed.

Hence, we still endorse our proposal of a European System of Financial Regulators (ESFR), structured like the ESCB and organized according to the regulation by objective model (Di Giorgio and Di Noia 2003). The ESFR would harmonize and coordinate financial regulation in member countries, design common principles and guidelines for prudential supervision and set out appropriate disclosure instruments and requirements. It would sponsor the necessary institutional changes at the domestic level, so as to merge and reorganize supervisory and regulatory powers in the financial sector of each member country. At the end of the process, in each country there would be just one national agency responsible for each objective of financial market regulation. This national agency would be part of a process of defining the general strategies and principles of financial regulation. It would be responsible for the national implementation of both the rules and the supervisory duties agreed upon at the Euro level.

In the 4-peak version, this reform calls for establishing two new European Agencies, one responsible for the microeconomic stability (European Prudential Supervision Authority) and one for transparency in the market, investor protection and disclosure requirements (European Authority for Market Transparency) of all financial intermediaries. These two central agencies would coordinate the different domestic agencies in each member country. Apart from this vertical form of coordination, cooperation would be also desirable horizontally, at both the European and national levels. This coordination, and resolution of eventual controversies, could be provided by special Commissions for the Supervision of the Financial System (as in the Corrigan Report, see Corrigan 1987) established at the European Commission and at national Treasuries. These commissions would be the natural place for activities involving proposals and consultation concerning measures regarding financial market regulation. No antitrust power would be given to any member of the ESFR, so as to avoid the trade-off between competition on one side and stability and transparency on the other. Moreover, agencies responsible for supervising market competition do already exist at both Euro and domestic levels. It would be wise to transform into a third separate and independent central agency the EU Antitrust DG. This agency would coordinate and promote the harmonized activities of domestic Antitrust agencies. In each member state, the national Antitrust agency would be responsible to safeguard competition in all economic sectors. Our suggested 4-peak model for financial regulation in Europe is sketched in Fig. 10.2.

We are aware that our proposed architecture is very ambitious and requires indeed a substantial amount of coordination among the different authorities. An additional and delicate problem is how to make these new agencies independent

The Proposal: a New European System of Financial Regulation

European System of Central Banks	European System of Prudential Supervision	European System for Investor Protection	European System for Competition

European Level

Coordination Committee

ECB	European Prudential Regulation Authority	European Investor Protection Authority	European Antitrust Authority

Domestic Level

Coordination Committee

National Central Bank	Prudential Supervisory Authority	Investor Protection Authority	Antitrust Authority

Fig. 10.2   A 4-peak regulatory model by "objectives" for the financial sector in USA

and accountable, a topic that deserves a separate investigation. Another important obstacle is the institutional and political resistance by existing national bodies whose powers would be diminished by the implementation of the proposal.

We would like to stress that some good example of international cooperation and coordination efforts can already be found in banking supervision, with the Basle Committee working on a wide range of topics with no formal by-laws, but a very strong leadership. At the EU level, after the Lamfalussy report, three "Level 3 Committees" (CESR, CEBS and CEIOPS, see above) assist the EU Commission in drafting level 2 regulatory measures using "comitology" powers.[14] It is to be stressed that while in all European countries the reform path opted for either a single regulator or regulation by objective, at the European level the old Institutional approach has been followed with 3 separate committees for banks, securities and insurance (and pension funds). The national supervisory systems would gain both in consistency and effectiveness if all stability, transparency and competition oriented rules were either issued or (better) coordinated by distinct independent agencies at the Euro level.

An application of our proposal for the US is actually contained in the mentioned Blueprint. Compared to Europe, the US framework would be greatly simplified by

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[14]Comitology refers to the delegation of implementation powers by the Council to the Commission for the execution of EU legislation: representatives of the member States, acting through Committees called "comitology committees", assist the Commission in the execution of the implementing powers conferred on it (Committee of Wise Men 2001).

the elimination of one level of supervisory structures, given that it would probably not be necessary to have local supervisors in each of the 50 states. As a matter of fact, several US Federal agencies already have local branches. These may be reorganized in districts rather than at the state level since it is likely that fewer legal and cultural barriers exist among states. The "4-peak" model would maintain and enhance Federal Reserve's responsibility for macrostability and the payment system. The new Prudential Supervision Agency would consolidate the FDIC, the OCC and the OTS and be endowed with all the prudential supervisory powers of local insurance regulators. The SEC (merged with CFTC and an insurance supervisor) would be given full responsibility for investor protection and market transparency. Antitrust powers would remain as they are. A coordination committee among those agencies and the Treasury should be appropriately designed and staffed.

10.5 Conclusions

In this paper, we have argued that financial market regulation should be redesigned and harmonized in the EU and the US according to a regulatory model by "objectives". This calls for assigning to a limited number of distinct and independent agencies all supervisory powers and regulatory responsibilities in financial markets and on financial intermediaries, regardless of their functions and legal status. These agencies would be in charge of microeconomic stability, investor protection and safeguarding competition in the financial sector. They would cooperate with the central bank for the purpose of guaranteeing macroeconomic stability and financial soundness.

In the Euro area, we favor the establishment of two new European financial regulatory agencies, distinct and independent of the ECB. These agencies would be responsible for coordinating legislation and execution of regulation in financial markets: the first European central agency would be responsible for the microeconomic stability of all intermediaries, while the second for transparency and disclosure requirements. The third objective of guaranteeing competition in financial (and non-financial) markets is already safeguarded by the Antitrust General Direction of the European Commission in addition to domestic agencies. It is be advisable to transform the EU Antitrust General Direction in a central and independent European agency. The Antitrust General Direction and the two newly created central agencies would be at the center of three European Systems of Financial Regulators, each one structured similarly and working in connection to the ESCB, thereby requiring active participation of national agencies in member countries. It is essential to maintain both levels of regulation and supervision (European-national) in a federal system.

This proposal faces many challenges. Even if there was a consensus on the final architecture of financial market regulation, implementation would have political and institutional obstacles. Changes in the Treaty on the European Union are needed in order to establish new agencies. These can be proposed only in the next intergovern-

mental conference. Changes in national legislation of each Euro country would also be required. Providing a satisfactory degree of accountability of the new agencies will be equally challenging. Furthermore, a well functioning and harmonized model of financial regulation and supervision would necessitate the participation of the United Kingdom. Should it not join the Eurozone, the United Kingdom would have to fully participate in the newly created European System of Financial Regulators.

It is easy to predict strong national, political and institutional opposition to the proposal. Hence, full financial market integration would require a much higher degree of political integration in Europe. However, a movement in favor of a scheme similar to ours is emerging. There is already a semblance of a federal system in place on macrostability and competition. In regards to investor protection and conduct of business, the new Committees created after the Lamfalussy report (CESR and ESC) started to coordinate and guide the national securities regulators. The challenge is to establish prudential supervision and microstability for all financial intermediaries (as CEBS and CEIOPS started to only recently). Given the consolidated experience of the Basle Committee on Banking Supervision and the recent positive experience of the ESC and CESR, it seems plausible that a new framework for financial market regulation and supervision will emerge in Europe: one based on harmonized regulation at the European level and national supervision. As regards the US, the application of our scheme, along the lines contained in the Blueprint, would lead to a strong simplification and would enhance cooperation among regulators.

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Chapter 11
Crisis Management and Lender of Last Resort in the European Banking Market

Arnoud W.A. Boot and Matej Marinč

Abstract   We discuss some key issues related to supervisory arrangements in the Euro-system countries. In particular, we address the lender of last resort (LOLR) structure and the related crisis management framework. We focus on the responsibilities and powers of individual countries (and national central banks) vis-à-vis those at the European level (EU and ECB). In this context, various issues will be raised relating to the effectiveness and efficiency of the arrangements and, specifically, the role and positioning of the LOLR in light of the fragmented supervisory structure. We will discuss potential paths forward.

11.1 Introduction

It is widely acknowledged that stability concerns and systemic risks in banking are real and warrant regulatory scrutiny. These issues have become more pertinent with the further integration of financial markets. The credit crisis that came about in 2007 has highlighted the complexities of an interlinked financial system.[1] In particular, the increasing cross-border footprint of financial institutions offers considerable challenges. For the European banking market, there has been a sizable increase in the cross-border externalities originating from the growing number of banking groups with a significant cross-border presence. Moreover, as highlighted in De Nicoló and Tieman (2005), real activities have become more synchronized, exposing EU member countries increasingly to a common European business cycle.[2] These

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[1] See the overview and analysis by Fratianni (2008). In particular, he discusses the increasing complexity of the financial system and the implicit "mushrooming" of the safety net.

[2] Simultaneously, domestic financial sectors have become more dynamic, less predictable, and more exposed to competition. This has ignited a lively debate on the interaction between stability and competitiveness; see Boot and Marinč (2008) for an analysis of the interaction between competitiveness, stability, and the effectiveness of capital regulation.

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developments point at the need for an international perspective on regulation and supervision.

The focus in this paper will be on the responsibilities and powers of individual countries vis-à-vis those at the European level (EU and ECB).[3] In this context, we raise various questions, in particular relating to financial stability and the effectiveness and efficiency of regulatory and supervisory arrangements. Our primary focus is on the lender-of-last-resort (LOLR) and the related crisis management structure. However, we will indicate that this role, and the allocation of tasks between ECB and national central banks, cannot be assessed independently of supervisory arrangements in the EU in general. Both supervisory and LOLR arrangements are fragmented with primary responsibilities at the national level. Key political concerns related to national sovereignty and excessive concentration of authority at the EU and ECB levels could explain this decentralized structure. We will critically evaluate these arrangements. Our primary conclusion is that centralization of the LOLR function is important, and actually could help facilitate convergence, and ultimately, centralization of prudential supervisory practices. However, considering the fiscal responsibilities which are at the member state level, crisis management and the financial risks it entails will continue to put national authorities at the center. Burden sharing arrangements for cross-border operating banks should be considered.

The organization of the paper is as follows. Section 11.2 provides a characterization of (prudential) supervisory practices in the EU and notes the limited role of the ECB in this area. In Section 11.3, the focus shifts to the LOLR arrangements. We discuss here three aspects: the sources of fragility and systemic risks, the allocation of LOLR responsibilities between ECB and national central banks, and the lack of fiscal authority at the EU level. The latter may well complicate the allocation of LOLR and crisis management responsibilities because of the potential budgetary consequences of LOLR support and crisis resolution. Section 11.4 asks the question whether current arrangements are sustainable and, particularly, what distortions the present decentralized nature of arrangements may induce. In Section 11.5, we discuss which improvements could be made and 11. 6 concludes.

11.2 A Characterization of ECB and EU Arrangements

The European regulatory architecture is best described as fragmented with primary responsibilities at the level of the individual nation states. Under the principles of only minimal essential harmonization, home country control and mutual recognition of supervision embedded in the Second European Banking Directive, prudential supervision remains solidly with the home country (i.e., the member state in which the financial institution has been licensed).

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[3]This paper expands the earlier analysis in Boot (2006).

At the national level, a diverse assortment of institutional arrangements continues to thrive. If there is a trend, it seems that a domestically centered cross-sector integration of supervision is underway, with the extreme being the fully integrated FSA supervisory model in the UK. Simultaneously, a 'twin peaks' type structure – separating prudential supervision and conduct of business supervision – is becoming more popular. Nevertheless, for now, a wide diversity of arrangements continues to exist. This is further highlighted by the fact that in some countries the central bank is the prudential supervisor, while in others – like in the UK – prudential supervision is the task of an independent supervisory agency. The organizational model of supervision will not be the focus of the current paper, but, as recent events relating to the credit crisis have highlighted, are not unimportant.[4]

At the European level, several arrangements are in place to facilitate the supervision of cross-border activities of financial institutions. For example, the ECB has a limited coordinating role for LOLR facilities that are instead the province of national central banks.[5] Also various multilateral arrangements exist. Within the ECB, the Banking Supervisory Committee (BSC) brings together banking supervisors of all EU countries to discuss financial stability issues, provide macro-prudential oversight, and assess EU and national banking legislation.

At the EU level, several cooperative arrangements are in place. Until 2004 these arrangements included the Banking Advisory Committee (BAC) that advises the EU on policy matters related to bank legislation, and the Insurance Committee. In 2004, the European Parliament and the EU Council adopted a 'Lamfalussy type' framework (Committee of Wise Men 2001) based on work by the Economic and Financial Committee (EFC) – a committee advising the Ecofin Council (EFC 2002). This framework, which initially was designed for streamlining the regulatory and supervisory practices for the European securities markets, was subsequently applied to the financial sector at large. It introduces a structure for financial sector rule making at the European level.[6] In this restructuring and further formalization of the EU regulatory and supervisory framework, the existing sectoral Bank Advisory Committee and Insurance Committee both were given important roles.[7]

These sectoral committees (banking, insurance, and also securities), and a separate committee addressing financial conglomerate issues, are essentially put under

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[4]Interesting recent researchers also asks the question whether responsibilities for deposit insurance and the LOLR role should be in one hand or allocated to separate agencies. Kahn and Santos (2005) point out the importance of incentives for forbearance in this tradeoff. See also Di Giorgio and Di Noia (2009: Chapter 10, this volume) who advocate a 4-peak approach of regulation and supervision by 'objectives'.

[5]The ECB has primarily a *facilitating* role for systemic issues. For example, its statute points explicitly at its role in promoting the smooth functioning of the payment system (Art. 3.1. and 22 of the Statute; see also Art 105(2) of the Maastricht Treaty).

[6]The Lamfalussy approach encompasses a 4-level regulatory approach: level 1 involves broad framework principles for legislation; level 2 detailed rules; level 3 aims at cooperation between national regulators, and level 4 addresses enforcement issues (see also Lannoo and Casey 2005).

[7]These committees have a role at level 2 in the Lamfalussy type four layer framework (see EFC 2002). Also the existing supervisory oriented Groupe de Contact has a role to play.

control of the finance ministers and kept at a distance from the ECB and national central banks. Non-supervisory national central banks and the ECB have observer status but no voting rights. This effectively gives the ECB no formal role in (micro) prudential supervision.[8]

Some convergence and increasing coordination in supervisory practices is observed. A recent development is the EU Directive on Financial Conglomerates that allocates group-wide supervisory responsibilities to a single coordinator located in the group's home country. The hope is that the Lamfalussy approach at the EU level will lead to a further streamlining and coordination in supervisory and legislative practices and, ultimately, convergence between member states.[9] A similar development comes from the November 2008 discussions of the G-20 in Washington that among other things put forward the notion of 'colleges of supervisors' aimed at improving the monitoring of international banking groups.

11.3 Rationale for Lender of Last Resort and EU Arrangements

Bagehot's (1873) classical motivation for the LOLR was that it would lend freely to solvent but illiquid banks against good collateral at a premium price (Rochet 2004). The reality of LOLR support in various countries in the world has been different in that net infusions of cash in troubled institutions have been quite common, in part because distinguishing between liquidity and solvency problems might be difficult.

This potential confusion and uncertainty about the true nature of illiquidity problems may have worsened over time. In particular, the proliferation of financial markets and the ways in which risks can be shifted through the system undoubtedly complicate the assessment of the fragility of the financial system. For our analysis, an understanding of the sources of fragility and their relative importance is critical because it impacts on the role played by the LOLR facility and the way this role might have changed over time. In turn, the assessment of the role of LOLR support in today's financial sector is of preeminent importance for evaluating the present EU

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[8]The ECB has been careful in defining its role in prudential supervision. While it downplays potential conflicts of interest that may arise in combining central banking and prudential supervision (ECB 2001), suggesting with that possibly a bigger role for itself, it simultaneously expresses that it is not aiming at a bigger role in supervision but only attempts to broaden cooperation (Duisenberg 2003). The considerable expansion of lending facilities that were adopted in the wake of the 2007 credit crisis has imposed more risk on central banks and brought them closer to an involvement in prudential supervision. This development has somewhat stretched the traditional (and well accepted) notion that central banks should only be involved in liquidity support and not exposed to solvency risk (Bagehot 1873).

[9]Other arrangements are in place as well. Various bilateral arrangements, such as Memoranda of Understanding (MoUs) between national supervisors, help in coordinating cross-border supervision. They further clarify, on a voluntary basis, the cooperation mandated in EU directives regarding information exchange, mutual assistance, establishment procedures and on-site examinations.

arrangements when it comes to LOLR support and crisis management in general.[10] In Section 11.3.1, we further elaborate on this.

Another issue is how the LOLR facility is organized in the Euro countries. The general principle is one of delegation (i.e., subsidiarity) with the LOLR having been assigned to national central banks. Understanding these arrangements is critical for an assessment of the effectiveness of crisis management in the Euro area. The allocation of responsibilities between national central banks and ECB with respect to LOLR support needs to be evaluated in the broader context of EU supervisory arrangements. In Section 11.3.2, we discuss the present allocation of responsibilities. A brief evaluation is contained in Section 11.3.3.[11]

11.3.1 Role of LOLR

In the classical interpretation, a financial crisis is directly linked to the notion of bank runs. In a fractional reserve system with long term illiquid loans financed by (liquid) demandable deposits, runs may come about due to a coordination failure among depositors (Diamond and Dybvig 1983). Even an adequately capitalized bank could be subjected to a run if the deadweight liquidation costs of assets are substantial. Regulatory interference via LOLR support, deposit insurance, and/or suspension of convertibility could all help and even fix (in this simple setting) the inefficiency. The externalities that a bank failure could create possibly provide a rationale for regulatory interference. These externalities could be directly related to the bank that is subjected to a potential run but could also be motivated by potential contagion effects. Many have generalized this simple setting by allowing for asymmetric information and incomplete contracts; see Bhattacharya et al. (1998, 2004), Goodhart et al. (1998), and Rochet (2004) for a review. The general conclusion is that fragility is real, and information based runs are plausible.

For the purpose of this paper, two observations are important; both are related to the proliferation of financial markets. First, access to financial markets weakens the liquidity insurance feature of demand deposit contracts. To see this point, note that the root cause of the fragility in the Diamond and Dybvig (1983) world is the underlying demand deposit contract. The rationale for this contract is the desire for liquidity insurance on the part of risk averse depositors with uncertainty about future liquidity needs. However, as shown by Von Thadden (1999), the very presence of financial markets allows depositors to withdraw early and invest in the financial market which puts a limit on the degree of liquidity insurance. This is related to the earlier work of Jacklin (1987) who shows that deposit contracts have beneficial liquidity insurance features provided that restricted trading of deposit contracts can

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[10]We will focus on crisis management in the context of systemic concerns. In this case, there is a direct link between the LOLR and crisis management.

[11]See Freixas and Parigi (2008) for an overview of the LOLR function.

be enforced.[12] In any case, these arguments suggest that the proliferation of financial markets weakens that liquidity provision rationale of deposits, which may help explain a lesser importance of deposits for banks in the future.[13]

A second observation is that the proliferation of financial markets would at first blush suggest that the LOLR role in providing liquidity loses importance. What we mean is that in Bagehot tradition one could ask the question whether the LOLR has a role to play in providing liquidity to liquidity constrained yet solvent institutions when capital markets and interbank markets are well developed. Goodfriend and King (1988) argue that solvent institutions then cannot be illiquid since informed parties in the repo and interbank market would step in. In this spirit, the former ECB board member Tommaso Padoa-Schioppa suggested that the classical bank run may only happen in textbooks since the "width and depth of today's interbank market is such that other institutions would probably replace those which withdraw their funds" (as quoted in Rochet and Vives 2004). As the events surrounding the credit crisis of 2007–2008 have highlighted, however, liquidity cannot be taken for granted. The LOLR role of central banks turned out to be quite important.

Thus, while the proliferation of financial markets could weaken the need for an LOLR to provide liquidity support, it has definitely not made LOLR activities redundant. This is particularly so when information asymmetries are considered.[14] More specifically, an extensive literature on aggregate shocks has moved away from the pure 'sunspot' bank run equilibriums, as in Diamond and Dybvig (1983), focusing instead on fundamentals. This literature builds on the empirical evidence in Gorton (1988) showing that banking crises – prior to the creation of the Federal Reserve – were predicted by leading economic indicators. Rochet and Vives (2004) show that a coordination failure in the interbank market may occur particularly when fundamentals are low and that this may lead to a need for liquidity support by the LOLR for a solvent institution.[15]

Overall the preceding discussion warrants the conclusion that the proliferation of financial markets (including interbank markets) has improved the risk sharing opportunities between banks, and possibly has reduced sunspot type bank run

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[12]Actually, Jacklin (1987) shows that with the 'extreme' Diamond-Dybvig preferences, a dividend-paying equity contract can achieve the same allocations without the possibility of bank runs. However, for basically all other preferences, a demand deposit contract does better provided that trading opportunities are limited.

[13]Paradoxically, the 2007 credit crisis has put deposits at center stage. The protection provided by deposit insurance, has made deposits arguably the only stable source of funding. The explicit (and implicit) government support via deposits appears indispensable.

[14]Caballero and Krishnamurthy (2007) emphasize the role of LOLR when agents cannot assess the probabilities of worst case events.

[15]Another line of research points at asset price bubbles as a potential source or cause of fragility and contagion (Allen and Gale 2000). Allen (2005) and De Bandt and Hartmann (2002) provide surveys on contagion. See also work by Lorenzoni (2008) on credit booms. Recent work by Acharya and Yorulmazer (2007) focuses on the steep drop in asset prices that collective massive liquidity needs may cause (cash-in the market pricing).

problems on individual institutions.[16] But these very same interbank linkages may well have increased systemic risk, i.e. the probability of propagation of liquidity and solvency problems to the financial system as a whole. It is therefore clearly wrong to trivialize the need for a LOLR.

Actually, a more market-centered view on systematic risks has gained ground at the expense of a more institutionally focused view of systematic risk. The propagation mechanisms for systemic crises have become substantially more complicated and possibly far reaching as well. For example, the revolution in structured finance and securitization may introduce all kinds of systemic issues. The risks in the markets for securitized assets are ill understood. Once big defaults would occur in this market a meltdown is not excluded, and systemic risks are possibly acute.[17] With the credit crisis of 2007 this scenario has effectively materialized (Brunnermeier 2008).[18]

11.3.2 LOLR Responsibilities in the Euro Area

The ECB has primary stability responsibilities when it comes to the payment system. But the ECB does not have an explicit task of preserving the stability of the financial system in general. This is left to the national central banks that have also the LOLR role. However, in light of the global consequences of the manifestation of systemic risks, the practical allocation of role in the Eurosystem could deviate considerably from its formal assignment.

The practical allocation problem of tasks and responsibilities, as it relates to the LOLR in the Euro countries, became clear in 1999. At the presentation of the 1998 annual report (October 26, 1999), the then ECB President Duisenberg commented that on the part of the ECB "there is a clearly articulated capability and willingness to act if really necessary" (Duisenberg, as reported in Vives (2001)). He added on the procedural issue that "The main guiding principle within the Eurosystem with reference to the provision of emergency liquidity to individual financial institutions is that the competent national central bank would be responsible for providing such assistance to those institutions operating within its jurisdiction." For a general liquidity crisis in the payment system Duisenberg indicated that a direct involvement

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[16]Whether total insolvency risk of individual institutions has come down depends on the actual risk taking and capitalization. Evidence in De Nicoló and Tieman (2005) suggests that the insolvency risk of European institutions has more or less remained the same over the last 15 years despite increases in capital over time and a wider geographic range of operations.

[17]Problems include the mighty role of credit rating agencies, the dependence on monoliners, etc.; see Boot et al. (2006) for an analysis of the growing importance of credit rating agencies for the functioning of financial markets. Keys et al. (2008) provide empirical evidence that a portfolio of securitized assets is 20% more likely to default pointing at substantial moral hazard in securitization.

[18]See Barrell and Davis (2008) for an overview of the subprime (credit) crisis.

of the ECB could be expected.[19] The latter is directly in line with the mandate of the ECB that stipulates its role in the smooth functioning of the payment system (Article 105(2) of the Maastricht Treaty).[20]

This interpretation of the LOLR role of the ECB and the national central banks is in line with the rather flexible wording of the role of the ECB in the Treaty. The LOLR function is primarily a national responsibility, and the provision of liquidity support is under the responsibility and liability of national central banks. Nevertheless, the ECB could also engage in liquidity support, though it uses stricter collateral requirements. Moreover, the scope of the LOLR involvement at the ECB level is restrained by the lack of fiscal authority at the European level.

11.3.3 Evaluation of LOLR Arrangements

The primary role of national central banks in providing LOLR activities and the (formally) secondary role of the ECB is somewhat curious. Systemic concerns at the EU level, the increasing integration of the EU economies and the introduction of the common currency would seem to dictate that LOLR be assigned to the ECB. However, one may argue that national central banks are often better able to assess the immediate liquidity needs of local financial institutions. This may well be valid but only addresses the practical operational organization of the LOLR role. It does not explain why the *responsibility* of LOLR support is left to national central banks.

The right way of looking at this is that political considerations have led to these arrangements. In particular, the Maastricht Treaty may have tried to prevent the emergence of an overly powerful ECB at the expense of national central banks. We do not think that there is a much deeper rationale for this, and we are reluctant to put forward more sinister arguments. For example, one could argue that preserving these powers locally serves the desire of national authorities to have better control over their home country financial institutions via the national central bank. This may well be the case. Such local power could help to defend these 'national interests' when a crisis occurs. This would not be without cost since it would cast doubt on the desired independence of central banks. Nevertheless, we would more readily subscribe to the idea that a desire to protect national sovereignty has prevented national authorities from agreeing to more powerful EU and Euro area institutions.

Also the lack of fiscal powers at the European level is in part, or mostly, motivated by the same balance between national sovereignty and effective EU decision making. This lack of fiscal authority has made it more complicated for the ECB to assume broader powers in the LOLR role. That is, liquidity support is often provided

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[19]We are not distinguishing in the text between the European System of Central Banks (ESCB), which is the Eurosystem that Duisenberg is referring to, and the ECB. This simplification is not totally correct because the relevant decision-making body at the center is the ESCB, and not the ECB as a stand-alone organization.

[20]See also Goodhart (2000), Freixas (2003) and Schinasi and Teixeira (2006).

in circumstances where losses may occur; the question then comes up of who is responsible for these losses.

To complicate this picture even further, the decentralized and fragmented nature of EU-banking supervision, with primary responsibilities at the level of individual member states, and only a coordinating and facilitating role at the EU level, in all likelihood further reduces the power of the ECB vis-à-vis the national central banks. National central banks in practice will be a natural partner to the primary local supervisory agencies. Indeed, in many countries the national central bank is also the local supervisory agency. Important in this respect are also the national – home-country – linked deposit insurance arrangements. Again, national authorities are in charge and the national treasury incurs the (contingent) financial obligations.[21]

These contingent financial obligations, combined with the absence of fiscal powers at the EU level, are a strong obstacle for the further centralization of both supervision at the EU level and LOLR responsibilities in the ECB. The well-known motto 'who foots the bill decides' underscores the existing decentralized focus. We see no reason why this would be different here.

11.4 Sustainability of Current Arrangements

The resulting patchwork of national supervision and Europe-wide coordination has so far held up reasonably well. The key questions are how this system will work in crisis situations and to what extent it will accomplish the efficiency objectives of regulation and supervision. The 2007–08 credit crisis might become an interesting learning experience. During crises, important concerns are raised about the adequacy of information sharing and cooperation between the various supervisors, such as the European Central Bank and the national central banks. In particular, in such situations the question about who will be in charge might become very urgent. Potential tensions between supervisory agencies, national central banks, and the ECB become evident.

Policy makers are aware of these issues. For example, the new Directive on Financial Conglomerates gives the home country supervisor the single coordinating responsibility in all member states for group-wide supervision of the financial conglomerate. Issues of financial stability however remain the responsibility of the host countries.

The question is how to coordinate these potentially diverse interests, especially during crises. The core message of the second Brouwer Report (EFC 2001) was that there was no coordination mechanism in place in case of such crisis. For that reason, a Memorandum of Understanding between virtually all European national central banks and supervisors was formulated to specify principles and procedures

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[21] The 2007 credit crisis has put some strain on deposit insurance arrangements. Some competition appears between the various national arrangements. Also, questions are raised about the willingness of home country tax payers to bail-out foreign depositors of domestic banks.

for cooperation in crisis management situations (ECB 2003). The fiscal side, in particular the budgetary obligations imposed on member states in case of bail-outs, also requires the approval of national finance ministries that bear the potential financial obligations. In a follow-up Memorandum of Understanding these finance ministries were also included (ECB 2005).

Several questions can be raised about the efficiency of the arrangements in general. The decentralized structure may give rise to potential conflicts of interest between the national authorities and 'outsiders'. For example, national authorities might be prone to TBTF (too-big-to-fail) rescues.[22] Alternatively, national authorities may not sufficiently appreciate (that is, internalize) the disrupting consequences that a domestic bank failure could have in other countries. Efficiency might be hampered in other ways as well. For example, the national scope of supervision may help to encourage the emergence of 'national champions'.[23] More fundamentally, the decentralized structure could give rise to a level playing field and regulatory arbitrage issues.

Casual observation and reasoning would seem to suggest that integration and further coordination (if not centralization of authority) of both regulation and supervision might yield substantial efficiency gains, not only for supervisory authorities but also more importantly for the supervised financial institutions. In the EU, there are currently more than 35 supervisory authorities responsible for prudential supervision; a typical large financial institution might have to report to more than 20 supervisors (Pearson 2003).

Yet, practical considerations suggest that a full integration of all regulatory and supervisory functions at the European level may not be feasible, if at all desirable. While it is clear that regulatory and supervisory integration needs to keep pace with the development of the size and the cross-border footprint of the covered banks, the heterogeneity of underlying supervisory systems and the implied costs of integration should not be underestimated. An interesting illustration is the evidence reported by Barth et al. (2002) on the variation across the European Union countries in supervisory institutions and practices. Their conclusion is that supervisory arrangements within the EU are as diverse as in the rest of the world. Illustrating this point further, the EU countries are current or former standard bearers of all major legal origins. A vast literature now documents how legal origin matters for the shape and functioning of the financial system (La Porta et al 1998).[24]

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[22] One could replace too-big-to-fail with too-big-to-close to emphasize that replacing management, wiping out equity holders, etc. could still be done to mitigate moral hazard.

[23] Such institutions would likely be TBTF (for sure from the national perspective) but possibly also have 'control' over local supervisors. Fratianni (2008) puts this in the context of a principal–agent problem. The agent (the bank) may have control over the principal (the supervisor). This would undermine the effectiveness of the supervisor.

[24] Bank regulation and supervisory practices differ considerably also between civil and common law countries, with a more flexible and responsive approach in the latter.

While commonsense suggests that ultimately a more integrated regulatory and supervisory structure is desirable,[25] the way we would get there is far from clear. The Lamfalussy approach may bring us in the right direction, but it does not provide for authority at the pan-European level. Indeed, practical considerations, including political concerns, dictate for now a fragmented structure on which a coordination layer needs to be superimposed; the lead regulator model is one example of that.[26]

However, the struggle for an efficient pan-European coordination and integration of regulation and supervision is more then just a practical issue that will be sorted out over time. Two things stand out. The first is that the scope of regulation and supervision needs to be contained. Effective supervision and regulation – given the mushrooming cross-sector and cross-border footprint – requires a better demarcation of safety and systemic concerns.[27] The cross-sector integration of financial institutions and the ever more seamless integration of financial markets and institutions have enormously broadened the scope of regulation and the potential sources of systemic risk.

This also relates to the issue of firewalls. For example, does a subsidiary structure reduce systemic concerns? We do not think that an answer is readily available. More generally, what type of constraints, if any, should be put on the corporate structure of financial institutions? While we tend to think of further deregulation in the financial sector possibly leading to even bigger and broader financial institutions, it is far from clear what the future will bring. In any case, changes in the industrial structure of the financial sector are of paramount importance for the design and effectiveness of regulation and supervision.[28] If these issues cannot be satisfactorily addressed, we are not very optimistic about the possibilities for effective and efficient pan-European regulation even in the long run.

The second issue is that very little is known about the efficiency and effectiveness of various regulatory and supervisory structures. As Barth et al. (2003) put it, "there is very little empirical evidence on how, or indeed whether, the structure, scope or independence of bank supervision affects the banking industry." Their own research suggests that the effect is at best marginal, but measurement problems are paramount. They conclude from this that we may thus choose to focus only on the

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[25] Actually, some theoretical work points at the potential value of competition between regulators; see also Kane (1988).

[26] An important distinction needs to be made between business conduct regulation and prudential regulation. We have focused on the latter. The former is closer to the functioning of financial markets and lends itself more readily to centralization at the European level. In the context of these financial markets, the 'real' Lamfalussy report (Committee of Wise Men 2001) does not directly propose authority at the EU level but it states that if its proposed approach is not successful the creation of a single EU regulatory authority should be considered.

[27] The earlier discussion on the precise source and propagation mechanism as it relates to systemic risk is actually pointing at the same issue.

[28] Earlier we referred to the concentration in the credit rating business and the importance of ratings for the markets for structured finance (securitization). It is interesting to ask what impact a meltdown of one of the main credit rating agencies would have on these markets and what this in turn would imply for participants in these markets.

effect that regulation has on systemic issues. But also here little is known. What this means is that we need much more work that tries to pinpoint the costs and benefits of different regulatory and supervisory arrangements. Obviously, in the context of the widely different national supervisory arrangements the lack of evidence does not really help in evolving to a harmonized "superior" model.

11.5 The Way Ahead

It is clear that further improving coordination and cooperation between supervisory bodies makes sense. The EFC (2002) proposals (based on the Lamfalussy approach) and the recent crisis management Memorandum of Understandings (MoUs) (ECB 2003, 2005) are steps in that direction. Further improvements can be made by harmonizing accounting standards and improving procedures. But this is not enough. Ultimately more is needed than just good intentions and procedures.[29] The missing command structure in EU arrangements (the various MoUs and the Lamfalussy framework), as well as that with respect to LOLR facilities needs to be addressed.

As stated already, an EU-wide regulatory and supervisory authority cannot be expected anytime soon. The LOLR function is directly related to crisis management, and in those circumstances a clear line of control is most important. But accomplishing improvements and particularly changing powers between national authorities and the ECB at the center is, as stated, a political issue. So far, whatever improvements have been made were predicated by crises. Indeed, crises create urgency. The Bank of Credit and Commerce International crisis was particularly important, because this crisis led to willingness to address pan-European coordination failures in supervision. It is then immediately clear that – unless a major crisis would come about – there is no urgency for change. Matters might be even worse. With no crises in sight, complacency could set in. Following this view, the credit crisis that started in 2007 may offer a window of opportunity.

Our own assessment is that current initiatives, including the lead supervisor designation for banking groups, are improvements in the right direction. The Lamfalussy framework we see favorably as well. It will in our view indeed improve the efficiency of the legislative and rule-making process, and encourage convergence in regulatory and supervisory practices. Also, the less formalized cooperative initiatives like the Banking Supervisory Committee within the ECB and the widely supported BIS initiatives clearly put us on the path to further improvements and harmonization. These initiatives facilitate a continuous process for improving the supervisory process without having to make highly political and controversial choices. This process we judge very favorably. Nevertheless, a fear for complacency

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[29]Cooperation between a system of dispersed (semi-autonomous) central banks and dispersed and autonomous prudential supervisors is very complicated. Decentralized systemic responsibilities combined with decentralized prudential responsibilities with each involving different bodies offer multiple coordination problems.

is in order. We need to continue to put improvements in supervisory practices and cooperation among supervisors high on the agenda and be constantly critical about the speed, efficiency, and effectiveness of the process. To speak with Lamfalussy, if the process slows down, more heavy-handed interventions should be considered.[30]

We are much less convinced that the same gradual process should apply to the LOLR structure. The LOLR role is intricately linked to crisis management, and that does not lend itself to a gradual approach or 'soft' agreements on cooperation. While MoUs (ECB 2003, 2005) help in overcoming some of the *lacunae* identified in the Brouwer crisis management report (EFC 2001), we do not think this is a sufficient response. This is not a criticism of MoUs though. To the contrary, we fully endorse them. The 2005 MoU that addresses cooperation and information sharing (including views and assessments) between supervisors, central banks and finance ministries is an important document. What it does not do (and does not intend to do) is to bring the LOLR responsibility to a more central level. To the contrary, it remains with national central banks which possibly do not, and often cannot, sufficiently take into account the pan-European systemic problems that may have arisen in a crisis situation. This national authority then diffuses the command structure, while the LOLR should be at the heart of crisis management.[31]

From our conversation with some national central bankers in the Euro-area emerges a strong feeling of collective responsibility. The suggestion is that this will effectively guarantee a central command structure at the ECB level, because any serious problem with potential Euro-area repercussions would immediately be brought to the ECB or, more correctly, the European system of central banks (ESCB). While one should be enthusiastic about the trust in each other and collective feeling of responsibility that has been created at the ECB level, one has to be careful with trusting such an informal approach when it comes to crisis management situations. Those situations are rare, involve novel occurrences that are rather unpredictable, and can have very severe consequences for individual member states. In those situations, national interests may collide with Euro-area wide responsibilities, and mutual trust might not be sufficient for aligning national interests with

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[30]These more positive comments on the developments in supervisory arrangements in the EU do not imply that we fully endorse the current state of affairs. One issue that deserves much more attention is how to address too-big-to-fail (TBTF) concerns. US practice with clear-cut timely interventions could be particularly helpful in EU banking markets considering the massive domestic consolidation (Eisenbeis and Kaufman 2005).

[31]In our view the central role given to national central banks is really an artifact of the past when the then rather segmented markets allowed the local central bank to resolve a bank crisis by 'forcing' the surviving institutions to take care of the problem. This no longer works, because local banks in the increasingly open banking market no longer feel the same responsibility for resolving problems in their home market. A case in point is the recent failure of a very small Dutch bank with only local Dutch operations (Van Der Hoop). Despite the potential reputation damage to the local financial sector, the (many times bigger) surviving institutions were not willing to step in. A further complicating factor is that due to the substantial consolidation in domestic markets, a typical failure might be very difficult to handle for the surviving local institutions.

Euro-area interests. For this very reason, a clear command structure at the Euro-level is important. This would imply that the ECB should get primary responsibility over the LLOR role.[32] In the recent credit crisis, the ECB has taken the lead. This might have been due to the unique characteristics of the credit crisis, with problems emerging very much at the center of the financial system and affecting all member states in a somewhat similar fashion.

A more formal centralization might not be feasible without other changes in EU arrangements. More specifically, in the current institutional setting, national central banks cannot extend emergency lending without the permission from all euro-system member countries because emergency lending implies credit risk and has implications for seigniorage sharing. The complications in this process effectively mean that the domestic ministry of finance (treasury department) essentially is indispensable for emergency lending.[33] This brings in a very nationally oriented focus. It appears that only introducing some budgetary (fiscal) powers at the EU level and/or designing cross-country burden sharing arrangements could facilitate more centralized decision making.

The feasibility of introducing budgetary (fiscal) powers seems very complicated and appears to directly interfere with the autonomy of member states vis a vis Brussels. Burden sharing arrangements might be an easier route to go, albeit complicated as well. As Goodhart and Schoenmaker (2009) argue, burden sharing arrangements should preferably be set-up ex-ante. Ex-post (after a crisis emerges), time is in short supply and potential conflicts of interest between countries might be difficult to overcome, particularly when a large institution that operates in many member states is involved.[34] Ultimately, burden sharing arrangements seem indispensable for accomplishing a less fragmented supervisory structure.

Only over time can an effective centralized structure become reality. In our view, it is important and absolutely necessary that this is dealt with; yet moving forward pragmatically seems most important. Creating a new supra-supervisor would not be without problems. Following our arguments in Section 11.4, a more gradual

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[32]Let us emphasize that trust and feelings of collective responsibility between national central banks and ECB even then remain important. Much of the information will come from the national level, and trust is needed to facilitate an optimal flow of information. This implies in the broader context of the 2003 and 2005 MoUs as well. Without trust and collective feelings of responsibility one cannot expect the good intentions with respect to information sharing in those MoUs to be of much value.

[33]See Schinasi and Teixera (2006). They highlight that central banks can indeed go further than offering just liquidity support (i.e. accept collateral below the standards, and in doing so incur credit risk), but this requires backing by domestic treasuries.

[34]Consider for example the demise of Fortis in October 2008. It involved a bank operating in three countries (Netherlands, Belgium and Luxembourg). In emergency settings these countries were able to agree on a resolution; however several frictions remained despite the fact that only three countries were involved. In particular, action could only be taken very late after it had become abundantly clear that there was an insurmountable problem with the bank. Timely intervention without having clear burden sharing arrangements in place appear very difficult.

approach is probably more realistic and for now continues to grant important supervisory powers to local bodies.[35]

For the LOLR role, in light of the pan-European nature of systemic issues, a central authority is however desirable. National central banks could still continue to play an important operational role in LOLR activities. Authority at the ECB level will give a powerful boost to information sharing, and this could distinctly improve the efficiency and effectiveness of the LOLR operations.

11.6 Concluding Thoughts

The centralization of LOLR and crisis management responsibilities is an important issue. We favor a more explicit and formal responsibility of the ECB over the LOLR function; national central banks would then get a more operational role.[36] As with the centralization of supervisory and regulatory responsibilities in Europe, the political feasibility of a centralized LOLR responsibility remains an issue to be dealt with. We alluded to this earlier.[37] This is also related to the issue of fiscal authority as discussed in Section 11.3.3. Burden sharing arrangements are needed. The EU Treaty, however, does allow for a heavier role of the ECB in LOLR operations,[38] so the true issue might be to get agreement within the decision-making body at the ECB (the European System of Central Banks, ESCB).

The recent credit crisis has given momentum to a more central role of the ECB. An important question is whether a more centralized LOLR responsibility with the ECB has any downside. Would this, for example, compromise the independence of the ECB? It could be that political pressure (also via Ecofin) to provide liquidity support in the case of a bank crisis might become more intense. One could argue that this type of pressure has always been present in central banking, and is actually much more intense for national central banks. A related concern is that the heavier LOLR role could intensify the potential conflict between financial stability and monetary policy objectives within the ECB. It is hard to assess the importance of this argument. The current arrangement already has this potential conflict built in (and one could argue about the importance of this conflict between objectives; see Issing 2003).

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[35]This does not mean that there will not be a role for local supervisors in the future. Local supervisors will always play a role because of the proximity to local institutions, which could offer information advantages.

[36]This recommendation has also been put forward by Lannoo (2002) and Vives (2001).

[37]National governments could find LOLR control at the national central banks convenient in the case of a crisis, particularly when financial difficulties threaten large domestic financial institution. This already suggests that national control could worsen TBTF incentives and possibly also compromise the role of national central banks in crisis management (i.e. they would be 'forced' in providing LOLR support also in the case of solvency problems).

[38]The ECB statute also allows for a more dominant role of the ECB with respect to the LOLR function.

On the positive side, apart from the benefits related to a more central command structure (see Section 11.5), we see several other potential advantages. One is that it could lead to a more prudent use of the LOLR facility (see Vives 2001, Lannoo 2002). Another potential benefit is that it may create extra urgency for communication between the ECB on one hand and national central banks and supervisory agencies on the other hand. National authorities could be more willing to share information with the ECB (since only then can support be expected). Thus, self-interest may facilitate a better exchange of information.

Going forward, a more central command structure for LOLR with the ECB might be a catalyst for further reforms in pan-European supervision. We could envision different paths of future developments. One is that a stronger position of the ECB could induce the EU (and Ecofin) to strengthen the role of the EU in supervision to "counter" the enhanced power of the ECB. This could be positive if it is effective in reducing the fragmentation in supervision, and if it would speed up convergence and enhance coordination. In that sense it could add urgency to the Lamfalussy process. However, the systemic nature of the 2007 credit crisis has given some momentum to a heavier role of the ECB in supervision, thus actually concentrating LOLR and supervision powers in the ECB. Whether this is optimal is unclear. Potential conflicts of interest may exist, and concerns about political interference might become even more acute.

Whatever path is chosen, the integration of financial supervision and regulation will be far from easy. Resolving the fundamental issues related to the scope of regulation, and, to a lesser extent, our understanding about the costs and benefits of different arrangements would help. Being pragmatic is important in this debate; first-best-choices are not in sight. The 2007 credit crisis may offer some valuable lessons for guiding us in this process.

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Chapter 12
The Evolutionary Chain of International Financial Centers

Michele Fratianni

Abstract   Financial products are unstandardized and subject to a great deal of uncertainty. They tend to concentrate geographically because of the reduction in information costs resulting from close contacts. Concentration leads to economies of scale and encourages external economies. Great financial centers enjoy a high degree of persistence but are not immune from decline and eventual demise. Yet, their achievements are passed along in an evolutionary manner. In revisiting the historical record of seven international financial centers—Florence, Venice, Genoa, Antwerp, Amsterdam, London and New York—the paper finds evidence of a long evolutionary chain of banking and finance. As to the present and the future, the forces of integration are likely to give an additional boost to the persistence of international financial centers.

12.1 Introduction

The most important insights on financial centers remain those of Charles P. Kindleberger (1974), who wrote his classic study more than thirty years ago. In that essay, he advanced the thesis that financial centers perform medium-of-exchange and store-of-value functions similar to money. The community gains in dealing with a single center instead of dealing with many locations; and these gains are proportional to the shift from N(N-1)/2 to (N-1), where N is the number of locations. The reasons why a center emerges are the same reasons why a currency emerges. People use money rather than barter because they economize on information and transaction costs. Money would not exist in a frictionless world, one devoid of transaction and information costs. Similarly, people execute financial transactions in a financial

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center in preference to executing financial transactions over a wide geographical domain because they save on transaction and information costs.

Financial products are unstandardized: They differ in terms of promised yield, expected yield, market risk, credit risk, maturity, liquidity, currency of denomination, and country of issue. Furthermore, the variations in the price of these products are largely explained by news. Unstandardized output facing a great deal of uncertainty tends to concentrate geographically because of the reduction in information costs resulting from face-to-face contacts. Concentration, in turn, leads to economies of scale. Concentration tends to occur in places, usually cities with large ports that are hubs of commerce, both domestic and international. Commerce pulls banking and finance, which in turn attract the customers and corporate headquarters. External economies come along as hubs create a host of services that are supportive of banking and finance: accountants, computer programmers, information technology specialists, and lawyers, to mention a few. On the other hand, the lower cost of information in local markets for local products, differences in time zone, and congestion lead in the opposite direction. A tug of war ensues between centralization and decentralization; see Grote (2009: Chapter 13, this volume) for a more extensive discussion of the role of information in financial centers.

Kindleberger identifies three attributes of great financial centers: a banking tradition, a central bank, and a strong currency. Financial centers and currencies tend to organize themselves in hierarchical order and Kindleberger (1983) predicted that the creation of a European currency and a European central bank would boost the development of a European money and capital market, which is right on the mark.

The purpose of this essay is to revisit the historical record of international financial centers but with a much longer time horizon than used by Kindleberger and, more recently, by Youssef Cassis (2006), who focuses on the 19th and 20th centuries. A long-time horizon has several advantages. First, given the degree of persistence of centers, examination of long periods of time gives us a deeper understanding of the forces that lead great financial centers, not only to rise but also to decline. Second, a mixture of evolution and "revolutions" has characterized the history of banking and finance (Fratianni and Spinelli 2006). Evolutions evoke a smooth rate of change, revolutions drastic changes. A long sweep of history is best suited to sort out exceptional sharp changes from smooth evolutionary ones. Finally, while banking concentration tends to coincide with finance concentration, the mix of the two products is not constant over time. Banking, in the extended sense of encompassing central banking, plays a critical role in the formation of financial centers, but the importance of finance rises over time.

The adopted strategy of this paper is to revisit the record of seven great international financial centers – Florence, Venice, Genoa, Antwerp, Amsterdam, London, and New York – so as to identify attributes of success, possible reasons for declines, and extent to which their achievements have been passed along in the evolutionary chain of finance. The sample is small but fits the purpose of looking at best practices rather than their distribution. The structure of the paper is as follows. I begin with the link between financial deepening and financial centers (Section 12.2). I then examine the record of the seven centers (Section 12.3), followed by an evaluation

and implications for the future (Section 12.4). I conclude with a brief discussion on the relevance of the paper for the mix of centralized and decentralized markets in a global financial environment (Section 12.5).

12.2 Financial Deepening and Financial Centers

Financial deepening, or what some historians call financial revolution, is the natural antecedent of a financial center. Important cases of financial deepening in history have occurred in Florence in the 14th century, Genoa and Venice in the 15th century, Antwerp in the 16th century, Amsterdam in the 17th century, England in the 18th century, and the United States in the 19th century. These "financial revolutions" were far from being random events; they were supported by three basic pillars: (i) innovations in financial institutions, instruments, and markets; (ii) an institutional mechanism through which the debtor commits not to renege on debt; and (iii) the presence of a public bank (Fratianni and Spinelli 2006).

The best known "financial revolution" is the English, which was sparked by the Glorious Revolution of 1688. With the ascendancy of Parliament, property rights in England became more secure, and government gained credibility in its commitment not to renege on debt (North and Weingast 1989). In 1694, Parliament created a public bank, the Bank of England. The Bank was authorized to engineer a debt-for-equity swap, that is, to transform government debt bearing a fixed rate of interest into equity. The shares issued by the Bank of England, and also those by the East India Company and the South Sea Company, were well received by the public and became increasingly marketable and liquid. Markets for these securities thickened, and their underlying transaction costs declined (Neal 1990). All of this led to the ascendancy of London as a financial center. London was a great location: a harbor and a hub of commerce with an Empire.

London eventually overshadowed Amsterdam, which had benefited from the Dutch financial revolution. This was sparked, in part, by Emperor Charles V, who, in search of an alternative to borrow from bankers like the Fuggers, spurred the provincial governments of the United Provinces to pledge taxes to service the debt issued to finance the Habsburg state. As James Tracy (1985, p. 217) puts it, "In the making of this shift, however, control of tax revenue had to be relinquished into the hands of the very same urban oligarchs . . .who themselves had heavy investments in state debt. . ." In 1609, the *Wisselbank* of Amsterdam received the monopoly on money changing, on bills of exchange valued in excess of 600 guilders, and on bullion transactions. The *Wisselbank* became the center of the Dutch payment mechanism. Amsterdam, like London, had a great location: a harbor and the hub of commerce with an Empire.

These two brief references to Amsterdam and London serve to motivate the thesis of this paper, which is that great international financial centers originate in cities with superior location and benefit from a deep financial transformation of economies that are leaders in the world economy. This transformation, in turn, results from institutional changes that are driven by expanding markets and

opportunities. Clearly, not all expanding markets and opportunities generate financial revolutions and international financial centers. These are more likely to occur under representative governments than under absolute monarchies and dictatorships. Once a center is created, the gains from centralization noted above work in its favor. This explains a high degree of persistence. But persistence eventually peters out in the face of contracting markets and opportunities or of restrictive rules that make other centers more attractive. Many great centers of the past have declined or disappeared altogether. Yet, their achievements have been passed along to newer centers in a sort of evolutionary chain of progress.

12.3 Seven Great Financial Centers

Medieval Florence, Venice, and Genoa were at the frontier of economic development and capitalism from the mid-1200s to the early part of the 1600s. The key to their success were commerce, international trade, and finance. Despite the lack of a harbor, Florence was very successful in trading and banking with Northern European countries. Genoa and Venice were maritime economies and fought for dominance of overseas routes. Geographic specialization occurred after Genoa and Venice fought their last war in 1378–81: the Venetians specialized in the East and the Genoese in the West; while both shared, with Florence, the North of Europe, Genoa and Venice shared republican political institutions and the rule of law, which gave them legitimacy and credibility to issue large amounts of long-term and marketable debt. Venice had a strong and stable government, willing and able to interfere with the economy. The state in Genoa was less interventionist because it was more "factious and unstable," as Machiavelli noted in his *Istorie fiorentine* (1965, pp. 494–95). Republican Florence was closer to Genoa than to Venice, but after 1434 the rules of the political game were set by the Medici family.[1]

All three city states had great financial centers by the standard of the times, but Florence first and Genoa later had true international character. Venice was more inward than outward in banking and finance. There was a heavy presence of outside bankers in Venice, especially from Florence, and their business was geared predominantly to the domestic market.

12.3.1 Florence

Florence was a great banking center by the mid-1200s (Sapori 1950). Florentine 'compagnie' – as the merchant-bankers of the time were called – like Bardi, Cerchi, Frescobaldi, Pazzi, and Peruzzi, among others, were active at home and abroad.[2]

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[1]The Medici family exerted "informal" hegemony from 1434 to 1494 and then more formally from 1512 to 1526; after 1530, their power became absolute.

[2]To Florentine bankers one must add those from Lucca (e.g., Riccardi), Pistoia (Ammannati), and Siena (Bonsignori).

They set operations in England to purchase wool for the big wool and cloth industry in Florence, to collect papal contributions, to lend funds to belligerent sovereigns, and to collect customs fees which were given to them as a guarantee for their loans (Sapori, pp. 396–8). The merchant-bankers had a complex business plan (Hunt 1990, pp. 151–2). They collected papal contributions in England, in particular from monasteries. The contributions were then used to advance funds to English growers, monasteries being prominent among them, to secure a steady delivery of wool. The Pope, in Avignon, would receive his dues from the home office in Florence. This arrangement minimized the export and import of specie, which was subject to large transportation and security costs. The sovereign, the other party in these transactions, provided protection to the merchant-bankers who repaid it by lending to the cash-strapped sovereign. The return on the loan came in part as disguised interest (to bypass canon law against usury) and in part as monopoly rights. As Edward Hunt (p. 152) puts it, "Merchant-bankers were primarily merchants who counted on trade for most of their profits. Banking for princes was thus mainly a means to this end."

The environment was risky and failure rates were high. A well-known story is the collapse of the Bardi and the Peruzzi in the mid-1340s after Edward III of England did not repay his debts on time. Giovanni Villani, the reputable chronicler of the time, gives an impassioned account of the event and treats it as a general banking crisis in Florence, spreading not only to other merchant-bankers but also to their creditors (Giovanni et al. 1857, Book 12, Chapter 55). Hunt believes that the losses suffered by the Bardi, Peruzzi and their creditors were much smaller than traditionally attributed by historians and that the two merchant-bankers eventually failed because of shocks taking place in Florence and not in England. What is not disputed is that the English king restructured his debts – one of the first restructurings in history – and settled them much later.[3]

Banking in Florence declined after that, undoubtedly feeling the aftermath of the Black Death of 1348. It returned to the frontier in the 1400s with the ascendancy of the Medici bank. For Raymond de Roover (1966), the greatness of the Florentine banking center derived from the superior organizational structure of the Medici bank. This structure resembled that of the modern holding company and facilitated the internationalization of banking business. With the structure, the vast international span of the Medici branches gave them a competitive advantage in the payment mechanism through which papal remittances were transferred from the periphery to Rome. The strong connections of the family with the Papacy did not hurt either.[4]

The decline of the Medici bank came in the latter part of the 1400s and had as proximate cause the same type of transactions that ruined the great Florentine merchant-bankers more than a century earlier – sovereign lending. " Although . . .

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[3]Hunt (p. 160) reports creditors' recovery rates of 36 percent for the Peruzzi and 46 percent for the Bardi.

[4]De Roover (p. 202) calculates that up to 1435 more than half of total earnings generated by the vast Medici network came from the Rome branch.

well aware of this danger, [the Medici] were unable to steer clear of it and foundered on the same reef" (de Roover 1966, p. 372). But sour sovereign lending came at a time of depressed economic conditions and trade deficits of the Low Countries with Florence that made it more difficult to transfer funds from the North to the South. Quite possibly, and unfortunately we do not have the data to test it, lousy sovereign lending may have well been endogenous relative to shocks to the economy. Whatever the ultimate causes, the Medici bank came to an end when King Charles VIII of France invaded Florence in 1494 and confiscated all Medici property. Other banks went under; some bankers had enough foresight to get out of the business before the crisis.[5]

Finance in Florence was, as in other city-states, connected with lending to government. This dates back to the 13th century, and it was compulsory and, as in Venice, based on a wealth census, the *estimo* (Molho 1971, Chapter 4; Conti 1984, pp. 10–16). In 1343, debt was consolidated in the *Monte Comune*, along the Venetian model, at a 5 percent interest rate (Conti, pp. 30–1). *Monte Comune* units, issued with a par value of 100 florins, traded at a sharp discount because of the low coupon relative to market interest rates and the risk that government could tax, reduce, delay, or skip interest payments altogether. In fact, all these possibilities occurred. Interest payments were first taxed at 25 percent at the start of the 15th century and then reduced repeatedly through the century.[6]

A unique feature of Florentine finance was a specialized social insurance system called *Monte delle Doti* (Dowry Fund), created in 1425 as part of long-term voluntary lending to government. This Fund had the twin purpose of providing finance capital to starting families and reducing the large stock of the *Monte Comune* (Molho 1994). After a few false starts, it became very popular: the investment was much better than *Monte Comune* shares in terms of yields and market risk. Initially, a father could deposit into the Fund 100 florins for each of his daughters for a term of either seven and a half years or fifteen years, yielding an annual compound interest rate of 12.99 percent and 11.33 percent , respectively. If the daughter died before the deposit maturity, the yield would be zero and the initial amount of the deposit would be returned to the father (Molho 1994, pp. 34–8). With the probability of payment before the age of 20 estimated at approximately 0.75, the expected annual yield of a 15-year deposit was 8.5 percent. This was the current yield on *Monte Comune* shares in 1425 (Conti, p. 34), but these shares carried a very substantial market risk. Hence, it is not surprising that the Dowry Fund grew in relation to the *Monte Comune*: it

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[5]The heyday of banking in Florence, despite a resurgence of sorts in the following century, was over. The decline of the banking industry, it should be noted, preceded the decline of the great Florentine industry, wool, by approximately a century. After 1600, wool output in Florence fell drastically, following a competitive shift in favor of the Low Countries and England (Goldthwaite 1980, p. 52).

[6]Interest payments were delayed in 1444, 1449, 1450, 1454 through 1459, and after 1467; back payments were canceled in 1483 and 1489; and interest was paid only in part from 1488 to 1492 (Conti, pp. 31–5, 57, 362–63). For the taxpayer-investor, *Monte Comune* turned out to be a financial disaster (Conti, Fig. 2).

combined aspects of a social insurance system with promised yields that were competitive with the current yields of the risky *Monte Comune* shares. The Dowry Fund failed to meet the second objective, the reduction of government debt. It ceased at the end of Republican Florence in 1530 (Conti, p. 69).

In sum, foreign trade and financial innovations launched the great financial center of Florence. The decline of the center coincided with negative shocks to the economy and to trade patterns (excluding wars because these were a universal features of city-states). Ultimately, the end of Florence was the consequence of the rise of Genoa, the new powerhouse in banking and finance of much of the 1500s and the early part of the 1600s.

12.3.2 Venice

The biggest, although not the first by any means, Venetian contribution to banking was in the field of so-called public banks. There were two of them: the first, *Banco della Piazza di Rialto* (*Banco di Rialto* for short) was established in 1587, and the second, *Banco Giro*, which gradually displaced the first, in 1619. Technically, the *Banco di Rialto* was no different than the older script banks (*banchi di scritta*) in the Rialto bridge that accepted *giro* accounts, an innovation prompted by currency scarcity and high costs of information regarding the vast range and often poor quality of coins. The critical difference was that the *Banco di Rialto* had a solvency guarantee from the state and the older *banchi* did not.[7] The *Banco di Rialto* became the model for the much more famous *Wisselbank* of Amsterdam; see below. The *Banco di Rialto*, like the *Wisselbank*, was a monopolist and centralized the clearing mechanism. Since payments through the giro system were less costly than with specie settlements, a premium emerged for payments *in banco* relative to those in specie.

The *Banco Giro* was launched to manage Venice's floating debt. The bank lent to government at short maturities and obtained, in exchange, that its deposit liabilities be treated as legal tender (Day 1987, p. 153). In other words, the *Banco Giro* was in fact an issue bank, just like the later Bank of England but with one difference: the *Giro* issued bookkeeping entries, whereas the Bank of England issued bank notes. The *Giro* deposits, like the *Rialto* deposits, enjoyed a premium with respect to currency, the economics being the same. Over time, the *Banco Giro* out-muscled and out-competed the *Banco di Rialto* because of the close connection it had with government.

In sum, the contributions of Venice to banking was to have created two institutions that served as model for the *Wisselbank* of Amsterdam and the Bank of England.

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[7] For early banking in Venice, see Mueller (1997, chapter 1). It should be pointed out that the first public bank was the *Taula de Canvi*, established in Barcelona in 1401. However, the *Taula* was not as purely a payments bank as the *Banco di Rialto* inasmuch as it lent heavily to the city.

12.3.3 Genoa

Genoa became an important financial center in the early *Quattrocento* with the establishment of the *Casa di San Giorgio* but acquired international status in the middle of the 1500s, when Genoese merchants displaced the Fuggers as the principal bankers at the Spanish court. Ferdinand Braudel (1992, p. 157) identifies the period 1557–1627 as the age of Genoese finance, when "...the merchant-bankers of Genoa, through their handling of capital and credit, [called] the tune of European payments and transactions."

The genius of 16th century Genoese finance was to use the silver inflows from the New World to make profits, through their deep expertise of the international monetary and credit flows, in interest rate spreads and trading bills of exchange. The system was quite complex and worked as follows. The Spanish Crown sold silver spot in Spain to the Genoese in exchange for future delivery of gold in Antwerp, where the gold was used to pay Spanish troops fighting in the Low Countries. The Genoese cost to deliver gold up north, through bills, was a fraction of the cost of shipping specie, including the high risk of piracy, from Spain to Antwerp. The Genoese acquired this advantage through "increasing returns to scale in international financial services" (Conklin 1998, p. 499). The silver was shipped to Venice and from there to the Far East to settle a trade deficit. In exchange, the Genoese received bills drawn on Antwerp where they were used to buy gold. To these transactions, which brought into equilibrium a web of long and short positions through the use of credit (Braudel, p. 168; Conklin, p. 499), one must add credit, which centered around exchange fairs.

Exchange fairs were periodic financial centers; they took place typically four times a year and lasted several days. The Genoese started their own fairs in Besançon in France in 1535 and then moved them to Piacenza in Northern Italy in 1579. Their objective was to centralize money and exchange transactions in Europe (Da Silva 1969, p. 36). But also a credit market operated at the fairs. The demand for credit came not only from merchants who wanted their bills renewed but also from new borrowers like kings facing budget deficits; the supply from individuals and business that had placed their savings with merchant-bankers.[8] The Genoese merchant-bankers channeled vast amounts of entrusted deposits into short-term loans (*asientos*) to the Spanish Crown. Against the *asientos* the Genoese received from the Crown collateral in the form of long-term securities (*juros de resguardo*).[9] Since the interest rate on the *juros* flowed back to the Crown, the transaction worked out to be an interest rate swap, with the fixed flow going to the Crown and the floating flow to the Genoese. The Genoese earned the difference between the higher

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[8] At the Piacenza fairs, according to Braudel (1992, p. 168), "...the capital of the Italian cities was all drained towards Genoa. And a multitude of small investors, Genoese and others, entrusted their savings to the bankers for modest returns."

[9] These arrangements start in 1566.

short-term interest rate and the lower long-term rate.[10] Furthermore, *asientos* loan contracts specified that the *juros* received as collateral would be sold if the Crown did not repay the loans. The Genoese received permission to sell the *juros* with the stipulation that they would be restored if the Crown paid the *asientos* (Lovett 1980, p. 905). Thus, the Genoese recovered immediately the initial capital lent to the Crown. If the Crown defaulted, the bankers gained the interest rate differential on the swap. If the Crown did not default, the bankers would make a capital gain by repurchasing the *juros* in the secondary market at a price below the price at which they sold.

It may be insightful to quote what a modern merchant banker like Sir David Scholey, at the time Chairman of S.G. Warburg Group in London, thinks of the Genoese system just described:

> This Genoese system of international finance stands alone in history up until the present day as an example of an IFC [international financial center] built not so much on locally based trade or primarily on a local surplus (although both elements were present), but rather on an efficient and sophisticated system for gathering the monetary surpluses of other parties, in part through a process of—to use a familiar phrase- securitization, or the extension of paper credit. Although Amsterdam in the 18th century and London in the 19th century also based many of their financial activities on the issuance and discounting of securities, these were backed primarily by increasing volumes of trade and of surplus capital which were centered locally (Scholey 1994, pp. 31–2).

In addition to international finance, the Genoese made two other significant financial innovations.[11] The first was the *Casa di San Giorgio*, a financial institution created in 1407 as a result of the consolidation of Genoa's public debt. San Giorgio's shareholders acquired all previous debt issues of the Republic of Genoa and performed what today would be called a debt-for-equity swap (Fratianni 2006). The swap would be done again in England in 1697, when the Bank of England began "engrafting" government debt onto the bank's capital (Neal 1990, p. 51). Economic historians have considered the conversion of debt into equity as a successful element of the English financial revolution because it helped to transform high transaction cost and difficult-to trade debt instruments into transferable and liquid shares (Neal 1990, pp. 96–7).

The other innovation was the *Banco di San Giorgio*, a unit of the *Casa*. The *Banco* was a public bank with the primary mission of facilitating the management of the San Giorgio's shares, called *luoghi* (Sieveking 1906, p. 46). It closed to external business in 1445 but continued to serve the state, *San Giorgio*'s shareholders, tax collectors, and suppliers. It re-opened for business to the general public in 1530 and was permanently closed in 1805. The *Banco* handled deposits, specie transactions, loans, and interest payments on *luoghi*. Deposit accounts were used by customers to settle payments. The giro system reduced the use of scarce specie and raised the velocity of narrowly defined money. The bankers from the *Banco*, with

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[10]It should be noted that short-term interest rates were higher than long-term interest rate

[11]What follows draws from Fratianni and Spinelli (2006).

other Genoese bankers, performed exactly the same function at the Besançon and Piacenza fairs but at an international level.

As a public bank, the *Banco di San Giorgio* had to guarantee that the depositor could receive specie on demand. Despite this constraint, the *Banco* extended loans to the Republic, tax farmers, and its own clients by allowing deposit accounts to run overdrafts (Assini 1995, 270). These were exchanged among clients as part of an extended credit network. Interest in the form of dividends on San Giorgio *luoghi* were credited in the accounts of the owners four times a year but before they could be cashed (Assini, p. 277). Payment delay on dividends fluctuated from nine months to a few years. The books registered the date of maturity of the dividends and owners, who had claims on future cash flow, would use the declared but unpaid dividends to extinguish a debt, settling the difference between the maturity of the dividend and the maturity of the debt through discounting. Dividends were actively exchanged as their own money of account, called *lire di paghe*. Jacques Heers (1961, pp. 159–72) gives an extensive discussion of the dividend market and the use of *lire di paghe* as bank money. In 1610, the *Banco* issued bank notes. In sum, the *Banco di San Giorgio*, just like *Banco Giro* in Venice, was the ancestor of the Bank of England.

12.3.4 From Antwerp to Amsterdam

Antwerp emerges as the financial "metropolis of Western Europe" between 1493 and 1520 (Van der Wee 1963, p. 113) and its star shines for much of the 16th century. The rise of Antwerp coincides with the decline of the money market in Bruges occurring between 1477 and 1482 (Van der Wee, pp. 109–110). For Raymond de Roover (1948), this decline was sparked by a shift in regulatory regime in Bruges. The authorities there became hostile to banks because of the large number of failures and recurrent accusations that money-changers picked and culled coins. Money-changers "favored debasement whenever their cash reserves were running low because of a crisis in the money market" (de Roover 1948, p. 341), whereas the authorities preferred monetary stability. The climate was particularly hostile for foreign merchants who, between 1484 and 1488, were asked to either move out of town or resettle in Antwerp (Van Houtte 1966, p. 44). In addition to the unfavorable regulatory climate, Bruges suffered from deteriorating business conditions. Van der Wee mentions the profligate policy of Emperor Maximilian and large losses incurred by Italian merchant-bankers who had lent large sums to the Burgundian princes. The decline of Bruges was slow (Van der Wee 1963, p. 140; Ehrenberg 1928, p. 233).

Antwerp made several important innovations. The first was the exchange or *bourse*, housed in a building created for that purpose in 1531, which transformed seasonal fairs into a permanent fair (Ehrenberg, p. 238). The institution of a *bourse* was not new; it had originated in Bruges earlier but there it was more a meeting place for merchants dealing in money and bills of exchange than a real exchange. The second was a legal framework supporting trading and contract enforcement. Rules were

issued to legalize the transferability of bills of exchange through endorsement and bearer clause (Gelderblom and Jonker 2005, p. 192; van der Vee, pp. 367–8). These rules, in turn, gave impetus to an expansion of financial instruments, in particular forward contracts. Commodities, like pepper, were traded at the *bourse* not only for spot delivery but also for future delivery. Forward contracts were particularly suitable to bills, especially the round-trip or *ricorsa* bills, which imbedded differences in interest rates. Well-informed merchant-bankers engaged in arbitrage transactions. These would work as follows. A merchant-banker in Antwerp would draw a bill in Venice and buy Venetian ducats in Venice at the exchange rate of 50 groats per ducat. The delivery of the ducat would occur at usance (i.e., by custom), say 60 days. The merchant-banker, by writing a second bill drawn on Antwerp, would earn a profit if the ducat, 60 days hence, could fetch (ignoring transaction costs) more than 50 groats. If the first exchange rate is defined as the spot exchange rate and the second the future exchange rate, one can apply interest rate parity and readily see that when the future rate exceeds the spot rate the home currency (in this case the groat) is at a discount in relation to the foreign currency (in this case the ducat), and consequently interest rates in Antwerp must have been higher than interest rates in Venice. Thus, profit from the two-way bill arises from borrowing in the low-interest rate location and lending in the high-interest rate location.[12] Forward premia and discounts on exchange rates were quoted in the Antwerp *bourse*.

Forward transactions were considered no more than waging bets and met with public disapproval and official sanctions. Ehrenberg (pp. 230–46) dedicates several pages to speculation and excesses taking place at the Antwerp *bourse*. This is not surprising given the imperfect knowledge of the time on the purposes of derivatives. There was a consensus that forward contracts were tantamount to taking chances or manipulating prices rather than managing risk. Authorities, fearing popular reactions to price increases of basic foodstuff, made repeated attempts to ban forward contracts but to no avail (Gelderblom and Jonker 2005, p. 193).

The last innovation of Antwerp was the development of a short-term loan market. The demand for loans came from governments, like the Netherlands government and Dutch municipalities, and sovereigns, like the Habsburg emperors, the English Crown, and the King of Portugal (Ehrenberg, pp. 247–80); the supply from South German merchant-bankers like the Fuggers and the Welsers, as well as Genoese, Spanish and Portuguese merchant-bankers. To some extent, the history of the Antwerp Exchange is closely tied to the fortunes of these bankers, in particular the Fuggers. The latter borrowed regularly in the Antwerp *bourse* on 'deposits' to finance their lending to the Spanish Court (Ehrenberg, p. 112). The relationship between the Fuggers and the Habsburg emperors resonates with the relationship that the Florentine bankers had with the English kings in the 1300s and the Papacy in the 1400s. In both instances, business transactions were profitable at first but ended up disastrously. The mistakes made by the Bardis, Peruzzis, and

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[12]The account of Ehrenberg on pages 244–5, although incomplete, is consistent with this reasoning. A much better explanation of the *ricorsa* bills is given by de Roover (1948, pp. 61–2).

Medicis were uncunningly repeated by the Fuggers.[13] For Ehrenberg, the decline of Antwerp is associated with the Habsburg bankruptcies and the implosion of the Fuggers. Van der Wee (p. 245) dates the final phase of Antwerp between 1572 and 1587. Gelderblom and Jonker (2004, p. 644) indicate that the shift from Antwerp to Amsterdam occurs after 1585, the year the Spanish occupy Antwerp and the Dutch impose a naval blockade of the Flemissh coast. By the late 1580s, Amsterdam becomes the center of the financial world.

In the evolutionary chain of financial centers, the Amsterdam Exchange of the 17th century stands out as the launching pad of corporate finance. In Amsterdam, shareholders of the Dutch East India Company (VOC) and the Dutch West India Company could realize their returns on investment by selling their equity positions in an organized exchange instead of waiting for the liquidation of the companies. Amsterdam developed an extensive secondary market in spot transactions, options, forward contracts, and even the beginning of futures. Eventually, a secondary market for debt and public debt also flourished.

The rise of the Amsterdam Exchange coincided with Dutch long-distance trade to the East (Far Eastern Asia) and West (Western Africa and Latin America) Indies. These voyages required much higher levels of capital than earlier maritime trade because the voyages took more time and the cost of protecting the envoys was higher. Gelderblom and Jonker (2004, pp. 648–9) report that fitting a ship for the Asian trade would cost 100,000 guilders, and that 20 percent of this investment, on average, would be lost due to a variety of misfortunes, including piracy; furthermore, capital would be tied for approximately 24 months. The sums involved were such as to spur the organizational innovation of the joint-stock company. In 1602, the States-General of the Netherlands gave the VOC a monopoly on Asian trade. VOC consolidated all previous Dutch trade companies and became, in the words of Braudel (1992, p. 213), "an independent power, a state within a state..." This is the same phrase Machiavelli (1965, pp. 494–5) used to characterize San Giorgio in Genoa. VOC's capital was 6.4 million guilders divided in fixed proportions among six Dutch cities; it was to be returned to shareholders after 10 years, but in 1609 VOC directors – who were not elected by shareholders –made it nonrefundable.[14] With no say in the management of the company, and with capital being non-refundable, only a secondary market could provide liquidity in VOC shares and a timely return on investment.

VOC did not pay dividends until 1610, much to the disappointment of shareholders. In that year, a large shareholder by the name of Isaac Le Maire carried out, through forward sales of VOC shares, the first bear squeeze on record. He

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[13]The Fuggers, having barely survived the royal bankruptcies of 1575 and 1607, were dealt a final blow with the bankruptcy of 1626 (Ehrenberg, pp. 130–32).

[14]Amsterdam had the largest share of the capital (50 percent) and the highest representation in the board (eight directors); Rotterdam followed with 25 percent of the capital and four directors; Delft, Enkhuizen, Hoorn and Middelburg had 6.25 percent of the capital and one director each. A 17th director was added, on a rotating basis, from one of the five smaller cities to prevent Amsterdam from having veto power on decisions; read Neal (2005, p. 167).

failed, but in the process got his message across to the directors who, after that incident, declared dividends fairly regularly and with high payouts.[15] Gelderblom and Jonker (2004, Table 1) document that there was an active secondary market in VOC shares from the very beginning. By the end of 1607, approximately one-third of the Amsterdam chamber's capital had changed hands. The liquidity of VOC shares made them very suitable (by far superior to annuities) as collateral for loans in the money market. Credit risk for these loans dropped, and money market interest rates declined (Gelderblom and Jonker 2004, Appendix Table 1).

A full panoply of instruments enriched the Amsterdam Bourse; these instruments came to life partly as a result of delays in transferring shares on the company's books and partly because of the high price of VOC shares.[16] Forward transactions, with settlements every 3 months, were the preferred vehicle for buying and selling shares. Some forward transactions were standardized and sold to third parties in the fashion of modern futures. VOC shareholders could also use call and put options.[17] These derivatives, as we have already mentioned earlier, met with public disapproval and official sanctions, but, in practice, were tolerated. All of this has come to us by courtesy of José Pensa de la Vega (1688), an erudite Amsterdam broker and a Sephardic Portuguese Jew, who wrote the first treatise on a stock market by titling it satirically *Confusión de confusiones*. De la Vega, who was addressing the Spanish-speaking Sephardic community so influential in the Bourse (Israel 1990), provides not only a primer of various transactions but also a first on behavioral finance, including profiles and underlying psychology of different types of investors. More importantly, de la Vega's account is evidence that the success of the illegal (but tolerated) derivative contracts depended, not on government regulations and the enforcement of the courts but on the reputation of brokers and market participants (Stringham 2003).

The Amsterdam Exchange was much more than the trading building; it included also the grain exchange, the Chamber of Insurance, the adjacent coffee and tea houses where brokers congregated, and the *Wisselbank* (Israel 1990, p. 412). As I have already mentioned, the latter was patterned after the Venetian *Banco di Rialto*. The *Wisselbank* had a monopoly on money changing, bills of exchange valued in excess of 600 guilders, and bullion transactions. Merchants were to bring all foreign coins to the bank and received credit in deposit accounts denominated in bank guilders. The *Wisselbank* was at the center of the Dutch payment mechanism. In the absence of bank fees, money settlements through the *giro* system – that is, by debiting and crediting deposit accounts with the bank – were cheaper and faster than settlements using coins. Bank fees on coins deposited in a bank account raised the premium on deposits and lowered the incentive to settle payments with deposits. A rise in uncertainty, caused for example by wars, raised the premium on specie and

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[15]Dividends averaged 16.5 percent of stock par value for the first half of the 17th century (Neal 2005, p. 171).

[16]Initial price of shares was 3,000 guilders.

[17]The archival material on options and futures is rather thin; see Gelderblom and Jonker (2005, pp. 199–200).

raised the incentive to settle payments with deposit transfers. The movements of the agio were self-correcting and

> . . . the Dutch were able to reap the advantages of a fixed exchange rate for their international trade and finance, encouraging their own merchants as well as foreign merchants to use their financing facilities for long-distance trade and long-term finance. At the same time, they were able to maintain the shock absorber benefits of a flexible exchange rate for their domestic economic activity (Neal 2000, 122).

In sum, Amsterdam became a leading financial center through its secondary market in equities. In the words of Gelderblom and Jonker (2004, p. 666), ". . . the course of events in Holland after 1600 runs counter to common opinion about the importance of a publicly traded government debt as the origin of secondary markets." Yet, for a careful scholar like Larry Neal, the Dutch, despite the remarkable innovations and efficiency of their payment mechanism, failed to achieve the success of the English financial revolution. The reason is that the provincial structure of the United Provinces was an obstacle to the creation of "a truly national debt backed by a national taxing authority" (Neal 2000, p. 123). This conclusion is even more remarkable if one recalls that the Dutch exported their financial techniques, human and non-human capital to London when William of Orange, the Stadholder of the United Provinces, became king of England in 1688.

12.3.5 The Anglo-American Centers

While there are several important financial centers today, two stand out – London and New York – and both share a common culture and language. Government finance, we recall, was the engine of the English financial revolution and the ascendancy of London as a financial center. The problem was how could government raise large amounts of funds to pay for an increasingly activist commercial and foreign policy in direct competition with France first and the Dutch later. The solution was found in a strong commitment mechanism to honor debt and reduce credit risk; financial instruments that were appealing to investors in terms of yields, maturity, transferability, and liquidity, and either financial institutions or financial markets which would make these characteristics happen. Economic historians are in agreement that the English implemented what the Dutch had done. This is true, except that the evolutionary chain of finance is longer than that: The Genoese of the 15th century had faced a similar problem and came up with a solution somewhat similar to the English solution. The Genoese entrusted their commitment mechanism to San Giorgio. San Giorgio was structured and governed to ensure that the Republic would honor its debts (Fratianni 2006). The latter were funded by alienated taxes, collected and administered by San Giorgio itself. San Giorgio was created with a debt-for-equity swap, or what the English called much later engraftment; its shares had low credit risk and were transferable. In England, the commitment mechanism resided with the Parliament that had superseded the divine rights of the monarch (North and Weingast 1989, p. 824). Government debt was placed with joint-stock

companies such as the Bank of England, the Million Bank, the East India Company, and most of all with the South Sea Company (Neal 1990, p. 51).

The Bank of England was created in 1694 with a capital subscription of 1.2 million pounds to finance a loan to government of an equal amount at an 8 percent rate of interest. The Bank was restrained from lending to the Crown unless explicitly authorized by Parliament (North and Weingast, p. 821). This authorization acted as an effective constraint imposed by creditors on debtor and thus lowered default risk. Just like San Giorgio, the Bank of England was in a position to represent and coordinate with ease all creditors. The lower coordination costs, in turn, implied a larger punishment on the defaulting debtor, and hence a lower credit risk of government (Wells and Wills 2000, p. 422).

The South Sea Company came into existence in 1711 with a very large (over 9 million pounds) purchase of short-term government debt and the assignment of monopoly rights to trade in South America (Dickson 1967, Table 5). Then, in 1720, a law was passed whereby all of the national debt – except that held by the Bank of England and the East India Company – would be sold to the South Sea Company; in other words, a complete takeover of English public borrowing. This takeover had been inspired by John Law's takeover of French debt in 1719 through his Mississippi Company (Murphy 1997, Chapter 14). The sound economic principle underlying debt conversion was the gain associated in transforming high transaction cost and difficult-to-trade debt instruments into transferable and liquid shares (Neal 1990, pp. 96–7). But the management of the South Sea Company were keen in driving up share prices through margin sales, exaggerated reporting of future profits, promises to pay unrealistic dividends, and political influence that led to the curtailment of corporations competing with the South Sea Company for investment funds.[18]

The South Sea Company share prices collapsed in August of 1720 as investors rushed for liquidity. It was a severe crisis, and its effects reverberated throughout Europe. In October of the same year, John Law's system collapsed. Banque Royale, the bank that Law had set up to convert paper money into bank notes and to give "elasticity" to French money supply, engineered an unsustainable inflation and a bubble in Mississippi Company share prices.[19]

The eclipse of the South Sea Company in England and the failure of John Law's system in France had momentous repercussions on the respective financial systems. In England, it worked as "the 'big bang' for financial capitalism," to use Neal's (2000, p. 128) description. It strengthened the role of the Bank of England which absorbed, through engraftment, the South Sea Company and launched, in 1726, its

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[18]The restrictions were defined by the Bubble Act of June 1720 (Dickson, p. 148). On management running up share prices of the South Sea Company, see Dickson (pp. 141–45) and Neal (1990, p. 109).

[19]See Neal (1990, Table 4.1 and Fig. 4.4) for the data on the explosion of bank notes issued by Banque Royale and on the Mississippi bubble.

first irredeemable perpetual Three Percents Annuities in 1726.[20] England came out of the crisis with a well-delineated financial system. For Larry Neal (2000, p. 128):

> The basic outlines of the Anglo-American structure of finance were set by 1723 – complementary sets of private and commercial and merchants banks, with all enjoying continuous access to an active, liquid secondary market for financial assets, especially for government debt.

In France, instead, the crisis did not elicit any policy response. It was left to fester mistrust in the monetary and financial system. The result was a rejection of markets and a delayed financial deepening (Baskin and Miranti 1997, pp. 113–5).

London's ascendancy matured for much of the 1700s and was fully completed by the end of the century, after the English defeated the Dutch in the Baltic naval war (Cassis 2006, p. 19). London stood out for the depth and breadth of its financial services. Its preeminence in the international acceptance market was such as to have earned it the attribution of "the clearing house of the world"; and bills of exchange denominated in pound sterling were considered an "international currency" (Baster 1937, p. 294).[21] Merchant-banks made the acceptance a marketable security. Exporters, not only would be guaranteed payment, but could obtain its present value immediately. Importers, on the other hand, could disburse funds after having received delivery of the goods. London merchant banks were also preeminent in sovereign lending, a service that had begun in Amsterdam (Riley 1980, Chapters 5–7) and had moved to London with the assistance of Dutch merchant-banks.[22] The House of Rothschild epitomized the importance and the power of merchant banks in financing foreign governments. They were the modern Bardis, Peruzzis, Medicis, and Fuggers but without the excesses that come by being too close to debtors. The major innovation of the Rothcschilds was to create a true international bond market for sovereign loans. It started in 1818 with a loan to Prussia denominated in sterling, with interest payable in London, and other British features (Ferguson 1998, pp. 124–5); in other words, it was what today we would call a Eurobond. As a result, British investors did not bear a currency risk and could evaluate the difference between the Prussian loan and British government bonds in terms of differences in credit risk. The loan was also placed in Amsterdam, Berlin, Frankfurt, Hamburg, and Vienna, making it a global loan.

The merchant bankers were one among the pillars of the London financial center. A large army of deposit bankers, discount bankers, central bankers, insurers, jobbers, stockbrokers, investment trust specialists, chartered accountants, and lawyers provided a dense concentration of highly specialized human capital that fed the

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[20]Further boost to the power of the Bank had come in 1707, when Parliament gave the Bank the monopoly on joint-stock banking in England and made its notes legal tender; and in1715, when the Bank began managing the national debt, thus re-enforcing its role as the fiscal agent of the state.

[21]With an acceptance, a party, typically a merchant banker, guarantees the payment of the bill should the drawer default. Bills of exchange, we recall, were early medieval instruments used to finance international trade.

[22]Baring Brothers of London learned the business of foreign lending through its association with Hope & Co. of Amsterdam; see Cassis (2006, p. 20).

growing and innovative markets for securities, gold, commodities, ship chartering, and insurance. The result was a distinctive and well-oiled machinery, with each piece fitting into a complex puzzle:

> . . .[M]erchant banks. . .accepted. . .the bills of exchange, generally for three months, that constituted the main instrument for financing international trade. . .Well before they reached their maturity dates, they were discounted, also by specialised banking houses—the discount houses—which then resold them to various British or foreign banks. . .[T]he clearing banks provided cash, in the form of day-to-day loans, to discount houses that discounted the bills of exchange accepted by the merchant banks. . .[T]he beneficiaries of these bills of exchange—wholesale dealers, merchants and industrialists—replaced the liquid assets that they had obtained through discounting them in the deposit banks. It was the deposit banks that made the whole wheel of international trade financing turn. The Bank of England had pride of place at the top of the edifice, guaranteeing the country's gold reserves, essential to the smooth running of the system. . . [M]erchant banks also specialised in issuing loans on behalf of foreign companies and governments. . .These securities were then traded on the London Stock Exchange. . .This huge market too was sustained by money at call supplied to stockbrokers by the deposit banks. . . (Cassis 2006, pp. 84–5).

The London Stock Exchange had no challengers at home. According to Lance Davis and Larry Neal (1998), this resulted from the separation of ownership of the Exchange from its operation. Owners wanted to maximize fees from membership and minimize the risk of inducing the emergence of competing exchanges, whereas Members of the Exchange wanted to maximize volume of transactions upon which commissions were charged. The outcome was a very competitive environment with a rapidly increasing number of traders that made it difficult to make collusive agreements. In contrast, the owners of the New York Stock Exchange (NYSE) limited the number of traders and colluded to have minimum commissions. Consequently, the NYSE faced national competition, even within the perimeter of the city.

London was at the center of global finance during the heyday of the gold standard (1880–1914). Foreign issues exceeded domestic issues; in fact, as much as one-third of world negotiable securities were traded there at the start of World War I (Davis and Neal, p. 40). The strong foreign orientation has remained a London characteristic to this day.

The United States went through a financial revolution a century after the British. Unlike the British Parliament, the US Congress did not share power with a king and could legitimately raise taxes for servicing the Federal debt. This was done in 1789–90 by pledging customs duties and excise taxes to pay interest on debt in hard money, the US dollar linked to gold and silver (Sylla 1998, p. 86). Alexander Hamilton and the Federalists saw in the national debt an instrument of consolidating the Union. With funded debt came a public bank, the First Bank of the United States, established in 1791. The Fist Bank was patterned after the Bank of England, except that its notes, unlike those of the Bank of England, were subject to a 100 percent specie requirement (Cowen 2000, p. 12). Like the Bank of England, the First Bank was more a national bank than a central bank. It lent to the Federal government, paid interests on government securities held in Europe (mainly in Amsterdam and London), held government deposits, and transferred these deposits and its own notes throughout the country (Cowen, pp. 139–40).

There was strong opposition to the First Bank. Thomas Jefferson, Hamilton's nemesis, had a vision of a decentralized agrarian republic. He disliked paper money, because it was prone to losses of purchasing power, and the banks that issued it. If banks were "dangerous," a monopoly bank he thought was outright "evil."[23] The conflict between the Hamiltonian vision and the Jeffersonian vision of money and banking was rooted in different visions of the role of government. This conflict was ultimately responsible for the short life of the First Bank of the United States (1791–1815) and of the Second Bank of the United States (1816–1836), the fragmented nature of the US banking system, and the tension between decentralization and centralization built into the Federal Reserve Act of 1913.

In the first round of the struggle, Hamilton won the day and his plan of a funded national debt and of the First Bank launched the financial transformation of the United States. Active secondary markets quickly developed in New York, not only on government debt but on bank and insurance stocks.[24] In the spring of 1792, Wall Street suffered its first crush. According to Ned Downing (2005, pp. 283–4), "[t]he roots of the panic of 1792 lay in the lack of an enforceable mechanism to settle the financial obligations undertaken by the auctioneers." Hamilton proposed a solution based on the credit transfer model of the Amsterdam *Wisselbank*, a solution that gave rise to the NYSE.[25] The *Wisselbank* is also the ancestor of the Depositary Trust and Clearing Corporation set up in 1960s to provide custody and daily securities settlement (Downing, pp. 283–4).

The importance of the New York financial center grew despite competition from rival cities and a hostile legislation that reflected the Jeffersonian tradition against big business, big banks, and concentration in general. As has been already mentioned, the demise of the First and Second Bank of the United States was part of this tradition. The revised National Bank Act of 1864 assigned to New York central reserve city status, meaning that national banks in reserve cities could satisfy part of their reserve requirement by holding deposits with New York banks, a recognition of the fact that New York was the money market center of the country. However, Chicago and St. Louis, in 1887, managed to be added to the list of central reserve cities, thus reestablishing a multi-polar system. The Federal Reserve Act of 1913 was another example of the conflict between the forces of centralization and decentralization. The Act was a compromise between the advocates of a single central bank, patterned after the Bank of England, and their opponents (Meltzer 2003, pp. 68–73). The outcome was a regionalization of central banking that created a

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[23]For Jefferson's quotations on money and banking, see http://etext. virginia. edu /jefferson /quotations/jeff1325.htm

[24]Sylla (2005, p. 306) shows the price histories from 1790 to 1820 of three Federal government securities, the Bank of the United States, the Bank of New York, the Manhattan Company, and the New York Insurance Company.

[25]There is some controversy about the effective start of the NYSE. For some, including Downing (p. 284), the Exchange began with the Buttonwood Agreement of 1792 signed by 24 New York merchants, securities dealers, brokers, and auctioneers. For others, NYSE starts with the formal charter of 1817; on this, see Sylla (2005, pp. 307–9).

tension between the center (the Board of Governors) and the periphery (the twelve reserve districts). The special role of New York, the money and financial center of the country, was not officially recognized until 1942 when the president of the Federal Reserve Bank of New York became a permanent member of the Federal Open Market Committee (Meltzer, p. 559).

In the first approximation, the New York capital market was not that different from London's, except in foreign trade financing where it was far behind at the start of the 20th century: part of the reason was due to the legal impediment, until 1914, for national banks to accept bills of exchange (Cassis, p. 122). Then, matters evolved, and New York began to rival London. The Bretton Woods system and the key-currency status of the dollar propelled New York to the top of the pyramid of the international money and financial centers. Virtually all foreign central banks kept dollar deposits and their stock of gold (in custody) with the Federal Reserve Bank of New York. New York also became a center of foreign exchange dealings.

The NYSE benefited from the big wave of "managerial capitalism" that characterized 20th century America (Baskin and Miranti, Chapter 5). It specialized in large capitalization stocks and set restrictive listing admission standards aimed at winning the public's general trust in equity investment.[26] This specialization has remained to this day. The NYSE has the largest capitalization of all exchanges in the world. At the end of June of 2007, its equity capitalization was $16.6 trillion. Tokyo, Euronext, NASDAQ, and London – following in the ranking – had capitalization ranging from $4 trillion for London to $4.7 trillion for Tokyo.[27] The difference is mostly due to the average listing capitalization. For example, whereas the NYSE and the London Stock Exchange have approximately the same number of listed companies (3,104 for NYSE and 3,273 for London, again as of the end of June 2007), average capitalization favors NYSE by a ratio of about 4.

There is a consensus that London and New York are the top international financial centers. They have been throughout the 20th century.[28] London has continued to prosper despite the end of the Empire, the collapse of the international gold standard, the decline of sterling as a key currency, the rise of the political and economic power of the United States after World War II, the creation of the euro, and the placement of the European Central Bank in Frankfurt. It has been a durable center and has renewed itself repeatedly through innovation. New York has benefited from the effects of those shocks that should have impacted London negatively but has

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[26]Cassis (p. 120) mentions that the restrictive standards, coupled with fixed commissions, generated rents to the Exchange's owners. They also encouraged the rise of rival exchanges.

[27]The data are from the World Federation of Exchanges, *Focus*, July 2007; see http://www.world-exchanges.org.

[28]Howard Curtis Reed (1981) ranks international financial centers for much of the 20th century using hierarchical cluster analysis and stepwise multiple discriminant analysis. London and New York are always at the top. In banking, London prevails over New York; see Table 2.2. In finance, New York was higher than London in 1955 but falls behind London in 1965, 1975 and 1980; see Table 2.4 in Reed.

suffered from legislation and rules designed to limit the comparative advantages of New York as a money market center and to maintain a regionalized banking system.

12.4 Evaluation and Implications for Concentration

Our long historical excursion confirms the basic proposition of Kindleberger's 1974 essay – namely, that the N-1 argument applies to money as well as to financial centers. Strong economies of scale are realized by financial centers; in the case of New York, these economies were so compelling as to overcome a hostile political culture and a legislation against geographic concentration. Economies of scale also explain the relative persistence of these centers; when decline occurs, it tends to be slow. Kindleberger appears to be correct also about the positive correlation between great centers and great monies. At least five of the seven centers surveyed had internationally accepted monies: the florin in Florence, the ducat in Venice, the guilder in Amsterdam and, in more recent times, the pound in London, and the dollar in New York. Fourth, great financial centers develop on the foundation of great banking centers.

One aspect Kindleberger did not emphasize was the nexus between financial centers and accountable institutions. Florence, Venice, Genoa, the Dutch, the English, and the Americans shared, to various degrees, democratic institutions and developed commitment mechanisms to honor their public debts. There were differences in the mechanism. In Genoa, current government spending had to match current borrowing, primarily from San Giorgio. In Venice and to a lesser extent in Florence, elected government set tax rates and forced borrowing to match government spending, including interest payment on debt. The model of representative government was the protagonist of the commitment mechanism for Dutch, English, and American finance. With the exception of Amsterdam, trading in government bonds preceded trading in equities. What would have happened to the development of financial centers in the absence of this commitment mechanism poses an interesting counterfactual speculation.

Financial centers persist; yet, no center lasts forever. Four of the seven centers (Florence, Venice, Genoa, and Antwerp) no longer exist. The historical record shows also a certain degree of dominance of one center over the others. Florence was the top banking center in the first half of the 14th century, Venice was a commercial and financial power house in the 15th century, Genoa was on the financial frontier in the second half of the 16th century, Amsterdam was the top financial center in the 17th century, London in the 19th century, and New York for part of the 20th century. Yet, these characterizations ignore significant overlaps. The three Italian city-states, for long stretches of time, co-existed on almost equal basis (Kindleberger 1996, p. 45). Genoa, in the South, had its best financial days when also Antwerp, in the North, was in her prime. Amsterdam and London co-existed at the top for much of the 18th century. Today, London and New York are both preeminent financial centers. When dominance emerges, displacement of one center by another is not necessarily

fast. We have seen that Amsterdam replaced Antwerp quickly, but it took almost one hundred years for London to assert her financial primacy over Amsterdam. A well-known theme developed by Kindleberger is that the shift from English financial primacy to US primacy took too long and was responsible for world economic instability in the inter-war period; see Kindleberger (1996, p. 224).

While centers decline and die out, the institutional and financial innovations they create survive through the long evolutionary chain of banking and finance. About institutions, we recall that the Florentines of the 14th century were the most innovative in commercial banking, including international banking, although they underestimated the extent of sovereign risk. The Medicis of the 1400s put together an organizational structure, spanning over much of Europe, that is a precursor of the modern bank-holding company. Beyond banking, the Florentines were so worried about young ladies not marrying that they set up a Dowry Fund, the forerunner of a social security system. The Genoese and the Venetians created public banks that lowered transaction costs for settling debits and credits. The *Wisselbank* of Amsterdam was patterned after the *Banco di Rialto* in Venice. The *Wisselbank*, in turn, inspired reforms after the American bubble of 1792 and became the model of the Depositary Trust and Clearing Corporation, among others. The English, in the late 1600s, reproduced the core of *Banco Giro* and *San Giorgio* in the Bank of England. The latter, in turn, was the model, among others, of the First and Second Bank of the United States and the inspiration of the Federal Reserve Act of 1913. The latter, in turn, was the inspiration of the European System of Central Banks created in 1999.

As for financial instruments, Genoa was the most innovative of the three Italian city-states. San Giorgio effected the earliest recorded case of a debt-for-equity swap. The same type of swap was repeated approximately 300 years later by the Bank of England, the Million Bank, the South Sea Company, and John Law's Mississippi Company. In Genoa, the swap, coupled with a sound governance structure that compressed credit risk for San Giorgio's shareholders, permitted the Republic of Genoa to borrow large amounts of debt at a low cost. The transformation of high transaction cost and difficult-to-trade debt instruments into transferable and liquid shares also reduced interest rates in England. Ultimately, however, in England and France the swap was mishandled by poor governance structures and political corruption and ineptitude that facilitated big bubbles. The Genoese were the first financiers to fully exploit the international payment mechanism, using credit instruments instead of costly specie transfers. In international trade finance, the lineage goes from Genoa of the 16th century to Amsterdam of the 18th century to London of the 19th century, and so on. Genoese bankers at the Spanish court of Phillip II used *juros*, obtained as collateral for short-term loans, to earn an interest rate spread between short- and long-term interest rates, thus being on record for possibly the first interest rate swap in history.

In Antwerp of the 15th century starts the history of exchanges and secondary markets and derivatives, which were greatly expanded in Amsterdam a century later. The Amsterdam Exchange brought us the modern age of funding and trading shares, including derivatives, of large enterprises. London copied Amsterdam and set a new frontier. New York followed London, and both centers have been at the top of the

pyramid for over a century. In fact, their business has grown relative to other centers. The United States went through a consolidation of exchanges in the 20th century, with the total number of them falling from approximately 100 to 5 over this period; and the NYSE gained market share from it (Arnold et al. 1999, Fig. 1). Regulatory reform and technological innovations were responsible for this consolidation. The introduction of country-wide telephone service in 1915 and of open-ended teletype in the 1930s favored the expansion of NYSE (Arnold et al., p. 1086), just like the laying of the first transatlantic cable in 1866 enhanced the financial integration between New York and London (Garbade and Silber 1978). The creation of a monetary union and the consequent replacement of national currencies with the euro in Europe has ushered a consolidation of exchanges (McAndrews and Stefanadis 2002). In 2000, the Amsterdam, Brussels, and Paris exchanges merged to form the pan-European Euronext. In June of 2007, the London Stock Exchange and Borsa Italiana announced plans for a merger. The consolidation of exchanges has now moved up to the global level. In April of 2007, NYSE and Euronext combined to form the first global stock market. NASDAQ, after having failed to purchase the London Stock Exchange, has announced an agreement to acquire the Nordic exchange OMX. More of this is expected in the future.

Consolidation is consistent with a deepening of economies of scale. Improvements in communication and information technology and the breakdown in financial borders favor the further expansion of leading international financial centers. By stretching their global reach, these centers can lower costs by sharing a common trading platform, while providing the benefit of deeper liquidity (Pagano 1989). The evolution of financial centers suggests that organized exchanges are best suited for low transaction cost and deep secondary markets.

12.5 Concluding Comments

Financial products are unstandardized and subject to a great deal of uncertainty. Geographical concentration reduces information and transaction costs in trading these products. The strong advantages of concentration show up in the persistence of financial centers. When centers finally lose their importance or disappear altogether, much of their legacy is carried by newer ones. Naturally, old institutions and products are re-engineered to suit the circumstances of the time; their roots remain, however. This is the essence of what I have called the long evolutionary chain of finance.

Finance and financial centers are the product of the West. Other great civilizations, such as China, have contributed little to this field. William N. Goetzmann and K. Geert Rouwenhorst (2005), in their *Introduction* to the *Origins of Value*, argue that these outcomes are accidents of history. For these authors, the financing requirements of the Crusades sparked the great Italian city states to experiment with bond issues and the development of bond markets. China, instead, financed the war against the Mongols with paper money and inflation. It could have been the other

way around: Equilibria are not unique. An important implication of the accidents-of-history thesis is that, in the words of the authors (p. 12), "[i]f capitalism is the confluence of fortuitous social, economic, and intellectual events ...we may not know how to re-create it. Will it work without the evolutionary process that brought it to fruition in Europe and North America over centuries, or will Russia and China be forced to perpetually exist as emerging markets ...?" We can restate this thesis by saying that initial conditions determine the uniqueness of the evolutionary path. But like in biology, financial evolution is not a smooth process: Jumps do occur over time and across space. Paper money, with the attendant benefits and costs, is now an integral part of the Western culture. Finance and financial centers have spread to the East, as Hong Kong, Shangai, and Singapore will attest. It might have taken a long time, but convergence is taking place.

The evidence of this paper is not consistent with the thesis that financial globalization brings an end to geographical concentration of financial services, also called the "end of geography" (O'Brien 1992), a point that is extensively elaborated by Michael Grote (2009: Chapter 13, this volume). International financial integration is not a new phenomenon. It was a key feature of the classical gold standard from 1880 to 1914; it then receded in the inter-war years and started again after World War II but especially after the end of Bretton Woods in 1973. Over this period, international financial centers have not only persisted but prospered. A mixture of centralization and decentralization is a better description of what happens as a result of financial globalization. Retail banking is widely dispersed, stock markets and bank headquarters are concentrated (Martin 1999). The trend toward increasing concentration of capital markets is not inconsistent with the existence of local capital markets. Small and medium-size firms have not the characteristics to accede to large centralized markets; hence, the reason why local capital markets can survive alongside concentrated markets.

One aspect this chapter has not treated is the relationship between financial crises and financial centers. Financial crises tend to occur predominantly where finance is most developed; they do not erupt in countries like North Korea. On the other hand, crises undermine the reputation of financial centers. Regulation and supervision, in addition to limiting the contingent liability of the public in relation to banking and financial failures, aim at shoring up reputation. Before the subprime crisis of 2007–2008, the United States enjoyed high reputation that its capital markets were deep, liquid, and legally safe. How will the subprime crisis alter the reputation of the US financial centers? Much depends on how policy will respond to the crisis. There are two different aspects to this policy. The first relates to an overhaul of the fragmented and complex US regulatory and supervisory architecture. The investing public, both at home and abroad, has been deeply shaken by the extent of the regulatory failure that has followed market failure. The damage will have to be repaired if the United States is to reestablish its comparative advantage in finance. The second relates to the international role of the dollar, which has permitted, until now, the United States to finance large and persistent current account deficits with debt denominated in dollars and at "subsidy" interest rates. The external deficits, in turn, imply a continued depreciation of the US dollar in exchange markets. Should this

trend continue, the dollar is bound to lose ground as a key currency in favor of more stable currencies, the euro first among them. A feeble regulatory architecture and a deteriorating dollar standard would deeply undermine the US comparative advantage in finance and the primacy of its financial centers.

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Chapter 13
Financial Centers Between Centralization and Virtualization

Michael H. Grote

Abstract   The chapter examines the current and future role of European financial centers. The "virtualization" of space leads to the weakening of the benefits from agglomeration through the widespread use of information and communication technology. Virtualization works well, however, only for standardized information, like stock prices, but not for complex information requiring constant interpretation. For the latter, face-to-face contacts cannot be substituted, and thus, financial centers are here to stay.

Nevertheless, it is not clear how many financial centers will survive. The chapter finds strong competition between Europe's first-tier financial center London and second-tier centers, such as Frankfurt and Paris. Due again to the nature of information, national centers will remain serving opaque domestic businesses. Thus, there is little competition between second-tier centers which are caught in between centralization – toward London – and regionalization toward the most opaque businesses within their respective countries.

13.1 Introduction

This chapter analyzes the role of European financial centers today. The financial sector is generally considered the most globalized of all economic sectors. Money is easily digitalized and is therefore highly mobile via information and communication technology. For this reason, it is generally believed that the spread of telecommunications together with the ongoing deregulation in Europe will have an enormous impact on the financial sector and financial centers. Why, in the age of the Internet, the financial industry still concentrates to a large extent in only a few cities and not only in one?

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Financial centers, like other agglomerations, are the outcome of both centripetal and centrifugal forces. These "shape the evolving geographies of domestic and global finance" (Martin 1999, p. 15). Section 13.2 deals with centripetal forces in financial production; these are linked to socio-institutional and cultural factors, labor market externalities, access to intermediate services, technological spillovers, and informational spillovers (Porteous 1999, Kindleberger 1974) and thus to proximity to other actors. Centrifugal forces, on the other hand, are related to congestion, rents, labor costs, lack of access to knowledge specific to other places and – provided that not all banks are located in the same financial center – internal economies of scale and scope. Section 13.3 analyzes face-to-face contacts that still do play a vital role in many financial businesses and are the major centrifugal force in the finance sector. Face-to-face contacts allow for the communication of complicated issues, create trust, and increase effort; therefore, announcements of the "death of distance" have been vastly exaggerated. Thus, financial actors are torn between the need to be close to clients and the need to exploit internal and external economies of scale by concentrating in one place. This reasoning leads to the conclusion in Section 13.4 that financial center competition predominantly takes place vertically and not horizontally between different centers on the same level. Financial centers at different stages of the hierarchy fulfill different functions. Surprisingly, the introduction of the Euro in continental Europe, so far, has had only few consequences for this hierarchy. We examine the forces that affect the location of stock trading in Europe in more detail in Section 13.5. The chapter closes with an assessment of the impact of increasing concentration of financial activities in London on firm financing throughout Europe.

13.2 Theory

Financial centers are among the most visible example of agglomeration. Various cities have served as financial centers during the last centuries; see Fratianni (2009: Chapter 12, this volume). Due to the fact that they do not need natural resources for their production process, concentrations of activity in specific locations are enigmas that need an explanation. Airports, train stations, and other elements of infrastructure, which are often cited as key locational factors, seldom trigger the evolution of a financial center; rather, they themselves expand, along with the importance of the location. In general, economies of scale – both internal and external – are regarded as the major driving force behind the emergence and perpetuation of financial centers. Agglomeration advantages are benefits that a single firm derives simply because it is located in spatial proximity to other firms. As these external economies of scale increase with every new participant, they tend to be dynamic (Thrift 1994). Two forms of agglomeration economies are generally distinguished: Localization economies – so-called Marshall-Arrow-Romer effects – are advantages emerging from the proximity to firms of the same sector, while urbanization economies –

so-called Jacobs effects – occur in close proximity to firms of other sectors (Fujita and Thisse 1996). Economies of scale and scope across firms in the same locale can generate significant comparative advantage to financial firms (Budd 1998). In the following section, the strengths of distinct agglomeration economies called pull factors are examined.

Liquidity and price information. Market liquidity has been one of the most important centripetal forces for traders in financial securities. Risk averse investors prefer to trade in a liquid market, because the risk of price changes caused by individual traders is lower, as is the risk of shocks (Gehrig 1998). Both liquidity and efficiency grow with the number of participants. Until recently, physical presence was required at each stock exchange in order to participate in the local market. It was also the only way to learn current stock prices and to understand the complex and partially unwritten rules of local stock exchange dealings (Grote et al. 2002).

Lower costs of infrastructure use. Closely related to this are external economies of scale through sharing infrastructure like settlement and payment systems. The greater the number of participants, the lower each individual's share of these fixed costs of running financial markets becomes (Thrift 1994). In the past, participation in these systems required an on-site presence for paper exchange. A study of foreign banks in Frankfurt shows that the German money settlement system was one of the major reasons for establishing offices in the city (Grote 2004).

Informational spillovers. A concentration of financial actors entails greater information turnover. As the number of possible contacts rises with the number of local actors, it can also be assumed that this local concentration leads to greater connectivity. It is therefore more likely that the diffusion of information and knowledge rises (Porteous 1999). This, in turn, leads to the creation of new knowledge and product and process innovations (Thrift 1994). Because it can be assumed that firms have different levels and types of knowledge, the benefits of communication grows with the number of participating firms. Communication is regarded as distance sensitive, which implies that the benefits of communication are larger when firms locate close to each other. Traders are dependent on a constant and rapid input of reliable information. Close contact prevents misunderstandings and allows for mistakes to be remedied quickly (Davis 1990).

Labor market. As the financial sector is still very much a "people's business" with a high demand for specialized expertise, a large local pool of specialized labor is not only attractive for firms but also for employees (Porteous 1999). Both sides can expect to make better matches because of the heterogeneity of qualification profiles and requirements (Kim 1991). Furthermore, the agglomeration of a large number of firms and potential employees reduces cyclical variations at the firm level.

Access to other business services. As argued earlier, agglomeration economies not only emerge from proximity to actors from the same sector but also to those of other sectors. Veltz (1996), for example, emphasizes the general advantages of locating in large metropolitan areas. The greater number and variety of firms can act as insurance against fluctuation and shocks. Veltz argues that this insurance increases in importance as uncertainty in the environment of firms grows. Because financial firms are users of specialized producer services, the concentration of firms from the

areas of law, accountancy, consultancy, and computers is especially attractive (Lo and Schamp 2001). Location near the source of such inputs can ensure better service and lower prices (Thrift 1994). Close proximity is important, because the timeliness of these services can be vital for exploiting profit opportunities (Porteous 1999). Although intermediary services are often less visible than financial firms, they are indispensable for the proper functioning of a financial center (Laulajainen 2001). Thus, the competitiveness of a financial agglomeration might be seen as dependent upon access to knowledge of specialized service suppliers (Lo 2001). The argument is therefore very close to informational spillovers.

Proximity to other industries. Close proximity and relationships to actors from diverse sectors provide traders with background information and industry insights to which they might otherwise not have access. These "urbanization" economies favor large cities that host a variety of industries. Then, informal networks can be used for verifying rumors; so, proximity yields more trustworthy information and thus can lead to greater trading profits. Empirical evidence shows that local proximity of traders to corporate headquarters is positively correlated with intraday trading profits. This might be taken as an indicator of the existence of local information advantages (Hau 2001a).

In the following section, we show that while some of the reasons for the spatial concentration of traders persist even in the age of telecommunication, other effects can be "virtualized". Virtualization is understood here as the substitution of virtual proximity, through the use of electronic systems, for spatial proximity.

13.3 Virtualization and its Counter-Forces

Local policy makers in financial centers are concerned about the ever increasing use of electronic communication methods, video conferencing, and direct flight connections between cities. Will financial centers become "virtualized" and thus disappear? Many of the cited reasons for spatial proximity are no longer relevant: With the introduction of computer-based trading and settlement and payment systems with remote access, both benefits, liquidity and low cost of infrastructure, no longer require an on-site presence. Markets can be accessed from any location anywhere in the world. Spatial proximity is substituted by virtual proximity on the net. Although the benefits of large numbers still occur, they can be reaped without being tied to one specific location. In these "virtual agglomerations" the "agglomeration of traders takes place within electronic communication networks" (Gehrig 1998, 13). Agglomeration economies thus turn into non-locational network externalities. This "virtualization" has many facets. Indeed, the back offices of European and US banks have now been moved not only to remote areas within their countries but also to faraway India and the Philippines. A large part of software development and maintenance for banks is done from Bangalore, and also parts of the core business of investment banks, equity research, is offshored and outsourced (Grote and Täube 2006). Online banking and presumably mobile bank-

ing have gained larger market shares. Will there be the "end of geography" in finance, as was predicted more than 15 years ago in a book by Richard O'Brien (1992)?

While some agglomeration effects have apparently disappeared from a spatial point of view, the impact of telecommunication on information spillovers is not so straightforward. The growth of information exchange via computer networks has been stunning in the last decades, and much has been written on the ensuing information age; see, for example, Castells (1997). Information that used to be restricted and difficult to obtain has now become ubiquitous. Stock prices, for example, are now available on the Internet in real time. It seems paradoxical that, at the same time, access to information is frequently mentioned as one of the most important locational factors. Indeed, many of the aforementioned agglomeration effects are still in effect and are not influenced by financial deregulation and communication technologies.

A large local labor market helps firms as well as employees to find suitable partners. Low search and transaction costs offer insurance against economic fluctuations. Wages are traditionally the largest part of costs in banks: A liquid labor market becomes more important, the more specialized are the qualifications. Especially high-volume and unstandardized tasks need a potential reservoir of qualified employees. Also, locally available business services continue to be important for banks: Meetings with specialized soft and hardware firms, business consultancies, accountancies, and international lawyers with a specialization in finance are required on a daily basis. Timely meetings and again a larger number of potential suppliers, for both sides, favor the localization in one place.

But why are these face-to-face contacts still so important? Why do people spend so much time in meetings, despite email, the Internet, and phones ubiquitously available? Not all kinds of information can be exchanged electronically. In the last few years, it has become increasingly evident that there is a crucial difference between information that is readily transferable via telecommunication and information that is not. These different types of information can be termed straightforward or complex (Gaspar and Glaeser 1998), standardized or unstandardized (Porteous 1999), codified knowledge or tacit knowledge (Cowan et al. 2000). Contrary to straightforward information, like share prices, interest rates, or the number of shares traded, complex information requires face-to-face contact. Complex information cannot be transferred without spatial presence of relevant counterparties. This is especially true if the information is highly contingent on different variables or if the information can be easily manipulated. In these situations, a unidirectional information transfer is not enough for the receiver to use the information (Lo 2000). Intervention, clarification, and redundancy are necessary for an actor to learn how to process the information and "to prevent misinterpretations or guarantee a certain degree of confidentiality" (Gehrig 1998, 33). Everyday examples for complex information are cooking or swimming. Even a very detailed description in a cookbook – simple information – does not turn a layman into a star chef. Only by long training, constant watching, repeating, imitating, and joint cooking with the master chef can knowledge

be transferred. Actors are often not fully aware of the workflow and unwritten rules, an important part of complex information, and therefore cannot transfer them electronically.

The transfer to the finance sector is evident: Only spatial proximity, a co-presence of actors, enables the exchange of complex information. Complex information requires not only an interactive but also a "thick" mode of communication. Body language, voice intonation, and eye contact can reveal depths of information which the written word cannot fully capture (Boden and Molotch 1994). Costly errors can be prevented by iterations of communication, in order to check the correct interpretation of a message. Finally, people tend to trust body language more than spoken language. Face-to-face contact is still the most efficient technology for the exchange of complex information. The more complex are the tasks, the more trust is needed, at least between parties on one side of the transactions. Trust is built by face-to-face contacts. Only the person who has passed the "test" of face-to-face meetings and has shown knowledge of the social, unwritten rules of the business belongs to the group. For instance, job interviews are overwhelmingly done face-to-face, especially when it comes to higher-ranking jobs. Once part of a certain group, one can verify rumors and half-baked information also via phone; see Lo (2003) for a detailed description of the merger and acquisition business.

In many cases, constant spatial proximity is not necessary. Temporary face-to-face contacts, say between a consultant and a client, are sufficient – as witnessed by many business trips in and out of financial centers. Orchestrating a complex deal with many external advisors, however, needs many meetings between the parties involved. Since these businesses are recurring, a constant presence of these actors in the same location, the financial center, saves transaction costs. Thrift (1994) argues that, despite new communication technologies, physical proximity to other firms remains crucially important within the financial sector. The "need for information, for the expertise that allows that information to be interpreted and for the social contacts that generate trust, information, interpretive schemes – and business – is paramount" (Thrift 1994, p. 334). Accordingly, social and cultural structures within the financial community (social embeddedness) determine the economic success of financial centers. Actors can meet frequently and without a long-term schedule. For running these meetings efficiently, social and cultural structures are becoming important. For instance, Beaverstock (2002) has highlighted the importance of business clubs for creating deal opportunities within Singapore's financial center.

Next to the exchange of implicit knowledge or complex information, another factor emphasizes the need for close spatial proximity – unintended and more or less random encounters with people from other firms in the finance sector. In these very informal meetings, actors tend to get informed about upcoming events, business opportunities, the importance of future official meetings (who else is coming?), market rumours and, last but not least, job opportunities. Information about innovations spread out quite fast with the help of these informal networks. The head of an American bank's subsidiary located in Frankfurt reported that the bank once relocated to a suburb to save rents. They suffered from a drop in business without the "presence on the market" and relocated again in the middle of Frankfurt's

financial district (Grote 2004). Information and communication technologies have not been able to close the gap between the "market" in the city center and the new location, only a few kilometres away. Even sophisticated video conferences happen on pre-scheduled dates with pre-set topics. It is unclear whether private information that is exchanged during these conferences stays private. This underlines the importance of spatial proximity within a financial district – notwithstanding technological progress. Face-to-face contacts and other forms of communication, such as phone and email, are not substitutes, especially when it comes to important decisions in complex contexts. The more information is ubiquitously available, the more interpretation and spontaneous meetings become necessary. Financial centers, therefore, will remain geographically distinguishable places of communication. It is a different question, however, how many financial centers are needed in Europe and elsewhere and where they will be located.

13.4 Financial Centers in Europe

European financial centers are part of the hierarchical world financial system. There are three world financial centers (world cities), one in each time zone. The status of New York and London in their respective areas is unchallenged but whether Tokyo – the preeminent financial center in Asia – or Hong Kong, Singapore, or Shanghai will finish first in Asia, is far from settled. Then there are the second-tier financial centers like in Europe – Paris, Frankfurt, Amsterdam, and Milan, again accompanied by national sub-centers.

13.4.1 Competition Among Financial Centers

What does that mean for the competition between financial centers? Often, ranking lists are produced that put financial center A ahead of center B. But do these centers compete? In other words, do banks consider going to Amsterdam instead of setting up a location in Paris? Do firms decide to go public in Frankfurt and not in Milan? Overwhelmingly, this is not the case. Paris and Frankfurt do not compete against each other. Foreign banks weigh the advantages between locations in a second-tier financial center against a location in London. For example, for a Chinese bank that wants to do business predominantly in Italy, the choice is between Milan and London. No other location will be taken into account (Schmidt and Grote 2006). Therefore, the size of most European financial centers reflects the size of the surrounding national economies. Exceptions to this rule include Geneva, Zürich, and Luxembourg that, for specific regulatory reasons, gained critical mass in asset and private wealth management, respectively. Competition among European financial centers happens generally vertically, between London and the second tier centers on one side and between the second tier centers and the sub-centers on the other; see Fig. 13.1.

Fig. 13.1 Competition and benchmarking in the European financial centre system Source: Schmidt and Grote (2006)
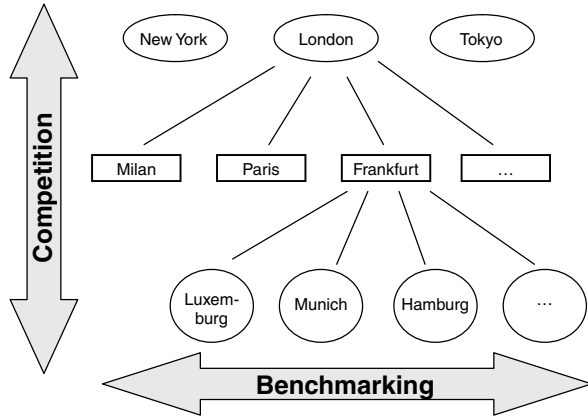
Thus, second-tier centers have two important competitors: London and the respective national sub-centers. Surprisingly, the introduction of the Euro in 1999 has not challenged the dominance of London. While in the past there have been fears about the loss of competitiveness of the City – mirrored by high-flying aspirations in Germany after becoming the location for the European Central Bank – banking and finance businesses have been largely unimpressed. London remains the place for the coordination of players irrespective of the currency denominations of the underlying financial instruments. If anything, the Euro has actually weakened Frankfurt's position as the former financial center of the Deutschmark, the leading currency in Europe before the Euro. Nowadays, most of the investment activities for Germany, including those of large German banks, are located in London. German subsidiaries of foreign banks are mostly responsible for the interface with German clients, but not with clients in other countries (with some exceptions in Austria and Switzerland). Generally speaking, second-tier centers have not succeeded in attracting business from other countries. In contrast, the press and policy makers often make comparisons among second-tier financial centers in terms of stock exchange turnover, number of foreign banks, and the like. While these may make sense for benchmarking, they ignore the fact that there is almost no direct competition among second-tier financial centers. National centers, however, do face competition from other cities within their respective countries.

13.4.2 National Centers and Other Locations

A third threat for second-tier financial centers in Europe, apart from virtualization and migration of activities to London, is migration of activities to other cities within a country. Again, the need for on-site presence has considerably weakened over time. Measuring the size of financial centers is notoriously difficult. Take for example stock exchange turnover. Today, more than 50 percent of Deutsche Börse's

turnover is generated from terminals located in London. To which center should this percentage be credited – London or Frankfurt? A more reliable indicator of activity would be people working in specific locations; but information is scarce, headcount statistics are only available at a much aggregated level (financial sector) and only published every couple of years. Many researchers resort to counting banks' local headquarters – especially foreign banks because these are the only ones that change locations – as the most reliable and available indicator for a given financial center's importance. One recent study (Grote 2008) on Frankfurt finds a surprising inverted "U" shape for the concentration of foreign banks in Germany over time.

Figure 13.2 depicts a "Locational Herfindahl Index (LHI)" that allows to analyze the overall spatial concentration of foreign banks in Germany over time. The LHI measures the sum of the squared shares of all foreign banks' locations in Germany separately for representative offices on the one side and subsidiaries and branches of foreign banks on the other. The "LHI composite index" merges the two indicators into one. There is a manifest inverted "U"-shape of the concentration of foreign banks. Starting at the end of the 1950s, foreign banks first tended to concentrate in one place, e.g., Frankfurt. That development peaked at the beginning of the 1980s. Frankfurt's historically low share of foreign banks today cannot be explained by the rise of another center but by dispersion of activities within Germany. Banks' interface with ultimate clients is affected only to a small degree by new communication technologies. Clients in knowledge-intensive businesses still need face-to-face contacts with their bankers (Storper and Venables 2004). Physical proximity is regarded as a competitive advantage. This is highlighted by the experience of a foreign bank in Germany: Since 2003, UBS has been buying wealth-management units
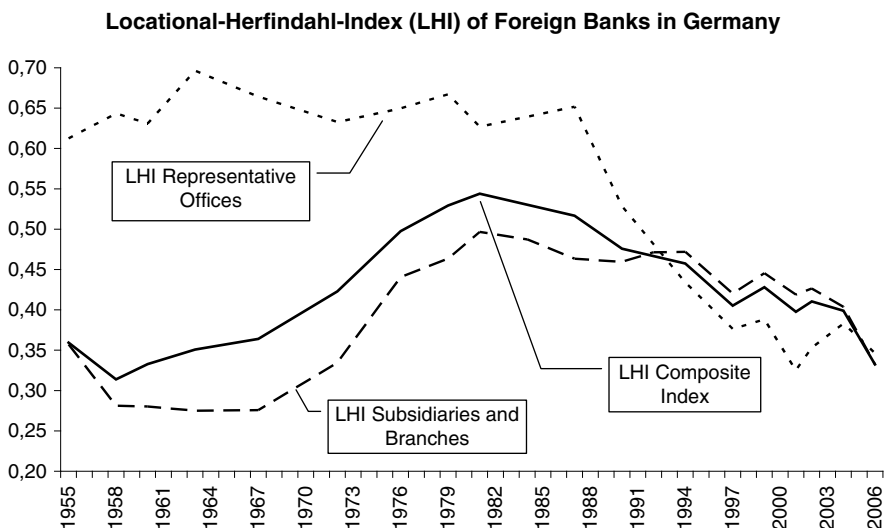
Fig. 13.2   Spatial concentration of foreign banks in Germany, 1955–2006
Source: Grote (2008)

from other banks and is now introducing offices all over Germany with the explicit aim to be closer to their (actual and potential) clients (UBS 2006). Interactions that take place between customers and banks are gaining in importance, leading to dispersion of banking activity in Germany.

The notion of "regionalization" of banking activities is supported by another analysis building on the geographic origin and geographic location of foreign banks in Germany. Out of 18 Austrian banks 13 are located in southern Germany and 5 in Frankfurt. Eight Dutch banks are located in western Germany, as are three out of six Belgian banks; Danish banks are exclusively located in northern Germany, mostly in Hamburg, where the only Norwegian bank resides. So, in parallel with the declining share of Frankfurt there is at least anecdotal evidence for regionalization of banking activities within Germany (Grote 2008). Wójcik (2002) finds a similar pattern for foreign shareholdings of German companies:

> The Dutch, Belgian and Swedish holders controlled companies located mainly in the north, including Berlin. The French, Austrian and Swiss entities held control mostly in the south, with Switzerland as the major source of foreign control in Ba-den-Württemberg, and Austria playing a similar role in Bavaria (Wójcik 2002, 887).

The strong manifestations of regional cross-country links are mirrored by the location of foreign banks. Relying on information and communication technologies, face-to-face contacts with clients become relatively more important; and accordingly, banks move closer to their clients. Thus, second-tier financial centers in Europe face two unpleasant developments. These centers lose not only against London but also against other cities dispersed in the country.

13.4.3 The Future of Second-Tier Centers

Does that mean that national financial centers become meaningless? Information and communication technology has ambiguous effects on financial centers, through concentration of activities and increasing mobility (O'Brien 1992, Grote et al. 2002). Standardized transactions requiring minimal interaction between financial actors (transaction processing, for example) can be concentrated in one place and then shifted to any location. These activities often yield only small revenues, and therefore seek out peripheral locations (Walter 1998, Lee and Schmidt-Marwede 1993). But for high-value businesses, centrifugal forces so far appear to be of minor importance. Gehrig (1995) goes further and asserts that the financial literature should ask the reverse of the common question of why economic activity is concentrated in only a few places. It should ask, rather: Why is all economic activity not concentrated in one single location? Localized knowledge about customers that is inaccessible from a financial center is the main centrifugal force at play. Ter Hart and Piersma (1990) focus on the determinants of physical, or spatial, proximity in financial sectors with respect to the requirements of financial transactions: the intensity of face-to-face-contact, the importance of contact rapidity and intensity, the scale of transaction, and acquaintance with the other party. The more complex and closer is

the transaction to the customer, the tighter is spatial proximity to customers (who are presumably dispersed) and the less concentrated are financial activities. Similarly, Clark and O'Connor (1997) divide financial products into three categories - transparent, translucent and opaque, based primarily on the information type and specificity required in order to trade in each product. The more localized knowledge is necessary to handle a product, the less concentrated are financial activities. Their classification suggests a hierarchical financial center system in which opaque products tend to be traded in sub-national centers, translucent products mainly in national centers, and transparent products in global financial centers.

From this point of view it is very unlikely that all banks will relocate to London, even if Great Britain were to introduce the Euro. A study on foreign banks in Frankfurt (Grote 2004) investigates bankers' responses to the question of why they are operating in Germany, mostly centering on face-to-face contacts and gathering knowledge on new laws and regulations. Among the reasons banks cite for coming to Germany, the answer given most often was their clients' desire to have a contact in Germany (Grote 2004). "Face-to-face" contact is crucial in banking, and knowledge regarding changing regulatory frameworks and the changing needs of potential clients necessitate a presence in the country as well. Some bankers, however, held that maintaining a presence in Germany is no longer necessary, and others were still concerned with German Mark payments until the final introduction of the Euro. Still, the majority of responses related to close contact with clients. Language is still an important issue, but not as significant as might have been expected; in most cases, it has not been possible to serve German clients from a foreign German office, even if staffed by Germans. As one interviewee explained, "The connection to the domestic cultural milieu gets lost once you are located abroad" (Grote 2004, Gehrig 1998). Knowledge of the nation-specific customs of business (usances), the ability to assess the state of a firm and its loans and the ability to gain access to clients all demand a permanent presence in the country where business originates. Additional factors cited were face-to-face contacts with other bankers and the need to demonstrate commitment to German clients by means of a German address and telephone number (Grote 2004).

However, some banks state that local presence is a thing of the past. That indicates that the European system of financial centers is likely to experience some changes in the coming years. These changes will be difficult to quantify by means of indicators like number of banks and a headcount of respective financial centers. Financial businesses are unique in their need for proximity to clients, other banks, and bank headquarters, and predictions regarding the future of the European system of financial centers must take this into consideration (Grote et al. 2002). In general, the less client-contact is needed the more likely that a business is mobile.

Some "informed speculations" about the fate of other financial centers in Europe might be in order. Although Germany's financial system is more bank-driven than most other systems and conclusions are therefore not easily drawn from the German case, we expect similar losses in importance for other national financial centers. Two recent studies on Amsterdam (Engelen 2007, Faulconbridge et al. 2007) report a recent decline of its financial center. One of the main reasons responsible for

this development is the loss of "opaqueness" of many financial products with more and better information availability and the development of specialized information providers over time (Faulconbridge et al. 2007). Since the two papers do not look at Amsterdam's relative domestic position, inferences about any "U"-shaped development cannot be drawn. Nevertheless, the loss of localized business activity due to lower "transport" costs is in line with developments in Frankfurt. While second-tier European financial centers might lose in relative importance for the provision of financial services, this does not spell the end of those centers, since there is a range of products for which local coordination between banks and within banks, as well as local knowledge, remains important (Wójcik 2007). A complete dispersion of activities in the respective countries is unlikely, since traditional agglomeration factors, infrastructure, labor market, and spillovers still exist. At the same time, not all business can be conducted from abroad (Grote et al. 2002). Second-tier financial centers are here to stay. For transactions that need face-to-face contacts with local clients, thorough knowledge of local laws and rules, as well as repeated interaction with other players, national financial centers remain the location of choice for financial actors. But we might have already seen the peak of the inverted "U" in the development of those second-tier financial centers in Europe.

13.5 Mobile Markets – Stock Exchange Trading

Stock trading exemplifies the locational pull that financial actors experience. In the past, physical presence at the stock exchange was absolutely necessary to execute trades on the floor. Since traders are closely associated with banks, it is not surprising that the rankings of stock exchanges closely reflect the rankings of financial centers. New information and communication technologies shift the organization of the trading process from floor-based trading to screen-based systems. With "transportation costs" approximating zero, it is now possible for spatially separated traders to tap directly into the same market. In a way, the new remote access technology has transformed liquidity from a spatial agglomeration into a virtual network. In principle, at least, the most liquid market can now be tapped from anywhere through telecommunication networks; on the surface, a spatial dissemination of traders seems highly likely.

With the possibility of remote access, the need for traders to be present on the floor has disappeared. Due to strong localization effects in the financial sector, traders tend to move to London, by far the largest financial agglomeration. Informational spillovers with other traders on one hand and information from headquarters of traded firms on the other became opposing forces that determine the location of stock traders (Lo and Grote 2002). Hau (2001a,b) studied the effect of distance on proprietary trading profits using data from traders located in eight European countries with access to Xetra, the electronic trading platform of the German Stock Exchange; and found that traders in non-German speaking financial centers underperform in large blue chip stocks.

On the other hand, spatial proximity to other traders, analysts, and sales force is essential for performance. This information is not always clear-cut and is not easily transported by information and communication technologies. Often, it is more a feeling of how the market is going to move, based on the analyst's experience. In these situations, face-to-face contact is decisive, because it can relay the ambiguous nature of the analyst's assessment (Power 2002, Storper and Venables 2004). Other well-known agglomeration forces, such as the spreading of new ideas and knowledge (Thrift 1994), a thick labor market (Porteous 1999), and the co-location of firms in related sectors have drawn traders toward the location where most other traders and analysts are, that is, London. So in the last years, London has emerged as an ever more important trading place for European stocks. The Amsterdam stock exchange, after the merger with Euronext, has experienced a decline in Amsterdam-based traders; that decline has been matched with a steady increase in remote access members (Engelen 2004). Due to the strong natural monopolies in stock trading outlined above, trading still takes place on several stock exchanges: German stocks are predominantly traded at Deutsche Börse, French and Dutch stocks at Euronext, etc. However, while trading takes place on the Deutsche Börse's Xetra system, traders are to a large extent located abroad: about 55 percent of Xetra's turnover is generated from overseas, as is more than 75 percent of Eurex's, the derivative arm of Deutsche Börse (2005a). As a consequence, the largest and most important customers of a profit-maximizing Deutsche Börse AG are now seated in London and not in Germany.

It is generally acknowledged that European stock exchanges are still too fragmented, and a consolidation is about to come (de Smidt and van Rietbergen 2002, McCreevy 2005). Euronext, the merger among the stock exchanges of France, Belgium, the Netherlands, Portugal, Scandinavian and Baltic countries is an example of this consolidation. However, with the exception of the London Stock Exchange and the Borsa Italiana in Milan, so far no major European stock exchange has merged. The business logic behind the proposed merger of stock exchanges is clear: economies of scale in providing the IT-infrastructure, trading systems, and general administration. Also, large customers that now work on several systems would be able to consolidate these systems. Liquidity of the now separate markets could be pooled and the choice for investors broadened (Deutsche Börse 2005b). What is most interesting in the formal proposals of both Deutsche Börse and Euronext for their potential acquisitions of the London Stock Exchange in 2005 is the emphasis placed on the geographic location of the board of a future merged stock exchange. Both potential acquirers intend to relocate a substantial part of their respective board functions to London, thereby weakening the influence of their own incumbent headquarters. Deutsche Börse, for example, has committed to move to London the members of the Executive Board responsible for the Cash Equities, Derivatives and Clearing businesses (Grote 2007). The heads of the business units with close contacts to customers are to move where the largest and most customers are, namely London. The Euronext statement reads similarly. Also another bidder for the London Stock Exchange, the Australian firm Macquarie, has been eager to reassure the financial community in London that the stock exchange's management will not

be relocated. This is remarkable: stock exchanges that build their entire business model on "virtual" trading still feel the need for close face-to-face interaction with their important customers.

Why do shareholders (who also happen to be customers, to a large extent, in the case of the London Stock Exchange) insist on a specific location for the management of the new entity? Why are acquirers willing to accept these conditions? Innovative processes are based on the exchange of tacit knowledge – such as the creation of new markets, indices, and technologies – or trading of new financial instruments. A "user-producer relationship" between traders and the stock exchange requires spatial proximity to get to know the – probably still unarticulated – needs of the traders (the market) before any other stock exchange provides that product. Moving close to the traders therefore is a profit-maximising strategy. Innovations in complex products often occur when users and producer work closely together (Lundvall 1988). Face-to-face contact is still the best "communication technology" (Storper and Venables 2004): being close to one another delivers more, richer, and faster information.

13.6 National Financial Centers and Corporate Financing

The development of innovative firm financing solutions – such as new market segments and new instruments, and innovative trading algorithms in the secondary markets – require constant interaction and, thus, spatial proximity. Solutions to financing problems can be provided by stock exchanges with a "user-producer interface." The more complex and variable the problems and the technology employed, the closer user and producer have to work together. It is striking that many financial actors with a focus on the rest of Europe are concentrating in London: banks, investors, traders, analysts, and now possibly stock exchanges, at least with the heads of customer-related activities. European firms, on the other hand, do not migrate. When representatives of Deutsche Börse or Euronext proposed to move to London to be closer to their important customers, they were conscious that they were giving up proximity to the headquarters of the listed firms.

But why should firms care about the location of investors, banks, traders, and analysts? Some recent research has brought to light the interrelation of information availability, geography, and investor behavior. For traders, close links to company insiders are important to establish personal networks that pay off in the form of timely information. For analysts, geographic proximity delivers more accurate analyses and more market impact than analyses done farther away (Malloy 2005). In line with the information hypothesis, these results are more pronounced for firms in remote areas.

A further, well-documented fact is the so-called investor's "home bias": the actual proportion of foreign assets held by investors is too small relative to the predictions of standard portfolio theory (French and Poterba 1991, Pinkowitz et al. 2001). This becomes even more obvious when looking into the home bias at home, i.e., local preferences in domestic portfolios. Coval and Moskowitz (1999) and

Grinblatt and Keloharju (2001) show that information asymmetries occur not only in international finance, but also within a country. So, when investors and firms are separated spatially, this might spell problems for firms. Traders located in London might make less profit when dealing with companies in other countries than their respective national counterparts: London-based analysts' reports may be less accurate and have less impact than the reports of analysts close to the firm's headquarters; and consequently London-based investors might prefer investing in large foreign firms. In short, the literature suggests that it is less attractive to invest in foreign firms. For the financial community, the agglomeration benefits of being located in London obviously outweigh the disadvantages of being far away from investment opportunities. That could mean higher capital costs and less financing opportunities for non-UK European firms, especially small and medium-sized ones. Indeed, Loughran and Schultz (2006) find evidence that rural firms – with a greater distance to potential investors – trade less and are owned by fewer institutional investors than urban firms. In another paper, the authors show that rural firms also go public later than urban firms, have more debt on their capital structure, and are less likely to conduct seasoned equity offerings (Loughran and Schultz 2005).

When stock exchanges merge and move their heads of product development to London, the user–producer interface with domestic firms deteriorates. However, any changes in the quality of the relationship between stock exchange and firms are dynamic in nature and are not felt immediately. The development of new capital market products, especially designed for local firms, is likely to slow down. Smaller countries with smaller centers suffer first from this development. For instance, after the merger of the Amsterdam stock exchange into Euronext in 2000 and the adaptation of the French trading and fee system that is unfavorable for smaller companies,

> many publicly quoted SME's have seen their window of trading being reduced to once or twice a day, leading to an erratic price formation process and a decline in daily trading... [that] severely limits the attractiveness of a public quotation (Engelen 2004, 22).

This is consistent with the results of Alessandrini et al. (2009: Chapter 5, this volume) who show that small and medium sized enterprises face greater financing obstacles when the "functional distance" that separates them from banks' headquarters increases. A rise of the importance of London relative to national financial centers is likely to increase the gap between firms and credit providers and, thus, the ability of firms to finance innovations. Another long-run concern, perhaps less visible, is that as banks move their headquarters – or at least their business units – to London the local regulatory authorities lose contact to "the market". New regulations usually come into being after long, intense and often informal talks between regulations and market participants. Even in today's Europe, much of the interpretation of regulations remains in the hands of national agencies (witness the discussion about hedge funds in Germany). Should new financial instruments be developed and applied predominantly in London and not at the national level, national regulations would be left behind. National regulators might not be suited to accommodate new businesses, thereby increasing the gap between them and London even further, or might not keep up with the risk involved in new instruments.

13.7 Conclusion

Banks reap internal and external economies of scale and scope by concentrating many activities in one place, such as London. Some tentative speculations about the future competition between the world financial centers are in order. The declining role of the US dollar as a world reserve currency might have long-run consequences. As the subprime financial crisis has shown, foreign investors fuelled the demand for dollar denominated products, thereby pushing profits and the number of jobs in Wall Street firms to unprecedented heights. The more the Euro grows as a global reserve currency, the more demand will manifest itself in Europe – presumably at the location with the most sophisticated financial knowledge, i.e. London. However, the relative gain against New York might turn into a phyrric victory for London. It is unclear how far investors' appetite for complex financial products will return after the crisis subsides. The less complex the products, the fewer are the interactions between bankers – and indeed, the fewer bankers are needed. Thus, in the medium term second-tier financial centers might suffer less from the current crisis, at least in comparison with the world financial centers.

In a longer perspective, technological developments allow banks to locate their offices nearer to their customers. National financial centers are torn between concentration of activities at a European level and dissemination of activities within their country. Their role is likely to be reduced further in the future. Nevertheless, European second-tier financial centers will not disappear. These centers are best suited for activities that are rich in interaction with local clients and moderate in interaction with financial actors. Added concentration in London might raise the cost of capital on firms throughout Europe through the lengthening of distance. Geographical space continues to matter in finance.

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