Social Capital and the Viability of Nonprofit Firms: Evidence from Norwegian Savings Banks *

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Abstract

Hansmann (1996) points out that a surprisingly large number of nonprofit firms operate in developed economies, often in sectors where they compete with for-profit firms. In this paper, we shed new light on the viability of nonprofit firms by studying the survival of nonprofit savings banks in the Norwegian banking industry after branching deregulations in the mid-1980s. We propose that banks' survival is related to the level of social capital in the local communities in which the banks operate. Using newspaper readership and charity donations to proxy for the amount of social capital, we estimate that an increase in social capital from the minimum to the maximum level observed in the sample increases the probability of survival for the average bank by approximately 10 percentage points at the time of deregulation. The result is robust to controls for, among others, bank equity, bank competition, population age and education. Our findings suggest that social capital may facilitate collective decision-making and the alignment of stakeholders' preferences.

Keywords: Nonprofit Firms, Social Capital, Corporate Governance, Financial Intermediation.

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1 Introduction

In his remarkable book, Hansmann (1996) points out that in modern developed economies nonprofit firms exist and compete with for-profit, investor owned firms in several sectors of the economy; most notably health care, education, and financial intermediation. This observation challenges the view that firms without owners and well-defined incentives for maximizing profits are less viable. Nonprofit firms represent an extreme form of separation between ownership and control—one would expect such firms to suffer from governance and operating inefficiencies, and eventually be driven out by competition from their for-profit counterparts.

In this paper, we shed new light on the viability of nonprofit firms by studying the survival of savings banks in the Norwegian banking industry where currently 102 savings banks compete with 28 other, for-profit, banking organizations.[1] Savings banks are essentially nonprofit firms: They cannot sell equity and they operate subject to a "non-distribution constraint" that bars the distribution of residual earnings to persons who hold control rights in the banks.[2] By regulation, profits are to be retained and thus reinvested in the banks' activities.[3]

We propose that the viability of nonprofit banks is related to the level of social capital in the local communities in which they operate. By design, the nonprofit organizational form allocates control rights and representation on banks' governing bodies to community stakeholders with potentially heterogenous interests. Social capital facilitates collective decision-making and the alignment of community members' preferences. This helps to ensure that savings banks, in the conduct of their business, internalize the preferences of the various stakeholder groups, as reflected in the continued community patronage and, therefore, survival of the nonprofit bank organizational form.

We test the relationship between social capital and the viability of savings banks by setting up a discrete time survival model. We observe exits from the population of savings banks in the time following deregulation of the Norwegian banking industry and estimate the probability of exit. Our results show that community social capital is a statistically significant determinant of savings banks' lifetime duration. We find that an increase in

[1] The figures refer to the number of banks at the end of our sample period 2005.

[2] Unlike many other nonprofit organizations that sustain themselves by governmental funding and charitable donations, savings banks are *commercial* nonprofits—they provide private goods for a fee and generate profits.

[3] Norwegian savings banks are firms without owners, as distinguished from cooperative banks. In the case of a dissolution, any remaining equity capital must, by law, be used to further savings bank business in the "home" area of the bank.

social capital from the minimum to the maximum level observed in the sample, lowers the probability that a savings bank disappears by approximately 10 percentage points, at the time of deregulation. This result obtains after controlling for competing banks' market share and several population characteristics of the communities in which the banks operate, such as age distribution and the level of education. We also find that the most important determining factor of banks' lifetime is the level of equity capital at the time of deregulation, and our results suggest that for banks with relatively low capital, social capital may substitute for equity capital.

In Norway, savings banks compete in the same product markets as for-profit banks and have, since a comprehensive deregulation of branching and quantitative credit restrictions in the mid-1980s, faced severe competition from branch networks of their for-profit counterparts. As a result, about 50 percent of the savings banks have disappeared, mostly as targets in acquisitions or through conversions from the nonprofit organizational form. We observe these events of exit from the population of savings banks from around the time of deregulation, 1987, until 2005. For every year, we map out the location of all banks' branches, placing each branch in one of the 433 municipalities of Norway. This data is matched with measures of the level of social capital of each municipality. We then estimate savings banks' probability of survival as a function of the level of social capital in the municipalities in which they operate, controlling for other bank and municipality level characteristics.

Social capital may be defined as features of social life—networks, norms, and trust—that enable participants to act together more effectively to pursue shared objectives for mutual benefit (Putnam (1993, 1995)). It concerns the "the ability of people to work together for common purposes in groups and organizations" (Fukuyama (1995)) and, more generally, "those voluntary means and processes developed within civil society which promote development for the collective whole" (Thomas (1996)).[4] Key dimensions of social capital are civic engagement, that is, active involvement in civil society, and norms of generalized reciprocity and trust.[5] Thus, in high social capital communities residents participate actively in local institutions with the purpose of promoting community welfare.

We proxy the level of social capital within a community with local residents' newspaper

[4]We follow Putnam's sociocentric definition of social capital as a characteristic of a community and the interactions between members of that community. Adam and Rončević (2003) discuss alternative egocentric and network-based definitions of social capital.

[5]Putnam's norm of "generalized reciprocity" refers to the the willingness to do something good for others in the expectation that, at some future point, someone (else) will do something good for you. In the extreme, generalized reciprocity is closely related to altruism; doing good without the expectation of reciprocity.

readership and charity donations. Interest and knowledge about public issues are necessary conditions for civic engagement in community affairs. Being informed, fosters discussion and connectedness among community members. Social connections may in turn enable participants of the community to act together in the pursuit of common objectives or collective goods. Further, altruism and volunteering are strongly related to generalized reciprocity, and indicate peoples' willingness to contribute towards a general goal at the price of reduced individual consumption.[6]

By nature, the measurement of unobservable social capital is not without problems. For our purposes, proxies for social capital must be available at the municipality level, display cross-sectional variation, and have no causal effect on savings banks' probability of survival. Newspaper readership has been suggested as a measure of civic engagement by Putnam (1993). We use a measure of the average number of newspapers subscribed to by households in each municipality.[7] Our charity donation measure comes from the annual Norwegian TV charity show—a large media event broadcasted nationally on prime time TV each year on a Sunday in October with the purpose of raising donations for a particular charity organization. On the day of the charity show, door-to-door collections are carried out by volunteers from municipalities all over the country. The national character of the TV charity show makes it an attractive event to base an altruistic measure of social capital on, because the event occurs in all municipalities simultaneously, that is, the "demand" for donations is nationwide. We construct two proxies: (1) a donation ratio based on the amount raised in day-time door-to-door collections, and (2) the number of committed donors in the 1990-collection for the organization "Save the Children". In 1990, in addition to the door-to-door collections, donors had the opportunity to sign up as long term sponsors, committing themselves to repeated payments at a set level (a so-called Godfather).

The door-collected amount reflects the willingness to give, i.e. altruism, but may also capture civic engagement if the number of volunteer collectors in the individual municipalities influence the magnitude of the amount raised. Committed donors could only sign up by phone during the evening TV show. Thus, this variable measures the cross-sectional distribution of the supply of donations only (as demand is uniform across the nation).

[6]Putnam (2000) argues that "[s]ocial capital refers to networks of social connection, doing *with*. Doing good *for* other people, is not part of the definition of social capital. But volunteering and philanthropy and even spontaneously helping are all strongly predicted by civic engagement. Those of us who belong to formal and informal social networks are more likely to give out time and money to good causes then those of us who are isolated socially. For this reason, altruism is an important diagnostic sign of social capital" (*ibid,* p. 117).

[7]Norwegian households' newspaper consumption (per capita) is the highest in the world and the newspaper distribution pattern has a distinct local character. E. g. despite its small population of 4.5 million, Norway has no nationally distributed paper (Høst (2005)).

Altruistic measures of social capital (blood-donation) have been innovatively employed in related work by Guiso, Sapienza, and Zingales (1994).

The literature on property rights has recently addressed the question of outside versus inside (cooperative) ownership, aiming to understand the features that make one or the other polar organizational form efficient, e.g. Hansmann (1996), Hart and Moore (1998), and Rey and Tirole (2007). Hansmann (1996) provides a general rationale for the existence of nonprofit firms and discusses the U. S. mutual savings banks explicitly. He argues that in the early nineteenth century, nonprofit banking institutions arose as a response to high contracting costs, rooted in asymmetries of information, between savers of modest income and existing commercial banks established and owned by wealthy individuals. In the absence of regulation, investor-owned banks had the opportunity and incentives to expropriate deposit holders by undertaking investments of high risk. Non-profit savings banks offered a suitable alternative: By introducing constraints on the distribution of profits and assigning the control over the bank's assets to a board of trustees, the mutual form provided fiduciary protection for small depositors.

This explanation, however, no longer accounts for the economic function of the mutual savings banks. The introduction of deposit insurance and capital requirements have reduced depositors' exposure to expropriation by investor-owned banks. Hansmann argues that if retail banking was to be recreated today, the services offered by nonprofit banks would most likely be provided by investor-owned financial institutions. He concludes that nonprofit banks will eventually "die out"—their presence today is due to the sluggish adaptation of organizations to their environments. Compared to Hansmann's argument, our analysis offers an alternative perspective on the continued existence of nonprofit savings banks in developed economies.

Our paper is related to the recent literature that documents the effect of social capital on economic outcomes. Knack and Keefer (1997) and La Porta, de Silanes, Shleifer, and Vishny (1997) show that countries with higher level of trust between citizens have higher economic growth and enhanced judicial efficiency. At the micro-level, Guiso, Sapienza, and Zingales (2004, 2007) document that more trusting individuals are more likely to invest in the stock market and make less use of informal credit.[8] In similar spirit, using data on venture capital transactions, Bottazzi, Da Rin, and Hellmann (2007) find that trust between nations enhances cross-border investments.

Our work is also related to research on stakeholder oriented firms whose objectives in-

[8]Guiso, Sapienza, and Zingales (2006) find evidence that individuals' display of trust towards others are influenced by their cultural background, e. g. religious upbringing, and hence changes only slowly over time.

corporate the welfare of stakeholders other than shareholders, as discussed in Tirole (2001). When stakeholders have divergent interests, multiple objectives may be difficult to align. Tirole (2001) points out that such difficulties represent a major hindrance to the implementation of a stakeholder society. From this point of view, our analysis identifies social capital as a mechanism that may facilitate the reconciliation of heterogeneous stakeholder preferences. Allen, Carletti, and Marquez (2007) argue, in line with our approach, that stakeholder oriented firms have a preference for surviving in the long term and, consequently, compete less aggressively and charge higher prices. They show that a concern for stakeholders implies a wealth transfer from the firm's customers to its other stakeholders. In our setting, however, savings banks' customers are depositors and borrowers in the local community who benefit themselves from the stakeholder orientation of the banks. Bøhren and Josefsen (2007) study the performance of Norwegian banks and find that the segment of nonprofit savings banks generate returns comparable to those for-profit banks, despite having no owners. They argue that product market competition mitigates the governance drawbacks of ownerless firms. Our paper is related to that of Bøhren and Josefsen in that both papers analyze aspects of ownerless firms, respectively survival and operating performance. The papers differ in that Bøhren and Josefsen compares the performance of banks of different organizational forms, whereas we study only the nonprofit form and propose a link between that organizational form and social capital.

The paper proceeds as follows. In Section 2 we discuss the link between community social capital and the savings banks' nonprofit organizational form. Section 3 provides a brief overview of the Norwegian banking industry and its development since deregulation. Section 4 describes our data, and Section 5 the methodology. Section 6 discusses the empirical results and Section 7 concludes.

2 Social capital and the nonprofit organizational form

The governing bodies of Norwegian savings banks are fundamentally different from those of commercial banks. Both types of organizations have a Committee of Representatives that set out general lines of direction and elect the Board of Directors responsible for the day-to-day management of the bank. Commercial banks have outside owners—shareholders—that constitute an absolute majority (72 percent) in the Committee of Representatives and have a residual claim on the cash flows generated by the bank. In contrast, savings banks have no owners. Their Committee of Representatives is comprised of depositors

and public appointees.[9] That is, savings banks are governed by stakeholders who have no equity investment and no formal cash flow rights, but may, nevertheless, have an interest in exerting control over the bank's decision-making and management and may therefore exercise not only formal, but also effective control. The absence of residual cash flow rights and the representation of various stakeholder groups on banks' governing bodies imply that savings banks have no explicit incentive to maximize profits. The lack of a profit motive is reinforced by the non-distribution constraint: savings banks are, by regulation, prohibited from distributing net profits and are required to use residual earnings to replenish their capital and channel resources for charitable purposes.[10]

By the non-distribution constraint and the allocation of control rights to stakeholders rooted in the local community, nonprofit savings banks are designed to internalize the effect of their actions on the welfare of stakeholders. This generates a link between the viability of savings banks and the level of social capital in the local community where they operate. We propose four channels through which social norms and the level of civic engagement may affect the ability of stakeholders to cooperate and therefore the functioning of the savings banks.[11]

First, in nonprofit firms control rights are shared between groups of stakeholders with potentially diverting interests. As a result, stakeholders may find it difficult to exert effective control even if they sit on the firms' governing bodies (Hansmann (1996)). For the savings banks in our sample, stakeholders are likely to have diverging ideas of what the objective function of the bank should be. The lack of incentives for maximizing profits is replaced by preferences over the allocation of surplus towards different stakeholder groups. Stakeholders in communities with high social capital, however, are likely to cooperate and agree more easily on a common objective. Consequently, the costs of collective decision making are likely to be lower in nonprofit firms located in such communities. That is, such banks' actions come closer to maximizing the aggregate welfare of their stakeholders and operate more efficiently from a general welfare point of view.

Second, stakeholders in high social capital communities are more likely to have a shared preference for the general well-being of the community that they are all a part of. A locally founded nonprofit bank may be a vehicle for the provision of collective goods or

[9]The relative proportion of depositors and public appointees is determined in the bylaws of the individual savings bank. In addition, both commercial and savings bank employees sit on the Committee of Representatives and make up respectively 28 percent and 25 percent of its members.

[10]By regulation, a maximum of 25 percent of the annual earnings can be set aside in a separate gift fund and distributed for charitable purposes.

[11]In the words of Putnam, civic engagement fosters "mutual obligation and responsibility for action, and facilitate cooperation for mutual benefit" (Putnam (2000:21)).

may take into account external effects of its actions on the community, e.g. it may lend to local firms on favorable terms with beneficial consequences for local economic and non-economic welfare, or it may display high willingness to share risk with local borrowers. Hence, Angelini, Di Salvo and Ferri (1998) find evidence that Italian credit cooperatives favor members by offering easier access to credit in the form of larger amounts and lower interest rates. If small borrowers are (or are perceived to be) detrimentally affected by banking consolidation, stakeholders may prefer local banks to remain independent and may exert their influence with this aim. The nonprofit form shields savings banks from hostile takeovers, and the community representatives in the bank may effectively block acquisitions. Alessandrini, Presbitero, and Zazzaro (2007) study consolidation in the Italian banking industry and show that when mergers result in an increased geographical distance between banks' head-quarters and borrowers' location, consolidation lowers the availability of finance to small firms.[12]

Also, civic participation may mitigate managerial agency problems though more active monitoring of savings banks' policies and practices, ensuring that these are consistent with local community objectives.

Furthermore, the viability of a nonprofit bank may be influenced by the level of trust among the members of the local community. Depositors may patronize the local savings bank rather than the local branch of a commercial bank because the former have members of the community itself on its governing bodies, whereas the latter have owners whose preferences typically do not internalize the community's costs and benefits of bank policies.[13]

3 Norwegian savings banks and the impact of deregulation

Since their establishment in the early nineteenth century, savings banks in Norway have had a strong local focus and served as an important source of finance for local firms and households. The spatial distribution of savings banks has been heavily influenced by Norway's mountainous geography with its many and small communities—there was a tendency

[12]There is mixed empirical evidence regarding the effect of banking consolidation on small business lending. Using Belgian data, Degryse, Masschelein, and Mitchell (2006) shows that single-relationship customers of target banks that remain with the merged bank, are less likely to increase subsequent borrowing than other customers. Using U. S. data, Berger, Saunders, Scalise, and Udell (1998) find evidence of a negative static effect on small firm finance from bank mergers. However, this effect may be offset by other lenders in the same local market. A study on Norwegian data, Jenssen (1997), suggests that small firms are more financially constrained in downturns if they borrow from large banks.

[13]In a related vein, Rose-Ackerman (1996) suggests that customers may prefer to buy from nonprofit firms if organizational form signals an ideological commitment from the firms' managers. This hypothesis, however, assumes trust arises from shared ideology rather than "shared community".

for every local community to set up its own savings bank. Hence, as late as 1960, 600 savings banks were still operating in the country. The bulk of these banks were very small in size.[14] Economic structural developments after 1960, however, prompted a rapid consolidation of the banking sector. An important aspect of the regulation of banks in Norway is that savings banks can not be acquired by commercial banks. The consolidation thus took place typically in the form of mergers between two or more savings banks from neighboring municipalities. Due to such mergers, over the next two decades, the number of savings banks decreased by 55 percent.[15]

Even though savings banks had to adjust to changes in the underlying set of business opportunities, free competition in the Norwegian banking industry was only introduced with the credit market reforms of the mid-1980s. Until 1984, bank lending in Norway was subject to quantitative regulations and bank branching was severely restricted. To establish new branches, banks were required to obtain approval from the Ministry of Finance, which through a lengthy process, would consult with, among others, the respective local authorities. These policies effectively provided a level of regulatory protection for local savings banks against entry from outside banking organizations.[16] The suspension of restrictions in the wake of deregulation enhanced competition and prompted further consolidation of the banking industry. Hence, from the time of deregulation till present, about 50 percent of the independent savings banks have abandoned their stand-alone status.[17]

Since 1987 savings banks have been able to convert their organizational form. In particular, regulation allows savings banks to increase their equity capital through the issue of so-called Primary Capital Certificates (PCCs). PCCs are residual claims on the banks' surplus and are typically traded on the Oslo Stock Exchange. From a corporate governance perspective, a PCC-bank represents a hybrid between a commercial bank and a nonprofit savings bank—it has outside owners with voting rights and residual cash flow rights, but other stakeholder groups may in principle continue to exert influence on bank management.[18] Through the issue of PCCs, several savings banks have pursued a growth-strategy

[14] Meinich (1972) describes the historical development of the Norwegian savings bank industry.

[15] Significant factors in this development was the depopulation of the small agricultural communities, the diffusion of private car ownership, the expansion of interregional supporting infrastructure, and increased commuting for work. These structural changes are reflected in the fact that during the 1960s, the number of Norwegian municipalities was reduced by 25 percent.

[16] See for example Norwegian Official Reports (1992, pp. 66–67) for a description of how the approval process could protect local savings banks with strong ties to local authorities.

[17] From 1984 to 1990 some general, non-binding restrictions on the establishment of branches of the three largest commercial banks remained. In 1990, all regulations regarding the establishment of bank branches were removed.

[18] PCC-holders elect no more than 40 percent of the seats on the Committee of Representatives.

following deregulation, developing into large regional banks fully capable of competing with the largest commercial banks in the loan market for domestic businesses.

It is important to emphasize that, in contrast to savings banks in many other countries, Norwegian savings banks are strongly engaged in business lending. Hence, in 1987, loans to businesses make up 31 percent of saving banks' portfolios, hereof 24 percent are commercial and industrial loans. In 2005, the fraction is 26 percent, of which 23 percent represent commercial and industrial loans.[19]

The banking crisis that took place in 1988-1993 also contributed to the transformation of Norway's banking industry. The commercial banks were hit hardest by the crisis, but some savings banks also got into trouble.[20] The first bank failure occurred in the fall of the first recession year, 1988, when a medium-sized regional commercial bank defaulted. From 1988 to 1990, 13 small and some regional banks failed, mostly savings banks. These banks, however, were of relatively small size. Towards the end of 1990, the situation deteriorated also in the largest commercial banks and the crisis became systemic, forcing the government to establish a governmentally-financed insurance fund. None of the failed savings banks were forced to close. Instead, these banks were either acquired by larger solvent savings banks, or forced to sell their devalued equity capital to the Savings Bank Guarantee Fund through the issue of PCCs. 15 acquisitions of savings banks and 3 PCC-conversions were the results of these rescue operations. The accumulation of loan losses and the newly deregulated credit regime were not independent phenomena, even if the impetus to the crises were partly caused by external events. Hence, failure was to a large extent a result of the business strategy pursued by the individual banks, and in particular the larger banks.[21]

Overall, regulatory changes and the consequent transformation of the banking industry in Norway resulted in a decrease in the number of nonprofit savings banks from 191 in 1987 to 103 in 2005. Of these banks, 23 banks converted to the PCC-form and the remaining banks were acquired in mergers with larger banks.

It follows from the above discussion that three distinct ways exist through which an independent savings bank may have disappeared during the period 1987-2005: (1) by dissolving, (2) by acquisition by another savings bank, or (3) by transformation into a PCC-bank. These forms of disappearance represent ways of "exiting" the population of savings banks

[19] Loans to households and municipalities (or municipality-owned firms) constituted 57 and 5 percent, respectively in 1987. The numbers in 2005 are 70 and 0.2 percent, respectively.

[20] Aggregate loan loss provisions in commercial banks constituted more than 4% of total assets at the peak of the crisis in 1991. The equivalent number for the savings banks was about 2%.

[21] See Moe, Solheim, and Vale (2004) for an account of the Norwegian banking crisis.

and constitute the core of our empirical analysis. In practice, only the latter two forms of exit matter, since no saving banks have actually dissolved during our sample period.

4 Data

For municipality-level variables we use 2005-municipality borders throughout the analysis (some mergers between municipalities occur during our sample period). Norway has 433 municipalities in 2005. All variables are annual from 1987 to 2005 unless otherwise mentioned.

Bank branches: We construct a data set of the municipality-location of each bank's branches for every year 1987–2005. Information on the location of bank branches is from the annual publication *Bankplassregisteret*, issued by the Norwegian Financial Services Association (www.fnh.no).

Newspaper subscriptions: The variable is the average number of newspaper subscriptions per household, not including freely distributed newspapers. Figures of subscription levels are kindly provided by Sigurd Høst, cf. Høst (2005), for the years 1984, 1996, and 2002. We construct a step-wise variable that equals respectively the 1984-level subscriptions in the years of 1987-1995, the 1996-level subscriptions in the years 1996-2001, and the 2002-level subscriptions in the years 2002-2005.

Donation ratio: The variable is defined as the amount raised from door-to-door-collection per capita divided by average income, multiplied by 1,000, that is, a ratio of, say, 0.20 implies that, on average, people donate 0.02 percent of (average) gross personal income in a particular municipality. Donation amounts are available from the national annual TV-charity shows *TV-aksjonen* in the years of 1990, and 2000-2005. We have been unable to recover municipality-level data for the other years of the sample. We construct a step-wise variable that equals respectively the 1990-donation ratio in the years 1987-1995, the 2000-donation ratio in the years 1996-2000, and the annual donated ratio in the years 2001-2005. Data for 1990 is kindly provided by Redd Barna. Data for 2000-2005 is kindly provided by DnB NOR (the bank in charge of the administration of donated amounts).

Committed donors ratio: The variable measures the number of godfathers per capita, scaled by average personal income and multiplied by 10^7, that signed up during the 1990 national TV-charity show *TV-aksjonen* to the benefit of the charity organization *Redd Barna* (Save the Children, www.reddbarna.no). In contrast to one-time donors, godfathers pay a fixed monthly amount to Save the Children with the aim of enabling the charity to pursue long

term goals. Data is kindly provided by Redd Barna.

Average gross personal income: The variable is measured in current Norwegian kroner and is calculated from municipality level data. It equals the mean of the, across municipalities, aggregated level. The data is available from 1993 and equals the level of 1993 in all years prior to 1993, adjusted for changes in the consumer price index. Data are from Statistics Norway (www.ssb.no).

Population: Population indicates the number of inhabitants in each municipality. The variable is logged in the estimations. Data are from Statistics Norway (www.ssb.no).

Population over 67 years: The variable is defined as the fraction of inhabitants of at least 67 years of age, multiplied by 100. Data are from Statistics Norway (www.ssb.no).

Population with higher education: The variable measures the fraction of municipality population who holds university-level (or equivalent) degree obtained in a program of at least 4-years of education, multiplied by 100. Data are from Statistics Norway (www.ssb.no).

Unemployment: The variable is the fraction of municipality population that are unemployed in a given year, aggregated across municipalities to the county level. The earliest year when data is available is 1988, hence 1987 employment values are set equal to the 1988 values. Data are from Statistics Norway (www.ssb.no).

Total assets and equity ratio in 1987 (bank level): The equity ratio is defined as the level of total equity divided by total assets, multiplied by 100. Detailed data on banks' balance sheet, income, and cost statements are from the banking statistics (ORBOF) at Norges Bank (the central bank of Norway). Data at the bank level are in general not publicly available, due to confidentiality clauses in banks' reports.

5 Methodology

We use a discrete-time duration model to estimate the relationship between the survival of non-profit savings banks and the level of social capital in the municipalities where they operate. The event in focus of our analysis is the disappearance of the savings bank as an independent non-profit organization. As discussed in Section 3, the event of exit from the population of savings banks may occur in the form of a dissolution, an acquisition, or a change in organizational form.

To record event occurrence, we divide the time from branching deregulation into equal-sized intervals of length one year, with interval j defined as $(\, j-1, j \,]$. Interval $j = 1$ is

thus the first year following the date of branching deregulation, 1 January 1984.[22]

Let T denote the time (years) elapsed from branching deregulation to the observed exit of savings bank i, i.e. we have observations on n independent and identically distributed random variables, where n is the number of banks observed at the beginning of interval 1. The failure function, $P(j) = prob(\mathrm{T} \leq j)$, is the cumulative distribution function of T with probability mass function $p(j)$. It defines, in turn, the survival function $S(j) = 1 - P(j) = prob(\mathrm{T} > j)$ which is simply the probability that the duration of the lifetime of a randomly chosen bank exceeds j periods. Since each bank does not survive for the same number of periods after deregulation, we index the last period of the lifetime of bank i, j_i.

Modelling of the economic relationship between the probability of survival and the explanatory variables focuses on the "hazard rate" rather than the survival function. The hazard rate is defined as the probability of the event of exit during interval j, conditional on survival up to that point in time. In this and the next section, we outline our estimation approach which follows Allison (1982) and Jenkins (2005).[23]

Let the hazard rate for bank i be defined as

$$h_{ij} = prob(\mathrm{T}_i = j | \, \mathrm{T}_i \geq j, x_{ij}) \,, \tag{1}$$

where x_{ij} is a $(k \times 1)$ vector of bank-specific (constant or time-varying) explanatory variables We explain in detail below how we construct the explanatory variables $\mathbf{x_i}$, but the general point is that $\mathbf{x_i}$ measures the characteristics of the bank and the markets in which it operates, among others, the level of social capital.

We specify a proportional odds (logistic) model for the hazard rate:

$$log\left[\frac{h_{ij}}{(1-h_{ij})}\right] = \mathrm{H}_{0j} + \beta' x_{ij} \tag{2}$$

$$\mathrm{H}_{0j} = \alpha_0 + \alpha_1 \log(j) + \alpha_2 [\log(j)]^2 \,. \tag{3}$$

In (2), the log-odds of the hazard rate for each bank depends linearly on x_{ij} and a "baseline" hazard of risk over time, H_{0j}. Since the hazard rate is a (conditional) probability, it lies between zero and one, while the log of the odds ratio accordingly lies between minus and

[22] Although it is possible to uncover the exact day of a bank's exit, we prefer to model the process in discrete rather than continuous time, even if the underlying process of bank lifetime is inherently continuous. The official day of, say, a bank merger is somewhat ad hoc since merger negotiations take time and special considerations may determine the exact date at which a merger becomes effective.

[23] Jenkins (2005) is a valuable exposition of duration analysis and its implementation. For discrete-time methods, see also Singer and Willett (1993).

plus infinity.

The baseline hazard, $\text{H}_{0j} \equiv \log\left[\frac{h_{0j}}{(1-h_{0j})}\right]$ is common to all banks and a function of observation time only. It is the underlying process driving the event of exit when the individual bank characteristics equal zero. In our setting, the baseline hazard captures the underlying process of consolidation in the Norwegian banking sector following deregulation. Ignoring the quadratic term in (3), the sign of α_1 controls the pattern of duration dependence for the population of savings banks. When α_1 is negative the hazard rate is monotonically decreasing over time for all banks, and the effect is the opposite when α_1 is positive. When α_1 is zero, the probability of exit is constant for all observation intervals. We include a quadratic term to capture the fact that the hazard rate cannot continuously decrease or increase forever, given that the population of banks at the beginning of the sample is fixed.[24] In practice, the log form in (3) was chosen based on a preliminary non-parametric estimation of the baseline hazard, see Section 5.2, with the aim of capturing the "shape" of the process of consolidation in a parsimonious manner, preserving degrees of freedom. As a robustness check, we estimate our main survival regression using time dummy variables in place of (3).

5.1 Estimation and likelihood

Our sample is right-censored as we do not observe the life duration of banks that survive from the time of deregulation until the end of our sample. We only know that these banks did not exit prior to 2005, the end of our sample period, as, by nature, banks can only exit once.[25]

Define an indicator variable, δ_i equal to one if bank i exits during the sample and zero otherwise (censoring). The general form of the likelihood function corresponding to the observations of T_i is

$$\begin{aligned} L &= \prod_{i,\text{uncensored}} p(j_i) \prod_{i,\text{censored}} [1 - P(j_i)] \\ &= \prod_{i=1}^{n} p(j_i)^{\delta_i} [1 - P(j_i)]^{(1-\delta_i)} \end{aligned} \tag{4}$$

[24] We do not include (de novo) banks formed during the sample period in the analysis, see Section 5.3 below.

[25] Censoring is indeed one reason why an OLS regression of life duration on bank and municipality-characteristics would be an inappropriate estimation approach for the issue at hand. The alternative approach of defining a binary dependent variable that equals one if a bank exits during the sample period ignores important information regarding the timing of exit, see Allison (1982) for a discussion of such issues and the analysis of event histories.

There is a one-to-one relationship between the survival function and the hazard rate and (4) can therefore be rewritten in terms of the latter. In our setting, the probability functions must be further modified for left-truncation—the relevant starting date for our "experiment" is the year of deregulation, 1984, but we observe the population of banks only three years later, from 1987.

Let j_τ denote the point of truncation (the year of 1987, common to all banks). The truncated (conditional) probability functions can be written in terms of the hazard rate as

$$p(j_i|j_i > j_\tau) = \frac{h_{ij_i}\prod_{k=1}^{j_i-1}(1-h_{ik})}{\prod_{k=1}^{j_\tau}(1-h_{ik})} = h_{ij_i}\prod_{k=j_\tau}^{j_i-1}(1-h_{ik}) \tag{5}$$

for censored observations and

$$1 - P(j_i|j_i > j_\tau) = \frac{\prod_{k=1}^{j_i}(1-h_{ik})}{\prod_{k=1}^{j_\tau}(1-h_{ik})} = \prod_{k=j_\tau}^{j_i}(1-h_{ik}) \tag{6}$$

for uncensored observations respectively.[26]

Substituting into the likelihood function we obtain

$$L = \prod_{i=1}^{n}\Big[h_{ij_i}\prod_{k=j_\tau}^{j_i-1}(1-h_{ik})\Big]^{\delta_i}\Big[\prod_{k=j_\tau}^{j_i}(1-h_{ik})\Big]^{1-\delta_i}. \tag{9}$$

Brown (1975) and Allison (1982) demonstrate that (9) can be reformulated as the likelihood function for a binary dependent variable, y_{ij}, where

$$y_{ij} = \begin{cases} 1, & \text{if bank } i \text{ exits during interval } j \\ 0, & \text{if bank } i \text{ does not exit during interval } j \end{cases}. \tag{10}$$

Hence, if the event of exit occurs for bank i during, say, the fifth year of observation, y_{ij} equals zero in years one to four, and one in year five. For banks that are not observed to exit during our sample, y_{ij} equals zero in all periods. Essentially, this formulation

[26]The corresponding unconditional expressions are respectively

$$prob(\mathrm{T}_i = j_i) = h_{ij_i}S(j_i-1) = h_{ij_i}\prod_{k=1}^{j_i-1}(1-h_{ik}) \tag{7}$$

and

$$prob(\mathrm{T}_i > j_i) = S(j_i) = (1-h_{i1})(1-h_{i2})...(1-h_{ij_i}) = \prod_{k=1}^{j_i}(1-h_{ik})\,. \tag{8}$$

converts the problem into a panel with a binary bank-specific dependent variable where the time dimension refers to the number of observation periods for each bank. The panel is unbalanced because not all banks survive for the same number of years. The reformulated likelihood function becomes

$$L = \prod_{i=1}^{n} \Big[\prod_{k=j_\tau}^{j_i} h_{ik}^{y_{ik}} \left(1 - h_{ik}\right)^{(1-y_{ik})} \Big]. \tag{11}$$

Equation (11) is the standard likelihood function for a binary dependent variable, hence, (2) may be estimated as a logit regression with y_{it} as the dependent variable and α_0, $\log(j)$, $(\log(j))^2$, and x_{ij} as explanatory variables. The number of observations equals $\sum_{i=1}^{n} (j_i - j_\tau)$.

5.2 Estimation of empirical hazard and survival probabilities

We provide non-parametric estimates of the empirical hazard function, $h_j = P(\mathrm{T} = j \,|\mathrm{T} \geq j)$, and survival function, $S(j) = \prod_{k=1}^{j} (1 - h_k)$, using the Kaplan-Meier product limit approach, assuming that the hazard is period-specific and the same for all banks.

Let n_j be the number of banks at risk of experiencing an exit event in the beginning of period j and d_j be the number of observed exits in period j. The empirical estimate of the hazard for period j is

$$\widehat{h_j} = \frac{d_j}{n_j}, \tag{12}$$

and the estimate of the survival function for period j is

$$\widehat{S(j)} = \prod_{k=1}^{j} \left(1 - \frac{d_k}{n_k}\right). \tag{13}$$

The survival probability at period j is thus equal one minus the 'exit rate' at each of the exit times preceding j. Notice that the hazard cannot be estimated for periods in which there are not exits.

5.3 Measuring duration

We collect information on the timing of all liquidations, mergers and acquisitions involving savings banks, on all issues of PCCs, and define the event of exit to take place during the year in which either of these three events occur. When the event of exit occurs right at the beginning of a year, i.e. if a bank is, say, acquired on January 1, 1988, the exit event is

defined as having taken place during the year of 1987.

In the case of bank mergers and acquisitions, only target banks are treated as exiting. Essentially all of the mergers that occur during our sample period have clearly defined target and acquiring banks, in the sense that the merged bank continues under the registration number of the acquiring bank in the data base of the Norwegian regulatory authorities. In one case a new bank was formed, and a new registration number issued, by a merger of eight smaller banks.[27] In this case, however, one bank comprised 60 percent of all bank assets in the merger, and we define that bank to be the de-facto acquiring bank, under the assumption that the smaller banks were less likely to be able to survive as stand-alone banks and that their choice of the merger occurred subject to this realization. It is almost always the case that the bank known to be the acquiring bank is also the largest.

New (de novo) savings banks are formed during the sample period. We exclude such banks entirely from the analysis as such banks choose location after deregulation has occurred. They do not, therefore, fit the premises of our "experiment" well. Also, almost all savings banks that are established after deregulation are PCC-banks from birth.

5.4 Explanatory variables and regressions

The dependent variable of the estimated logit model is a bank-specific dummy variable that indicates whether exit has occurred in a given year for a given bank cf. (10). The estimated hazard rate, however, is a function of explanatory variables that capture, among others, aspects of the markets and the local communities in which individual banks operate, in particular, the level of social capital. We map municipality-level information into to bank-specific variables using information on the branch structure of each bank. For each year in the sample, we know the exact location of the banks' branches. For each bank we can therefore construct a weighted average of the municipality-level variables, where the weights are the fractions of the bank's branches located in the municipalities.[28]

For illustration, let $\log(\text{POP}_m)$ denote the log of the population in municipality m and let BRANCHES_{im} denote the number of branches of bank i in municipality m. We then construct the bank-level population variable, "log(Population)$_i$", as the weighted average

[27] In 1988, the savings banks Sunnfjord, Gloppen, Gaular, Hornindal, Innvik, Leikanger, Stryn, and Balestrand merged to form a new bank, *Sparebanken Sogn og Fjordane*.

[28] This calculation implicitly assumes that a bank's branches are all of equal size. The assumption is necessary because data on the distribution of bank assets on municipalities do not exist.

of (logged) population size.

$$\log(Population)_i = \sum_m \left[\frac{\text{BRANCHES}_{im}}{\sum_m \text{BRANCHES}_{im}} \cdot \log(\text{POP}_m) \right] . \tag{14}$$

The branch structure employed in (14) is the structure that applies at the beginning of each interval (year). Other bank-level explanatory variables, including our measures of social capital, are constructed in a similar manner.

In the estimated hazard rate model, equation (2), the explanatory variable of interest is the measure of the level of social capital in the municipalities in which a given bank operates. In addition, we include several other variables in the regression to control for the characteristics of the municipalities, in particular municipality size, the proportion of residents in retirement (proxied by the fraction of the population over 67 years of age), and the education level of the residents in the municipality. Our measures of social capital, newspaper subscriptions and charity donations, are likely to be correlated with these population characteristics—omitting such characteristics might bias our results. Also, donations to charity may well be affected by the level and distribution of income in a municipality. We therefore scale the two charity donation measures employed in the regression by average (gross) personal income in the municipality.

A factor that is likely to affect the survival probability of savings banks is competition from other banks. We include in our regressions a bank-specific measure of the degree of competition a given bank faces from other banks, which we measure in alternative ways. Our preferred measure, "bank asset competition", captures the average weighted market share of competing banks in municipalities in which a given bank has branches. We proxy market share by total assets in a manner similar to equation (14), where the municipality level variable in (14) is the competing banks' share of total assets in municipality i.[29] The alternative competition measures use in place of bank market share the number of competing banks, the number of competing banks' branches, the number of competing large banks (size above the 90th percentile), and the number of competing commercial banks respectively. Importantly, we *always* compute the bank market competition measures from information on all municipalities and all banks in the Norwegian banking industry. That is, while our sample of savings banks is a subsample of all banks in the industry (see Section 5.3), our competition measures reflect the actual competition each bank in the

[29] We estimate competing banks' share of total assets in a given municipality by assuming that all branches of a given bank are of similar size and dividing total assets by the number of the bank's branches in that municipality.

sample is exposed to from *all* other banks, including banks that are not themselves in the sample.

We also include two measures of bank characteristics at the beginning of the sample; the equity capital ratio and bank size (log of total assets) in 1987. The suggestion of Hansmann (1996) that savings banks die only slowly because they are not under pressure to generate economic profits, would suggest that a bank can survive in a competitive regime for a longer period of time if it starts out with a considerable level of capital. It is also possible that bank size matters for the probability of survival. Large banks typically have more diversified portfolios, which may improve their risk-return tradeoff, and make them less susceptible to local economic shocks. Bank size and capitalization are, through accounting identities, causally affected by a bank's continued survival and therefore we use only the 1987-values of these two variables. This relationship is likely to be especially strong for banks with a non-distribution constraint.

Finally, we include a control variable for the level of economic activity measured by the rate of unemployment, lagged one period. In cases where bank lending is directed mainly towards local businesses and households, loan supply will directly affect municipality-level employment and our regressions may suffer from reverse causality. We try to encounter this problem by lagging the rate of unemployment and we show regressions both with and without unemployment.

Our base case regression measures social capital at the level of municipalities. The size distribution of Norwegian municipalities, however, is quite wide. Many municipalities have a rather low number of inhabitants whereas municipalities that contain a regional capital are many times larger (cf. Table 3). It is possible that the large differences in size induce noise in our measures of social capital and may affect our estimates. To account for this possibility, we run two regressions in addition to the base case regressions.

In the first specification, we measure social capital at the county level, which may reduce noise in our measures through aggregation. County level measures are constructed from municipality-level variables by simple aggregation of each variable in the measure.[30] In the second specification, we omit from the sample, in each year, municipalities with population size above the 95th percentile of the distribution. That is, the most populated municipalities are excluded from the weighted average in equation (14). In terms of social capital, the interpretation is that we are omitting the part of the variation in social capital that is associated with households in the large cities. For example, preferences for a particular charity organization may be markedly different for households in big cities, and our proxies

[30]There are 19 counties in Norway in 2005.

of social capital will pick up such variation as noise. In other words; there may be something "special" about the big cities and the proxies we use may be picking up different sources of variation in the city and the remaining municipalities respectively. We therefore exclude the city municipalities to see if that impacts our regression results. Notice that in this regression specification the bank competition measure is the only variable for which we do not omit large municipalities, i.e. this variable is constructed as a weighted average over all municipalities and all banks as discussed above. The other municipality characteristics have an important function as controls for the social capital proxies in the regression and are therefore computed with the same municipalities as the social capital proxy.

In general we collect municipality level data for as many years of the sample period as possible but statistics are not always available for every year. In such cases, we construct a step-wise variable in accordance with the years of information that are available. We refer to Section 4 for the exact variable definitions.

As a further test of robustness, we run our main regressions taking into account the pattern of failed banks during the banking crisis. In particular, for a failed bank, we determine the year of exit as the first year in which it receives capital from the savings banks guarantee fund. The savings banks guarantee fund is a private risk-sharing arrangement among the savings banks and one may debate whether a draw on the fund is equivalent to an exit. This redefinition effectively shifts the distribution of exit dates towards the beginning of the sample and causes more tied observations and less variation in the data, which may potentially reduce identification.[31]

6 Results and discussion

6.1 Descriptive statistics

Table 1 summarizes the structure of the Norwegian banking sector in 1987 and 2005. The table shows that the number of nonprofit savings banks drops from 191 in 1987 to 103 in 2005. This is compared to a decrease in the population of commercial banks from 24 in 1987 to 7 in 2005 and an increase in the population of PCC-banks from 0 in 1987 to 23 in 2005. The number of savings bank branches have been reduced from 1445 in 1987 to 350 in 2005. Over the same period, the number of branches of commercial and PCC-banks have changed from 720 to 476 and from 0 to 397, respectively. The total number of branches of for-profit banks have thus increased from 720 to 873 in the period. The number of single-

[31] Information on capital infusions from the savings bank guarantee fund may be found in Moe et al. (2004), ch. 6.

office savings banks (unit banks) is 60 in 1987 and 34 in 2005. The number of single-office commercial banks is 8 in 1987 and 6 in 2005. Only 2 PCC-banks are single-office banks in 2005.

The average number of branches in the group of savings banks is 7.6 in 1987 and 3.4 in 2005. Commercial and PCC-banks are typically larger. In the group of commercial banks, the average number of branches is 30 in 1987 and 31.7 in 2005, while for the PCC-banks the figure is 17.3 in 2005. In 1987, 73 percent of the nonprofit savings banks have less than 5 branches and 7 percent have more than 25 branches.[32] In contrast, only 33 percent of the commercial banks have less than 5 branches in 1987, but 25 percent have more than 25 branches.[33] In 1987, 28 percent of savings bank branches and 6 percent of commercial and PCC-bank branches are located in municipalities with below-median population. In 2005, the figures are 33 and 18 percent respectively. Overall, the figures illustrate that competition in the banking market has sharpened considerably since deregulation, also in the smaller municipalities.

Figure 1 contrasts the geographical distribution of savings bank branches in 1987 and 2005 with the corresponding distribution of commercial and PCC-banks. It is evident from the plots that the competition from for-profit banks has intensified over the sample period. It is also noticeable that a savings bank operates as the only bank in several municipalities in 2005, despite the fact that regulatory barriers to entry have been absent for two decades at this point in time. It is possible, however, that other barriers, such as high social capital, effectively deter entry.[34]

Table 2 provides a summary of the annual number of exits from our sample of savings banks from 1987 and onwards. The first column indicates the year of exit. The second column shows the number of savings banks present in the beginning of a given year and the third column gives the number of banks that exit during each year. Out of the 191 savings banks at the beginning of the sample period, 102 savings banks survive until the end of the sample.

The last two columns in the table state the estimated survival probabilities and interval hazard rates computed by the Kaplan-Meier method (cf. Section 5.2). The survival probabilities equal the proportion of the initial population of savings banks that survive several consecutive years. The table suggests that 90 percent of the banks survive for more than

[32] The corresponding statistics for 2005 are 86 percent and 0.03 percent.

[33] The corresponding statistics for 2005 are 47 percent and 27 percent.

[34] It is a well-known anecdote in the Norwegian banking community that large banks abstain from establishing branches in tight-knit communities due to the belief that they would not be able to capture a large enough share of the market to make their presence profitable.

one year, 83 percent survive for more than two, while 77 percent survive for more than three years. The median survival time or bank duration in our sample exceeds 19 years: Just above half the savings banks, 53 percent, remain alive for 20 years after deregulation.

The interval hazard rate equals the ratio of the number of banks that exit the sample in a given year relative to the number of banks present in the beginning of that year. The results clearly show that the hazard probability is highest in the earliest years of the sample, around 7 percent, and subsequently falls to a lower level of a few percent. The hazard rate is not monotonically decreasing over time, and there appears to be a clustering of consolidation/conversions, the first in the years right after deregulation, the second at the end of the 1990s, resulting in several tied observations.

Tables 3 and 4 show descriptive statistics for the main variables of the duration analysis presented below. In Table 3, we display statistics for the variables measured at the municipality level. The municipalities vary considerably in size. The, by far, largest municipality is Oslo, the Norwegian capital. It is also noticeable that the rate of unemployment has relatively low cross-sectional variation. The corresponding bank level explanatory variables are reported in Table 4.

6.2 Logit regressions of the probability of exit

Table 5 shows the results from a logit regression of the hazard rate on a baseline hazard and explanatory variables, using newspaper subscriptions as the measure of social capital. The results of Model (1) show that Subscriptions has a significant negative effect on the hazard rate, that is, savings banks' probability of exit in a given period is lower when banks have branches in municipalities with a high level of social capital. The effect is significant at the 1 percent level.

To interpret the sign of the estimated coefficients, consider first the estimated baseline hazard function, $\alpha_0 + ln(j) + ln(j)^2$. In period one, i.e. the year of 1987, j equals 1. That is, the baseline hazard reduces to α_0. The estimated value of α_0 is positive which implies that the odds, $(\frac{h}{1-h})$, in period one exceeds 1—the baseline probability of exit is higher than the probability of survival. One can compute that the baseline probability of exit in period one equals 0.98.[35] The negative sign of the estimated coefficient on subscriptions then implies that a bank with a value of subscriptions equal to, say, 1, has a 93 percent probability of exit in period one, assuming for simplicity that all other explanatory variables equal zero.[36] That is, depending on their signs, the coefficient of the explanatory variables

[35] $h = 0.9802$ solves $\ln(\frac{h}{1-h}) = 3.90$.

[36] From $\ln(\frac{h}{1-h}) = 3.90\text{-}1.25$.

shift the baseline hazard up or down, in the scale of logit-hazard. The estimated negative coefficients of the second and third term in the baseline hazard function imply that the probability of exiting decreases over time as j increases in value. The estimated joint effect of these two terms is statistically significant at the 1 percent level (LR-Test 2). Thus, we estimate that the hazard of exiting is falling over time at an increasing rate, a result that corresponds well with the data pattern shown in Table 2.

The estimated effect of banks' equity ratio at the outset of the deregulated regime is also negative and statistically significant at a level below 1 percent—capitalization is a very important determinant of the viability of nonprofit banks.

Of the other explanatory variables included in the regression, only municipality size (population) is significant at the 10 percent level. The estimated coefficient of municipality size has a negative sign that likely reflects the fact that many of the savings banks that have pursued a growth strategy after deregulation are headquartered in the populated regional centers. These banks have typically been acquiring other banks in mergers. The variables Bank Asset Competition and Population over 67 Years are both significant at the 20 percent level. The competition measure has a positive sign, that is, the probability of exit is higher the larger the market share of competing banks. The sign on the population over 67 variable is also positive, that is, we do not find evidence that nonprofit banks located in communities with an aging population are able to survive longer. In fact, we find the opposite.

To get a sense of the economic importance of the subscriptions and equity ratio variables, we estimate the marginal effect of a discrete change in Subscriptions in the year of 1987, assuming that all other explanatory variables are held at their mean values. When the average number of subscriptions per household increases from its minimum value of 0.5 to its maximum of 1.93, the estimated probability of exit decreases by approximately 12.6 percentage points for the average bank. In the middle of the sample period, 1997, the difference is –2.8 percentage points, that is, the probability of exit decreases by 2.8 percentage points when the value of subscriptions is raised from its minimum to its maximum value. If one instead considers a discrete increase in Subscriptions of one standard deviation around the mean (from 1/2 standard deviation below to 1/2 above), the corresponding figures are -0.02 in 1987 and -0.01 in 1997. The lower probabilities in 1997 reflect that most mergers occur in the first half of the sample and therefore the estimated probability of exit is considerably lower in the second half of the sample period. Clearly the economic importance of social capital is considerable when we compare the two extremes, but much smaller if we look at variation around the average. This seems to suggests that banks that operate in markets with an average level of civic engagement experience a relatively modest effect

of social capital. However, banks that operate in communities with above-average social capital experience a markedly improved probability of survival.

The estimated marginal effect of changes in the ratio of equity capital in Model (1) is considerable. In 1987, a discrete change in Equity Ratio from its minimum to its maximum level, decreases the probability of exit by 42.7 percentage points, holding all other explanatory variables at their means. An increase in Equity Ratio of one standard deviation around its mean lowers the estimated probability of exit by 5.7 percentage points. In 1997, the corresponding changes in probabilities are –12.3 percentage points and –1.2 percentage points respectively. Summing up, the estimated economic effects of social capital and the ratio of equity capital are both economically significant, and the capital effect is not only larger but also more persistent over time.

Model (2) includes the lagged rate of unemployment as a control for the degree of economic activity in the municipalities. The probability of exit is lower the higher is Lagged Unemployment. This may reflect that bank mergers tend to occur in areas with economic growth. The effect, however, is not quite significant at conventional levels. Its inclusion has little effect on the estimated coefficients of the other explanatory variables. In Model (2), the estimated marginal effect of an increase in the value of Subscriptions from its minimum to its maximum level is –10.5 and –2.8 percentage points in 1987 and 1997. The marginal effects for Equity Ratio are –33.9 and –13.2 percentage points, respectively.

Model (3) substitutes the municipality level measure of Subscriptions with the corresponding measure at the county level. This increases both the estimated coefficient and its standard error. The variable is again significant at the 1-percent level. Bank Asset Competition is now significant at the 10-percent level, whereas the estimated coefficients on the other explanatory variables change only little. The economic effect of social capital is larger in this specification; the estimated difference between the minimum and maximum level of Subscriptions is –19.5 percentage points in 1987 and –5.0 percentage points in 1997. The marginal effects of a one standard deviation increase is similar to Model (2), that is, the difference between the two extremes of the distribution doubles, but its standard deviation remains unchanged.

Model (4) omits the municipalities with regional centers and this lowers the estimated coefficient on Subscriptions below the estimate in Model (2). The coefficient is significant at the 5 percent level.

In Figure 2, we illustrate the economic interpretation of our results further. We depict the estimated effect of social capital on the probability of exit for different values of Equity Ratio in 1987 and 1997, using the estimates of Model (2). All other explanatory variables

are held at their mean values. The plots show that a (hypothetical) average bank with Equity Ratio equal to the minimum ratio observed in our sample, has a markedly higher exit probability than the average bank. The effect is largest at the beginning of the sample in 1987, but the difference is considerable also in 1997. On the other hand, social capital, as measured by Subscriptions, has almost no effect on the survival probability of a bank with the maximum observed equity ratio. This result implies that social capital is especially important for the survival of savings banks with a relatively low level of equity capital and suggests that social capital may serve as a substitute for equity capital.

Table 6 displays the results with the two donation-based measures of social capital. In Model (1), the estimated coefficient on Donation Ratio has a negative sign and is statistically significant at the 5 percent level. This result is similar to that of Table 5, i.e. banks that operate in markets with relatively high donations (high social capital) have a lower probability of exit. Population over 67 Years is also significant at the 5 percent level and the estimated coefficients on the other explanatory variables are largely similar to Model (1) in Table 5. In particular, the effect of Equity Ratio is of similar size and very significant. Controlling for unemployment, Model (2), decreases the estimated coefficient on Donation Ratio and lowers its significance slightly to 6 percent. Aggregated to the county level, Model (3), Donation Ratio appears to have little information about bank survival and is insignificantly different from zero. In contrast, the estimated effect and its level of significance is high when the populous municipalities are omitted from the sample in Model (4). The latter specification, increases the magnitude of Bank Asset Competition, which is now significant at the 5 percent level.[37] The effect on the probability of exit on an increase in Donation Ratio from its minimum to maximum level in 1987 is –22 and –17 percentage points in Models (4) and (5) respectively, that is, about twice as large as the effects estimated with Subscriptions.

Models (5)–(8) display the results of a similar set of regressions for Committed Donors Ratio. This measure of social capital is generally less significant than Donation Ratio, at 6 percent in Model (5) and 13 percent in Model (6). Aggregation to county level in Model (7), however, increases the estimated magnitude of the coefficient and its significance considerably. This may reflect the fact that, in many municipalities, only a few people sign up as committed donors—on average 12 donors (median 6 donors). Here, the existence of many municipalities of small size may come into play in the sense that the county level measure has more information because it is drawn from a larger population. Omitting the

[37] In contrast to the other variables, Bank Asset Competition includes the populous municipalities where competition is especially severe. Its significance may therefore reflect the "special-ness" of the large cities.

most populous municipalities in Model (8) lowers the estimated coefficient and increases its p-value to 13 percent. The effect of the other explanatory variables is generally similar to Models (1)–(4). The effect on the probability of exit on an increase in Committed Donors Ratio from its minimum to maximum level in 1987 is –7 and –6 percentage points in Model (4) and (5) respectively, that is, of a similar order of magnitude as the effects estimated with Subscriptions.

6.3 Robustness

Table 7 shows regression results with alternative measures of bank market competition, using newspaper subscriptions as the measure of social capital. The regression specification is similar to Model (2) in Table 5. The estimated coefficient on Subscriptions is robust to different measures of competition. The estimated coefficients on the competition measures themselves are all insignificant at conventional levels and less significant than the measure of competing banks' market share employed in the previous tables. It is interesting, however, that the sign of the competition measures in Models (3) and (4), competing large and commercial banks, changes to negative, indicating that stronger competition from large and commercial banks *lowers* the probability of exit. This may suggests that stakeholders in savings banks have a particular preference for the nonprofit organizational form. The insignificance of the results, however, provides only suggestive evidence for such an effect.

The regressions in Tables 8 and 9 are similar to those of Tables 5 and 6 except that the log-baseline hazard function is replaced with a dummy variable for each period j in which at least one bank exit occurs.[38] This specification may capture time-varying macroeconomic developments better than the models with the log-baseline hazard, but it increases the number of estimated parameters by 12 and lowers the number of observations.

In Table 8, the estimated coefficients for Subscriptions and the other explanatory variables do not change much. The estimated economic effect of an increase in Subscriptions from its minimum to its maximum value in Model (2) is –11.9 percentage points in 1987 and –2.4 percentage points in 1997, which is of the same order of size as the regressions with the log-form baseline hazard. In Table 9, the estimated coefficients for Donation Ratio are a little lower compared to the log-baseline specification, whereas the estimated coefficients for Committed Donors Ratio are a little higher. The remaining explanatory variables are roughly unchanged. The economic effect on the probability of exit of an increase in social capital from its minimum to maximum level in 1987 is –15.1 and –7.6 percentage points for

[38]The time effect is not identified in years with no exit and these years are omitted from the regressions.

Donation Ratio and Committed Donors Ratio respectively, and in 1997 the corresponding figures are –1.4 and –2.1 percentage points (Models (2) and (5)).

In Tables 10 and 11 we display the results from regressions where banks in default are set to exit in the year they receive capital infusions from the savings bank guarantee fund. Overall, the effect of social capital is robust to this specification. The estimated coefficients of Subscriptions are marginally larger than in Table 5. The estimated coefficients on Donation Ratio and Committed Donors Ratio are marginally lower in some specifications, and marginally higher in others.

7 Conclusion

We study the survival of savings banks in the Norwegian banking industry in a period following branching deregulations in the mid-1980s. We show that the viability of savings banks is significantly related to the level of social capital in the local communities in which the savings banks operate. Our results imply that social capital reduces banks' probability of exit by a few percentage point for banks with branches in the average community, but that the effect is markedly higher for banks that operate in markets with above-average levels of social capital, in the order of 10–15 percentage points. We also find evidence to suggest that social capital may substitute for equity capital for less well capitalized banks.

This link between social capital and the nonprofit organizational form follows from the observation that, by design, savings banks are nonprofit firms that allocate control rights over decision-making to stakeholder groups from the local community. Hence, the nonprofit organizational form induces savings banks to internalize the effect of their actions on the community and its various stakeholder groups.

Social capital may facilitate cooperation among stakeholder groups with divergent interests and thereby reduce the costs of collective decision-making. Also, social capital may generate a shared preference for the wellbeing of the community among its members.

In summary, our findings suggest that social institutions, such as civic engagement, norms, and altruism, matter for the existence and survival of nonprofit organizations, even in a highly competitive industry such as the banking sector. They provide, to our knowledge, the first evidence of a link between social capital and business organizational form.

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Table 1:

The Norwegian Banking Sector
Characteristics by Organizational Form in 1987 and 2005

	1987			2005		
	Savings Banks	Comm. Banks	PCC Banks	Savings Banks	Comm. Banks	PCC Banks
No. of banks	191	24	0	103	15	23
No. of branches	1,445	720	0	350	476	397
Average no. of bank branches	7.6	30.0	0	3.4	31.7	17.3
No. of single office banks	60	8	0	34	6	2
No. of small banks (< 5 branches)	140	8	0	89	7	7
No. of large banks (> 25 branches)	14	6	0	3	4	5
No. of branches in below median pop. municipalities	416	42	0	117	31	125
No. of branches in above median pop. municipalities	1,029	678	0	233	445	272

Note: The table displays the number of banks and bank branches by organizational form in the entire Norwegian banking sector, for 1987 and 2005. No. of banks, No. of branches (Average no. of bank branches) refer to the total (average) number of banks and bank branches in the population of banks, respectively. No. of single office banks is the number of banks with a single branch office. No. of small banks (No. of large banks) refer to the number of banks with less than 5 (more than 25) branches. Further, the bottom two rows display the number of bank branches in municipalities with population below and above the median, where the median municipality population is 4,346 in 1987 and 4,451 in 2005.

Table 2:

Empirical Survival and Hazard Functions
Savings Banks, 1987-2005

Year	Number of savings banks: present beg. of year	Number of savings banks: that exit during year	Survival function	Interval hazard function
1987	191	19	0.90	0.10
1988	172	14	0.83	0.08
1989	158	11	0.77	0.07
1990	147	11	0.71	0.07
1991	136	7	0.68	0.05
1992	129	4	0.65	0.03
1993	125	0	0.65	0.00
1994	125	1	0.65	0.01
1995	124	2	0.64	0.02
1996	122	3	0.62	0.02
1997	119	2	0.61	0.02
1998	117	0	0.61	0.00
1999	117	8	0.57	0.07
2000	109	2	0.56	0.02
2001	107	3	0.54	0.03
2002	104	0	0.54	0.00
2003	104	0	0.54	0.00
2004	104	2	0.53	0.02
2005	102	0	0.53	0.00

Note: The table shows bank survival summary statistics estimated with the Kaplan-Meier product-limit method. The first column indicates each year (interval) in the sample. The second column gives the number of savings banks in the sample at the beginning of each year. The third column shows the number of exits during the year. The estimate for the survival function for year j, column four, is the proportion of savings banks that survive until the end of year j. The estimated interval hazard function for year j, column five, equals the number of banks that exit in year j, divided by the number of banks in the sample at the beginning of year j.

Table 3:
Descriptive Statistics I: Municipality and County Level Variables

	Median	**Mean**	**Std.dev.**	**Min.**	**Max.**
Subscriptions	1.10	1.13	0.28	0.39	2.17
Subscriptions (County Level)	1.16	1.13	0.15	0.50	1.41
Donation Ratio	0.15	0.17	0.09	0.00	1.14
Donation Ratio (County Level)	0.12	0.14	0.05	0.00	0.26
Committed Donor Ratio (1990)	0.10	0.11	0.09	0.00	0.63
Committed Donor Ratio (1990) (County Level)	0.11	0.10	0.04	0.01	0.15
Population	4,364	10,112	28,522	212	529,846
Pop. over 67 Years	15.78	15.60	3.67	5.68	31.29
Pop. w. Higher Education	1.27	1.57	1.16	0.00	11.27
Lagged Unemployment	0.03	0.03	0.01	0.00	0.12

Note: The table shows descriptive statistics of the main variables at the municipality and county level. Subscriptions is the average number of newspaper subscriptions per household. Donation Ratio is the door-collected contribution to the annual national TV charity show measured per capita, divided by average municipality (county) income, and multiplied by 1,000 for scaling. Committed donors is the number of committed donors per capita that signed up during the 1990 national TV charity show, scaled by average municipality (county) income and multiplied by 10^7. Population is the number of municipality residents. Pop. w. Higher Education is the proportion of residents with a 4-year university-level degree or higher, multiplied by 100. Pop. over 67 Years is the proportion of inhabitants at age 67 years or older, multiplied by 100. Unemployment is the proportion of municipality residents that are unemployed. The sample period is 1987–2005. All variables are measured at the municipality level, except where county level is indicated.

Table 4:
Descriptive Statistics II: Bank Level Variables

	Median	**Mean**	**Std.dev.**	**Min.**	**Max.**
Subscriptions	1.17	1.18	0.27	0.50	1.93
Subscriptions (County Level)	1.18	1.07	0.27	0.22	1.41
Donation Ratio	0.15	0.16	0.07	0.00	0.48
Donation Ratio (County Level)	0.13	0.14	0.05	0.00	0.26
Committed Donor Ratio (1990)	0.11	0.11	0.06	0.00	0.35
Committed Donor Ratio (1990) (County Level)	0.11	0.11	0.03	0.01	0.15
Equity Ratio (1987)	9.69	10.31	2.63	3.15	20.08
Log(Total Assets) (1987)	6.38	6.40	1.12	2.91	11.33
Bank Asset Competition	0.51	0.48	0.31	0.00	1.00
Competing Banks	1.36	1.52	1.52	0.00	11.27
Competing Branches	0.32	0.55	0.72	0.00	5.64
Competing Large Banks	0.33	0.35	0.28	0.00	0.99
Competing Commercial Banks	0.17	0.19	0.19	0.00	0.94
Log(Population)	8.71	8.88	1.04	6.26	13.18
Pop. over 67 Years	16.09	16.03	3.14	6.48	26.44
Pop. w. Higher Education	1.50	1.67	0.92	0.19	9.69
Lagged Unemployment	2.46	2.60	1.11	0.20	6.21

Note: The table displays descriptive statistics for the bank level variables employed in the logit regressions. Bank level variables are constructed from municipality (county) level variables as a weighted average of the municipalities (counties) in which a given bank has branches, where the weights equal the fraction of the bank's branches in each municipality (county), cf. equation (14). Subscriptions is the average number of newspaper subscriptions per household. Donation Ratio is the door-collected contribution to the annual national TV charity show measured per capita, divided by average municipality (county) income, and multiplied by 1,000 for scaling. Committed donors is the number of committed donors per capita that signed up during the 1990 national TV charity show, scaled by average municipality (county) income and multiplied by 10^7. Equity Ratio (1987) is the bank's level of equity divided by total assets in the year of 1987, multiplied by 100. Log(Total Assets) (1987) is the log of the total value of assets measured in million Norwegian kroner. Bank Asset Competition is the weighted average market share of competing banks, measured in terms of total assets. Competing Banks is the weighted average number of competing banks per 10,000 inhabitants. Competing Branches is the weighted average number of competing banks' branches per 10,000 inhabitants. Competing Large Banks is the weighted average number of competing large banks per 10,000 inhabitants, where a large bank is a bank with total assets in excess of 1 billion Norwegian kroner in a given year. Competing Commercial Banks is the weighted average number of commercial banks per 10,000 inhabitants. Population is the number of municipality residents. Pop. w. Higher Education is the proportion of residents with a 4-year university-level degree or higher, multiplied by 100. Pop. over 67 Years is the proportion of inhabitants at age 67 years or older, multiplied by 100. Unemployment is the proportion of municipality residents that are unemployed. The sample period is 1987–2005. All variables are measured at municipality level, except where county level is indicated. All variables are time-varying except where indicated.

Table 5:
Effect of Social Capital on Savings Banks' Probability of Exit:
Household Subscriptions to Newspapers

	(1)	(2)	(3)	(4)
Subscriptions	-1.25	-1.25	-2.12	-1.21
	(0.46)	(0.48)	(0.77)	(0.47)
Equity Ratio (1987)	-0.32	-0.32	-0.32	-0.32
	(0.07)	(0.07)	(0.07)	(0.07)
Log(Total Assets) (1987)	0.03	0.03	0.06	0.02
	(0.11)	(0.11)	(0.10)	(0.10)
Bank Asset Competition	0.79	0.84	1.09	1.06
	(0.58)	(0.58)	(0.62)	(0.54)
Log(Population)	-0.41	-0.36	-0.40	-0.43
	(0.23)	(0.23)	(0.23)	(0.24)
Pop. w. Higher Education	0.24	0.14	0.12	0.23
	(0.21)	(0.23)	(0.22)	(0.30)
Pop. over 67 Years	0.06	0.06	0.06	0.06
	(0.04)	(0.04)	(0.04)	(0.05)
Lagged Unemployment	–	-0.19	-0.18	-0.20
	–	(0.12)	(0.12)	(0.13)
α_0	3.90	3.91	4.87	4.36
	(2.12)	(2.17)	(2.41)	(2.50)
$\log(j)$	-0.12	0.10	0.09	0.29
	(0.41)	(0.45)	(0.45)	(0.47)
$\log(j)$ squared	-0.24	-0.29	-0.28	-0.35
	(0.15)	(0.15)	(0.15)	(0.16)
No. Obs	2412	2412	2412	2195
Pseudo-R^2	0.13	0.13	0.13	0.13
p-value LR-Test 1	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.00	0.00	0.01

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on H_{0j} and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, H_{0j} is a baseline hazard function, $\text{H}_{0j} = \alpha_0 + \alpha_1 \log(j) + \alpha_2 \big[\log(j)\big]^2$, and x_{ij} is a vector of bank and municipality-specific characteristics. Subscriptions is the average number of newspapers subscriptions per household computed as a weighted average across the municipalities in which a given bank has branches. Please refer to Table 4 for remaining variable definitions. Models (1) and (2) measure Subscriptions at the municipality level, and Model (2) includes the lagged rate of unemployment as a control for municipality economic activity. Model (3) measures Subscriptions at the county level. Model (4) omits municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\log(j)$ and $\log(j)^2$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

Table 6:
Effect of Social Capital on Savings Banks' Probability of Exit: Charity Donations to Annual TV Charity Show

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Donation Ratio	-6.66	-5.91	-2.21	-6.63	–	–	–	–
	(3.12)	(3.27)	(3.68)	(3.36)	–	–	–	–
Committed Donor Ratio (1990)	–	–	–	–	-3.81	-3.02	-8.05	-3.18
	–	–	–	–	(2.11)	(2.08)	(3.25)	(2.14)
Equity Ratio (1987)	-0.32	-0.33	-0.33	-0.33	-0.31	-0.32	-0.33	-0.32
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Log(Total Assets) (1987)	0.08	0.09	0.07	0.08	0.07	0.07	0.04	0.06
	(0.11)	(0.11)	(0.11)	(0.09)	(0.11)	(0.11)	(0.11)	(0.10)
Bank Asset Competition	0.91	0.94	0.89	1.28	0.82	0.85	0.80	1.12
	(0.62)	(0.62)	(0.60)	(0.58)	(0.60)	(0.61)	(0.60)	(0.56)
Log(Population)	-0.55	-0.49	-0.28	-0.74	-0.35	-0.30	-0.31	-0.45
	(0.25)	(0.26)	(0.23)	(0.28)	(0.23)	(0.23)	(0.23)	(0.24)
Pop. w. Higher Education	0.25	0.17	0.11	0.20	0.23	0.15	0.20	0.17
	(0.22)	(0.23)	(0.22)	(0.29)	(0.21)	(0.22)	(0.22)	(0.29)
Pop. over 67 Years	0.09	0.09	0.07	0.08	0.07	0.07	0.08	0.05
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)
Lagged Unemployment	–	-0.15	-0.18	-0.18	–	-0.15	-0.13	-0.16
	–	(0.12)	(0.13)	(0.13)	–	(0.12)	(0.12)	(0.13)
α_0	4.18	3.88	1.93	6.08	1.90	1.80	2.43	3.10
	(2.25)	(2.29)	(2.28)	(2.95)	(1.98)	(2.00)	(2.11)	(2.55)
$\log(j)$	0.06	0.21	0.10	0.47	-0.18	0.00	-0.03	0.20
	(0.43)	(0.45)	(0.44)	(0.47)	(0.41)	(0.44)	(0.44)	(0.46)
$\log(j)$ squared	-0.37	-0.39	-0.30	-0.48	-0.21	-0.25	-0.25	-0.31
	(0.17)	(0.17)	(0.16)	(0.18)	(0.16)	(0.21)	(0.16)	(0.16)
No. Obs	2412	2412	2412	2195	2412	2412	2412	2195
Pseudo-R^2	0.12	0.13	0.12	0.13	0.12	0.13	0.13	0.13
p-value LR-Test 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on H_{0j} and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, H_{0j} is a baseline hazard function, $\text{H}_{0j} = \alpha_0 + \alpha_1 \log(j) + \alpha_2 \big[\log(j)\big]^2$, and x_{ij} is a vector of bank and municipality-specific characteristics. Donation Ratio and Committed Donors Ratio are computed as a weighted averages across the municipalities in which a given bank has branches. Please refer to Table 4 for variable definitions. Models (1) and (2), respectively (5) and (6), measure Donation Ratio and Committed Donors Ratio at the municipality level. Models (2) and (6) include the lagged rate of unemployment as a control for municipality economic activity. Models (3) and (7) measure Donation Ratio and Committed Donors Ratio at the county level. Models (4) and (8) omit municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\log(j)$ and $\log(j)^2$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

Table 7:

Alternative Measures of Bank Competition
Effect of Social Capital on Savings Banks' Probability of Exit:
Household Subscriptions to Newspapers

	(1)	(2)	(3)	(4)
Subscriptions	-1.27	-1.24	-1.26	-1.23
	(0.47)	(0.47)	(0.47)	(0.46)
Equity Ratio (1987)	-0.33	-0.34	-0.34	-0.34
	(0.07)	(0.07)	(0.07)	(0.07)
Log(Total Assets) (1987)	-0.01	-0.02	-0.04	-0.03
	(0.10)	(0.10)	(0.10)	(0.10)
Competing Banks	0.07	–	–	–
	(0.07)	–	–	–
Competing Branches	–	0.07	–	–
	–	(0.16)	–	–
Competing Large Banks	–	–	-0.13	–
	–	–	(0.57)	–
Competing Commercial Banks	–	–	–	-1.08
	–	–	–	(1.03)
Log(Population)	-0.16	-0.16	-0.15	-0.07
	(0.20)	(0.20)	(0.21)	(0.21)
Pop. w. Higher Education	0.10	0.10	0.11	0.14
	(0.22)	(0.22)	(0.22)	(0.22)
Pop. over 67 Years	0.06	0.05	0.06	0.05
	(0.04)	(0.04)	(0.04)	(0.04)
Lagged Unemployment	-0.18	-0.18	-0.17	-0.17
	(0.12)	(0.12)	(0.12)	(0.12)
No. Obs	2412	2412	2412	2412
Pseudo-R^2	0.13	0.13	0.13	0.13
p-value LR-Test 1	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.00	0.00	0.00

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on H_{0j} and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, H_{0j} is a baseline hazard function, $\text{H}_{0j} = \alpha_0 + \alpha_1 \log(j) + \alpha_2 \big[\log(j)\big]^2$, and x_{ij} is a vector of bank and municipality-specific characteristics. Subscriptions is the average number of newspapers subscriptions per household computed as a weighted average across the municipalities in which a given bank has branches. Bank Asset Competition is the weighted average market share of competing banks, measured in terms of total assets. Competing Banks is the weighted average number of competing banks per 10,000 inhabitants. Competing Branches is the weighted average number of competing banks' branches per 10,000 inhabitants. Competing Large Banks is the weighted average number of competing large banks per 10,000 inhabitants, where a large bank is a bank with total assets in excess of 1 billion Norwegian kroner in a given year. Competing Commercial Banks is the weighted average number of commercial banks per 10,000 inhabitants. Please refer to Table 4 for remaining variable definitions. Models (1) and (2) measure Subscriptions at the municipality level, and Model (2) includes the lagged rate of unemployment as a control for municipality economic activity. Model (3) measures Subscriptions at the county level. Model (4) omits municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\log(j)$ and $\log(j)^2$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

Table 8:

Robustness to Specification of Baseline Hazard I
Effect of Social Capital on Savings Banks' Probability of Exit:
Household Subscriptions to Newspapers

	(1)	(2)	(3)	(4)
Subscriptions	-1.24	-1.25	-2.22	-1.23
	(0.46)	(0.47)	(0.76)	(0.47)
Equity Ratio (1987)	-0.32	-0.32	-0.31	-0.32
	(0.07)	(0.07)	(0.07)	(0.07)
Log(Total Assets) (1987)	0.03	0.03	0.06	0.02
	(0.10)	(0.10)	(0.10)	(0.09)
Bank Asset Competition	0.76	0.78	1.03	0.99
	(0.57)	(0.58)	(0.61)	(0.54)
Log(Population)	-0.38	-0.37	-0.40	-0.44
	(0.23)	(0.23)	(0.23)	(0.24)
Pop. w. Higher Education	0.21	0.19	0.16	0.29
	(0.21)	(0.22)	(0.21)	(0.30)
Pop. over 67 Years	0.06	0.06	0.06	0.06
	(0.04)	(0.04)	(0.04)	(0.05)
Lagged Unemployment	–	-0.06	-0.05	-0.06
	–	(0.14)	(0.13)	(0.15)
α_0	3.65	3.74	4.80	4.08
	(2.14)	(2.19)	(2.42)	(2.51)
No. Obs	1860	1860	1860	1695
Pseudo-R^2	0.12	0.12	0.12	0.13
p-value LR-Test 1	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.01	0.06	0.03

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on H_{0j} and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, H_{0j} is a baseline hazard function and x_{ij} is a vector of bank and municipality-specific characteristics. $\text{H}_{0j} = \alpha_0 + \sum_{j=2}^{\text{J}} \delta_j \text{D}_j$, where D_j is a dummy for interval j and J is the overall number of intervals of the sample (estimated interval dummies are not reported). D_j is omitted from the regression if no bank exit occurs in interval j (years 1993, 1998, 2002, 2003, and 2005). Subscriptions is the average number of newspapers subscriptions per household computed as a weighted average across the municipalities in which a given bank has branches. Please refer to Table 4 for remaining variable definitions. Models (1) and (2) measure Subscriptions at the municipality level, and Model (2) includes the lagged rate of unemployment as a control for municipality economic activity. Model (3) measures Subscriptions at the county level. Model (4) omits municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\{\text{D}_j\}_{j=2}^{\text{J}}$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

Table 9:

Robustness to Specification of Baseline Hazard II
Effect of Social Capital on Savings Banks' Probability of Exit: Charity Donations to Annual TV Charity Show

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Donation Ratio	-5.98	-5.90	-1.56	-6.75	–	–	–	–
	(3.55)	(3.61)	(4.18)	(3.76)	–	–	–	–
Committed Donor Ratio (1990)	–	–	–	–	-3.83	-3.95	-9.30	-3.97
	–	–	–	–	(2.09)	(2.14)	(3.27)	(2.14)
Equity Ratio (1987)	-0.32	-0.33	-0.32	-0.32	-0.32	-0.32	-0.32	-0.31
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Log(Total Assets) (1987)	0.08	0.08	0.06	0.08	0.07	0.07	0.03	0.06
	(0.11)	(0.10)	(0.10)	(0.09)	(0.11)	(0.11)	(0.11)	(0.09)
Bank Asset Competition	0.85	0.86	0.81	1.21	0.77	0.76	0.70	1.02
	(0.61)	(0.61)	(0.60)	(0.58)	(0.60)	(0.60)	(0.59)	(0.55)
Log(Population)	-0.50	-0.49	-0.28	-0.74	-0.32	-0.32	-0.33	-0.45
	(0.26)	(0.27)	(0.23)	(0.30)	(0.23)	(0.23)	(0.23)	(0.25)
Pop. w. Higher Education	0.23	0.21	0.15	0.26	0.20	0.21	0.27	0.24
	(0.22)	(0.23)	(0.22)	(0.29)	(0.21)	(0.22)	(0.22)	(0.29)
Pop. over 67 Years	0.09	0.09	0.06	0.08	0.07	0.07	0.08	0.05
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)
Lagged Unemployment	–	-0.03	-0.05	-0.05	–	0.03	0.05	0.03
	–	(0.13)	(0.14)	(0.14)	–	(0.13)	(0.14)	(0.14)
α_0	3.71	3.71	1.52	5.86	1.66	1.64	2.35	2.78
	(2.43)	(2.43)	(2.40)	(3.18)	(2.00)	(2.00)	(2.12)	(2.53)
No. Obs	1860	1860	1860	1695	1860	1860	1860	1695
Pseudo-R^2	0.12	0.12	0.11	0.12	0.12	0.12	0.12	0.12
p-value LR-Test 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.02	0.13	0.02	0.00	0.03	0.02	0.03

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on $\text{H}0j$ and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, $\text{H}0j$ is a baseline hazard function and x_{ij} is a vector of bank and municipality-specific characteristics. $\text{H}0j = \alpha_0 + \sum_{j=2}^{\text{J}} \delta_j \text{D}j$, where $\text{D}j$ is a dummy for interval j and J is the overall number of intervals of the sample (estimated interval dummies are not reported). $\text{D}j$ is omitted from the regression if no bank exit occurs in interval j (years 1993, 1998, 2002, 2003, and 2005). Donation Ratio is the door-collected contribution to the annual national TV charity show measured per capita, divided by average income, and multiplied by 1,000 for scaling. Committed donors is the number of committed donors per capita that signed up during the 1990 national TV charity show, scaled by average income and multiplied by 10^7. Both variables are computed as a weighted average across the municipalities in which a given bank has branches. Please refer to Table 4 for remaining variable definitions. Models (1) and (2), respectively (5) and (6), measure Donation Ratio and Committed Donors Ratio at the municipality level. Models (2) and (6) include the lagged rate of unemployment as a control for municipality economic activity. Models (3) and (7) measure Donation Ratio and Committed Donors Ratio at the county level. Models (4) and (8) omit municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\{\text{D}j\}_{j=2}^{\text{J}}$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

Table 10:

Robustness to the Norwegian Banking Crisis I
Effect of Social Capital on Savings Banks' Probability of Exit:
Household Subscriptions to Newspapers

	(1)	(2)	(3)	(4)
Subscriptions	-1.28	-1.28	-2.13	-1.24
	(0.46)	(0.48)	(0.77)	(0.48)
Equity Ratio (1987)	-0.32	-0.32	-0.32	-0.33
	(0.07)	(0.07)	(0.07)	(0.08)
Log(Total Assets) (1987)	0.03	0.04	0.07	0.02
	(0.10)	(0.10)	(0.10)	(0.10)
Bank Asset Competition	0.79	0.84	1.10	1.06
	(0.58)	(0.58)	(0.62)	(0.55)
Log(Population)	-0.40	-0.35	-0.39	-0.45
	(0.23)	(0.23)	(0.24)	(0.24)
Pop. w. Higher Education	0.25	0.15	0.13	0.24
	(0.21)	(0.22)	(0.21)	(0.30)
Pop. over 67 Years	0.05	0.05	0.05	0.05
	(0.04)	(0.04)	(0.04)	(0.05)
Lagged Unemployment	–	-0.20	-0.19	-0.21
	–	(0.12)	(0.12)	(0.13)
α_0	4.00	3.99	4.96	4.69
	(2.14)	(2.20)	(2.46)	(2.53)
$\log(j)$	-0.04	0.19	0.18	0.34
	(0.41)	(0.45)	(0.45)	(0.47)
$\log(j)$ squared	-0.28	-0.33	-0.32	-0.38
	(0.16)	(0.16)	(0.16)	(0.17)
No. Obs	2389	2389	2389	2188
Pseudo-R^2	0.13	0.13	0.13	0.14
p-value LR-Test 1	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.00	0.00	0.01

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on H_{0j} and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, H_{0j} is a baseline hazard function, $\text{H}_{0j} = \alpha_0 + \alpha_1 \log(j) + \alpha_2 \big[\log(j)\big]^2$, and x_{ij} is a vector of bank and municipality-specific characteristics. Banks that receive capital from the private savings bank guarantee fund in year j are set to exit in that year. Subscriptions is the average number of newspapers subscriptions per household computed as a weighted average across the municipalities in which a given bank has branches. Please refer to Table 4 for remaining variable definitions. Models (1) and (2) measure Subscriptions at the municipality level, and Model (2) includes the lagged rate of unemployment as a control for municipality economic activity. Model (3) measures Subscriptions at the county level. Model (4) omits municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\log(j)$ and $\log(j)^2$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

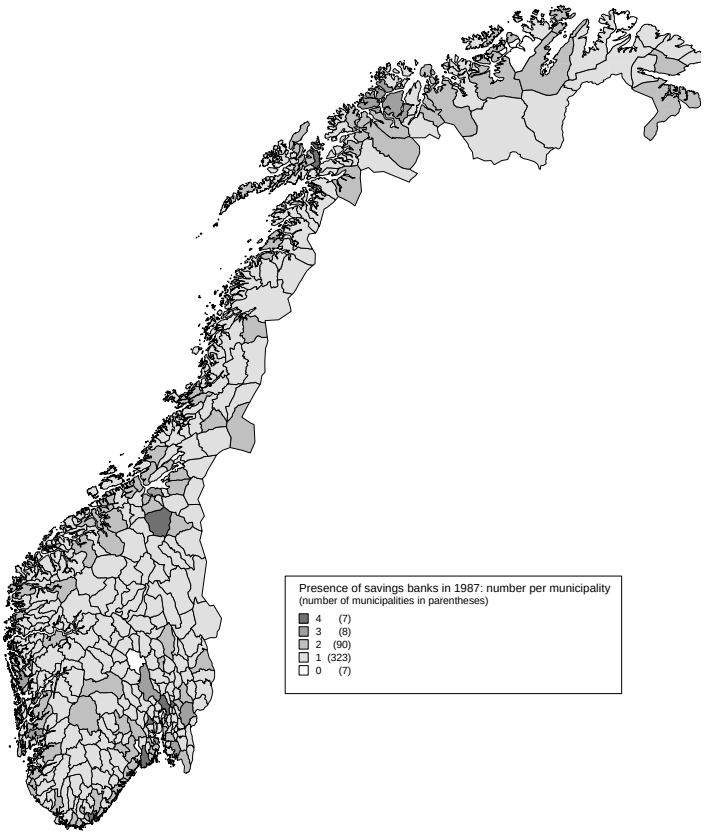
Table 11:

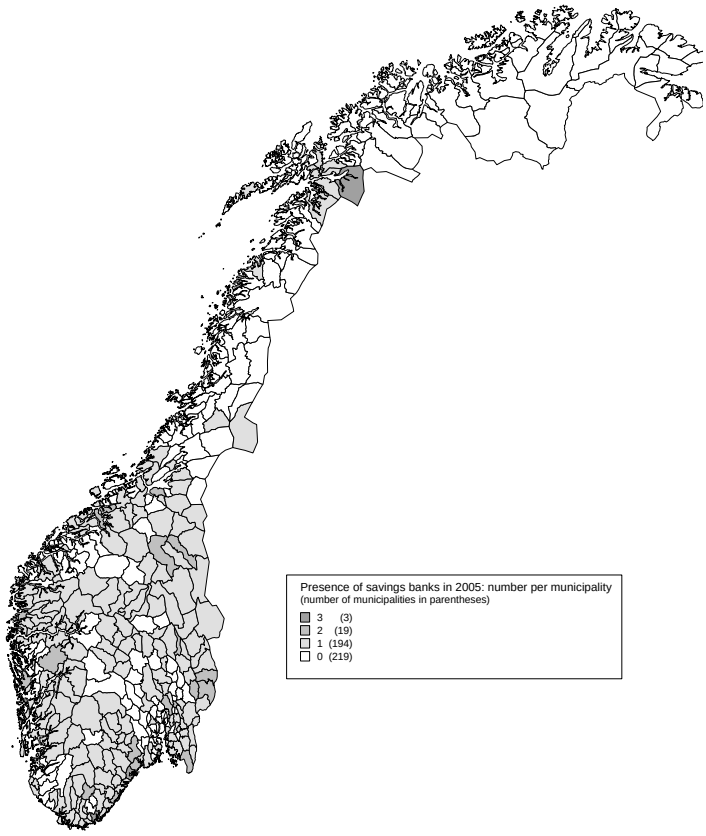
Robustness to the Norwegian Banking Crisis II
Effect of Social Capital on Savings Banks' Probability of Exit: Charity Donations to Annual TV-Collection

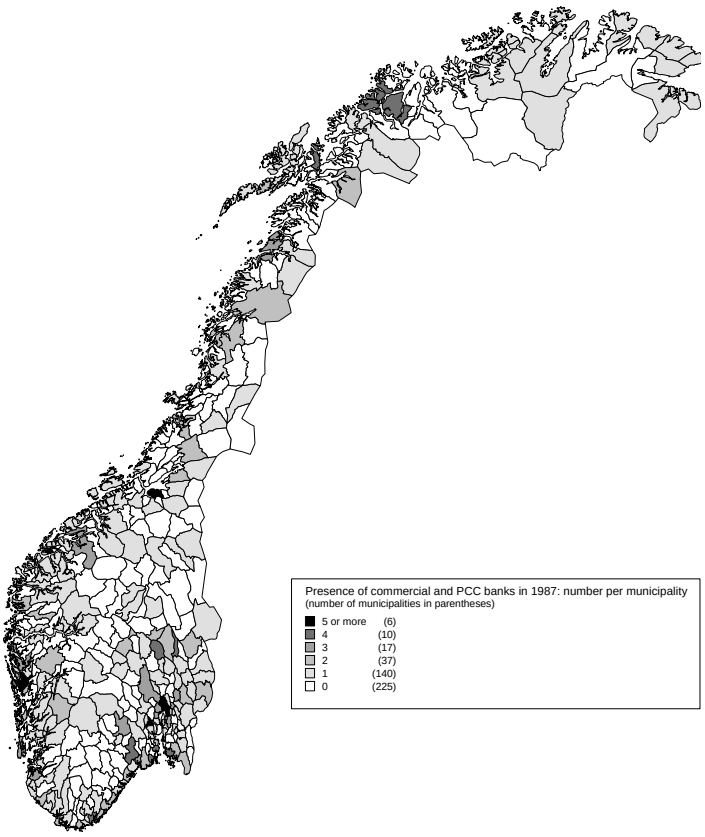
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Donation Ratio	-6.44	-5.59	-1.87	-7.09	–	–	–	–
	(3.12)	(3.27)	(3.71)	(3.39)	–	–	–	–
Committed Donor Ratio (1990)	–	–	–	–	-3.57	-2.85	-7.46	-2.98
	–	–	–	–	(2.11)	(2.16)	(3.26)	(2.16)
Equity Ratio (1987)	-0.32	-0.33	-0.33	-0.34	-0.31	-0.32	-0.33	-0.33
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Log(Total Assets) (1987)	0.09	0.09	0.07	0.09	0.08	0.08	0.05	0.06
	(0.11)	(0.11)	(0.10)	(0.09)	(0.11)	(0.11)	(0.11)	(0.10)
Bank Asset Competition	0.90	0.94	0.88	1.29	0.80	0.85	0.80	1.12
	(0.62)	(0.62)	(0.60)	(0.58)	(0.60)	(0.61)	(0.60)	(0.56)
Log(Population)	-0.54	-0.47	-0.27	-0.78	-0.33	-0.28	-0.29	-0.46
	(0.26)	(0.26)	(0.23)	(0.29)	(0.23)	(0.23)	(0.23)	(0.25)
Pop. w. Higher Education	0.27	0.18	0.12	0.22	0.24	0.16	0.21	0.18
	(0.21)	(0.22)	(0.22)	(0.29)	(0.21)	(0.22)	(0.21)	(0.29)
Pop. over 67 Years	0.08	0.08	0.06	0.08	0.06	0.06	0.07	0.05
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)
Lagged Unemployment	–	-0.17	-0.20	-0.19	–	-0.17	-0.15	-0.18
	–	(0.12)	(0.13)	(0.13)	–	(0.12)	(0.12)	(0.13)
α_0	4.10	3.74	1.82	6.64	1.83	1.70	2.29	3.33
	(2.31)	(2.35)	(2.36)	(3.01)	(1.99)	(2.01)	(2.12)	(2.57)
$\log(j)$	0.12	0.28	0.17	0.52	-0.11	0.08	0.05	0.24
	(0.43)	(0.45)	(0.44)	(0.48)	(0.41)	(0.44)	(0.44)	(0.46)
$\log(j)$ squared	-0.41	-0.42	-0.33	-0.52	-0.25	-0.29	-0.28	-0.33
	(0.17)	(0.17)	(0.16)	(0.18)	(0.16)	(0.16)	(0.16)	(0.17)
No. Obs	2389	2389	2389	2188	2389	2389	2389	2188
Pseudo-R^2	0.13	0.13	0.13	0.14	0.13	0.13	0.13	0.13
p-value LR-Test 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p-value LR-Test 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Results are coefficient estimates from bank level logit regressions of y_{ij} on H_{0j} and x_{ij}, where y_{ij} equals one if bank i exists in year j and zero otherwise, H_{0j} is a baseline hazard function, $\text{H}_{0j} = \alpha_0 + \alpha_1 \log(j) + \alpha_2 \big[\log(j)\big]^2$, and x_{ij} is a vector of bank and municipality-specific characteristics. Banks that receive capital from the private savings bank guarantee fund in year j are set to exit in that year. Please refer to Table 4 for variable definitions. Models (1) and (2), respectively (5) and (6), measure Donation Ratio and Committed Donors Ratio at the municipality level. Models (2) and (6) include the lagged rate of unemployment as a control for municipality economic activity. Models (3) and (7) measure Donation Ratio and Committed Donors Ratio at the county level. Models (4) and (8) omit municipalities with population size above the 95th percentile. LR-test 1 is a Likelihood Ratio test of the joint significance of $\mathbf{x_{ij}}$. LR-test 2 is a Likelihood Ratio test of the joint significance of $\log(j)$ and $\log(j)^2$. The sample is 1987–2005. Standard errors corrected for heteroscedasticity and clustering at the bank level are in parentheses.

Figure 1: Geographical Presence of Bank Organizational Forms: 1987-2005







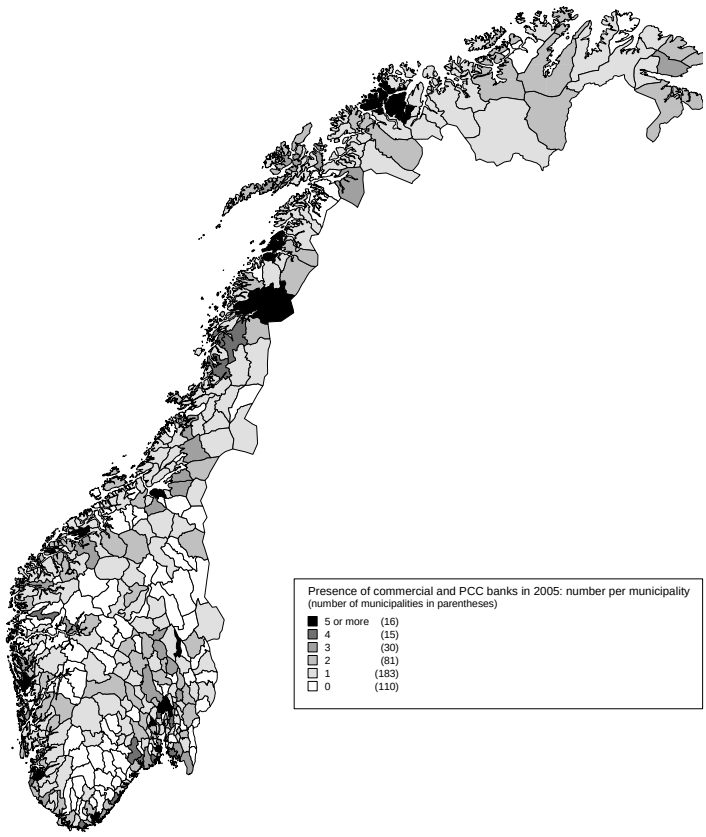
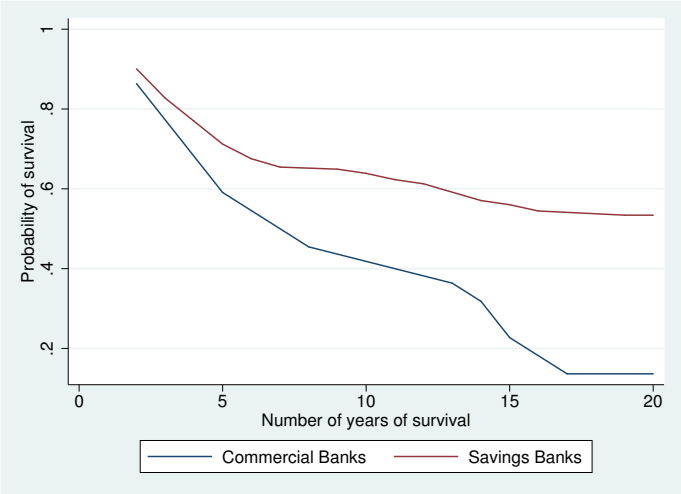
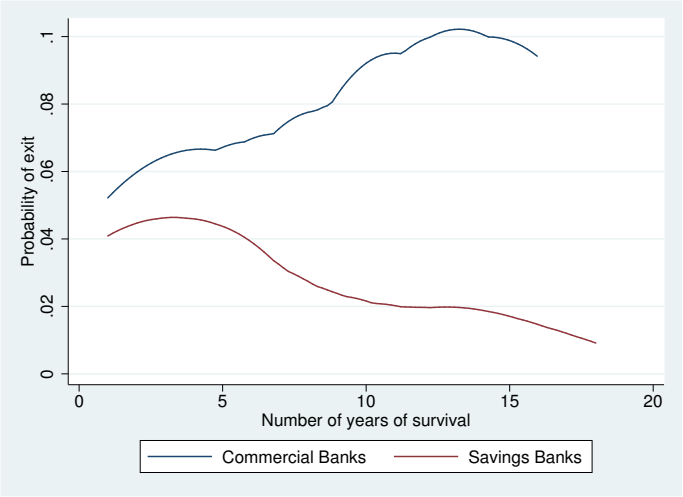


Figure 2: Survival Function for Savings and Commercial Banks



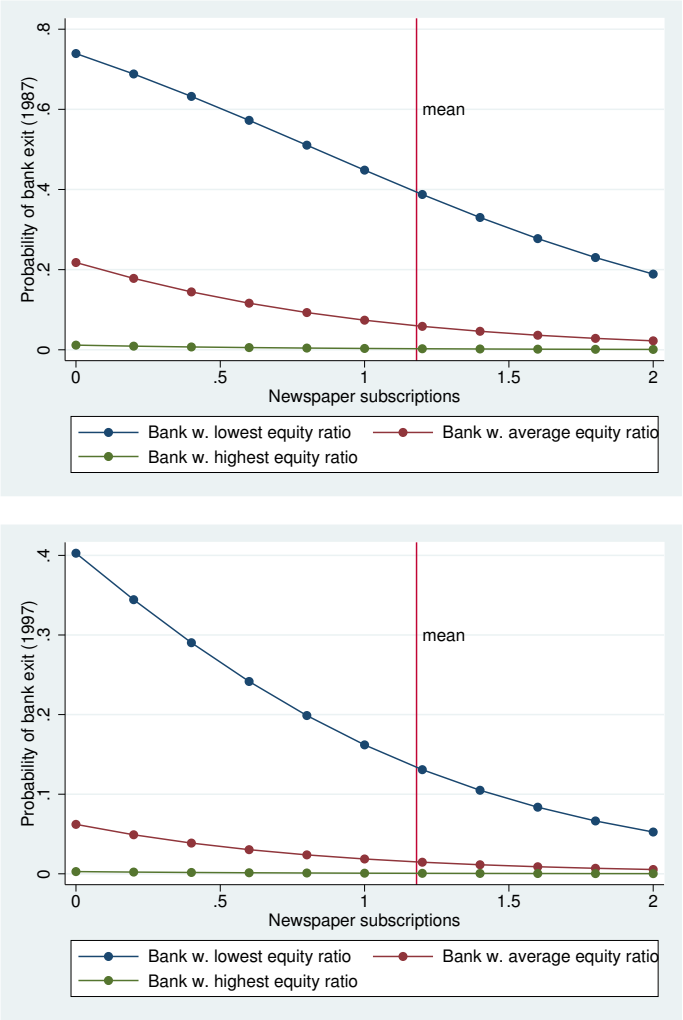
Notes: The figure shows estimated survival functions for the groups of savings and commercial banks respectively. The functions display the probability of bank survival in a given year, conditional on survival in all preceding years. For the group of savings banks, the values of the function correspond to the survival probabilities presented in Table 2.

Figure 3: Smoothed Hazard Function for Savings and Commercial Banks



Notes: The figure shows smoothed hazard functions for the groups of savings and commercial banks. The functions display the probability of exit in a given year, conditional on bank survival in all preceding years. For savings banks and for the years where at least one exit occurs, the values of the function correspond to the interval hazard rates presented in Table 2.

Figure 4: Effect of Social Capital on Banks' Probability of Exit for Different Equity Ratios



Notes: The figures show the effect of newspaper subscriptions, a measure of social capital, on the probability of bank exit in 1987 and 1997, for different bank equity ratios (minimum, median, and maximum), according to the estimates in Table 4, Model (2). Newspaper subscriptions is the average number of newspapers subscriptions per household computed as a weighted average across the municipalities in which each banks has branches. Equity ratio is is the bank's level of equity divided by total assets in the year of 1987, multiplied by 100. The minimum, median, and maximum equity ratios equal 3.2, 9.7, and 20.1 respectively. All other variables are held at their mean values.