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Firms and their distressed banks: lessons from the Norwegian banking crisis☆

Steven Ongena[a], David C. Smith[b,*], Dag Michalsen[c]

[a] *Department of Finance, Tilburg University, PO Box 90153, 5000 LE Tilburg, The Netherlands*
[b] *Division of International Finance, Board of Governors of the Federal Reserve System, Washington, DC 20551, USA*
[c] *Norwegian School of Management, PO Box 58, 1338 Sandvika, Norway*

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Abstract

We use the near-collapse of the Norwegian banking system during the period 1988–1991 to measure the impact of bank distress announcements on the stock prices of firms maintaining a relationship with a distressed bank. Although banks experienced large and permanent downward revisions in their equity value during the event period, firms maintaining relationships with these banks faced only small and temporary changes, on average, in stock price. Firms with access to unused liquid bank funds and firms that issued equity just prior to the crisis experience relatively high abnormal returns. Overall, the aggregate impact of bank distress appears small.

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*Corresponding author.
E-mail address: david.c.smith@frb.gov (D.C. Smith).

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1. Introduction

Many economists maintain that large-scale interruptions in bank lending activities can propagate negative shocks to the real sector. For example, Bernanke (1983) argues that the systematic failure of banks exacerbated the decline in the U.S. economy during the Great Depression, and Slovin et al. (1993) show that firms borrowing from Continental Bank suffered large stock price declines upon its collapse in 1984. More recently, Hoshi and Kashyap (2000), Morck and Nakamura (2000), and Bayoumi (1999) lay at least partial blame for Japan's current economic malaise on system-wide disruptions in bank lending that began in the early 1990s. All of these researchers maintain that market imperfections prevented firms from obtaining valuable financing once their banks became distressed.

A second set of economists view banks as performing functions that are either substitutable or enhanced by capital markets. Some of these researchers, exemplified by Black (1975), Fama (1980), and King and Plosser (1984), see nothing special about the services provided by banks and reason that the causality of any correlation between the health of the banking system and economic activity runs from the real sector to banks. Still others link the importance of banks to the structure of the financial system in general. For instance, Greenspan (1999) suggests that countries most susceptible to banking shocks are those that lack developed capital markets. He reasons that countries with well-developed capital markets insulate borrowers by providing good substitutes when banks stop lending. Similarly, Rajan and Zingales (1998) argue that sufficient competition from capital markets prevents banks from misallocating funds to unprofitable investment projects and mitigates the impact of a financial crisis on the real sector.

To shed some new light on this debate, we investigate the costs of bank distress using the Norwegian banking crisis of 1988–1991 as our laboratory of study. Our data permit us to directly link Norwegian banks to their Oslo Stock Exchange (OSE) customers through time. Using these links, we measure the impact of bank distress announcements upon the stock prices of firms related to the troubled banks. Our sample covers 90% of all commercial bank assets, and nearly all exchange-listed firms in Norway, presenting us with an opportunity to measure the impact of a banking system's near-collapse on a large segment of the economy.

There are a number of reasons why the Norwegian banking crisis presents an ideal setting for studying the impact of bank distress. First, the crisis was systemic and economically significant. During the crisis years, banks representing 95% of all commercial bank assets in Norway became insolvent, forcing the closure of one bank and the bailout of numerous other financial institutions, including Norway's three largest commercial banks. Bank managers were fired, employees were laid off, and

listed banks lost over 80% of their equity value. Second, banks are a primary source of funds to companies in Norway. Most of the commercial debt in Norway is raised through loans from financial institutions (92% in 1994, according to the *Statistical Yearbook of Norway*, 1996), and many firms maintain a relationship with only one bank. This assures that we isolate the impact of bank impairment on each firm's primary, if not only, source of debt financing. Third, the nature of the crisis allows us to control the direction of causality running between banking sector and borrower health. The deterioration in bank assets during the crisis resulted primarily from failures of small businesses, not from the exchange-listed companies in our study, which were relatively healthy at the outset of the crisis. Fourth, although bank-dominated on the credit side, Norway's corporate governance system contrasts starkly with other bank-centered economies, such as Japan and Korea, that have recently experienced financial crises. In particular, regulatory and legal restrictions in Norway keep significant control rights out of the hands of banks, and tend to favor the protection of minority equity shareholders.

Our evidence suggests that announcements of bank distress during the Norwegian banking crisis had little impact on the welfare of firms maintaining relationships with the troubled banks. Fig. 1 provides a preview of our results. It compares the stock price performance of a value-weighted portfolio of all firms on the OSE to the performance of a portfolio containing only OSE bank stocks. During the crisis period, Norwegian bank stocks lost most of their equity value, falling 84% between

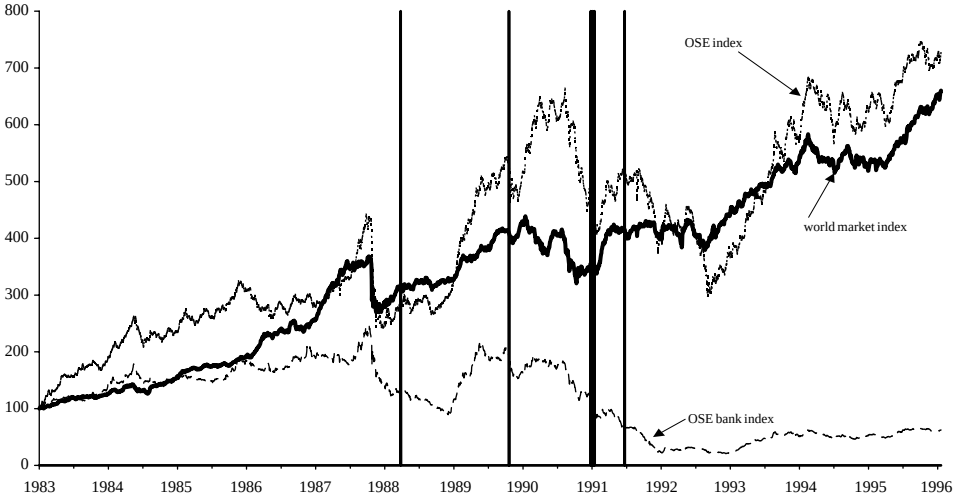

Fig. 1. Stock market returns around the crisis period. This figure compares the growth in three stock market indices from 1983 to 1996. The OSE index is a value-weighted index of all stocks listed on the Oslo Stock Exchange (OSE). The OSE bank index is a value-weighted index of all banks listed on the OSE. Daily returns on these indices are provided by Oslo Børs Informasjon. The world market index is a value-weighted combination (by the U.S. $ value of market capitalization on July 1, 1987) of stock market indices from Germany, Japan, U.K., and the U.S. and is based on daily returns from Datastream. The black vertical lines correspond to the event dates in our sample.

1988 and 1991. Over the same period, the value-weighted portfolio of OSE firms *climbed* 63%, outpacing the average performance of a value-weighted combination of the U.S., U.K., German, and Japanese stock markets. On an event-by-event basis, our analysis reveals that while banks experienced an average cumulative abnormal return (CAR) of −10.6% in the three days surrounding their distress announcement and –11.7% over a seven-day window, firms maintaining relationships with these distressed banks experienced an average three-day CAR of –1.7% and a seven-day CAR of +1.5% around the same event dates. These basic results are insensitive to the benchmark, averaging method, and other tests of empirical robustness.

We use cross-sectional regressions to study how the abnormal returns vary with proxies for a firm's dependence on financing from the distressed bank, and its ability to draw on alternative sources of financing. We find that firms earn lower returns after a distress announcement when they are highly leveraged and heavily drawn on a bank credit line, and earn higher returns when they issued equity prior to the distress period. These findings suggest that firms that are unable to draw on liquid sources of financing, or that lack alternatives to bank financing, are more harmed by bank distress.

Our original abnormal return estimates could suffer from selection biases. For instance, the event study excludes firms that terminate bank relationships prior to the event period. If these firms left because they were cut off by their banks, then the measured abnormal returns could understate the negative impact of bank distress. Moreover, crisis-induced changes in bank lending patterns could favor some firms over others, masking the damage caused by bank distress. To address these issues, we examine the behavior and performance of firms leaving the distressed bank in the years surrounding the distress announcement. Overall, we find little evidence that selection biases influence our results.

Our investigation is similar to recent studies that use firm-level data from crisis periods in Japan and other East Asian countries. Unlike our paper, these studies find that negative shocks to banks harm borrowing firms. For instance, Gibson (1995, 1997) finds that publicly listed Japanese firms with ties to lower-rated banks spent less on investment in the early 1990s than firms associated with higher-rated banks, while Kang and Stulz (2000) show that bank-dependent Japanese firms experienced lower stock returns than otherwise similar firms that were not dependent on bank financing. Using event study methods, Yamori and Murakami (1999) report that the 1997 failure announcement of Hokkaido Takushoku, a large Japanese city bank, resulted in an average three-day CAR of −6.6% for firms listing the failed institution as their main bank; Bae et al. (2002) find that credit downgrades of Korean banks during the East Asian crisis led to an average three-day CAR of −4.4% for borrowing firms; and Djankov et al. (2000) demonstrate that bank closure announcements in Indonesia, Korea, and Thailand during the East Asian crisis resulted in borrower abnormal returns of −3.9%. In the closing section of our paper, we offer an explanation of why our results differ from these other studies.

We organize the rest of the paper as follows. Section 2 details the major events surrounding the Norwegian banking crisis. Section 3 discusses the data and

introduces our event study methodology. Section 4 contains the empirical results. Section 5 contains a discussion of the results and concludes.

2. The Norwegian banking crisis

On March 18, 1988 Sunnmørsbanken, a small commercial bank in western Norway, issued an earnings report warning that it had lost all of its equity capital. This event marked the beginning of the Norwegian banking crisis, a four-year period in which 13 banks representing over 95% of the total commercial bank assets in Norway either failed or were seriously impaired. The crisis unfolded along the lines of a "classic financial panic" as described by Kindleberger (1996). A *displacement*—substantial and rapid financial deregulation in the mid-1980s—ignited *overtrading* in the form of a bank lending boom. In the midst of the credit expansion, a sudden decline in oil prices precipitated a fall in asset values. Many weak firms went bankrupt, imperiling the banks tied to the failing firms. This led to *revulsion* in trading in the form of reduced bank lending throughout the economy.

Banking deregulation began in earnest in 1984. Prior to that year, Norwegian authorities limited both the quantity and rates at which Norwegian banks could lend. So-called "interest rate declarations" set upper limits on average bank loan rates, while restrictive reserve requirements, regulations requiring banks to invest in government bonds, and direct controls on lending by state-owned banks facilitated the rationing of credit at artificially low loan rates. In 1984, authorities relaxed reserve requirements, allowed subordinated debt to be counted as bank capital, and opened Norway to competition from both foreign and newly established Norwegian banks.[1] Over the next two years, the Norwegian government lifted all interest rate declarations, phased out bond investment requirements, consolidated bank oversight responsibilities under the Banking, Insurance, and Securities Commission (hereafter BISC), and further relaxed restrictions on competition by permitting foreign banks to open branches in Norway. To compete for market share in the newly deregulated environment, banks aggressively expanded lending. Between 1984 and 1986, the volume of lending by financial institutions to firms and households in Norway grew at an annual inflation-adjusted rate of 12%, roughly three times the average growth rate in the years prior to deregulation. A large portion of this growth came from new banks, small commercial banks, and savings banks.

The rapid expansion in credit ended in 1987 as bank loan losses began to accumulate. During 1986, the price of North Sea Brent Blend crude oil fell from $27 a barrel to $14.50 a barrel, precipitating a sharp decline in asset values in the oil-dependent Norwegian economy. Existing loans to cyclically sensitive firms also came

[1] Seven foreign banks were permitted to open subsidiaries. These included three U.S. banks (Chase Manhattan, Citibank, and Manufacturers Hanover Trust), three French banks (Banque Indosuez, Banque Nationale de Paris, and Banque Paribas), and one English bank (Samuel Montague). Oslobanken, the first Norwegian commercial bank to be created since 1961, received formal permission to begin operations on March 30, 1984 (*Årsmelding fra Bankinspeksjonen, 1984*). By 1986, five newly created domestic commercial banks operated in Norway.

into jeopardy. The annual number of bankruptcies in Norway increased from 1,426 establishments in 1986 to 3,891 in 1988 and 4,536 in 1989. Most of the bankruptcies were small, unlisted firms concentrated in the real estate, transport, construction, retail store, fishing, hotel, and restaurant industries. Paralleling these failures, real bank loan growth slowed to 3.6% in 1988 and 2.8% in 1989, and commercial loan losses, measured as a percentage of total bank assets, rose from a level of 0.47% in 1986 to 1.57% in 1988 and 1.60% in 1989. (Summary statistics on number of bankruptcies, loan growth, and loan losses are obtained from various editions of the *Statistical Yearbook of Norway*.) The transition from a tightly regulated economy to a more competitive financial marketplace most likely accentuated these losses because of poor decision-making, high risk-taking, and outright fraud in bank lending.[2] Sunnmørsbanken was the first to announce insolvency. During 1988–1989, similar announcements followed from three other small commercial banks and four savings banks. All of these banks were located in northern or western Norway, the regions in which most business failures were occurring.

At the outset of the crisis, the Norwegian government had no formal program for shoring up the capital of troubled banks, nor did it sponsor any form of deposit insurance. Instead, the banking industry managed its own deposit insurance programs. It was these programs—the Commercial Bank Guarantee Fund (CBGF) and Savings Bank Guarantee Fund (SBGF)—that first injected capital into the troubled banks. Under the guidance of the BISC, the CBGF injected Kr1.3 billion ($65 million) into the impaired banks and arranged for most of them to be merged with healthier banks. One exception was the insolvent Norion, a newly formed commercial bank that came under investigation by the BISC for fraud in May 1989. The CBGF denied funding to Norion beyond the amount needed to cover liabilities of existing depositors, forcing the government to take over the stricken bank. Within six months, the government had shut the bank down and put its remaining assets under direct administrative control. By the spring of 1990, capital injections from the CBGF and consolidations proposed by the BISC appeared to stem the outbreak of bank insolvencies. *Aftenposten*, a nationally circulated Norwegian newspaper, proclaimed on March 16, 1990 (p. 1) that the "Norwegian banking industry had weathered its worst difficulties" and that "the losses appear now to have flattened out."

That optimism, however, was premature. Uncertainty created by the Persian Gulf crisis, weaknesses in global financial markets, and economic downturns in Sweden and Finland diminished the ability of Norwegian banks to borrow abroad. Newspapers began to report that Norway's three largest commercial banks were in trouble. Early in December 1990, Norway's third-largest commercial bank, Fokus, announced large losses due primarily to the poor performance of its existing

[2] Early in the crisis, the chairman of Norway's central bank, Hermod Skånland, attributed high loan losses to "a combination of bad banking, bad policies, and bad luck" (*Euromoney*, 9/1/89). In September 1990, the BISC appointed a commission to investigate whether the behavior of some bank managers during the crisis was criminally fraudulent. By 1995, the committee had completed investigations into 11 financial institutions. The committee found indications of possible criminal acts or negligence in at least four of the institutions. However, no formal charges were ever brought against any institution.

loan portfolio. It had recently acquired two of the original troubled commercial banks. Later in December, Norway's second-largest commercial bank, Christiania Bank, announced an unexpected upward adjustment in loan losses, and requested an injection of capital by the CBGF. Christiania Bank had earlier acquired Sunnmørsbanken, the first bank to announce failure. Within two weeks of the Christiania Bank news release, Norway's largest commercial bank, Den norske Bank, also announced an upward revision in its loan loss estimates. All three of the banks publicly recognized that funds previously available through international markets had now dried up or become prohibitively expensive.[3] The magnitude of the losses at Fokus Bank became apparent in February 1991 when the CBGF announced that a bailout of the bank had depleted nearly all of the remaining capital in the private insurance fund.

Without further aid, the entire banking system was in danger of collapsing. On March 5, 1991 the Norwegian parliament allocated Kr5 billion to establish the Government Bank Insurance Fund (GBIF). The money in the GBIF was made immediately available for use by the CBGF to finish the bailout of Fokus Bank and to begin injecting capital into Christiania Bank. Shortly after the establishment of the GBIF, Den norske Bank announced that it would also need a large capital infusion to sustain operations. By the fall of 1991, it became clear that the Kr5 billion used to start the GBIF would be inadequate for bailing out all three of Norway's largest banks.

After six months of debate on to how to resolve the worsening crisis, the Norwegian parliament increased the size of the GBIF, created a new fund called the Government Bank Investment Fund, and amended existing laws to force each ailing bank to write down its equity capital. This effectively allowed the Norwegian government to step in and take control of the three banks. In late 1991, the total size of the government's guarantee funds quadrupled to Kr20 billion (an amount equal to 3.4% of GDP) and the Norwegian government completely took over Fokus and Christiania banks and gained control of 55% of Den norske Bank.

By 1992, the crisis had not only taken its toll on the Norwegian banking system but had also spread to other Nordic countries. Sweden and Finland experienced similar patterns of distress as bank loan losses in 1992 climbed to over 5% of total bank assets and authorities in each country took unprecedented steps to rescue ailing banks (see Drees and Pazarbasioglu, 1995). In Norway, only eight domestic commercial banks remained in operation and 85% of the country's commercial bank assets were under government control. Most large savings banks, mortgage companies, and finance companies had also experienced record losses during the period, and in 1993, Norway's largest insurance provider was forced into government stewardship.

[3] According to the BISC, problems in the banking sector, exacerbated by credit rating downgrades, led to a decline in the amount of foreign funds available to Norwegian banks. A confidential report produced in December 1990 by the BISC for the Ministry of Finance stated, "There is a clear cut risk of a systemic crisis among other things as a result of the difficulties in international financial markets" (*Annual Report 1991*, BISC, p. 4). By the third quarter of 1991, Den norske Bank was forced to abandon plans for a new equity issue, further weakening its capital position.

Three points should be made about the crisis. First, government responses were unclear ex-ante, making it unlikely that investors could have predicted the ex-post outcomes. No bank had failed in Norway since 1923 and the Norwegian government had taken a "hands-off" approach to insuring depositors against failure. Moreover, bank representatives made it clear at the beginning of the crisis that state intervention was unnecessary, if not undesirable. For instance, Tor Kobberstad, head of the Norwegian Bankers Association (*Bankforeningen*), stated in October 1989,

> A bank that is poorly managed should not be allowed to continue on forever; it sets a bad precedent for the industry. If we're going to maintain a private banking system; we should do it through resources from banks within the system. One should be extremely careful about trying to solve problems through state assistance ("Staten bør ikke hjelpe bankene;" *Dagens Næringsliv*, 10/26/89).

Second, government intervention led to disruptive changes at the distressed banks. The first time the government stepped in, it liquidated Norion Bank. In exchange for an injection of capital, the GBIF required ailing banks to write down their capital, replace management, cut costs, and scale back their branch networks ("Bankers trøst," *Dagens Næringsliv*, 1/29/91). Subsequent control of the three largest banks indeed led to dismissal of the board of directors and top management at both Fokus and Christiania Bank ("Fokus to Get More Capital After Big Loss," *The Wall Street Journal Europe*, 8/26/91; "State Takeover of Christiania Is in Prospect," *The Wall Street Journal Europe*, 10/15/91). Third, the impact of the crisis on the banking industry has been long-lived. The stock market value of Norwegian banks did not return to their pre-crisis levels until the summer of 1997. Moreover, the Norwegian government held its controlling stake in Christiania Bank until October 2000, and continues to hold the majority stake in Den norske Bank.

3. Data and event study methodology

Having given an overview of the history of the Norwegian banking crisis, we now turn to the data and methodology used to analyze the impact of bank distress announcements on the stock prices of firms maintaining relationships with distressed banks.

3.1. Relationship, announcement, and stock price data

As part of their listing requirements, all firms on the OSE must provide annual information on their "primary" bank relationships, up to a maximum of four. These relationships are reported in *Kierulfs*, a handbook published by the OSE and the source for our relationship data. A primary bank relationship typically involves short- and long-term lending, as well as the frequent purchase of deposit, cash management, foreign exchange, and risk management services. We count a firm as starting a relationship when it adds a new bank to the *Kierulfs* list. We treat newly

listed firms as censored, since we do not observe the start dates of their relationships. Similarly, we only count a firm as terminating a relationship when we observe it dropping a bank from its list, not when the firm delists from the exchange. The sample covers, on average, 95% of all non-bank firms listed on the OSE during that period. These firms maintained relationships with a total of 55 different banks, including 24 Norwegian commercial banks, 15 international commercial banks, and 17 Norwegian savings banks. During an average year, 74% of the firms maintained a relationship with only one bank, while only 2% maintained four or more bank relationships (Ongena and Smith, 2001).

Table 1 offers some insight into how often sample firms switch bank relationships by reporting the number of relationships started and terminated over the period 1980–1995. During this period, the OSE listed an average of 129 firms. Of these firms, an average of roughly ten started a new relationship each year, while six ended relationships. Switching activity increased substantially from 1986 to 1988 as deregulation began to take hold. Beginning in 1989—one year into the crisis

Table 1
Annual overview of turnover in bank relationships, and number of firms listing and delisting on the Oslo Stock Exchange (OSE)
This table lists, by year, the total number of firms listed on the OSE, the number of new bank relationships, the number of terminated bank relationships, and the number of firms listing and delisting from the OSE. Listed firms must report all important bank relationships to the OSE on an annual basis. We identify a firm as terminating a relationship when it drops a bank from the list, and starting a relationship when it adds a new bank to the list. Information on bank relationships comes from *Kierulfs* Handbook. The total number of OSE-listed firms, and the number of firms listing and delisting each year, are from OSE publications.

Year	Firms listed on the OSE at start of year	OSE-listed banks at start of year	Bank relationships started	Bank relationships terminated	Listings on the OSE	Delistings from the OSE
1980	113	13	5	5	6	10
1981	109	13	2	1	5	2
1982	112	14	3	4	6	1
1983	117	14	5	5	21	2
1984	136	15	7	5	22	0
1985	158	16	6	1	7	6
1986	159	17	17	16	8	13
1987	154	18	14	10	5	16
1988	143	14	18	12	3	17
1989	129	13	11	6	12	11
1990	130	15	14	7	7	23
1991	114	11	14	9	14	11
1992	117	8	16	5	11	7
1993	121	9	10	4	15	11
1994	125	9	14	5	17	11
1995	131	7	10	6	20	18
Average	129.3	12.9	10.4	6.3	11.2	9.9

period—firms began to scale back on the number of bank relationships they terminated, but continued to add new relationships at a rate triple that prior to deregulation.

Table 1 also reports the number of firms listing and delisting from the OSE each year. The number of firms going public increases markedly during the early 1980s, a period in which substantial deregulation and modernization occurred on the OSE, including a lifting of prohibitions on foreign purchases of equity in 1984 and the introduction of U.S.-style insider trading regulations in 1985 (Eckbo and Smith, 1998). During the crisis period, delistings of OSE firms remained relatively constant (with the exception of 1990), while new listings steadily increased.

We match the relationship data with a set of distress announcements by banks involved in the Norwegian banking crisis. We start with a list of all crisis-related bank announcements that appeared on the OSE wire service or in the annual reports of governmental and quasi-governmental agencies, compiled by Kaen and Michalsen (1997). To this list, we add announcements of distress appearing in major Norwegian newspapers during the period. We define an event to be the date that the first material announcement of distress by a bank appears in one of our news sources. Such an announcement commonly includes a statement about severe loan losses, inadequate reserves, or large capital losses. We obtain 13 announcements covering the period March 1988 to January 1991. To these, we add the June 17, 1991 joint request by Den norske Bank and Christiania Bank for an injection of capital via government-purchased preferred equity. This request was the first indication that the losses at Norway's two largest banks outstripped the existing capital of the government guarantee fund, and was the effective start of a series of highly publicized parliamentary and newspaper debates discussing the prospect for rescuing the banking system. We then exclude distressed banks that did not maintain a relationship with at least one exchange-listed company. Our final sample of events leaves us with five banks and six distress events. In 1990, these five banks maintained relationships with 108 OSE-listed firms, representing 96% of the firms in our sample at that time.

Table 2 contains the event dates and a short description of each distress announcement. It also reports the number of sample relationships associated with each distressed bank and the number of relationships with nondistressed banks in the year of the distress announcement. For the purposes of the event study, we assume that a firm maintains a relationship with the distressed bank at the time of the announcement if the firm includes the bank on its report to *Kierulfs* in the year prior to the event. Later, we examine the sensitivity of our estimates to this assumption. Henceforth, we refer to firms associated with a distressed bank in the year of the distress announcement as "related firms," and label all other sample firms during the same period as "unrelated firms." We obtain a total of 217 related-firm observations and 443 unrelated-firm observations across the six events.

For the event study and regression analysis, we also need ownership, financial, and stock price data. For these, we rely on *Kierulfs* and sources provided by the OSE. Our analysis eventually requires that we have a complete stock price history for the firms over the 291 trading days surrounding the distress event and complete

Table 2
Distress events and number of relationships per distressed bank
This table summarizes the six events in our sample, with each distressed bank indicated in boldface. Event dates correspond to the actual announcement date (if given in a report) or the trading day prior to the announcement in a newspaper. CBGF is the Commercial Bank Guarantee Fund; SBGF is the Savings Bank Guarantee Fund; and BISC is the Norwegian Banking Insurance and Securities Commission. The table also lists the number of firm–bank relationships associated with each distressed bank (related firms) in the year of the distress announcement and the number of relationships associated with non-distressed banks in that year (unrelated firms). Listed firms must report all primary bank relationships to the Oslo Stock Exchange (OSE) on an annual basis. We assume that a firm maintains a relationship with the distressed bank at the time of the announcement if the firm includes the bank on its report to the OSE in the year *prior* to the event.

Distress date	Distress event	Related firms	Unrelated firms
03/18/88	**Sunnmørsbanken** must turn around losses in order to sustain operations (OSE wire reports).	3	122
10/08/89	BISC reports that **Sparebanken Nord-Norge** has lost its capital. SBGF provides capital injection (SBGF *1989 Annual Report*).	2	111
12/11/90	Report appears in business newspaper about financial problems at **Fokus Bank**. Fokus neither acknowledges nor denies report (*Dagens Næringsliv*).	10	101
12/20/90	**Christiania Bank** makes upward adjustment in loss estimate (OSE wire reports).	54	57
01/04/91	**Den norske Bank** has made adjustments in loan loss estimate 1990 (OSE wire reports).	59	41
06/17/91	CBGF receives requests from **Den norkse Bank** and **Christiania Bank** for injection of preferred equity (*Dagens Næringsliv*).	89	11
Total relationships		217	443

accounting information in the year prior to the event. For the results reported in this paper, we record as ''missing'' realized daily returns in absolute value larger than 100%. Our results are unaffected when we alter the cutoff imposed by this screen. With the screens in place, we are left with 173 related-firm and 267 unrelated-firm observations.

We report results using both a value-weighted index of all OSE stocks and a world market index as measures of the benchmark market return. We construct the world index using the value-weighted returns from Datastream stock market indexes for Germany, Japan, the U.K., and the U.S. Each country receives a weight in the world index proportional to its U.S. dollar market capitalization as of July 1, 1987. Judging abnormal returns relative to a world index sidesteps biases in the OSE created by a correlation between the Norwegian economy and the banking crisis. For example,

estimates of event-day abnormal returns will be biased upward if the Norwegian stock market falls on news correlated with a bank's announcement of distress.

3.2. Event study methodology

To obtain estimates of abnormal returns, we run market model regressions of the realized daily stock return for event portfolio j, r_{jt}, on a measure of the realized daily return of the market index, r_{mt}, and a set of $2\tau+1$ daily event dummies, δ_{jkt}, $k=-\tau,-\tau+1,\ldots,0,\ldots,\tau-1,\tau$, which take the value of one for days inside the event window ($t=k$) and zero outside the window,

$$r_{jt}=\alpha_j+\beta_j r_{mt}+\sum_{k=-\tau}^{\tau}\gamma_{jk}\delta_{jkt}+\varepsilon_{jt}. \tag{1}$$

The coefficients γ_{jk} measure the daily abnormal returns inside the event window. For the results reported in the tables, we start the estimation 150 days prior to the start of the event window, include up to 41 days inside the window, and end the estimation 100 days after the event window. Because nontrading of stocks is a common problem on the OSE, we check all our results by adding three lead and lagged values of the market index to correct for nonsynchronous trading. Sums of the daily abnormal return estimates $\hat{\gamma}_{jk}$ over various windows yield cumulative abnormal return (CAR) estimates, which can be tested for significance using a Wald test.

4. Empirical results

In this section, we first analyze how bank distress announcements impact the stock returns for the banks themselves, and then report the related-firm abnormal returns. Next, we run cross-sectional regressions of firm abnormal returns on a set of variables that proxy for a firm's dependence on bank financing and its ability to obtain competitive forms of financing. We end the section with an investigation of possible sample selection biases.

4.1. Event study results

We begin by studying the stock price reaction of the banks to their own distress announcements. Doing so allows us to jointly gauge the informativeness of the chosen event dates and the economic importance of the announcements. Table 3 reports individual and average bank CARs using both the OSE index and the world market index over various windows surrounding announcements of distress. Because the two benchmarks generally produce similar CAR estimates, we focus in the text on estimates measured relative to the world market index. Stock price data for Sparebanken Nord-Norge are not available before 1994, so this bank is excluded from Table 3.

Table 3
Cumulative abnormal returns, distressed banks
Cumulative abnormal returns (CARs) to banks announcing distress. The Oslo Stock Exchange (OSE) market index is a value-weighted index of returns on all firms listed on the OSE. The world market index (World) is a value-weighted (by the U.S. $ value of market capitalization on July 1, 1987) combination of the value-weighted indices of German, Japanese, U.K., and U.S. stocks. For the 6/17/91 event, the CARs for Den norske Bank and Christiania Bank are averaged and treated as one event. For the individual distress events, the *p*-values reported in parentheses are based on a Wald test that the sum of daily abnormal returns within the event window are zero. The test is distributed $\chi^2(k)$, where k is the number of days in the window. For the average across all events, the *p*-values are based on a *t*-test that assumes the returns are i.i.d. across the events.

Bank (event date)	Market index	Event window			
		$(-10,-1)$	$(0,+10)$	$(-3,+3)$	$(-1,+1)$
Sunnmørsbanken (03/18/88)	OSE	0.057	0.073	0.067	−0.028
		(0.022)	(0.008)	(0.000)	(0.001)
	World	0.059	0.067	0.070	−0.028
		(0.019)	(0.012)	(0.000)	(0.000)
Fokus Bank (12/11/90)	OSE	−0.031	−0.363	−0.173	−0.148
		(0.199)	(0.000)	(0.000)	(0.000)
	World	−0.037	−0.387	−0.239	−0.192
		(0.129)	(0.000)	(0.000)	(0.000)
Christiania Bank (12/20/90)	OSE	−0.024	−0.061	−0.082	−0.074
		(0.256)	(0.011)	(0.000)	(0.000)
	World	−0.107	−0.074	−0.095	−0.115
		(0.000)	(0.005)	(0.000)	(0.000)
Den norske Bank (01/04/91)	OSE	−0.123	−0.040	−0.124	−0.085
		(0.000)	(0.075)	(0.000)	(0.000)
	World	−0.134	−0.069	−0.108	−0.104
		(0.000)	(0.002)	(0.000)	(0.000)
Christiania Bank (06/17/91)	OSE	0.229	0.000	−0.150	−0.064
		(0.000)	(0.990)	(0.000)	(0.000)
	World	0.260	0.028	−0.120	−0.053
		(0.000)	(0.316)	(0.000)	(0.000)
Den norske Bank (06/17/91)	OSE	0.149	−0.102	−0.303	−0.149
		(0.000)	(0.020)	(0.000)	(0.000)
	World	0.197	−0.067	−0.259	−0.128
		(0.000)	(0.188)	(0.000)	(0.000)

Table 3 (*continued*)

Bank (event date)	Market index	Event window			
		(−10,−1)	(0,+10)	(−3,+3)	(−1,+1)
Average across all events	OSE	0.013	−0.088	−0.107	−0.088
		(0.808)	(0.290)	(0.097)	(0.011)
	World	0.001	−0.096	−0.112	−0.106
		(0.979)	(0.277)	(0.100)	(0.015)
SUR regression across all events	OSE	−0.024	−0.105	−0.136	−0.096
		(0.561)	(0.015)	(0.000)	(0.000)
	World	−0.036	−0.118	−0.137	−0.116
		(0.370)	(0.005)	(0.000)	(0.000)

As a means of summarizing the CAR estimates across events, we report averages using two different methods. The first takes a simple average of the CARs, assumes that the estimates are independent across events, and uses a *t*-test to judge significance. The second method uses a seemingly unrelated regression (SUR) framework that jointly incorporates all announcements assuming that the price impact across banks is equal. The latter method averages the individual bank estimates using weights proportional to the standard deviation of the event-specific error terms (see Thompson, 1985).

From a distressed bank's perspective, the events have a substantial and surprising impact on stock price. For instance, the stock prices of Den norske Bank and Christiania Bank increase over the ten days prior to their bailout request on June 17, 1991, but fall more than 9% immediately after the announcement was made. On average, the set of distressed banks earn zero abnormal returns leading up to the distress event and experience an announcement-day decline of roughly 10% that persists beyond the ten-day post-announcement window. These averages are not only statistically significant but economically meaningful. For example, on an aggregate basis, the (−1, +1) and (−3, +3) event windows capture 38% and 58%, respectively, of the total price fall in Norwegian bank stocks from the beginning of 1988 to the end of 1991.

We now turn to examining the abnormal returns of the related firms around bank distress announcements. Table 4 reports event-specific CAR estimates based upon equally weighted portfolios of related firms grouped by event as well as average CARs across all events. The signs and magnitude of the related-firm portfolio CARs tend to be more mixed across events than the bank CARs. Over the (−1, +1) event window, borrowers from Sparebanken Nord-Norge fall by 26%, while firms related to Sunnmørsbanken and Fokus Bank decline by 6%. However, over the longer (−3, +3) and (0, +10) windows, "reversals" can be observed in returns for firms related to Sunmørsbanken and Sparebanken Nord-Norge. That is, their cumulative abnormal returns are higher over these longer event windows than for the three-

Table 4
Cumulative abnormal returns, related firms
Cumulative abnormal returns (CARs) on an equal-weighted portfolio of related firms' stocks. N is the number of stocks in the portfolio. The Oslo Stock Exchange (OSE) market index is value-weighted. The world market index (World) is a value-weighted (by the U.S. $ value of market capitalization on July 1, 1987) combination of the value-weighted indices of German, Japanese, U.K., and U.S. stocks. The firm-weighted difference portfolio averages the differences between portfolios of related and unrelated firms. The portfolios are created by first weighting each return by the total number of related firms. For the individual distress events and for the firm-weighted difference portfolio, the p-values reported in parentheses are based on a Wald test that the sum of daily abnormal returns within the event window are zero. The test is distributed $\chi^2(k)$, where k is the number of days in the window. For the average across all events, the p-values in parentheses are based on a bootstrapped distribution (150 draws) that preserves the cross-sectional error structure of firms sharing a common event and the error structure of the overlapping time period between event estimation windows (see Appendix A).

Banks (event date)	N	Market index	Event window			
			$(-10, -1)$	$(0, +10)$	$(-3, +3)$	$(-1, +1)$
Sunnmørsbanken (03/18/88)	3	OSE	−0.070	0.088	0.142	−0.079
			(0.006)	(0.002)	(0.000)	(0.000)
		World	−0.063	0.115	0.150	−0.064
			(0.011)	(0.000)	(0.000)	(0.000)
Sparebanken Nord-Norge (10/08/89)	2	OSE	−0.179	−0.274	−0.076	−0.256
			(0.000)	(0.000)	(0.019)	(0.000)
		World	−0.181	−0.308	−0.102	−0.263
			(0.000)	(0.000)	(0.000)	(0.000)
Fokus Bank (12/11/90)	9	OSE	0.011	0.028	−0.019	−0.023
			(0.057)	(0.001)	(0.000)	(0.000)
		World	0.015	0.000	−0.066	−0.062
			(0.050)	(0.972)	(0.000)	(0.000)
Christiania Bank (12/20/90)	49	OSE	0.015	−0.005	0.021	0.004
			(0.001)	(0.408)	(0.000)	(0.187)
		World	−0.036	−0.014	0.011	−0.022
			(0.000)	(0.039)	(0.003)	(0.000)
Den norske Bank (01/04/91)	52	OSE	−0.035	0.052	−0.022	−0.016
			(0.000)	(0.000)	(0.000)	(0.000)
		World	−0.043	0.033	−0.012	−0.028
			(0.000)	(0.000)	(0.037)	(0.000)
Christiania Bank and Den norske Bank (06/17/91)	75	OSE	0.016	−0.004	0.000	−0.010
			(0.000)	(0.286)	(0.812)	(0.000)
		World	0.032	0.008	0.015	−0.003
			(0.000)	(0.222)	(0.001)	(0.028)

Table 4 (*continued*)

Banks (event date)	*N*	Market index	Event window			
			(−10, −1)	(0, +10)	(−3, +3)	(−1, +1)
Average across all related firms	173	OSE	0.009	0.010	0.009	−0.009
			(0.366)	(0.160)	(0.453)	(0.240)
		World	−0.003	0.009	0.015	−0.017
			(0.173)	(0.380)	(0.753)	(0.020)
Firm-weighted difference portfolio	6	OSE	0.001	0.017	0.017	−0.014
			(0.935)	(0.391)	(0.565)	(0.253)
		World	0.003	0.020	0.017	−0.017
			(0.863)	(0.286)	(0.549)	(0.227)

day event window. This volatility is not surprising given that only five firms are associated with these two banks, and customers of these smaller banks tend to be smaller and risky themselves. Firms related to Christiania Bank and Den norske Bank suffer less upon their banks' first announcement of distress. These borrowers experience abnormal price drops that average −2.5% over the short (−1, +1) window, zero over the (−3, +3) window, and a slightly positive amount for the (0, +10) period. Moreover, these same firms experience a relatively mild three-day decline of −0.3%, while their banks' stocks fall by an average of 19% upon the announcement that bank losses exceeded the existing capital of the government guarantee fund. Over longer windows, related-firm stock prices once again tend to bounce back.

For a consistent view of the aggregate impact of these distress announcements on the related firms, the bottom of Table 4 reports the average CARs across all firms. To create the average, we first estimate the market model regression on a firm-by-firm basis and calculate the mean CAR across all 173 firm estimates. Then, in order to control for the cross-sectional dependence in CAR estimates, we generate standard errors from bootstrapped distributions that preserve the cross-sectional dependence in the market model error terms ε_{jt} for firms with event dates that overlap in time. Appendix A contains a detailed description of the bootstrap procedure.

Using the bootstrapped errors, the average three-day CAR estimate is a statistically significant −1.7%. However, all other CAR estimates are small and statistically insignificant. In fact, related-firm prices reverse themselves, on average, over longer horizons. Over the seven- and ten-day event windows, the average CARs are +1.5% and +0.9% and statistically insignificant. At the bottom of Table 4, we also report an estimate that judges the performance of related firms relative to

unrelated firms over the event period. Specifically, we construct a firm-weighted "difference" portfolio that assumes investors can form a zero-cost portfolio before the event date that is long in related firms and short in unrelated firms. To create the portfolio, each firm receives a weight that is proportional to the total number of firms in the sample that year. The difference portfolio CAR estimates suggest that the related-firm stock prices fall by more than those of unrelated firms on event dates, but the difference is not statistically significant.

4.2. Cross-sectional regressions

To gain a better understanding of the patterns underlying the abnormal returns documented in Table 4, we now consider regressing related-firm CARs on a set of variables related to the financial, governance, and bank relationship characteristics of the firm. The variables are selected to measure a firm's dependence on a single bank's financing versus its ability to obtain financing from other sources. We hypothesize that firms dependent on financing from a distressed bank should experience larger negative stock price shocks on the day their bank announces distress than firms with other means of financing new projects. Unless otherwise specified, all variables are measured at the end of the year prior to the distress announcement. We provide a description of the variables and summary statistics in Table 5.

Firm-specific information asymmetries could prevent some firms from accessing funds from outside sources. We include three indicators of potential information problems at the firm level. The first variable, Ln Sales, measures the size of the firm in terms of the logarithm of sales, expressed in 1990 kroner. The second variable, Age, is the number of years the firm has been in operation since its founding date. Larger firms are likely to be better known among analysts, news services, and traders, while older firms benefit from an established reputation. The third variable, Tobin's Q, defined as the year-end market value of equity plus the book value of debt, divided by the book value of assets, measures investor sentiment about a firm's growth opportunities. The value of firms with high Tobin's Q tends to be more tied to projects with unknown future payoffs than firms with low Tobin's Q.

An obvious measure of a firm's dependence on bank financing is the proportion of assets financed by bank debt. Unfortunately, we cannot directly observe the amount that firms borrow from banks. Instead, we use as a proxy Total Debt, defined to be the total book value of firm debt, divided by the sum of the book value of debt and market value of equity, because firms in Norway rely so heavily on banks for debt financing. Highly leveraged firms are more likely to have relied on bank financing in the past and are less likely to obtain new financing from banks that are distressed. In addition to Total Debt, we include the variable Drawn Credit, which is the proportion of the total book value of debt associated with a firm's borrowing through a line of credit. Line-of-credit lending represents the most liquid form of lending that banks can offer borrowers. Firms that can borrow without a credit line, or that have low levels of drawn credit, should be more creditworthy and less liquidity constrained than firms with high levels of drawn credit.

Table 5
Summary of firm characteristics, related firms
There are 173 related-firm observations in the sample. The variable Sales is year-end sales, measured in millions of 1990 Norwegian kroner. Age is measured relative to the founding date of the firm (in years). Tobin's Q is the year-end market value of equity plus book value of debt, divided by the book value of assets. Total Debt is the book value of debt, divided by the sum of year-end market value of equity and book value of debt. Drawn Credit is the book value of drawn lines of credit, divided by the book value of debt. Cash Flow is the ratio of net operating income and normal depreciation to book value of assets. Equity Issue is the ratio of equity issued, publicly and privately, by the firm in the two years prior to bank distress, to the book value of assets. Termination Propensity is the forecasted likelihood that a firm will terminate a relationship, conditional on the duration of its relationship and a set of financial characteristics (see Ongena and Smith, 2001). Healthy Bank equals one when a firm maintains a relationship with another bank previously unaffected by distress, and zero otherwise. International Bank takes the value of one when a firm maintains a relationship with a non-Norwegian bank, and zero otherwise. Banker On Board equals one when a manager of the distressed bank sits on the firm's board and zero otherwise.

	Mean	Standard deviation	Minimum	Median	Maximum
Sales	2,800	7,303	0	589	63,083
Age	57.6	39.9	0.0	63	149
Tobin's Q	1.556	0.659	0.385	1.399	4.581
Total Debt	0.540	0.228	0.000	0.589	0.945
Drawn Credit	0.037	0.070	0.000	0.000	0.350
Cash Flow	0.091	0.112	−0.400	0.099	0.357
Equity Issue	0.070	0.127	0.000	0.016	0.832
Termination Propensity	0.062	0.047	0.000	0.058	0.285
Healthy Bank	0.260	0.439	0.000	0.000	1.000
International Bank	0.086	0.282	0.000	0.000	1.000
Banker On Board	0.023	0.150	0.000	0.000	1.000

We construct two measures of a firm's ability to finance investments through non-debt liquid sources of financing. Cash Flow, defined to be net income plus depreciation, divided by the book value of assets, provides an estimate of the level of cash available to the firm at the time of the distress announcement.[4] Equity Issue is the total amount of public and private equity raised by the firm in the two years prior to the distress event, divided by firm book value of assets. Firms that recently issued equity should be more liquid and less risky than firms that have failed to issue equity. Equity-issuing firms have received recent accreditation by an underwriter and have been exposed to public scrutiny through the offer process. Therefore, they should also find it easier to tap external financial sources, if need be, during a crisis period.

Because banks can exploit informational advantages gained over the course of a relationship to lock in borrowers, firms with a strong relationship to a distressed bank may find it costly to obtain financing elsewhere. We include four variables that measure the strength of a firm's relationship with a distressed bank. Termination

[4] Defining the cash variable in terms of the stock of cash (cash assets + marketable securities) produces results similar to the flow variable.

Propensity is an estimate of the ex ante likelihood that a firm will terminate its bank relationship, conditional on the duration of the relationship up through the year prior to the distress announcement. The variable serves as a proxy for the ease with which a firm can switch relationships. To construct the variable, we use the fitted estimates from a conditional hazard model of relationship termination behavior introduced by Ongena and Smith (2001). Their model allows the duration of a relationship to vary as a function of firm size, age, leverage, profitability, and the number of relationships maintained by the firm. They show that these variables are strong predictors of the termination behavior of Norwegian firms. We include the dummy variables Healthy Bank, set equal to one when a firm also maintains a relationship with a bank not in distress, and International Bank, set equal to one when a firm maintains a relationship with a non-Norwegian bank. Firms maintaining relationships with healthy Norwegian banks or foreign banks should be less susceptible to the impairment of their distressed bank. Banker On Board is a dummy variable that takes the value of one when a bank officer from the distressed bank sits on the board of directors of the firm. Kroszner and Strahan (2001) argue that a banker that sits on a borrower's board of directors could favor decisions that enhance the bank's health at the possible expense of the borrower's value.

Finally, we include two variables to control for possible biases in the CARs related to investor anticipation of the event. Bank CAR, defined to be the three-day CAR estimate for the distressed bank, acts as a measure of the level of surprise in the distress announcement, weighted by the relative losses faced by the bank. The second variable, Crisis Length, is the logarithm of the number of days between the date of a particular distress announcement and the date of the first distress announcement (March 18, 1988). If the seriousness of the crisis becomes more apparent as time passes, then announcements should become less informative over time.

Table 6 contains the results from regressing $(-1, +1)$ and $(-3, +3)$ related-firm CARs (stated in percent terms) on various combinations of the explanatory variables. We include both sets of CARs to extract patterns that persist outside of the three days surrounding the event. The *p*-values printed in parentheses under the coefficient estimates are based on the bootstrapping procedure described in Appendix A.

Most of the coefficient estimates in Table 6 are statistically insignificant and, taken together, the variables explain a small fraction of the variation in the related-firm CARs. Nevertheless, several interesting patterns emerge. First, Equity Issue has a positive and statistically significant coefficient estimate that remains robust across all model specifications. The estimates suggest that every dollar of new equity issued on 100 dollars of assets in the two years prior to the distress announcement leads to an increase of between 13 and 28 basis points in the $(-3, +3)$ CAR. Second, highly leveraged firms perform poorly relative to firms with less leverage. The Total Debt estimate implies that each extra dollar of debt per 100 dollars of assets reduces the $(-3, +3)$ CAR by 11 basis points. Third, the proportion of firm debt tied up in drawings on a line of credit also negatively influences the $(-3, +3)$ CAR. In other words, leveraged firms with debt tied up in the most liquid form of bank financing are worse off at the time of bank distress than firms using less liquid forms of

Table 6
Cross-sectional examination of firm related CARs
The number of observations is 173. The dependent variable is the three (seven)-day cumulative abnormal return for the firm (in percent). Ln Sales is the logarithm of year-end sales, measured in millions of 1990 Norwegian kroner. Age is measured relative to the founding date of the firm (in years). Tobin's Q is the year-end market value of equity plus book value of debt, divided by the book value of assets. Total Debt is the book value of debt, divided by the sum of year-end market value of equity and book value of debt. Drawn Credit is the book value of drawn lines of credit, divided by the book value of debt. Cash Flow is the ratio of net operating income and normal depreciation to book value of assets. Equity Issue is the ratio of equity issued, publicly and privately, by the firm in the two years prior to bank distress, to the book value of assets. Termination Propensity is the forecasted likelihood that a firm will terminate a relationship, conditional on the duration of its relationship and a set of financial characteristics (see Ongena and Smith, 2001). Healthy Bank equals one when a firm maintains a relationship with another bank previously unaffected by distress, and zero otherwise. International Bank takes the value of one when a firm maintains a relationship with a non-Norwegian bank, and zero otherwise. Banker On Board equals one when a manager of the distressed bank sits on the firm's board and zero otherwise. Bank CAR is the three (seven)-day CAR for the bank (in percent). Crisis Length is the logarithm of the number of days since the first distress announcement (March 18, 1988). Coefficients are listed on the first row in each cell with reported below p-values based on a bootstrapped distribution (150 draws) that preserves the cross-sectional error structure of firms sharing a common event and preserves the error structure of the overlapping time period between event estimation windows.

Dependent variable	CAR(−1, +1)			CAR(−3, +3)		
Intercept	−2.722	−2.867	−10.271	8.105	−4.858	−14.613
	(0.293)	(0.293)	(0.226)	(0.260)	(0.206)	(0.240)
Ln Sales	0.642	0.027	0.001	0.344	0.270	0.221
	(0.106)	(0.560)	(0.466)	(0.313)	(0.300)	(0.333)
Age	−0.000	−0.000	−0.000	−0.022	0.007	0.007
	(0.446)	(0.473)	(0.453)	(0.220)	(0.300)	(0.320)
Tobin's Q	−0.629	0.318	0.804	−1.659	1.692	2.277
	(0.406)	(0.473)	(0.253)	(0.373)	(0.233)	(0.326)
Total Debt	−7.423			−11.205		
	(0.086)			(0.100)		
Drawn Credit		0.781	1.378		−29.782	−28.600
		(0.493)	(0.466)		(0.060)	(0.060)
Cash Flow	2.864	7.864	5.585	3.396	1.491	−0.938
	(0.293)	(0.146)	(0.180)	(0.400)	(0.413)	(0.506)
Equity Issue	9.211	11.583	11.227	9.066	23.456	23.204
	(0.026)	(0.046)	(0.073)	(0.153)	(0.013)	(0.013)
Termination Propensity	0.198	−0.051	0.013	0.043	0.241	0.319
	(0.186)	(0.466)	(0.466)	(0.426)	(0.200)	(0.146)
Healthy Bank	−3.379	−2.473	−2.616	−2.857	−2.638	−3.011
	(0.100)	(0.140)	(0.146)	(0.186)	(0.226)	(0.180)
International Bank	−1.869	−1.440	−1.438	1.566	0.328	0.553
	(0.186)	(0.266)	(0.260)	(0.286)	(0.406)	(0.406)
Banker On Board	−0.180	0.900	0.989	−1.677	−2.526	−2.302
	(0.493)	(0.393)	(0.380)	(0.373)	(0.340)	(0.346)
Bank CAR			−0.008			0.076
			(0.446)			(0.426)
Crisis Length			1.019			1.546
			(0.680)			(0.146)
Adjusted-R^2	0.000	−0.008	−0.015	−0.003	0.029	0.023

financing. The (−3, +3) estimates associated with Drawn Credit imply that every one percentage point increase in the amount of debt coming from a credit line implies a decrease in the seven-day CAR of over 30 basis points.

Overall, our cross-sectional results provide support for the argument that firms that cannot draw on liquid sources of funding, or that are unable to access capital markets prior to their bank's distress, are more negatively impacted by their bank's announcement of distress.

4.3. Potential selection bias from firms that leave

The sample selection techniques we use for the event study could bias the related-firm abnormal return estimates. For example, because we include only those firms maintaining a relationship with a troubled bank at the time of the event, we overlook firms that could have been dropped by the bank before the event. If such firms were healthy before being dropped and were harmed by being cut off, then our estimates understate the negative impact of bank distress. Moreover, distress could induce a troubled bank to change its future lending strategy in a way that favors some types of firms over others after the distress event. For instance, a bank could strengthen the viability of some borrowers by cutting off financing to their competitors. If investors are unable to differentiate between favored and unfavored borrowers, then our estimates might mask the true costs of distress. In fact, an increase in observed departures by firms after the distress announcement could signal that some firms are affected negatively by distress at their banks.

To better understand the potential for such biases, Table 7 examines the frequency with which related firms terminate relationships with distressed banks in the nine years surrounding each distress announcement, where year 0 is the event year. Overall, relatively few firms end relationships during this period. In years –4 to –1, an average of four firms—or 1.6% of all related firms—leave, while in years +1 to +4, relationships are terminated at an average rate of 1.8% per year. During the event year, the termination rate increases to 3.7%, when eight firms leave. Because our relationship data are annual, we cannot observe whether these eight firms leave before or after the event. The event study results in Table 4 assume that the firms stay with their banks through the event period. Dropping these firms from the CAR estimates does not meaningfully alter the Table 4 averages. Nevertheless, our estimates could be still biased if these firms leave prior to the announcement and experience a wealth decline at the time of departure, or if the firms are forced out after the event and investors fail to recognize the impending termination.

Table 7 termination rates do not account for firms that delist from the OSE in the years around the event period. Because firms could be forced to delist when they are cut off from bank financing, Table 7 also reports delisting frequencies for related firms. In contrast to termination rates, delisting rates are relatively high. The rate peaks in year −1 at 13.1%, when 30 firms depart the exchange, and averages 9.2% during the five years from −4 through 0. After year 0, delisting rates decline to average just over 4% for years +1 to +3, falling roughly in line with average delisting rates for the OSE in other years.

Table 7
Termination and delisting frequencies for related firms, by year relative to the distress announcement
This table lists the total number of firms related to distressed banks, and the percentage of related firms that terminate relationships with distressed banks and delist from the OSE, by year relative to the distress announcement (year 0). Listed firms must report all important bank relationships to the OSE on an annual basis. We identify a firm as terminating a relationship when it drops a bank from the list, and starting a relationship when it adds a new bank to the list. Information on bank relationships comes from *Kierulfs* Handbook. Listing and delisting statistics are from the OSE.

	Relationships with distressed banks				
Year relative to distress announcement	Total at start of year	Number terminating	% Terminating	Number delisting	% Delisting
−4	249	4	1.61	19	7.63
−3	239	4	1.67	18	7.53
−2	228	4	1.75	16	7.02
−1	229	3	1.31	30	13.10
0	217	8	3.69	23	10.60
+1	207	3	1.45	10	4.83
+2	212	5	2.36	7	3.30
+3	251	8	3.19	11	4.38
+4	252	0	0.00	26	10.32
Average	235	4.33	1.89	17.78	7.63

The patterns in Table 7 do not by themselves imply the existence of sample selection biases. For instance, firms could be dropped by their banks because they are delinquent or unprofitable borrowers, or delist because they either go bankrupt, are too weak to meet listing requirements, or fail because of low profitability. For these firms, bank termination is most likely an effect rather than the cause of their problems. Other firms could simply choose to drop their relationship with a distressed bank because they want to borrow from a healthier bank. Such firms might turn to an existing relationship with another bank, or switch to a new bank. Similarly, healthy firms can delist because they are acquired or taken private, or because they decide to list on another exchange. In these cases, firms are not harmed by their choice to depart from their banks or the exchange.

Although we cannot observe the true reasons that firms depart their banks, we can make inferences about the health of the firms and the availability of substitute financing at the time of their departure. Our event study estimates are more likely to be biased if we observe that departing firms are relatively healthy or heavily dependent on the distressed bank relationship at the time of departure, or if they perform relatively poorly after their departure.

Table 8 focuses on four financial variables measured at the point at which departing firms leave their bank. Profitability is the ratio of operating income to book value of assets, Tobin's Q is the market value of equity plus book value of debt, divided by the book value of assets, Prior Three-Year Return is the holding-period

Table 8
Characteristics of related firms that terminate relationships with distressed banks, or that delist from the Oslo Stock Exchange (OSE), by year relative to the distress announcement
Panel A reports the mean characteristics for related firms that terminate relationships with distress banks or delist from the OSE in the years around the distress announcement. Profitability is the ratio of operating income to book value of assets. Tobin's Q is the ratio of the market value of equity plus book value of debt to book value of assets. Prior Three-year Return is the three-year holding-period return on a firm's stock. Multiple Relationships is a dummy variable set equal to one when a firm maintains a relationship with another bank besides the distressed bank. All variables are measured at year-end prior to the year of termination or delisting. Panel B reports the difference in mean values of firms that terminate or delist with firms that stay with the distressed bank during the event years.

	Profitability		Tobin's Q		Prior Three-year Return		Multiple Relationships	
Event year	Terminate	Delist	Terminate	Delist	Terminate	Delist	Terminate	Delist
Panel A: Mean characteristics of firms that terminate or delist								
−2	0.085	0.355	1.294	1.693	0.294	1.026	0.500	0.375
−1	0.302	−0.070	2.465	1.461	−0.021	0.249	0.667	0.533
0	−0.017	0.034	1.184	1.527	−0.244	0.418	0.250	0.565
+1	−0.008	0.095	1.021	1.350	−0.314	0.377	0.333	0.700
+2	−0.001	0.098	1.080	0.959	−0.139	−0.223	0.600	0.143
Average across firms	0.047	0.077	1.326	1.488	−0.112	0.453	0.435	0.500
Panel B: Mean characteristics of firms that terminate or delist relative to firms that stay								
−2	−0.030	0.239*	−0.096	0.304	−0.164	0.569*	0.071	−0.054
−1	0.171	−0.200***	0.889	−0.115*	−0.236	0.034	0.250	0.116
0	−0.115**	−0.064**	−0.348**	−0.005	−1.149***	−0.488*	−0.162	0.153*
+1	−0.109	−0.006	−0.431*	−0.101	−1.033***	−0.341	−0.083	0.284*
+2	−0.080*	0.019**	-0.057	−0.178*	−0.332***	−0.416	0.195	−0.262*
Average across firms	−0.058*	−0.028	−0.087	0.075	−0.605***	−0.041	0.054	0.084*

*Difference significant at 10% level,
**Difference significant at 5% level,
***Difference significant at 1% level.

return on a related firm's stock over the three years prior to the departure year, and Multiple Relationships is a dummy variable set equal to one when a firm maintains a relationship with another bank besides the distressed bank. Panel A reports the average values of the characteristics by the year in which firms depart, with all variables measured at year-end in the year prior to departure. Panel B of Table 8 judges the performance of departing firms relative to firms that stay by subtracting the average value of the characteristic for firms that stay at the distressed banks in each year. Due to missing accounting and stock price data, the sample sizes used in the calculations are slightly smaller than the numbers reported in Table 7. We lose seven of the original 23 firms that terminate in periods −2 through +2, and 10 of the original 86 firms that delist during that period.

Table 8 indicates that related firms that terminate relationships with ailing banks are 5.8 percentage points less profitable, have a Tobin's Q ratio that is 8.7 percentage

points lower, and experience pre-event, three-year holding-period returns that are 60.5 percentage points lower than firms that stay. The terminating firms experience negative gross holding-period returns in years −1 through +2, and negative gross operating profits in years 0 through +2. Taken together, the statistics suggest that terminating firms are poor performers before departing the bank. Delisting firms appear to be more similar to firms that stay with their banks. They have profitability ratios that are only 2.8 percentage points lower, and three-year returns that are 4.1 percentage points lower than staying firms. Neither of these differences is significantly different from zero. The average Tobin's Q for delisting firms is 7.5 percentage points higher than for firms that stay, although this difference is also not statistically different from zero. Meanwhile, the fourth variable group suggests that departing firms, whether they terminate or delist, are no more dependent on one bank relationship than firms that stay. In fact, delisting firms appear to be significantly less dependent on the distressed bank than staying firms. On average, 43.5% of the terminating firms maintain more than one bank relationship, 5.4 percentage points more than the proportion for staying firms. The difference, however, is not statistically significant. Fully 50% of all delisting firms maintain multiple bank relationships, or a statistically significant 8.4 percentage points more than for those firms that stay.

Table 9 tracks the long-run stock return performance of firms after they terminate, and compares their performance to staying firms with similar levels of sales and Tobin's Q. Firms that delist, of course, cannot be tracked after they delist. Panel A reports the mean gross holding-period return for terminating firms over one-, three-, and five-year holding periods, starting at the end of the year of termination. Panel B reports the holding-period returns net of holding-period returns on a set of "matched" firms. Matched firms are staying firms that are close to departing firm in terms of sales and Tobin's Q. Each departing firm gets eight matched firms.

Because there are relatively few terminating firms, it is difficult to draw any strong statistical conclusions. However, the patterns in Table 9 suggest that terminating firms perform more poorly than firms that stay, at least up to five years after their departure. The stock price of terminating firms falls an average of 21% in the first year after leaving their bank, or 11 percentage points more than firms that stay. Terminating firms recover enough to break even over three years, but matching firms earn 45% over the same period. By five years out, terminating firms close the gap and earn positive returns but still fall 30% behind firms that stay with the banks.

Taken together, what do Tables 7–9 tell us about potential sample selection biases? First, relatively few firms maintaining relationships with distressed banks, about 4% per year, terminate their relationships in the years around the distress announcement. This means that even if these firms were hurt because they were cut off by a distressed bank, correcting the estimates for their departure are unlikely to change our results. For instance, if we take the 16 firms with complete accounting and stock price data that terminate in years −2 through +2 and assume that the loss of the relationship results in a permanent (and large) 10% abnormal decline in their stock prices, then their combined effect would be to reduce the "all related firms" event CARs by a maximum of 90 basis points (with equal weights, each firm's CAR

Table 9
Long run performance of related firms that terminate relationships with distressed banks, by year relative to the distress announcement
Panel A of this table reports the mean holding-period stock returns of related firms that terminate relationships with distressed banks, beginning at the end of the year of termination. Panel B reports the mean holding-period returns relative to firms with levels of Sales and Tobin's Q similar to the terminating firms, but that stay with the distressed bank.

Event year	Number of firms	One-year	Three-year	Five-year
Panel A: Gross holding-period returns				
−2	1	−0.187	−0.700	−0.363
−1	3	−0.110	−0.487	−0.560
0	8	−0.236	0.114	0.754
+1	1	−0.853	−0.500	−0.500
+2	3	−0.038	0.478	0.883
Average across firms	16	−0.211	−0.020	0.384
Panel B: Holding-period returns relative to similar firms that stay				
−2	1	−0.338	−0.376	0.061
−1	3	−0.031	−0.750*	−0.383
0	8	−0.053	−0.145	−0.847*
+1	1	−0.577	0.220	0.277
+2	3	−0.036	−0.673	0.756
Average across firms	16	−0.117	−0.471**	−0.318

would contribute approximately 1/181 of the overall average and $-10\% * (16/181) = 0.884\%$). Second, terminating firms appear to be "dogs" in the sense that they are relative underperformers at the time that they depart. If banks forced these firms out, it was probably because the firms were harming the banks, not vice versa. Because these firms continue to perform poorly after departing the bank, we cannot fully discount the possibility that they became worse off because of the loss of their relationship with the distressed bank, but it is more likely that these firms would perform poorly independent of the bank they use. Third, firms that delist during this period most likely do so for reasons unrelated to bank distress, such as a merger or a transaction to be taken private. The average delisting firm experiences pre-event holding period returns and levels of profitability and Tobin's Q that are similar to staying firms, and is more likely to maintain a relationship with more than one bank than firms that stay.

4.4. Potential listed firm selection bias

Our study also suffers from potential selection biases because our sample excludes unlisted companies. According to modern banking theory, small, young, "informationally opaque" firms should be more dependent on bank financing than large, established, "informationally transparent" firms. Listed firms usually fall in the latter category because they tend to be relatively big, old, and subject to more

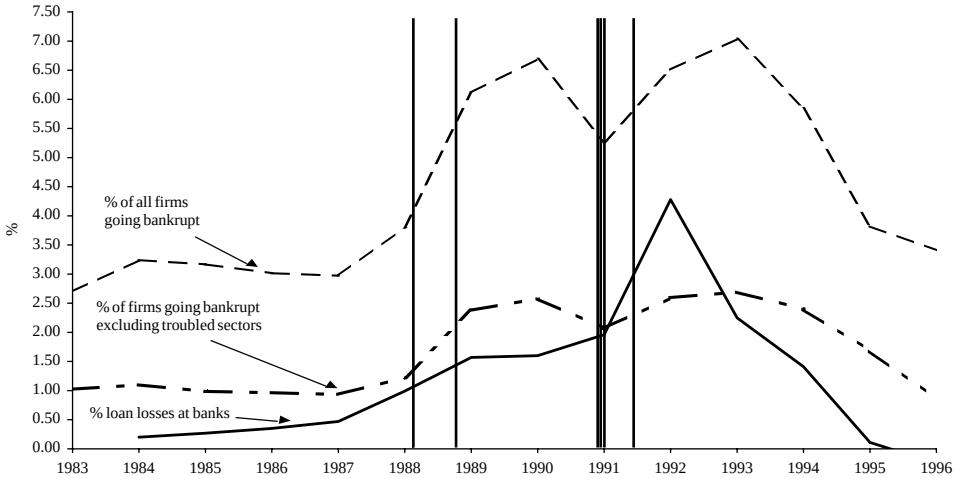

Fig. 2. Bankruptcy rates in Norway and loan losses at Norwegian banks. This figure compares bankruptcy rates with bank loan losses in Norway for the years 1980–1995. The "% of all firms going bankrupt" is calculated as the total number of bankruptcies divided by the total number of nonfinancial corporations in Norway. The "% of firms going bankrupt excluding troubled sectors" removes bankruptcies in the real estate, transport, construction, retail store, fishing, hotel, and restaurant industries. The "% loan losses at banks" are realized losses at Norwegian banks as a proportion of total bank assets. All data are compiled from various issues of the *Statistical Yearbook of Norway*. The black vertical lines correspond to the event dates in our sample.

stringent disclosure requirements than unlisted firms. Moreover, by definition, listed firms have access to public equity markets as an alternative source of financing to bank loans, in contrast to unlisted firms. Therefore, we could misrepresent the costs of bank distress by focusing only on listed firms, although nearly all firm-level papers that study the impact of bank distress on borrowers focus on listed firms because of the difficulty in obtaining information on unlisted firms.[5]

To get a rough sense for the impact of bank distress on nonlisted firms, we compare in Fig. 2 the timing of bankruptcy rates in Norway with loan losses at Norwegian banks over the period 1983–1996. For reference purposes, we also include our sample event dates, represented by vertical lines extending up from the x-axis. The solid line in the figure plots the annual realized commercial bank loan losses as a percentage of commercial bank assets. This line peaks at the end of 1991, when loan losses reach 4.3% of bank assets. The top dashed line traces out total pending bankruptcies as a percentage of all nonfinancial corporations in Norway, including small, privately held companies. This line rises quickly from 1987 and first peaks at 6.7% at the end of 1989, a full year before most distress announcements and two years before loan losses top out. The rate falls and then rises again to top out at 7.0% at year-end 1992, one year after the peak in loan losses. The 1992 peak could

[5] For example, see Slovin et al. (1993), Gibson (1995,1997), Kang and Stulz (2000), Yamori and Murakami (1999), Bae et al. (2002), Djankov et al. (2000), and Hubbard et al. (2002).

indicate that cutbacks in financing due to bank distress caused firm failures to rise. Alternatively, it could reflect continuing adjustments in industries that were ailing prior to the banking crisis. (If banks became more profit-oriented and sophisticated in their loan assessments after the crisis, then the second spike could indicate that banks cut off financing to surviving firms deemed poor credit risks.) To explore the latter possibility, the alternating dashed and dotted line in the graph excludes bankruptcies in the troubled sectors of real estate, transport, construction, retail store, fishing, hotel, and restaurants. These industries were largely responsible for the rise in bankruptcies that preceded the crisis. With these excluded, bankruptcy rates rise only slightly after the year-end 1989 peak. It is possible that the second wave of bankruptcies within the originally troubled industries reflects inefficient closures of viable firms cut off by their banks. However, outside of these industries, the figure suggests that ailing banks do not transmit their problems to borrowing firms.

5. Discussion and conclusion

The Norwegian banking system was in deep financial trouble between 1988 and 1991. Loan losses exhausted capital at many banks, private deposit insurance funds went broke, the banking sector nearly collapsed, and Norway's largest banks were ultimately nationalized. Yet the average firm maintaining a relationship with a distressed bank faced only small and temporary downward revisions to its stock price when its bank announced distress. In fact, the average stock price of all publicly listed Norwegian companies grew over the crisis period, outstripping the average returns on other exchanges around the world. Our results suggest that bank distress caused no significant interruptions to the financing and investment abilities of exchange-listed Norwegian firms despite the fact that these firms relied on banks as their primary source of debt financing. We do find that highly leveraged firms, particularly firms heavily drawn on a bank line of credit, as well as firms that had not issued equity within two years of the bank crisis, experienced significantly lower announcement-period abnormal returns than low-leverage firms and firms that had issued equity.

Our event study findings stand in contrast to recent empirical evidence from crises in "bank-dominated" Asian countries like Japan and Korea. Studies show that firms in these countries experienced large average stock price declines upon the announcement of bank distress. Why is there a disparity between our results and these studies?

We believe that the answer relates to differences between the corporate governance systems in Norway and the Asian countries. The Norwegian financial system leans towards strong protection of minority shareholder rights and transparent accounting and disclosure, giving investors the ability to work within a well-functioning equity market to control firms in a way that maximizes shareholder value. In addition, banks in Norway are precluded from owning large equity positions in the companies they lend to. For these reasons, banks in Norway can only exert control over firms

through their role as inside creditors. In contrast, Asian countries rely on systems that encourage strong equity-type control by banks, and discourage minority shareholder protections and accurate disclosure standards. Banks in Asian countries often control large blocks of equity voting rights while holding only small portions of cash flow rights, meaning that banks' incentives are distorted away from shareholder wealth maximization.[6]

Distortions created by the separation of ownership and control could become particularly onerous when banks are financially distressed. For instance, managers at troubled banks have an incentive to continually refinance loans to unprofitable companies to avoid having to recognize loan losses or increase loan loss provisions. These managers may also prefer to block profitable borrowers from seeking new financing that reduces their control over the borrower. In turn, ailing firms in this environment rely heavily on banks to maintain funding, and profitable firms are precluded from seeking financing elsewhere. When a banking crisis hits these countries, borrowers are negatively affected because of the strong control exerted by banks, the lack of viable alternatives to bank financing, and the distortions created by bank distress in these countries.

As evidence in support of our argument, we compare in Table 10 the total number of equity-type issues, the number of issues as a proportion of listed firms, and issue amounts as a fraction of market capitalization for nonfinancial firms in Norway and Japan over the period 1985–1996. The sources for these data are described in Appendix B. A comparison between Norway and Japan is interesting because the two countries have similar levels of per-capita wealth, faced financial crises that began at roughly the same time (Japan's crisis started in 1991), and experienced two different outcomes to their crises—Norway's crisis was over in four years, while Japan's continues today.

Despite the fact that Japan's equity market is often considered to be better developed than Norway's (see, for example, Beck and Levine, 2001), relatively few Japanese firms tapped their equity market for financing. As a proportion of the total number of listed firms, Japanese equity issues peaked in 1989 at 27%, and fell off quickly during the crisis years. As late as 1996, only 10% of Japanese firms were issuing equity each year. By comparison, an average of 33% of Norwegian firms issued equity each year, the rate of equity issuances barely dropped during the Norwegian banking crisis, and nearly *half* of all OSE firms were issuing equity each year by 1996. The size of equity offerings in Norway was also larger than that in Japan. Norwegian firms raised an average of 4% of total stock market value each year while Japanese firms raised 1%. Because the frequency of issues in Norway is approximately double that in Japan, the average issue size in Norway is roughly twice that in Japan, measured in proportion to stock market value. Coupled with the cross-sectional regression result that Norwegian firms issuing equity just prior to the distress period performed significantly better than firms that did not issue equity,

[6] For descriptions of the corporate governance structures of East Asian firms, see Allen and Gale (2000), Dinç (2000), and Claessens et al. (2000). Bøhren and Ødegaard (2000) provide a detailed overview of corporate governance in Norway.

Table 10
Equity issuance behavior of Norwegian and Japanese publicly listed firms, 1985–1996
This table lists the number of nonfinancial, publicly listed firms in Norway and Japan that issue equity or equity-type securities, and the total value of offerings relative to total market capitalization, for the years 1985–1996. The seasoned Norwegian issues are provided by Øyvind Norli and consist of all seasoned public, rights, and private equity offerings made by nonfinancial firms on the Oslo Stock Exchange (OSE), based upon OSE *Annual Reports* (see Norli, 1998). The public equity and rights category includes initial public offerings, taken from Helland and Samuelson (1999). To calculate the Norwegian ratio of total equity raised to market capitalization, we use data from *OSE Annual Statistics*. The Japanese issues consist of all initial and seasoned public, rights, and private equity and all convertible bond issues (both domestically and abroad) made by nonfinancial firms listed on Japanese stock exchanges taken from the Tokyo Stock Exchange (TSE) *Annual Securities Statistics*. We use data from the TSE *Fact Book* to calculate the Japanese ratio of the total equity raised to market capitalization, limiting the sample to firms listed on the TSE.

	Norwegian firms					Japanese firms					
	Public and rights equity	Private equity	Total equity-type issues	Issues over listed firms	Amount raised over market cap.	Public and rights equity	Private equity	Convertible bonds	Total equity-type issues	Issues over listed firms	Amount raised over market cap.
1985	41	6	30	0.29	0.05	103	18	208	329	0.18	0.01
1986	23	12	28	0.23	0.04	66	16	189	271	0.15	0.01
1987	19	10	22	0.20	0.03	72	22	313	407	0.21	0.02
1988	19	18	30	0.28	0.04	125	23	322	470	0.24	0.02
1989	26	19	43	0.35	0.04	179	22	348	549	0.27	0.03
1990	24	20	37	0.36	0.04	125	21	161	307	0.15	0.02
1991	19	9	28	0.25	0.03	60	19	103	182	0.09	0.01
1992	25	6	23	0.25	0.05	12	22	50	84	0.04	0.00
1993	39	21	57	0.46	0.06	5	11	128	144	0.07	0.01
1994	33	11	39	0.33	0.05	18	16	169	203	0.09	0.01
1995	58	28	76	0.53	0.03	9	17	62	88	0.04	0.00
1996	55	30	81	0.49	0.02	37	17	184	238	0.10	0.01
Average	32	16	41	0.33	0.04	68	19	186	273	0.14	0.01

these patterns suggest that Japanese firms have performed poorly because they lack the financial flexibility to access public equity markets.

Appendix A. Bootstrapping procedure

To obtain a distribution for the average CAR across all events that accounts for the cross-sectional (and cross-event) correlation in firm error terms, we first regress the realized daily return of the stock for each firm i, r_{jt}, on the realized daily return on the world market index in period t, r_{mt}, and 41 event dummies, δ_{jkt}. We also include three leads and lags of the market index to control for nonsynchronous trading,

$$r_{it} = \alpha_i + \sum_{n=-3}^{3} \beta_{in} r_{m,t+n} + \sum_{k=-20}^{20} \gamma_{ik} \delta_{jkt} + \varepsilon_{it},$$
$$t = -170, -173, \ldots, 120; \quad i = 1, 2, \ldots, I, \tag{A.1}$$

where ε_{it} is an error term. Let I_j represent the number of firms involved with event j and $I = \sum_{j=1}^{6} I_j$. Denote the estimated coefficients as $\hat{\alpha}_i$, $\hat{\beta}_{in}$, and $\hat{\gamma}_{ik}$ and note that the CAR is the sum of the daily abnormal return estimates over the event window.

We draw our bootstrapped data by first drawing with replacement 291 integer index values from a uniform distribution defined over the interval -170, $-173, \ldots, 120$. For each draw, we store the results in a vector. These independent draws determine the dates of the original errors that will be used to sequentially fill in the new time series of 291 daily observations. Based on this vector, we will then draw the OLS residuals corresponding to the index values for each of the I_j firms involved in the event. If the next chronological event is nonoverlapping, we repeat this process of drawing 291 index values and matching firm OLS errors with the index values. If part of the next chronological event overlaps with the first, we use the index values from the first event plus or minus the distance in event time between the two events for the overlapping portion. We repeat this process for all six events. By drawing the bootstrapped data in this manner, we preserve both the within-event and cross-event error dependencies in the data. Note, however, that we otherwise assume that the data are independently distributed through time.

For one completed draw of data, we then calculate for each firm the bootstrapped daily return of the stock, $\hat{r}^1_{it}$,

$$\hat{r}^1_{it} = \hat{\alpha}_i + \sum_{n=-3}^{3} \hat{\beta}_{in} r_{m,t+n} + \sum_{k=-20}^{20} \hat{\gamma}_{ik} \delta_{jkt} + \hat{\varepsilon}^1_{i\tau}, \tag{A.2}$$

where $t = -170, -169, \ldots, 120$; $\tau = \tau^j_{-170}$, $\tau^j_{-169}, \ldots, \tau^j_{-120}$; $i = 1, 2, \ldots, I$, $\hat{\varepsilon}^1_{it}$ is the tth OLS residual order according to the index values drawn above and the superscript 1 refers to the first draw of data.

Once the new set of returns has been created, we can run regressions similar to (1) and (A.1) to estimate daily firm-level abnormal returns, firm-level CARs, and average CARs across firms. We repeat this procedure 150 times to generate a

distribution of the estimates. From this distribution we compute the empirical *p*-values reported in Tables 4 and 7. A similar procedure is then also used to bootstrap distributions for the estimated coefficients in the cross-sectional regressions.

Appendix B. Equity offering data

The seasoned Norwegian issues are provided by Øyvind Norli and consist of all public, rights, and private equity offerings made by nonfinancial firms listed on the Oslo Stock Exchange (OSE), based upon OSE *Annual Reports* (see Norli, 1998). We add initial public offerings, taken from Helland and Samuelson (1999), to the category of public equity offerings. To calculate the Norwegian ratio of total equity raised to OSE market capitalization, we use data from the OSE *Annual Statistics*. The Japanese issues consist of all initial and seasoned public, rights, and private equity and all convertible bond issues (both and foreign) by nonfinancial firms listed on Japanese stock exchanges. The numbers come from the Tokyo Stock Exchange (TSE) *Annual Securities Statistics*. For the Japanese ratio of total equity raised to market capitalization we use the TSE *Fact Book*, which limits the sample to TSE firms only.

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