

Real Effects of Bank Concentration and Competition in Europe^{*}

Nicola Cetorelli
Federal Reserve Bank of Chicago
and
Wharton Financial Institutions Center

Prepared for
The Federal Reserve Bank of Cleveland and Journal of Money, Credit and Banking
2003 Annual Conference on Banking Consolidation and Competition,
May 21-23, 2003

Abstract

European Union (EU) countries have experienced significant deregulation affecting the banking industry, a process culminated in 1993 with the implementation of the Second Banking Coordination Directive. Prior to 1993, cross-border expansions were heavily constrained. Under the current regime, in contrast, banks from EU countries are allowed to branch freely into other EU countries. By removing substantial barriers to entry, the new legislation aimed at generating significant improvements in the competitive conditions of financial markets. However, concurrently to the process of deregulation, European banking industries have also experienced a significant process of consolidation and increase in market concentration. Exploiting such significant innovations affecting the banking industries of EU countries, this paper explores the effect of changes in banking market structure on the market structure of non-financial industries. It asks whether bank competition promotes the formation of industries constituted by a few, large firms, or rather, whether it facilitates the continuous entry of new firms, thus maintaining unconcentrated market structures across industries. Theoretical arguments could be made to support either hypothetical scenario. Empirical evidence is derived from a panel of manufacturing industries in 29 OECD countries, both EU and non-EU members, adopting a methodology that allows controlling for other determinants of industry market structure common across industries, across countries or related to time passing. The evidence suggests that the overall process of enhanced competition in EU banking markets has led to less concentrated markets in non-financial sectors.

JEL Classification Codes: L2, G2, G3

^{*} The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Chicago or the Federal Reserve System. I thank participants to the World Bank Conference on Bank Concentration and Competition and especially Andy Winton for comments and suggestions.

1. Introduction

This paper analyzes the effect of bank deregulation and bank concentration on industry structure in European countries. European Union (EU) countries have experienced significant deregulation affecting the banking industry. The process of regulatory reform was motivated by the need to achieve the level of harmonization required for the establishment of a single, competitive market for financial services. This process has culminated in the early 1990s with the implementation of the Second Banking Coordination Directive, which defined the basic conditions for the provision of the so-called Single Banking License. Prior to the enforcement of the new regulation, cross-border expansions were subject to the authorization and subsequent control of the host country, as well as to capital requirements. Under the current regime, in contrast, banks from EU countries are allowed to branch freely into other EU countries. It is common opinion that the Second Banking Coordination Directive has represented the most significant deregulation in European banking in recent history. By removing substantial barriers to entry, the new legislation was specifically aimed at generating significant improvements in the competitive conditions of financial markets.¹ Concurrently to the process of deregulation, European banking industries have also experienced a significant process of consolidation, as indicated by a substantial decrease in the number of operating banks in many countries. In keeping with the structure-conduct-performance hypothesis, one would expect negative effects on competition associated with this

¹ Empirical evidence consistent with this prior is provided, for instance, in Angelini and Cetorelli, (Forthcoming).

process, especially considering that consolidation has mostly taken place within individual countries: relatively few genuine cross-border bank mergers have been observed in Europe. This study estimates the effect of bank deregulation and bank concentration on the market structure of non-financial industries, using a panel of both EU and non-EU member countries.

A growing body of research work has been devoted in recent years to analyzing the role played by financial markets in real economic activity. The theoretical conjecture that financial markets should matter for economic growth is hardly recent, tracing back at least to Schumpeter (1912). The contemporary empirical work is also inspired by the previous contributions of Goldsmith (1969), Gurley and Shaw (1967), and McKinnon (1973). The revival of this literature in the last decade was inspired in large part by the fact that extensive and reliable cross country data sets had become available in the 1980's (e.g., Penn World Tables), and by the lingering theoretical debate about the actual importance of financial markets for real economic activity. The work that has followed, e.g. King and Levine (1993 a,b), Demirguc-Kunt and Maksimovic (1998), Levine and Zervos (1998), Rajan and Zingales (1998), Levine, Loayza and Beck (2002), has provided robust empirical evidence that broader, deeper financial markets are strongly associated (causally) with better prospects for future economic growth.

Having established this basic finding, the research effort is now focused on the analysis of the *mechanisms* through which finance affects growth: what are the specific characteristics of financial markets that seem to be associated with lower or higher growth prospects? For example, does it matter whether banks are privately or government

owned (La Porta, Lopez-de-Silanes and Shleifer, 2001), or whether there is higher or lower protection for financial contracts (Levine, 2000), or whether banks are in a more or less competitive environment (Jayaratne and Strahan, 1996, Cetorelli and Gambera, 2001)? And related to this, just what aspects of firms and industries are impacted by finance so that it eventually translates into more economic growth?

This paper focuses on addressing precisely this last question and it is the natural continuation of a research agenda in which I explore the role of banking market structure on the *market structure* of industrial sectors.

In recent years, much theoretical and empirical work has examined the economic role of banking market power. Challenging the customary view that a lack of competition in the banking industry is unequivocally detrimental to social welfare, authors have suggested that concentration of market power may in fact enhance the role of banks as information producers in their lending activity and their willingness to establish close lending relationships with their client firms.²

This paper contributes to a new dimension of analysis, investigating the effect of bank concentration on the market structure of industrial sectors: does concentration of market power in the banking industry lead banks to concentrate funding toward a few firms of large size, or does bank concentration foster entry of new firms over the life cycle of an industry, thus contributing to maintaining an unconcentrated market structure? For this purpose, the innovations that have taken place across EU banking markets make a good example of a case study where to apply empirical methodologies characteristic of

² See, e.g., Pagano (1993) and Guzman (2000) for theoretical arguments suggesting that banking market power reduces equilibrium credit, thereby generating a negative effect on economic growth. Petersen and Rajan (1995), Shaffer (1998), Cao and Shi (2000), Dell’Ariccia (2000), Manove, Padilla and Pagano (2000), Cetorelli and Peretto (2000)

“natural experiments” type of settings.

The role of banking market structure on the market structure of industrial sectors has not received much attention so far in the mainstream economic literature.³ Scattered evidence is found in the work of history scholars. For example, in his study of Italian industrialization in the late nineteenth century, Cohen (1967) describes how a quasi-monopolistic banking industry “...led to the emergence of concentration of ownership and control in the new and rapidly growing sectors of the industrial structure”. Capie and Rodrik-Bali (1982) note that the intense process of consolidation and increase in concentration that characterized British banking in the early 1890’s preceded that experienced later on by manufacturing industrial sectors. Similarly, Haber (1997) and Maurer and Haber (2002), report a very close connection between bank and industry concentration in mid- to late-nineteenth-century and early-twentieth-century Mexico. The general impression from historical studies that bank concentration should be associated with concentrated industries is finally expressed by Cameron (1967) in his renowned study on banking in the early stages of industrialization, where he states that “...Competition in banking is related to the question of competition in industry. In general the two flourish – and decline – together. Whether this phenomenon is a joint by-product of other circumstances, or whether it results from the decline or restriction of competition among banks, is a matter worthy of further research. It is a striking coincidence, in any case, that industrial structure – competitive, oligopolistic, or monopolistic – tends to

identify instead potentially positive effects associated with banking market power.

³ This paper is closely related to Cetorelli (2001) where I have developed the basic rationale behind the relationship between banking and non-financial industry market structure.

mirror financial structure.”

What are the economic mechanisms through which a characteristic of the banking industry such as its market structure should have anything to do, possibly in a causal sense, with the market structure of industrial sectors? While a formal theoretical model focusing on this relationship is still missing, we can delve on the existing literature on the economic role of banking market structure to formulate alternative theoretical conjectures. To this end, the framework proposed by Petersen and Rajan (1995) represents a good foundation from which to ponder the role of banking market structure on the market structure of non-financial industries. Petersen and Rajan argue that young and unknown firms have easier access to credit if banks have market power. In their reasoning, banks with market power fund young firms with the expectation that they will be capable of extracting future rents once those firms eventually become profitable. Following their reasoning one could argue that banks with market power, pursuing their goal of profit maximization, should always attempt to select the best available pool of entrepreneurs, thus favoring new entrants along the entire life cycle of an industry. This is because new entrants are potentially endowed with higher return projects and more innovative technologies that would guarantee ever increasing profit-sharing opportunities for the banks.

Yet, maintaining the same premises in the Petersen and Rajan model, it is also legitimate to envision completely different economic forces at play, which could lead to opposite conclusions. The basic argument in Petersen and Rajan relies on the formation of long-time lending relationships and on the value that inheres to such relationships for the bank.

The latter is represented in their work by the present value of the future stream of profits of those firms the bank originally helped start up, firms that eventually become the industry incumbents. A possible theoretical “tension” embedded in this argument lies in the fact that the profitability of the older bank clients (and thus the bank’s own profitability) will be affected by the entry of new firms. In recent papers, Cestone and White (Forthcoming) and Spagnolo (2002) have presented theoretical frameworks in which existing lending relationships do indeed affect the behavior of lenders vis-à-vis potential new borrowers. The less competitive the conditions in the credit market, the lower the incentive for lenders to finance newcomers. Hence, financial market competition can represent a form of barrier to entry in product markets.⁴ This theoretical argument would then suggest that bank concentration should enhance industry concentration.

Judging by the formulation of these alternative conjectures, the effect of bank concentration on industry market structure is therefore theoretically ambiguous. Empirical evidence presented in a series of recent papers indicate that in fact higher bank concentration and more banking market power are associated with higher industry concentration. Cetorelli (2001) provides evidence that bank concentration leads to larger average firm size in non-financial sectors. Cetorelli and Strahan (2003) show that the effect is not only limited to an impact on the first moment of the size distribution but that higher bank concentration and market power have an impact on the entire distribution of firm size. With a focus on the entire industry life-cycle dynamics, Cetorelli (2003) show

⁴ This work is itself based on contributions to the issue of product market competition, such as Brander and Lewis

evidence that more bank concentration implies less entry and thriving of younger firms and also delayed exit of older firms. Finally, using cross-country, firm-level data, Beck, Demirguc-Kunt and Maksimovic (2003) find evidence that more bank concentration is associated with more financing obstacles, especially for smaller firms.

This paper gathers empirical evidence on the effect of changes in banking market structure on average firm size in 27 manufacturing sectors in 28 OECD countries over time. It confirms that sectors where incumbents are more dependent on external sources of finance have a disproportionately larger average firm size if they are in countries with a more concentrated banking industry. The evidence also indicates that such an effect of bank concentration on industry market structure is substantially reduced, if not reverted, for countries after becoming members of the European Union. Moreover, the EU-specific industry deregulation associated with the implementation of the Second Banking Directive has also lead to less concentrated non-financial industries.

2. Methodology and data

This section describes the empirical model used to identify the effects of bank concentration and bank deregulation on firm size and provides detailed information on the data set.

In order to test the effect of bank concentration and to focus specifically on EU markets, the following fixed-effect model specification has been adopted:

(1986), Chevalier (1995), Kovenock and Phillips (1995, 1997), Maksimovic (1988).

$$(1) \quad \text{Avg. Firm Size}_{ijt} = \alpha_i + \beta_j + \gamma_t + \delta \cdot \text{Bank Concentration}_{it} \cdot \text{Ext.Dep.Incumbents}_j + \\ + \eta \cdot \text{Bank Concentration EU}_{it} \cdot \text{Ext.Dep.Incumbents}_j + \varepsilon_{ijt}$$

where average firm size in country i , industry j and time t is measured either as the natural logarithm of the ratio of value added and number of establishments, or as the natural logarithm of the ratio of total employment and number of establishments, both for each sector j , in country i and time t . The data on manufacturing sectors at three-digit second-revision ISIC level of disaggregation for 29 OECD countries is extracted from a data set put together by the United Nations Industrial Development Organization (UNIDO). The time series availability varies by country but it spans from 1980 to 1997.

In this model specification, $\alpha_i, \beta_j, \gamma_t$ capture, respectively, the country-specific, industry-specific and time-specific components of firm size: Kumar, Rajan and Zingales (1999) identify several industry-specific and country-specific factors as possible determinants of industry firm size. For instance, the degree of capital intensity, the amount of employed human capital and the R&D intensity are all possible characteristics, among many others, that are likely to affect an industry's market structure. Likewise, the quality of the judicial system, the set of laws and regulation and the level of economic and financial development are some of those "environmental" factors, common across industries in a country, which are also likely determinants of firm size. Finally, firm size could also contain a common cyclical component. The inclusion of the three vectors of indicator variables in the model specification allows controlling for the simultaneous influence of these industry-, country- and time-specific factors.

The effect of bank concentration on firm size is still identifiable measuring the differential effect across industrial sectors, arguing that if an effect exists, it should be especially noticeable on those sectors where incumbent firms are still in need of external sources of funds: As Rajan and Zingales (1998) observed, industrial sectors differ from one another, for technological reasons, in terms of the degree of dependence on external sources of finance. For example, sectors such as Tobacco, Food, or Beverages have much lower needs for external funding than sectors such as Machinery or Professional and Scientific Equipment. What is also true is that external financial dependence varies with the age profile of a firm. That is, when young, firms in almost all sectors display a positive need for external funds, while they maintain such needs at later stages in the life cycle only in a fraction of sectors⁵. Now, from the theoretical underpinnings illustrated above, we gather that bank concentration may play a role in industries' market structure in that banks in concentrated markets may choose to privilege their older clients. Indeed the conjecture is about *competition for funding* between industry incumbents and newer entrants. Hence, in sectors where incumbents are not dependent on external funding there will not be any competition for resources with entrants, and bank concentration should not matter much as a determinant of firm size in those sectors. If there is any effect to pick up in the data, we should find evidence of it by focusing on those sectors where in fact old firms, the incumbents, are still in need for external funds. The interaction terms in model (1) identify the role of bank concentration. More precisely, bank concentration measures the 3-firm ratio in each country i and time t , and it is multiplied by an indicator variable equal to one for sectors where mature firms (more than 10 years old) have

⁵ In our dataset, 16 out of 26 sectors display a positive need for external finance for mature firms.

above-median level of dependence on external sources of finance. The cross-country data on bank concentration is taken from Demirguc-Kunt and Levine (2001) and it spans from 1990 to 1997. The data on external financial dependence is instead taken from Rajan and Zingales (1998). It is measured on U.S. listed companies and it is computed as the fraction of capital expenditure not financed with cash from operations, as an average over the 1980-1990 decade.⁶

Hence, if bank concentration leads to the funding of fewer and larger industry incumbents, we should find that sectors where those older firms are highly dependent on external finance should exhibit, all else equal, a disproportionately larger average firm size if they are located in countries characterized by higher bank concentration.

The second term of interaction captures the differential effect of bank concentration in EU countries, and it is the product of the first term of interaction with a dummy equal one for EU countries, from the year they become members. Note that since they have variability across all three dimensions, both terms of interaction are identifiable even in the presence of the three vectors of dummy variables.

The competitive effect associated with the implementation of the Second Banking Directive is identified using a similar model specification:

$$(2) \text{ Avg. Firm Size}_{ijt} = \alpha_i + \beta_j + \gamma_t + \delta \cdot \text{Bank Deregulation}_{it} \cdot \text{Ext.Dep.Incumbents}_j + \varepsilon_{ijt}$$

⁶ Rajan and Zingales (1998) argue that the “dependence of U.S. firms on external finance [is] a good proxy for the demand for external funds in other countries” (Rajan and Zingales (1998), p. 563–65).

where bank deregulation is an indicator variable which takes value one for those European countries that are members of the European Union, either after 1993 (the year the Second Banking Directive was implemented) or after the country becomes a member of the EU, whichever comes later.⁷ The improvement in competitive conditions in EU banking markets after deregulation should have an *opposite* impact on average firm size than that of bank concentration identified with model (1). More precisely, if bank concentration implies a larger average firm size in sectors where old firms are still dependent on external finance, an improvement in bank competition via deregulation should imply easier access to credit for industry entrants and therefore a lower average firm size.

In both models I have also included, as additional control variables, total manufacturing value added in each country i and time t , and the ratio of sectoral value added over the total for each sector j , country i and time t . Both variables were constructed using the UNIDO data set.

Table 1 shows the pattern of average firm size and bank concentration across countries, and Table 2 the pattern of average firm size and external financial dependence across industrial sectors.

3. Empirical results

1. The effect of bank concentration on industry market structure

⁷ Belgium, Germany, France, Italy, Luxembourg and the Netherland joined the EU from its inception in 1950. Denmark, Ireland and the United Kingdom joined in 1973, Greece in 1981, Spain and Portugal in 1986, Austria, Finland and Sweden in 1995. In addition to its 15 current Member States, the EU is preparing for the accession of other 13 eastern and southern European countries.

Table 3 presents the results of a basic regression where I estimated the differential effect of bank concentration across industries, for all countries without distinction between EU and non-EU members. These estimations were obtained to verify the degree of consistency with those in Cetorelli (2001). The main difference was that in Cetorelli (2001) the data set included a cross-section of manufacturing industries in OECD countries but without a time series dimension. In this table the dependent variable is the logarithm of value added over number of establishments. In column (1) I use the entire OECD group of countries and include industry, country and time indicator variables. As reported, the bank concentration interaction exhibits a positive and significant coefficient, indicating that, controlling for industry, country and time specific factors and for the specific stage in life-cycle a sector is in, sectors where old firms are more dependent on external finance have firms of disproportionately larger average size if they are in countries with high bank concentration.

One could argue that despite the inclusion of the total manufacturing value added variable, the model may not properly control for factors having the same double dimensionality – time and country variability - of the bank concentration variable. Column (2) reports the results of a similar regression in column (1), where I allowed for the absorption of country trends, substituting the separate vectors of country and year indicator variables with one vector of common country-year ones. This specification is much more penalizing, in terms of additional loss of degrees of freedom and also in terms of perhaps excessive country-time variability that is absorbed by the dummies. Despite that, the regression results in column (2) indicate that the bank concentration interaction

term is still positive and significant, and in fact it displays a larger estimated coefficient. Column (3) and (4) report additional regression results with the same flavor of those in columns (1) and (2), where, however, I restricted the sample to European countries only. The results show that while the coefficient of the bank concentration interaction is still positive, it is no longer significant.

Table 4 presents results for an identical set of regressions as those reported in Table 3, using as an alternative measure of average firm size the logarithm of the ratio of number of employees and number of establishments. The results confirm that the bank concentration interaction is positive and significant, both with and without the inclusion of country trends, and this time for both the OECD and the European-only samples.

The results of these first two tables are therefore consistent with theoretical priors suggesting that banks with market power may have the tendency to preserve relationships with their older clients, which grow larger, at the expense of potential new entrants. This result is also (reassuringly) consistent with that obtained in Cetorelli (2001).

Next, I have tested whether the effect of bank concentration would be different for European countries once they become members of the European Union. To a great extent, EU states can be considered as having a higher degree of homogeneity, defined in terms of common implementation of EU-wide directives and commitment to common policies of open markets. The EU membership may thus result in a competition-enhancing effect. Table 5 and 6 present the results of regressions including a differential term of interaction for EU member countries. The estimated coefficient for this term is consistently negative and significant across all specifications, indicating that EU

membership is associated with a more overall competitive environment. In this environment, potential industry entrants are less constrained by the financial barrier to entry that a concentrated banking market may represent.

2. The effect of bank deregulation

Last, I have tested the direct effect of the implementation of the Second Banking Directive. As described in introduction, such piece of EU-wide deregulation of the banking industry removed important barriers to entry in banking markets, thus contributing to enhance the overall level of bank competition in EU countries. Table 7 and 8 present the results of regressions where I have included an interaction term between the external financial dependence variable with a dummy equal one for EU countries after 1993, when the Second Banking Directive was implemented, or after the year a country became member of the EU, whichever comes later. As the results indicate, this term of interaction is negative and significant, for either choice of dependent variable, set of countries and with or without the inclusion of country trends. Following deregulation, EU banking markets become more competitive and this seem to translate into easier entry and less concentration in non-financial industries.

4. Conclusions

This paper has contributed to investigate a new dimension of analysis of the economic role of bank concentration and competition. The results show that, controlling for industry, country and time fixed effects, and also for more restrictive country-time fixed

effects, sectors where old firms are more in need of external finance are of disproportionately larger size if they are in countries whose banking sector is more concentrated.

This result is consistent with theoretical priors suggesting that market power gives banks an implicit equity stake in the firms with whom they have already established long lasting relationships. The evidence also seems to imply that bank market power may represent a financial barrier to entry in non-financial industries.

The results have also shown, however, that such effect of bank concentration is substantially weakened in EU-member countries, indicating that in the more “competition-proned” environment of the European Union firms have easier access to funds, thus reducing the influence of bank concentration on the market structure of non-financial industries. Similarly, the empirical evidence also suggests that pro-competitive deregulation of the banking industry, such as the EU-wide implemented Second Banking Directive, has contributed to reduce the average firm size of non-financial sectors.

To the extent that bank concentration leads to more or less concentrated industries, this analysis exposes a potential link between characteristics of the banking industry and firms’ conduct in other industrial sectors. For example, depending on market structure, firms may have different pricing strategies for their products or different incentives for technology adoption. Therefore, regulation that directly affects the market structure of the banking industry will also have effects, perhaps undesirable, down the line in non-financial product markets. These considerations point to novel directions of analysis of the impact of banking market structure on social welfare.

References

- Angelini and Cetorelli, 2003, “The effects of regulatory reform on competition in the banking industry”, *Journal of Money Credit and Banking*, Forthcoming.
- Brander, James and Tracy Lewis, “Oligopoly and Financial Structure: The Limited Liability Effect”, *The American Economic Review*, Vol. 76, No. 5. (Dec., 1986), pp. 956-970.
- Cameron, Rondo, 1967, *Banking in the early stages of industrialization* (Oxford University Press, New York, NY).
- Cao, M. and S. Shi (2000) “Screening, Bidding, and the Loan Market”, Mimeo, Queen’s University.
- Capie, F. and G. Rodrik-Bali (1982), “Concentration in British Banking, 1870 - 1920”, *Business History*, 24, 280-292.
- Cestone, Giacinta and Lucy White, “Anti-Competitive Financial Contracting: The Design of Financial Claims”, *Journal of Finance*, Forthcoming
- Cetorelli, N. , 2001, “Does Bank Concentration Lead to Industry Concentration?”, Federal Reserve Bank of Chicago, WP 2001-01
- Cetorelli, N., 2003, “Life-Cycle Dynamics in Industrial Sectors. The Role of Banking Market Structure”, *Quarterly Review*, Federal Reserve Bank of St. Louis, Forthcoming
- Cetorelli, N. and M. Gambera (2001), “Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data”, *Journal of Finance*, 56, 2, 617-648.
- Cetorelli, Nicola, and Pietro F. Peretto, 2000, “Oligopoly banking and capital accumulation”, Federal Reserve Bank of Chicago, Working paper 2000-12.
- Cetorelli, N. and P. Strahan, 2003, “Banking and Industry Structure. Evidence from U.S. Local Data”, Mimeo
- Chevalier, Judith A., “Capital Structure and Product-Market Competition: Empirical Evidence from the Supermarket Industry”, *The American Economic Review*, Vol. 85, No. 3. (Jun., 1995), pp. 415-435.
- Cohen, Jon, 1967, “Financing industrialization in Italy, 1894–1914”, *Journal of*

- Economic History* 27, 363–382.
- Dell’Ariccia, G. (2000), “Learning by Lending, Competition, and Screening Incentives in the Banking Industry”, Mimeo, IMF.
- Demirgüç-Kunt, Asli, and R. Levine, (2001), *Financial Structure and Economic Growth*, (eds.), MIT Press.
- Demirgüç-Kunt, Asli, and Vojislav Maksimovic, 1998, Law, finance, and firm growth, *Journal of Finance*, 56, 2107–2137.
- Goldsmith, Raymond, W. *Financial Structure and Development*. New Haven, CT: Yale University Press, 1969.
- Gurley, John G. and Shaw, Edward S. 1955. "Financial Aspects of Economic Development," *American Economic Review*, 45, 515-38.
- Guzman, M. (2000), “Bank Structure, Capital Accumulation, and Growth: A Simple Macroeconomic Model”, *Economic Theory*, 16, 2, 421-455.
- Haber, S. (1997), *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914*, Stanford University Press.
- Jayaratne, Jith and Philip Strahan, “The Finance-Growth Nexus: Evidence from Bank Branching Deregulation,” *Quarterly Journal of Economics* 111(3), (1996), 639-70.
- King, Robert G. and Levine, Ross, "Finance and Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics*, 1993a, 108, 717-38.
- King, Robert G. and Levine, Ross, "Finance, Entrepreneurship, and Growth: Theory and Evidence," *Journal of Monetary Economics*, 1993b, 32, 513-42.
- Kovenock, Dan and Gordon M. Phillips, “Capital Structure and Product Market Behaviour: An Examination of Plant Exit and Investment Decisions”, *The Review of Financial Studies*, Vol. 10, No. 3. (Autumn, 1997), pp. 767-803.
- Kovenock, Dan and Gordon M. Phillips, “Capital Structure and Product-Market Rivalry: How Do We Reconcile Theory and Evidence?” *The American Economic Review*, Vol. 85, No. 2, Papers and Proceedings, (May, 1995), pp. 403-408.
- Kumar, K., R. Rajan and L. Zingales (1999), “What Determines Firm Size?”, University of Chicago Working Paper.
- La Porta, Rafael, Lopez-de-Silanes, Florencio, and Andrei Shleifer, “Government

- Ownership of Commercial Banks”, *Journal of Finance*, 2001.
- Levine, Ross; Loayza, Norman; Beck, Thorsten. “Financial Intermediation and Growth: Causality and Causes,” *Journal of Monetary Economics*, 2002, 46, 31-77.
- Levine, Ross and Zervos, Sara, “Stock Markets, Banks, and Economic Growth,” *American Economic Review*, 1998, 88, 537-558.
- Maksimovic, Vojislav, “Capital Structure in Repeated Oligopolies”, *The RAND Journal of Economics*, Vol. 19, No. 3. (Autumn, 1988), pp. 389-407.
- Manove, M., J. Padilla and M. Pagano (2000), “Collateral vs. Project Screening: A Model of Lazy Banks”, CEPR Discussion Paper 2439.
- Maurer, N, and S. Haber (2002), “Institutional Change and Economic Growth: Banks, Financial Markets, and Mexican Industrialization, 1878-1913”, in *The Mexican Economy, 1870-1930*, J.L. Bortz and S. Haber, eds., Stanford University Press.
- McKinnon, Ronald I. *Money and Capital in Economic Development*. Washington, DC: Brookings Institution, 1973.
- Pagano, M. (1993), Financial Markets and Growth. An Overview, *European Economic Review*, 37, 613-622.
- Petersen, Mitchell A. and Raghuram G. Rajan, “The Effect of Credit Market Competition on Lending Relationships”, *The Quarterly Journal of Economics*, Vol. 110, No. 2. (May, 1995), pp. 407-443.
- Rajan, Raghuram G., and Luigi Zingales, “Financial Dependence and Growth,” *American Economic Review* 88(3), (1998), 559–586.
- Schumpeter, Joseph A. 1912. *Theorie der Wirtschaftlichen Entwicklung*. Leipzig: Dunker & Humblot, [*The Theory of Economic Development*, translated by Redvers Opie. Cambridge, MA: Harvard University Press, 1934.]
- Shaffer, S. (1998), “The Winner’s Curse in Banking”, *Journal of Financial Intermediation*, 7, 4, 359–392.
- Spagnolo, Giancarlo, “Debt as a (Credible) Collusive Device”, SSE Ec.&Fin. W.P. No. 243, (2001)

Table 1: Average Firm Size and Bank Concentration Across Countries

<i>Country</i>	<i>Ln(va/no.est.)</i>	<i>Ln(Emp./no.est.)</i>	<i>Bank Concentration</i>
Australia	14.33775	3.68393	.6482356
Austria	14.98726	4.495798	.7219185
Belgium	13.98336	3.562576	.6476625
Canada	15.00872	4.137156	.5837914
Czech Republic	12.0781	5.734251	.8646001
Denmark	14.45874	3.673602	.7437906
Finland	14.91703	4.242352	.8828248
France			.414438
Germany West	15.81104	5.053391	.4549705
Greece	13.70816	3.84133	.7693471
Hungary	14.70301	6.073357	.6998351
Iceland	12.67111	2.2798	1
Ireland	14.07746	3.756913	.7350337
Italy	14.77086	4.179225	.3562633
Japan	14.5518	3.369591	.2170099
Korea, Rep.	14.1841	3.878878	.3126329
Luxembourg	14.63149	4.231299	.3838012
Mexico	15.84689	5.9216	.5836384
Netherlands	15.49991	4.736675	.7380463
New Zealand	12.99911	2.794762	.6939822
Norway	14.50926	3.914007	.8405356
Poland	15.41152	6.503342	.5034863
Portugal	13.22094	3.681847	.4578493
Spain	13.57518	3.199897	.4737538
Sweden	15.21361	4.441467	.8831108
Switzerland			.7590806
Turkey	14.85739	4.9535	.4376526
United Kingdom	14.41054	3.814538	.5565007
United States	15.12917	4.056541	.1864721

Bank concentration is the sum of market shares (measured in total assets) of the three largest banks in each country. The data on individual banking institutions varies by country but it spans for the period 1990-1997. The values reported are averages over the sample period. The figures for firm size are calculated as simple averages for each country across all industries and over time.

Table 2: Average Firm Size and External Financial Dependence
Across Industrial Sectors

<i>Isic</i>	<i>Sector</i>	<i>Ln(va/no.est.)</i>	<i>Ln(Emp./no.est.)</i>	<i>External Dependence</i>
311	Food	14.08678	3.888206	-0.0520653
313	Beverages	15.38108	4.436783	-0.1463893
314	Tobacco	17.15729	5.618409	-0.3754666
321	Textiles	13.99757	4.031199	0.1410054
322	Wearing Apparel	13.25029	3.618692	-0.0201083
323	Leather	13.24073	3.306214	-1.330175
324	Footwear	13.61598	3.947371	-0.5728263
331	Wood Products	13.14599	3.173224	0.2491902
332	Furnitures and Fixtures	13.15987	3.260224	0.329176
341	Paper and Products	15.00423	4.544604	0.1043816
342	Printing and Publishing	13.82034	3.555834	0.1358248
351	Industrial Chemical	15.71694	4.910531	
352	Other Chemicals	15.06287	4.365358	-0.1836157
353	Petroleum Refineries	17.72687	5.888985	-0.0217111
354	Petroleum and Coal Products	14.53268	3.792876	0.1620249
355	Rubber Products	14.86087	4.552456	-0.1225661
356	Plastic Products	13.9431	3.727345	
361	Pottery, China etc.	14.06791	3.984686	0.1633804
362	Glass and Products	14.73027	4.338665	0.0310358
369	Non-Metallic Products	14.13102	3.668588	0.1519385
371	Iron and Steel	15.73547	5.272175	0.0870939
372	Non-Ferrous Metals	15.27572	4.781541	0.0731368
381	Metal Products	13.71522	3.604358	0.0437072
382	Non-Eletrical Machinery	14.28047	4.027712	0.2166062
383	Electrical Machinery	14.92107	4.603697	0.2300215
384	Transport Equipment	14.99909	4.767653	0.1632407
385	Professional Goods	14.15431	3.979891	0.1936534
390	Other Manufacturing	13.31041	3.263575	-0.0513038

The figures for firm size are calculated as simple averages for each sector across all countries and over time. External financial dependence relates to mature companies (more than ten years old), and is the fraction of capital expenditures not financed with cash flow from operations. It is measured on U.S. listed companies during the 1980's.

Table 3: Effect of Bank Concentration on Average Firm Size

$\ln(v.a. / no. establishments)_{ijt}$	(1)	(2)	(3)	(4)
	No country trends Oecd	Country trends Oecd	No country trends Europe	Country trends Europe
<i>Share v.a.ijt</i>	1.502*** [0.175]	1.596*** [0.165]	1.829*** [0.231]	2.022*** [0.211]
<i>Total v.a.it</i>	1.0e-12*** [3.2e-13]	.	-1.9e-12*** [5.4e-13]	.
<i>Bank concentration_{it} * Old firms external dependence_{ijt}</i>	0.362*** [0.109]	0.424*** [0.103]	0.115 [0.146]	0.132 [0.141]
<i>Country Fixed Effects_i</i>	Yes	.	Yes	.
<i>Year Fixed Effects_t</i>	Yes	.	Yes	.
<i>Industry Fixed Effects_j</i>	Yes	Yes	Yes	Yes
<i>Country*Year Fixed Effects_{it}</i>	.	Yes	.	Yes
<i>Observations</i>	2867	2867	2385	2385
<i>R-squared</i>	0.82	0.78	0.82	0.72

The dependent variable in all column is the natural logarithm of value added divided by the total number of establishments in sector j, country i and year t. *Share v.a.ijt* is the fraction of value added of sector j, country i, at time t over total manufacturing value added in country i at time t. *Total v.a.it* is total manufacturing value added in country i at time t. Bank concentration is the 5-firm ratio for the banking industry of country i at time t. Old firms external financial dependence is a dummy equal to one for sectors where mature firms (> 10 years old) have above-median needs for external sources of funding. Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Effect of Bank Concentration on Average Firm Size. Continued

$\ln(\text{no. emp.} / \text{no. est})_{ijt}$	(1)	(2)	(3)	(4)
	No country trends Oecd	Country trends Oecd	No country trends Europe	Country trends Europe
<i>Share v.a.ijt</i>	1.306*** [0.210]	1.412*** [0.137]	1.467*** [0.257]	1.638*** [0.173]
<i>Total v.a.it</i>	-1.7e-13 [3.0e-13]	.	-3.0e-12*** [5.5e-13]	.
<i>Bank concentration_{it} * Old firms external dependence_{ijt}</i>	0.361*** [0.094]	0.381*** [0.088]	0.240* [0.129]	0.206* [0.120]
<i>Country Fixed Effects_i</i>	Yes	.	Yes	.
<i>Year Fixed Effects_t</i>	Yes	.	Yes	.
<i>Industry Fixed Effects_j</i>	Yes	Yes	Yes	Yes
<i>Country*Year Fixed Effects_{it}</i>	.	Yes	.	Yes
<i>Observations</i>	2857	2857	2315	2315
<i>R-squared</i>	0.78	0.66	0.78	0.63

The dependent variable in all column is the natural logarithm of total number of employees divided by the total number of establishments in sector j , country i and year t . $Share\ v.a.ijt$ is the fraction of value added of sector j , country i , at time t over total manufacturing value added in country i at time t . $Total\ v.a.it$ is total manufacturing value added in country i at time t . Bank concentration is the 5-firm ratio for the banking industry of country i at time t . Old firms external financial dependence is a dummy equal to one for sectors where mature firms (> 10 years old) have above-median needs for external sources of funding. Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Effect of Bank Concentration on Average Firm Size. Differential Effect for EU Member Countries

$\ln(v.a. / no. establishments)_{ijt}$	(1)	(2)	(3)	(4)
	No country trends Oecd	Country trends Oecd	No country trends Europe	Country trends Europe
<i>Share v.a.ijt</i>	1.486*** [0.175]	1.595*** [0.165]	1.822*** [0.231]	2.029*** [0.211]
<i>Total v.a.it</i>	1.0e-12*** [3.2e-13]	.	-1.8e-12*** [5.5e-13]	.
<i>Bank concentration_{it} * Old firms external dependence_{ijt}</i>	0.404*** [0.111]	0.433*** [0.103]	0.028 [0.145]	0.048 [0.145]
<i>Bank concentration EU_{it} * Old firms external dependence_{ijt}</i>	-0.267*** [0.075]	-0.062 [0.075]	-0.324*** [0.085]	-0.232** [0.097]
<i>Country Fixed Effects_i</i>	Yes	.	Yes	.
<i>Year Fixed Effects_t</i>	Yes	.	Yes	.
<i>Industry Fixed Effects_j</i>	Yes	Yes	Yes	Yes
<i>Country*Year Fixed Effects_{it}</i>	.	Yes	.	Yes
Observations	2867	2867	2385	2385
R-squared	0.82	0.78	0.82	0.72

The dependent variable in all column is the natural logarithm of value added divided by the total number of establishments in sector j, country i and year t. *Share v.a.ijt* is the fraction of value added of sector j, country i, at time t over total manufacturing value added in country i at time t. *Total v.a.it* is total manufacturing value added in country i at time t. Bank concentration is the 5-firm ratio for the banking industry of country i at time t. Old firms external financial dependence is a dummy equal to one for sectors where mature firms (> 10 years old) have above-median needs for external sources of funding. Bank concentration EU is the product of bank concentration and a dummy equal one for EU member countries (starting in the year they become members). Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Effect of Bank Concentration on Average Firm Size. Differential Effect for EU Member Countries. Continued

$\ln(\text{no. emp.} / \text{no. est})_{ijt}$	(1)	(2)	(3)	(4)
	No country trends Oecd	Country trends Oecd	No country trends Europe	Country trends Europe
<i>Share v.a.ijt</i>	1.281*** [0.207]	1.409*** [0.137]	1.457*** [0.255]	1.648*** [0.173]
<i>Total v.a.it</i>	-1.6e-13 [3.0e-13]	.	-2.9e-12*** [5.6e-13]	.
<i>Bank concentration_{it} * Old firms external dependence_{ijt}</i>	0.420*** [0.095]	0.407*** [0.088]	0.143 [0.126]	0.098 [0.123]
<i>Bank concentration EU_{it} * Old firms external dependence_{ijt}</i>	-0.370*** [0.065]	-0.193*** [0.065]	-0.367*** [0.073]	-0.306*** [0.083]
<i>Country Fixed Effects_i</i>	Yes	.	Yes	.
<i>Year Fixed Effects_t</i>	Yes	.	Yes	.
<i>Industry Fixed Effects_j</i>	Yes	Yes	Yes	Yes
<i>Country*Year Fixed Effects_{it}</i>	.	Yes	.	Yes
Observations	2857	2857	2315	2315
R-squared	0.78	0.66	0.78	0.63

The dependent variable in all column is the natural logarithm of value added divided by the total number of establishments in sector j , country i and year t . $Share\ v.a.ijt$ is the fraction of value added of sector j , country i , at time t over total manufacturing value added in country i at time t . $Total\ v.a.it$ is total manufacturing value added in country i at time t . Bank concentration is the 5-firm ratio for the banking industry of country i at time t . Old firms external financial dependence is a dummy equal to one for sectors where mature firms (> 10 years old) have above-median needs for external sources of funding. Bank concentration EU is the product of bank concentration and a dummy equal one for EU member countries (starting in the year they become members). Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Removal of Barriers to Entry in EU Banking Markets

$\ln(v.a. / \text{no. establishments})_{ijt}$	(1)	(2)	(3)	(4)
	No country trends Oecd	Country trends Oecd	No country trends Europe	Country trends Europe
<i>Share v.a.ijt</i>	2.131*** [0.203]	2.800*** [0.140]	2.671*** [0.174]	2.787*** [0.139]
<i>Total v.a.it</i>	1.4e-12*** [8.8e-14]	.	7.9e-13*** [2.3e-13]	.
<i>Bank deregulation_{it} * Old firms external dependence_{ijt}</i>	-0.162*** [0.055]	-0.159*** [0.049]	-0.436*** [0.056]	-0.120* [0.061]
<i>Country Fixed Effects_i</i>	Yes	.	Yes	.
<i>Year Fixed Effects_t</i>	Yes	.	Yes	.
<i>Industry Fixed Effects_j</i>	Yes	Yes	Yes	Yes
<i>Country*Year Fixed Effects_{it}</i>	.	Yes	.	Yes
Observations	7853	7853	7072	7072
R-squared	0.78	0.73	0.78	0.69

The dependent variable in all column is the natural logarithm of value added divided by the total number of establishments in sector j , country i and year t . $Share\ v.a.ijt$ is the fraction of value added of sector j , country i , at time t over total manufacturing value added in country i at time t . $Total\ v.a.it$ is total manufacturing value added in country i at time t . Bank deregulation is a dummy equal to one for EU member countries based on the following rule: $\text{Max}\{\text{year}=1993, \text{year}=\text{year country joins EU}\}$. Old firms external financial dependence is a dummy equal to one for sectors where mature firms (> 10 years old) have above-median needs for external sources of funding. Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Removal of Barriers to Entry in EU Banking Markets. Continued

$\ln(\text{no. emp.} / \text{no. est})_{ijt}$	(1)	(2)	(3)	(4)
	No country trends Oecd	Country trends Oecd	No country trends Europe	Country trends Europe
<i>Share v.a.ijt</i>	1.434*** [0.165]	1.902*** [0.114]	1.979*** [0.145]	1.972*** [0.114]
<i>Total v.a.it</i>	7.8e-13*** [7.3e-14]	.	-2.2e-13 [2.1e-13]	.
<i>Bank deregulation_{it} * Old firms external dependence_{ijt}</i>	-0.204*** [0.050]	-0.213*** [0.041]	-0.438*** [0.051]	-0.241*** [0.052]
<i>Country Fixed Effects_i</i>	Yes	.	Yes	.
<i>Year Fixed Effects_t</i>	Yes	.	Yes	.
<i>Industry Fixed Effects_j</i>	Yes	Yes	Yes	Yes
<i>Country*Year Fixed Effects_{it}</i>	.	Yes	.	Yes
Observations	7839	7839	6980	6980
R-squared	0.79	0.62	0.79	0.59

The dependent variable in all column is the natural logarithm of total number of employees divided by the total number of establishments in sector j , country i and year t . *Share v.a.ijt* is the fraction of value added of sector j , country i , at time t over total manufacturing value added in country i at time t . *Total v.a.it* is total manufacturing value added in country i at time t . Bank deregulation is a dummy equal to one for EU member countries based on the following rule: $\text{Max}\{\text{year}=1993, \text{year}=\text{year country joins EU}\}$. Old firms external financial dependence is a dummy equal to one for sectors where mature firms (> 10 years old) have above-median needs for external sources of funding. Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%