Distressed Relationships:

Lessons from the Norwegian Banking Crisis (1988-1991)

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Abstract

This paper seeks to measure the magnitude of the effect of bank distress on the loss of relationship benefits. We use the near-collapse of the Norwegian banking system during the period 1988 to 1991 to measure the impact of bank distress announcements on the stock prices of firms maintaining a relationship with a distressed bank. We find that although banks experience large and permanent downward revisions in their equity value during the event period, firms maintaining relationships with these banks face only small and temporary changes, on average, in stock price. We analyze the cross-sectional variation in firm abnormal returns and find that firms that maintain relatively long relationships suffer more upon announcement of bank distress.

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1 Introduction

The impact of bank distress on economic activity is a recurrent, yet contentious, subject of study. For example, Bernanke (1983) argues that bank failures exacerbated the contraction of real activity in the U.S. during the Great Depression years. Consistent with this argument, Bernanke and James (1991) find that the eleven countries with banking panics in the 1930s faced significantly more serious declines in output than thirteen other countries that avoided panic. Similarly, Grossman (1993) finds that the number of bank failures during the U.S. National Banking period from 1865 to 1914 had a substantial, though typically short-lived, impact on aggregate output.

Bank distress may affect real activity through a variety of channels. Uninsured depositors may lose all or part of their demand deposits, insured depositors may suffer from the temporary lack of liquidity, bank employees may be fired, and/or other banks may suffer financial losses through institutional or informational contagion. A set of recent papers focuses on the 'relationship benefits' that accrue to firms borrowing from banks (for example Kashyap, Stein and Wilcox (1993)). Bank distress may interrupt the flow of such benefits. Bank failure may result in the loss of valuable, customer-specific information and preclude the future ability for some firms to obtain financing. A distressed bank may also become less willing to 'lean against the wind' and renegotiate debt during difficult financial times, or may even decide to curtail credit extensions.

Slovin, Sushka and Polonchek (1993) claim to present clear evidence that borrowing firms are valuable bank stakeholders. They document that the impending insolvency of Continental Illinois in 1984 resulted in average abnormal returns of -4.2% on stocks of client borrowing firms. Moreover, the subsequent rescue by the Federal Deposit Insurance Corporation (FDIC) resulted in average stock price gains of +2.0%. Thus, the de facto failure of Continental Illinois impaired those

firms that maintained a lending relationship with the bank, while the unexpected FDIC rescue salvaged some relationship benefits.

In a spirit similar to Slovin et al. (1993), we measure the impact of bank distress announcements on the stock prices of publicly listed firms that maintain a relationship with a distressed bank. We use as a study framework the near-collapse of the Norwegian banking system during the period 1988-1991. Because of this experimental setting, our paper differs from Slovin et al. (1993) in several meaningful respects. First, we are able to study the effect of bank distress on relationships across multiple distress events, rather than using one isolated bank collapse. Some of the banks in our data set are small regional banks, while others are large commercial banks. Second, our series of distress events afford us the unique opportunity to track the system-wide deterioration of a banking system. The distressed banks in our study account for more than 85% of all bank assets in Norway and nearly all Oslo Stock Exchange (OSE) firms have a relationship with at least one of banks in our sample. Therefore, the average of our wealth impact measures represents a 'system-wide' estimate. Third, because Norwegian firms typically maintain only one bank relationship and do not use public debt markets, we are able to isolate the impact of impairment on the firm's primary, if not only, source of debt financing.

We find that although the banks themselves experience large and permanent downward revisions in their stock prices upon announcement of distress, firms maintaining relationships with these banks face only small and temporary declines, on average, in stock price. For example, we estimate average abnormal returns to distressed banks during 3 and 7-day event windows to be -10.6% and -11.2%, respectively. In contrast, average abnormal returns to related firms are -1.9% and +1.5%. We find the first distress events to occur chronologically have the most negative impact on firm abnormal returns, but these first distress events are also small banks with few customers. We

also study the cross-sectional variation in firm abnormal returns as a function of firm and relationship-specific characteristics and find the negative impact of an announcement to be increasing in the duration of the relationship.

The rest of the paper is organized as follows. Section 2 contains an overview of the relevant theoretical and empirical literature. Section 3 provides a summary account of the major events surrounding the Norwegian financial crisis. Section 4 motivates our choice of six bank distress events and introduces the econometric methodology used in our paper. Section 5 contains the results and Section 6 concludes.

2 Literature Review

Leland and Pyle (1977), Diamond (1984), Ramakrishnan and Thakor (1984), Fama (1985) and Boyd and Prescott (1986) argue that it is a bank's ability to abridge information asymmetries on credit markets that makes a bank 'special' relative to other financial institutions.[1] As a bank provides an array of services through time to a firm, it gains substantial knowledge about its customer's financial needs. For example, managing the firm's checking accounts may help the bank in monitoring the firm (Mester, Nakamura and Renault (1998)). The bank can use this intimate knowledge to establish and maintain a close relationship with the customer. Such relationships may improve contracting flexibility between the customer and bank (for example Boot and Thakor (1994) and von Thadden (1995)), reduce agency problems through increased control (Rajan (1992)), enable reputation-building (Diamond (1991)), and ensure confidentiality (Campbell (1979), Bhattacharya and Chiesa (1995), and Yosha (1995)).

Bank default halts the flow of such relationship benefits to the firm and risks the loss of informational capital built up by the bank. In case of such loss, firms may be forced to seek costly

financing alternatives or to queue up alongside other firms to seek a new bank relationship. But even temporary bank distress may decrease the value of bank relationship benefits. For example, a distressed bank may be less forthcoming and flexible in debt renegotiations, deny credit extension, or spend fewer resources on control. Public financial markets may be more suspicious of firms related to distressed banks, as bank distress may reflect poorly on the bank's monitoring prowess or even partially result from the poor repayment record by the firm seeking additional funding. In general, a strong bank relationship makes the firm dependent upon the financial health and the willingness of the bank to extend credit. Tight monetary policy, for example, may pinch smaller banks and their borrowers may experience the brunt of the ensuing credit crunch (for example, Kashyap and Stein (1995)). A firm may seek to diversify the risk of losing relationship benefits by establishing multiple bank relationships (Detragiache, Garella and Guiso (1997)). However, maintaining connections to many domestic banks may be costly and will not accomplish diversification if all banks are affected by similar adverse liquidity shocks.

Motivated by information-based theories on the value of a bank relationship, Slovin et al. (1993) examine the wealth impact of Continental Illinois Bank's de facto failure on 29 publicly traded firms retaining Continental Illinois Bank as a direct lender or lead manager in a syndicate. They show that these firms lost an average of 4.2% of their market value over three days prior to an announcement by the Federal Deposit Insurance Corporation (FDIC) that the bank would be bailed out. The firms then gain 2.0% of their value back over the day before and day of the announcement. Slovin et al. (1993) argue that the possible dissolution of a long-term bank relationship has a substantial negative impact on the wealth of firms involved with a distressed bank.

Evidence from the protracted Japanese financial crisis also suggests that bank health may affect firm performance. Kang and Stulz (1998) find that firms with close banking relationships

performed worse during and after the 1990-1993 deflation of the Japanese stock market when their 'main' banks were also facing financial problems. Using data from the period 1994-1995, Gibson (1997) reports that bank-dependent firms invested significantly less when their main bank received low credit ratings.

'Contagion' - the spillover of negative effects from one firm to another - may complicate any assessment of the impact of bank distress on borrowing firms, especially when the shocks setting off the distress event are economy-wide. Pure contagion resulting in a banking panic, or discriminatory contagion triggering a run on a bank similar to the distressed bank, will also affect borrowers of the run-on banks. For example, in Rajan (1994), poor earnings announcements cause banks to coordinate credit policies during adverse shocks to the borrowing sector. Such coordination arises because a banker's reputation is less sensitive to poor earnings when other banks admit to poor earnings and loan losses. Evidence on the presence of contagion effects is mixed. Wall and Peterson (1990) examine stock price returns and financial statements of U.S. banks around the time of the Continental Illinois crisis. They found no evidence of spillover to other banks. Aharony and Swary (1983), Swary (1986), and Aharony and Swary (1996) on the other hand, find that stock prices of non-failing banks are affected following a bank failure when the non-failing banks share common features with the failed banks. Finally, Slovin, Sushka and Polonchek (1999) find that dividend reductions at U.S. money center banks have negative, contagion-type externalities, but dividend reductions at regional banks have positive competitive effects on geographic rivals.

Three other papers focus on the interaction of firm and bank performance during the Norwegian banking crisis. Kaen and Michalsen (1997) investigate contagion effects by examining the impact of 24 separate bank distress announcements on bank and non-bank stock price indices. In contrast to most U.S. studies, they find some evidence of contagion throughout the entire Norwegian

banking industry following the distress announcements, and some effects on other sectors. However, no attempt is made to directly link bank problems to relationship firms. The two other papers focus on the time-series properties of stock price indices before and during the crisis. Andrade, Clare and Priestley (1997) show that shocks to the Norwegian bank stock index during the crisis period only temporarily affected the volatility of other industry indices. Clare and Priestley (1998) estimate bank default probabilities using bank stock price index data.

3 The Norwegian Financial Crisis

On March 18th 1988, Sunnmørsbanken, a small bank in western Norway, issued a public statement that it must turn around losses in order to sustain operations. This event marks the beginning of a financial crisis that overwhelmed many Norwegian savings and commercial banks, and culminated with the effective nationalization of Norway's largest commercial banks in December 1991.[2] The scars of this dramatic chapter in Norwegian financial history remain visible today, more than eight years after its poignant finale. Even today, the Norwegian Government continues to hold majority stakes in Den norske Bank (DnB) and Kreditkassen, Norway's two largest commercial banks and Norwegian bank stocks, on average, remain far below their pre-crisis levels.[3] The Norwegian banking crisis itself was not an isolated event. Financial institutions in Sweden, Finland, and to a lesser extent in Denmark, also became impaired in the late 1980s and early 1990s. The crises in the rest of Scandinavia erupted a year or more after the onset of the Norwegian crisis, reflecting in part the earlier cyclical downturn in Norway initiated by the sharp fall in oil prices in 1986 (Drees and Pazarbasioglu (1995)).

Figure 1 provides a convenient visual summary of some of the events and characteristics of the Norwegian banking crisis. It charts the daily stock price activity of a value-weighted index of

Norwegian banks, the value-weighted OSE index, and a 'world' market index - consisting of market capitalization-weighted returns from the US, UK, Germany and Japan - over the period 1983 to 1996. In addition, the figure marks with vertical lines the distress event dates followed in this paper, beginning with the failure of Sunnmørsbanken. We return to a description of these events below. Across the bottom of the figure, we also report annual observations on measures of oil prices, Norwegian GDP growth, and bank loan growth and loan losses in Norway.

The Norwegian crisis was preceded in time by a period of rapid deregulation. Prior to financial liberalization, Norwegian banks faced lending rate regulations and quantitative lending restrictions. So-called 'interest rate declarations' set upper, and infrequently adjusted, limits on average bank lending rates. Consequently, demand for bank loans surpassed the level compatible with economic stability. To limit credit expansion, authorities in Norway relied mainly on supplementary reserve requirements, but also imposed bond investment requirements and direct controls on lending by state-owned banks. According to Drees and Pazarbasioglu (1995), chronic excess demand for credit cemented close and long-term relationships between borrowers and their banks, while bank profitability was ensured by the absence of inter-bank competition and the restrictions on entry by financial institutions and foreign banks.

Swift financial deregulation in the mid-80s fundamentally changed this picture. Authorities effectively lifted lending controls by abandoning supplementary reserve requirements in 1984, and phasing out bond investment requirements in 1985. In September 1985, lending rates were also liberalized by the introduction of an 'interest rate monitoring system', and in 1986 foreign banks were permitted to open subsidiaries in Norway. Norwegian commercial and savings banks aggressively expanded credit to maintain market share. They felt encouraged in their quest by strong growth in real activity, fueled by expansionary monetary policy. In 1985, commercial bank loans expanded at

the alarming rate of 37.5%, and in 1986 loan volume grew again by 23.4%.

A sharp decline in oil prices in 1986 precipitated a decline in real estate values in the oil-dependent Norwegian economy. Moreover, the transition from a tightly regulated to a more competitive financial marketplace may have accentuated poor internal risk management practices. In any case, by 1986 Norwegian bank loan losses began to mount. Commercial bank loan losses, as a percentage of total bank assets, rose from a level of 0.27% in 1984 to 0.99% in 1987, the year when problems in the financial sector became publicly apparent (Jonassen (1992)). By 1991, loan losses stood at 1.83% of total bank assets. Initially, distress appeared limited to smaller banks, making it possible for existing industry-based insurance funds to bail out troubled banks. However, reports in 1990 of financial troubles at Norway's third largest commercial bank, Fokus Bank, made it clear that the problems were spreading to Norway's larger commercial banks. By the end of 1990, capital from private insurance funds had been depleted, requiring the Norwegian government to set up its own emergency guarantee fund. Upon the collapse of Norway's two largest banks in late 1991, the size of the government's own guarantee fund had quadrupled to NOK 20 billion, an amount roughly equal to the total market capitalization of the OSE. Subsequent to the failure of the large banks, the Norwegian government became the sole owner of Fokus and controlled 98% and 55% of the voting equity in Kreditkassen and DnB, respectively.

The Norwegian banking crisis was traumatic and took four years to unfold. Yet during this whole ordeal, real activity was never particularly depressed and stock market investors seemed relatively bullish about the present and future profitability of the Norwegian economy. Although between January 4th, 1988 and December 30th, 1991 the Norwegian bank stock index plunged more than 80%, the value-weighted OSE index *climbed* by more than 60%, outpacing our measure of the world market index. This seeming disconnection between the financial and the real sector is puzzling,

especially for an economy where 91% of all commercial debt is financed by either a bank or non-bank financial intermediary.[4] In the next sections, we study this pervasive financial crisis and its impact in more detail using event study methodology.

4 Data and Methodology

To identify bank distress announcements during the crisis period, we supplement a list originally compiled by Kaen and Michalsen (1997) with reports from major local daily newspapers. Kaen and Michalsen (1997) cull 24 event dates from Oslo Stock Exchange (OSE) news tapes and annual reports of governmental and quasi-governmental agencies. In all cases, event dates are the days the information was actually released by an agency or reported in a newspaper or across a wire. For this paper, we select those event dates deemed to be the first material announcement of distress by a bank. This first announcement commonly includes statements about severe loan losses, inadequate reserves, or large capital losses. We obtain thirteen of such announcements, but retain only those banks that maintain a 'primary' relationship with at least two OSE-listed non-financial firms. This criterion leaves us with five bank distress events. We include, as an additional event, the announcement, on June 17th 1991, of the endorsement by the Commercial Bank Guarantee Fund (CBGF) of the application for preference capital by Den norske Bank (DnB) and Kreditkassen, Norway's two largest commercial banks. This endorsement was the first indication that the magnitude of the losses at the two banks outstripped the existing capital of the existing government guarantee fund. The date was the effective start of a series of highly publicized parliamentary and newspaper debates discussing the prospect for rescue. These debates culminated in the nationalization of the two banks.

Table 1 contains the event dates and the number of publicly traded firms having a bank relationship with each distressed bank (henceforth, we refer to such firms as 'related' firms) in the year

before, and after, the announcement date. We collect the firm-by-firm identity of bank relationships through OSE publications. The OSE requires all listed firms to report their 'primary' bank connections, up to a maximum of four. A primary bank connection typically involves short and long-term lending, as well as the frequent purchase of deposit, cash management, and foreign exchange services, and often also derivatives services. Ongena and Smith (1998a) contains a specific account of the reporting process.

Ongena and Smith (1998a) also report that roughly 75% of OSE firms maintain only one bank relationship. This characteristic of the Norwegian financial landscape greatly facilitates the interpretation of our results. All else equal, we should expect financial distress at an individual bank to have more impact on the related firms in Norway than in other bank-dominated European countries, such as Italy and Germany, where large firms often maintain many bank relationships (see Ongena and Smith (1998b)).

With a few exceptions, our methodology for studying the impact of bank distress announcements of related firms follows standard event studies. To obtain our abnormal return estimates, we regress the realized daily return on the stock of firm j in period t, r_{jt}, on the realized daily return on a measure of the market index in period t, r_{mt}, and 41 daily event dummies, δ_{jkt}, which take the value of one when $t=k$, and zero otherwise.

$$(1) \qquad r_{jt} = \alpha_j + \beta_j r_{mt} + \sum_{k=-20}^{20} \gamma_{jk} \delta_{jkt} + \varepsilon_{jt}, \quad t = -170, -169, ..., 120.$$

The coefficients γ_{jk} represent our daily abnormal return parameters. For the results reported in the tables we start the estimation 150 days prior to the start of the event window and end it 100 days following the event window. Hence the total number of daily observations used in the estimation is

291. Because non-trading 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 (1) to correct for non-synchronous trading. We correct all standard errors using a Newey and West (1987) weighting matrix with five lags. We calculate cumulative abnormal returns (CARs) by summing the estimates of the coefficients, γ_{jk}, over the event window, and judge the significance of the CARs using a Wald test.

The bulk of the stock return data comes from *Oslo Børs Informasjon*, an information subsidiary of the OSE. We screen out those stocks with realized daily returns in absolute value larger than 100% and firms for which the annualized market value of equity is not available (our results are virtually unaffected if we drop these screens). Overall, we are able to track the stock price performance of 128 firms related to the five distressed banks in our study. These sample firms represent roughly 90% of the total number of firms listed on the OSE during our study period.

We report results using both the OSE index and the world market index as the benchmark 'market return'. We construct the world market index from daily, value-weighted US, Japanese, UK, and German stock market returns using data from *Worldscope*. Each country receives a weight in the world index proportional to its US dollar market capitalization as of July 1st, 1987. We include the world market index in order to account for possible biases induced by contagion effects on the OSE.

5 Results

5.1 Banks in Distress

We begin by examining the CARs of the bank stocks around each of the event dates.[5] We use the bank stock price reactions as a gauge for the informativeness of our selected events. Table 2 reports, for each event date and for three different event windows, the CAR estimates and p-values for the

Wald test statistic (in parentheses). Figure 2 plots the average bank CARs for the 20 trading days surrounding the event date. The average price reaction over the (-1,+1) interval is substantial. All of the CARs are large, negative and statistically significant, independent of the choice of market index. Across all banks, the average 3-day CAR is near -10%, and significant at the 1% level using a standard z-test.[6] The magnitude of the abnormal returns persist over the longer windows, suggesting that the price changes are permanent.

5.2 Related Firms

We now turn to examining the abnormal returns of the related firms around bank distress announcements. We first construct equally-weighted portfolios of related firms according to event date. We report the CARs for each of these 'event' portfolio's in Table 3. The three firms banking with Sunnmørsbanken at the beginning of the crisis and the two firms relying on Sparebanken Nord-Norge, the next bank in chronological time to fail, are substantially affected by financial distress at their primary bank. The latter firms generate average CARs of around -25% over the three days surrounding the announcement and approximately -50% over a 21-day event window. For the other events, the results are much weaker, and mixed. With the exception of the announcement of June 1991, the average related firms across all 3-day event windows experience a statistically significant fall in stock prices upon announcement of their bank's distress, when judged relative to the world market index. Relative to the OSE, the 3-day CARs are smaller in magnitude. Morover, many of the CARs over larger windows are zero, or even significantly positive, suggesting that the price drops experienced by related firms are temporary.

Table 4 provides different measures for summarizing the impact of bank distress events across all of the events. The first row in Table 4 simply averages the CARs across the six event

portfolio's and compares the averages using a z-test. Relative to the world market benchmark, we find related firms lose 7.3% of their value over the three-day period surrounding the announcement. This estimate is significant at a 5% level. With the OSE Market Index, the average 3-day CAR is -6.3% and is significant at a 10% level.

However, averaging across the events is problematic for several reasons. First, the negative 3-day CARs may not be entirely attributable to the loss of bank-specific relationship benefits. For example, distress at one bank may trigger managerial actions or pre-emptive regulatory intervention at other banks, leading to a general tightening of credit (Rajan (1994)). This, and other contagion-type effects imply that *unrelated* firms may also be affected following a distress announcement at another bank. In fact, a regression of the OSE index on the world market index suggests that 'spillovers' may occur. For 3-day windows around all event dates, the average CAR associated with the OSE is -1.8%, which is significant at a 10% level. Of course, this result may be driven by the dominance of events in which related firms dominate the OSE. To focus directly on the impact of related firms vis-à-vis the unrelated firms, we also construct equally-weighted portfolios of firms without any connection to the distressed bank in the year of the event date. We then examine the CARs of a difference portfolio, constructed to be a zero cost portfolio that is long in related firms and short in the unrelated firms. The resulting 3-day CAR of the net portfolio, averaged across the six events, is -6.0%, which is significant at a 10% level. The average 21-day net CAR is an insignificant -5.2%. A value-weighted version of the difference portfolio alters the significance of the 3-day CAR result. The estimate is -4.2%, but not significant. Hence, we can not unequivocally conclude that related firms are affected more by bank distress than unrelated firms.

A possibly more misleading problem with the simple average across events is that the number of stocks varies substantially across the six events. Only three listed firms use Sunnmørsbanken in

1988 and two firms use Sparebanken Nord-Norge in 1989, but 65 firms list Kreditkassen and/or DnB as their primary bank in 1991. To address this issue, we first weigh each event CAR by the relative number of stocks in the portfolio. This weighting reduces the magnitude of the 3-day average CAR to -2.1% and the average 21-day CAR to 0%. Second, we also calculate CARs on a firm-by-firm basis and calculate the average CAR across all firms in the sample. Although such firm-level averaging is a sensible way to report average CARs, it introduces potential correlation in the error terms across regressions, which bias standard error estimates of the average. We report the results in the bottom rows of Table 4. The 3-day average CAR of -1.9% is similar to the firm-weighted estimate of -2.1%, and is significant at the 1% level, assuming i.i.d. errors across the firms. The 21-day CAR, on the other hand is positive, though insignificant. To correct for the likely correlation across the firm-level estimates, we bootstrap a distribution that assumes errors are correlated across related firms sharing the same event date, but uncorrelated across events. These standard errors are reported in italics under the regression standard errors (the bootstrap procedure is described in the appendix).[7] Using the bootstrap standard errors does not greatly alter our conclusions.

A third problem pertains to the timing of announcement of bank distress vis-à-vis the point at which the bank connections are reported on the OSE. If, within the same year, the event date precedes the reporting date, then we face the danger of excluding firms from an event portfolio that maintain a relationship through the distress period, but drop their bank before reporting time. To account for this bias, we rerun our results assuming a firm is related to the bank it reports in the year prior to the event date. Such a portfolio may also be biased because it may contain relationships that terminate after the previous year's reporting date, but prior to the event. The results are fairly robust to the switch in definitions. For instance, we find that the average 3-day CAR (using the OSE Market Index) is -2.5% and is significant at a 5% level, while the average 21-day CAR is negative but

insignificant.

To summarize, correctly weighted estimates and firm-by-firm averages provide a consistent result: Stock prices of Norwegian firms were at most only temporarily affected by distress at their primary bank with downward revisions of roughly 2% in the three days surrounding the bank distress announcement. For event windows greater than three days, the abnormal returns are typically zero, or even positive. Two small banks, Sunnmørsbanken and Sparebanken Nord-Norge were the initial prey to bank distress. In both cases the 3-day CARs are significantly negative and quite large in absolute value, indicating that firms are substantially affected by financial distress at their primary bank. However, the five firms that these banks serviced are small, fitting into the OSE's three smallest size deciles. The other distress announcements involve Norway's largest banks, which service small and large firms alike. Firms related to these banks experience far less of an impact on their stock price. For example, if we average across the four events occurring in 1990 and 1991, the average 3-day CARs for the four equal-weighted portfolio's is only -0.9% with the OSE Market Index and -2.8% with the World Market Index as benchmark. Both averages are significant at a 5% level. The average 21-day CAR is in both cases is positive, though not significantly different from zero.

5.3 Cross-Sectional Regressions

We now examine in more detail how event-, relationship-, and firm-specific characteristics impact the magnitude of the 3-day CARs across the sample firms. We do so by regressing the (-1,+1) firm-level CARs on a set of firm and relationships characteristics, and a set of event dummies. To construct the regressions, we require that each firm have data available on market value of equity, book value of debt, and age. We lose five firms from our initial sample, leaving us with 123 observations. The results of the regressions are in Table 5.

Model 1 in Table 5 contains a constant and four event dummies (we exclude the dummy for the June 17th, 1991 event). The inclusion of event dummies may be motivated as follows. First, as a financial crisis unfolds, investor expectations about the entire banking sector may change, altering the informational content of distress announcements for individual banks. If the seriousness of the crisis became apparent sequentially, then each announcement may become less informative over time. On the other hand, it is not clear that all distress announcements are equally informative or consequential, even if our procedure for picking the distress announcements is impartial and ultimately successful in identifying key bank distress announcements. For example, it is a-priori not apparent whether an announcement detailing loan losses (for example, *DnB*, January 4th, 1991) will have the same impact on related firms as an unconfirmed announcement pertaining to a bank's financial problems (*Fokus Bank*, December 11th, 1990).

One indication that the announcement is a surprise would be a positive correspondence between the bank CARs and the magnitude of the dummy coefficient estimates. Bank characteristics may also determine the ultimate negative effect on related firms. For example, corporate customers of a defaulting large bank may encounter more problems finding a replacement bank when capacity of the rest of the banking sector is inadequate to deal with the sudden influx of firms without a relationship (Gale (1993)). In this case, we should expect to see a positive correlation between bank size and the magnitude of the dummy coefficient estimates.

Turning to the results in the first column of Table 5, an immediate pattern emerges. The magnitude of the coefficient estimates, which are all significant at a 1% level, fall through time. Although we do not report the results, we also examine the correlation between the event dummy estimates and bank and event date characteristics. We can reject at a 5% level the null hypothesis of no correlation between the size of the dummy coefficient and the timing of the distress announcement

(we use a Pearson correlation test statistic, and assess its significance using a t-test). However, no correlation appears to exist between the 3-day bank CARs and the size of the dummy coefficients. We can reject, at a 10% level, the null hypothesis of no correlation between the size of the dummy coefficients and the ranked sizes of the banks. But the correlation is negative, opposite our expectations.

In Model 2 of Table 5, we introduce three relationship variables. MULTIPLE takes the value of one when a firm maintains a multiple-bank relationship, and zero otherwise. INTERNATIONAL takes the value of one when a firm maintains a relationship with an international bank and zero otherwise, and DURATION is the observed length of the reported bank relationship with the distressed bank. Having alternative bank financing sources, especially non-Norwegian ones, should shield a firm from the negative fallout of domestic bank distress. Hence, we expect the coefficients on MULTIPLE and INTERNATIONAL to be positive. Ongena and Smith (1998a) document that firms are more likely to switch banks as the relationship matures, such that a long bank relationship with what ultimately proves to be a distressed bank, may indicate a lack of alternative sources of funding. Hence, we expect a negative coefficient on DURATION. The signs of all three coefficient estimates are consistent with our priors. However, only the DURATION coefficient is significant. The estimate associated with duration implies that an additional year of having a relationship with the distressed bank decreases a firm's 3-day CAR by 0.3%. However, interpretation of this result requires care as our measurement of the DURATION variable is left censored because we cannot observe bank connections before 1979, or prior to the listing of a firm on the OSE.

For model 3, we add four firm characteristics. SIZE is the market value of equity of the firm, Q is ratio of the market value of equity plus book value of debt to book value of assets, AGE is the founding date of the firm, and DEBT is the ratio of the book value of debt to book value of assets.

All variables are measured as of the end of the year prior to the distress announcement. Other things being equal, small, young, high-growth firms may be more reliant on a bank relationship and therefore be affected more by unexpected bank distress, than other firms. According to our results, however, none of these variables is statistically significant.

Assessing the significance of the regression estimates using standard t-tests may be biased because the abnormal returns estimates may be correlated across firms sharing a common event date. To circumvent this problem, we use the draws from our original bootstrap experiments to create distributions around the regression coefficients. The bootstrapped regression standard errors appear in italics and only confirm our earlier results.

6 Conclusion

Many Norwegian commercial banks were in deep financial trouble between 1987 and 1991. Loan losses exhausted capital in many banks, as well as private and government insurance funds, the banking sector collapsed, and Norway's largest banks were ultimately nationalized. Even today, bank stocks have yet to recover to their pre-crisis levels. Nevertheless, we find that stock prices of firms maintaining a bank relationship with distressed banks face only temporary downward revisions in stock price on the announcement of their bank's distress. The average firm's stock price bounced back within a trading week around the announcement. Overall, the stock price of these publicly listed companies grew over the event period. While related firms and firms without a connection to the distressed bank were not affected differently, abnormal returns to stocks of related firms with longer relationships to the distressed bank were significantly and substantially more negative over a 3-day period around the distress announcement dates.

Our evidence complements findings by Slovin et al. (1993). They report an average

abnormal two-day return of -4.2 percent around the announcement insolvency of Continental Illinois in 1984 and an abnormal increase of 2.0 percent upon the announcement of the FDIC rescue. They argue that such large price changes are estimates of the potential value tied directly to the firm-bank relationship. By contrast, our results suggest that the bank relationships are not as valuable using data across five banks in Norway during the period 1987 to 1991.

One explanation for our results is that investors anticipated the ultimate rescue of all banks by the Norwegian government and therefore firm relationships were safe. The large wealth loss experienced by the banks then reflects anticipated rent extraction by the Norwegian government, while firm relationships are maintained. However, it is not clear bailout was the expected outcome of the crisis. For example, after its share capital was lost in 1989, Norion Bank, a small commercial bank, was placed under public administration and then liquidated (all bank depositors received full compensation). This particular pay-off and the existence of two industry-operated deposit insurance funds with ultimate government backing prevented the occurrence of bank runs, but may also have promulgated the idea that the liquidation of even a large commercial bank remained a real possibility. The increasing coefficients on the consecutive event dummies in the cross-sectional regressions are, however, compatible with a gradual recognition by investors that the Norwegian government would bail out any defaulting larger commercial bank. An alternative explanation is that investors were unable to distinguish between good (survivor) and bad (ultimately failing) banks (Kaen and Michalsen (1997)), and perceived the financial problems in the banking sector as wide-spread and systemic. Clare and Priestley (1998) argue that their stock price-based measure of the probability of failure indicates that investors as early as 1984 implicitly assigned a non-trivial probability to failure of the entire Norwegian banking sector.

Appendix: Bootstrapping Procedure

We construct the bootstrap distribution of the average 3-day Cumulative Abnormal Return (CAR) as follows. We start by regressing the realized daily return of the stock for each firm *i*, r_{it}, 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,

$$(A.1) \quad r_{it} = \alpha_i + \sum_{n=-3}^{3} \beta_{in} r_{m,t+n} + \sum_{k=-20}^{20} \gamma_{ik} \delta_{jkt} + \varepsilon_{it}, \quad t = -170, -169, ..., 120; \quad i=1, 2, ..., I.$$

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 define the 3-day CAR for each firm *i* to be the sum of the three estimates $\hat{\gamma}_{i,-1}$, $\hat{\gamma}_{i,0}$, and $\hat{\gamma}_{i,+1}$. For each event we average these CAR's across all firms to obtain the realized average 3-day *CAR*.

We obtain a distribution that accounts for cross-sectional correlation in firm error terms within a given event by drawing 291 times with replacement from t = -170, -169, ..., 120. For each draw, we store the results in a vector. For example, we may obtain a vector (-54, 67, -107, 18, 22, ..., -54, ..., -107, ..., -3). We repeat this procedure for each event, yielding a total of six row vectors, $\mathbf{T}^j$, each with 291 elements, t_t^j. We then calculate for each firm the bootstrapped daily return of the stock, r_{it}^1,

$$(A.2) \quad r_{it}^1 = \hat{\alpha}_i + \sum_{n=-3}^{3} \hat{\beta}_{in} r_{m,t+n} + \sum_{k=-20}^{20} \hat{\gamma}_{ik} \delta_{jkt} + \varepsilon_{it},$$

t =-170, -169, ..., 120; $\tau = \tau^{j}_{-170}, \tau^{j}_{-169}, ..., \tau^{j}_{120}$; i=1, 2, ..., I.

Here, we index the return by a superscript '*1*' to indicate this calculation will be the first of a number of *N* draws. Notice that our bootstrap procedure maintains the event structure of the errors, i.e. for each firm connected to the same event we utilize the same error term chronology.

Next we regress the bootstrapped daily return of the stock for each firm i, r^{1}_{it}, on the realized daily return on the world market index in period t, r_{mt}, and 41 event dummies, δ_{jkt}:

$$(A.3) \quad r^{1}_{it} = \alpha^{1}_{i} + \sum_{n=-3}^{3} \beta^{1}_{in} r_{m,t+n} + \sum_{k=-20}^{20} \gamma^{1}_{ik} \delta_{jkt} + \varepsilon^{1}_{it}, \quad t = -170, -169, ..., 120; \; i=1, 2, ..., I.$$

ε^{1}_{it} are the error terms. Denote the estimated coefficients $\hat{\alpha}^{1}_{i}$, $\hat{\beta}^{1}_{in}$, and $\hat{\gamma}^{1}_{ik}$. We calculate the Cumulative Abnormal Return (-1,+1) for each firm i by summing $\hat{\gamma}^{1}_{i,-1}$, $\hat{\gamma}^{1}_{i,0}$, and $\hat{\gamma}^{1}_{i,+1}$, and average across all firms to obtain the first bootstrapped 3-day average CAR, CAR^{1}.

We repeat the procedure, starting with the drawing with replacement to construct the six vectors of sequencing numbers. We go through the entire procedure *N* times to obtain a bootstrapped distribution for the average *CAR*, characterized by CAR^{1}, CAR^{2}, CAR^{3}, ..., CAR^{N}.

A similar procedure is then also used to bootstrap distributions for the estimated coefficients in the cross-sectional regressions.

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Notes

[1] Gertler (1988) and Bernanke (1993) review the role of banks in the macro-economy, Bhattacharya and Thakor (1993) and Freixas and Rochet (1997) review contemporary banking theory, and Ongena and Smith (1999) review theoretical and empirical work on bank relationships.
[2] Kaen and Michalsen (1997) summarize the Norwegian banking crisis and list the most important crisis events. Drees and Pazarbasioglu (1995) provide comparative descriptions of the crises and policy responses in Norway, Finland, and Sweden.
[3]On March 22, 1999, the Norwegian government sold its controlling interest in Kreditkassen. It still owns 34.6% of the equity (*OSE wire service report*).
[4] Based on 1994 loans from financial institutions to the commercial sector (*Statistical Yearbook of Norway, 1996*). While bank-dominated on the debt side, Norwegian law prohibits banks from investing more than 4% of their assets in real estate and/or the equity of non-financial companies (*Forretningsbankloven*, 1961, 24 May, Nr. 2, § 24). As of 1994, Norwegian banks owned only 1% of the equity in the non-financial sector (Nilsen (1995)).
[5] Stock price data for *Sparebanken Nord-Norge* are not available before 1994.
[6] I.e., we construct the z-test assuming the CAR's are i.i.d. and

$$\frac{CAR^{b}(-t,+t)}{\left(\frac{\hat{\sigma}^{b}}{\sqrt{6}}\right)} \sim N(0,1)$$

with,

$$\hat{\sigma}^{b}(-t,t) = \left(\frac{6\sum_{i=1}^{6}\left(\sum_{k=-t}^{t}\hat{\gamma}_{ik}^{b}\right)^{2} - \left(\sum_{i=1}^{6}\sum_{k=-t}^{t}\hat{\gamma}_{ik}^{b}\right)^{2}}{6(6-1)} \right)^{1/2}.$$

[7] We require that each firm have data available on market value of equity, book value of debt, and age. We lose five firms from our initial sample, leaving us with 123 observations (see also the results reported in the following section).