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## The effects of the Norwegian banking crisis on Norwegian equities<sup>1</sup>

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### Abstract

We examine the information effects of Norwegian savings and commercial bank financial distress announcements on Norwegian bank and non-bank stock prices. We find that Norwegian commercial bank failures during the Norwegian banking crisis were associated with negative common stock abnormal returns for both Norwegian banks and large Norwegian corporations listed on the Oslo Børs. We interpret this finding as supporting the conclusion of Norges Bank that the banking crisis was an economy-wide systemic crisis and required intervention by Norges Bank and the Norwegian government. Although we find no systemic market-wide information effects associated with the failure of Norwegian savings banks, we are reluctant to conclude that these bank failures had no effect on the households, businesses and local economies served by these banks. The absence of negative abnormal returns on large commercial banks or publicly listed Norwegian corporations for the savings-bank events may reflect the fact that large commercial banks were serving a different banking clientele than the savings banks and that large Norwegian corporations did not rely on savings banks for financing. © 1997 Elsevier Science B.V.

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*Keywords:* Bank failures; Norwegian financial markets

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### 1. Introduction

Near the end of 1991, Norway's second (Kreditkassen) and third (Fokus Bank) largest commercial banks failed and were taken over by the government. In December 1991, the Norwegian government also acquired a 50% equity stake in the

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<sup>1</sup> Earlier versions of this paper were presented at the 1993 European Finance Association meetings in Copenhagen and the 1993 Australasian Finance and Banking Conference in Sydney. The paper has also benefited from comments received at a Norges Bank finance seminar in Oslo, Norway.

country's largest bank, Den norske Bank (DnB), when it announced that its capital would be inadequate to satisfy regulatory requirements. These large bank failures followed a number of smaller savings and commercial-bank insolvencies which began in 1987, failures which prompted financial press reporters to declare the Norwegian banking system effectively nationalized.<sup>2</sup>

The objective of this paper is to examine the effects of these bank failures on Norwegian bank and non-bank stock prices. We address three questions:

- (1) Did financial distress information about banks affect the market value of non-bank equities?
- (2) Did financial distress information about individual banks affect investor perceptions of the market value of other Norwegian banks?
- (3) Were bank stock price reactions to bank failures conditioned on whether the bank would eventually fail?

We ask the first question because we want to know whether the effects of bank failures were restricted to the failed bank and/or the banking industry or whether the market value of all Norwegian firms were affected; in other words, were the failures market-wide systemic events? The answer to this question is important for formulating public policy responses to bank failures because the economic consequences of letting banks fail would be more severe were they systemic events affecting the entire economy than were they localized within the banking industry (Smith and Wall, 1992; Meehan et al., 1993).

We ask the second question because we want to know whether bank failure announcements cause investors to revalue other bank equities. We ask the third question because we want to know whether investors can or do distinguish between strong and weak banks if they revalue all bank equities at the time of bank failure announcements. These last two questions are related to the ongoing debate about whether bank regulators can rely on bank equity prices to help identify problem banks (Gilbert, 1990; Randall, 1989; Simmons and Cross, 1991).

We find financial distress announcements about individual Norwegian commercial banks affected the market prices of non-bank equities as well as other commercial banks. These information effects appear as negative abnormal returns on non-bank Oslo Børs stock indexes. Consequently, we conclude that the Norwegian banking crisis was a country-wide systemic event which affected all Norwegian businesses and justified intervention by the Norwegian government to maintain and restore confidence in the banking system.

We begin by providing background information about the Norwegian banking industry and banking crisis in Section 2. We describe our banking crisis events in Section 3 and examine how these events affected Oslo Børs indexes and bank stock returns in Section 4. Our conclusions are contained in Section 5.

<sup>2</sup> For example, two Financial Times reporters, Robert Preston and Karen Fossli, conclude a story about DnB's need for a capital injection with: "following the rescue of Christiania [the international name for Kreditkassen] and Fokus, the whole [Norwegian] banking system will in effect have been nationalized." *Financial Times* October 25 1991, p.21.

## 2. The Norwegian banking crisis: a descriptive summary<sup>3</sup>

The Norwegian banking system consists of savings banks and commercial banks. Savings banks are mutual organizations owned by their depositors; commercial banks are limited liability privately owned stock companies. Both savings and commercial banks write retail (consumer) and corporate (commercial) loans. However, savings banks are the primary servers of the corporate (commercial loans) market with 60% of their loans made to the corporate sector.

During the period investigated (1984 through 1991), both savings and commercial banks were regulated by the Kredittilsynet, which is the Norwegian Banking, Insurance and Securities Commission (BISC), and by Norges Bank, the Norwegian central bank. The BISC was concerned with bank solvency and security issues. Norges Bank controlled the ability of banks to extend credit through bank reserve requirements and the direct provision of liquidity through Norges Bank loans. No governmental agency or regulatory body insured Norwegian bank deposits until 1991 when the Norwegian government established the Government Bank Insurance Fund (GBIF) in the wake of ever-mounting loan losses and bank failures. Prior to 1991, only industry-organized and managed private deposit insurance funds existed. These funds were the Savings Bank Guarantee Fund (SBGF) and the Commercial Banks Guarantee Fund (CBGF). In other words, no governmental agency was officially or legally responsible for insuring depositor funds during most of the crisis period and especially during the period of savings-bank failures. Therefore, the potential for a run on bank deposits at a 'weak' or any other bank, as a result on one bank, always existed.

At the beginning of our study period, 1984, there were 198 savings banks with total assets of NOK 158 272m and 27 commercial banks with total assets of NOK 224 089m. In 1991, there were 136 savings banks with total assets of NOK 239 902m and 21 commercial banks with total assets of NOK 338 185m.

We begin our analysis in 1984 because this year marked the beginning of the deregulation of Norwegian Banking. Norwegian bank lending was directly regulated by Norges Bank from the end of the Second World War until 1984. During this period loan demand usually exceeded officially prescribed limits. In 1984, as part of a general deregulation of banking, direct lending controls were abolished and bankers no longer needed to ration credit. The only quantitative limitation on the volume of outstanding loans was the availability of bank deposits and other funding sources. The deregulation of bank lending coincided with monetary policies designed to hold down nominal interest rates and encourage growth in real incomes. This accommodative monetary policy pumped liquidity into the banking system and led to substantial increases in bank credit. Loans to the public by commercial and savings banks rose by 37.5% in 1985 and 23.4% in 1986. The central bank's expansionary policies were

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<sup>3</sup> Data and dates were taken from various issues of the Norges Bank Economic Bulletin and from the Report by the Commission on the Banking Crisis (1992), a report issued by a commission appointed by Royal Decree in October 1991.

especially evident in the increase in Norges Bank's loans to commercial and savings banks, rising from 1% of total bank assets in 1984 to 14% in 1986.

Norges Bank officials believe commercial-bank lending policies during this period were designed to gain market share and establish dominant market positions. There is also a belief among Norges Bank officials that after deregulation bankers made many marginal loans because they had little prior experience in distinguishing bad credits from good credits during the credit rationing period (Solheim, 1990).<sup>4</sup>

Early evidence about the poor quality of many loans appeared in 1986 when the Norwegian economy suffered from declining oil prices and a tightening of monetary and fiscal policy. Commercial-bank loan losses as a percentage of total commercial banking assets rose from 0.27% in 1984 to 0.47% in 1986. Savings banks experienced smaller but still increasing loan losses. From the outset, these loan losses were spread over all industries, this continuing for the entire crisis period.

The financial condition of the banking industry worsened in 1987 with commercial-bank loan losses increasing sharply to 0.99% of assets. Jonassen (1992) identifies 1987 as the year when Norwegian banks' financial problems became publicly apparent. Near the end of this year the Norwegian Banking, Insurance and Securities Commission (BISC), reviewed the status of Den norske Creditbank (DnC). Solheim, 1990 cites the ensuing report as the basis for replacing DnC senior management and changing its strategy from expansion to consolidation, emphasizing improved bank solvency. Critical reports about other banks were also written by Norges Bank leading to management and strategy changes at these banks as well.<sup>5</sup>

Signs of serious bank liquidity and capital problems appeared in 1987. The first bank affected was Sunnmørsbanken, a medium-sized bank located in Ålesund (Western Norway north of Bergen) with total assets of NOK 7.4bn. The Kredittilsynet declared that Sunnmørsbanken would be insolvent by the end of the year. Norges Bank responded by providing Sunnmørsbanken with liquidity loans which were guaranteed by a private bank insurance fund organized and administered by the banking industry, the Commercial Banks Guarantee Fund (CBGF). The Commercial Banks Guarantee Fund also appointed a new board of directors for the bank. The Kredittilsynet also declared two medium-size savings banks insolvent in November 1988: Sparebanken Nord with total assets of NOK 7.6bn and Tromsø Sparebank with assets of NOK 7.1bn. These banks received direct capital assistance of NOK 600m from the savings-bank industry's privately organized counterpart to the Commercial Banks Guarantee Fund, the Savings bank Guarantee Fund (SBGF). In addition, Norges Bank provided another NOK 200 million in 5 year loans to support the banks.

Banking industry conditions continued to deteriorate in 1989. Savings banks were especially hard hit and saw their loan losses, as a percentage of total loans, peak at

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<sup>4</sup> The Governor of Norges Bank in 1991, Hermod Skånland, is explicit about banking practices. He says that: "had the banks competed less in terms of volume and more in terms of long-term profitability, had they been more prudent in their lending operations and less sanguine about the future, there would again hardly have been a general banking crisis." *Norges Bank Economic Bulletin*, March, 1991, p. 169.

<sup>5</sup> We know of no specific public release dates for these reports so we are unable to perform an event analysis of them.

about 2.75%, up from roughly 0.5% in 1986. These savings-bank loss ratios can be compared with those of the commercial banks, which were 1% of total loans in 1986 and just under 2.5% in 1989. During 1989, the Savings bank Guarantee Fund provided NOK 1863million in capital and deposit guarantees to the problem savings banks. These advances and guarantees were usually coupled with mergers of the affected banks – either among themselves or with other savings banks – so as to avoid bank liquidations.

One event in 1989 became a harbinger of 1991. For the first time since 1928, a commercial bank was taken over by the government. This bank, Norion Bank, was in Oslo and was eventually liquidated. No relief arrived in 1990. Ten of the 22 commercial banks in the country reported net income losses, including the three largest commercial banks, and commercial-bank loan losses, as percentage of total loans, continued to climb to just under 3%. Ten of the 30 largest savings banks, accounting for over 90% of savings-banks' assets, also reported net income losses in 1990 although loan loss ratios for the savings-bank industry did begin to decline.

The private Savings Bank Guarantee Fund contributed support and capital guarantees to five savings banks in 1990. Again, the preferred course of SGBF action was consolidating the weak banks into a new institution or merging the weak bank with a stronger bank. In December 1990, Fokus Bank, the third largest commercial bank, was given a NOK 1500m capital guarantee by the private Commercial Banks Guarantee Fund. Fokus Bank was also required to write down the nominal value of its share capital by 50%.

The Norwegian banking system collapsed in 1991. Commercial-bank loan losses, as a percentage of total loans, peaked at about 6.25%, with corporate loan losses, as a percentage of total corporate loans, peaking at 7.5% compared to 1.5% in 1986. In October 1991, the government took over Kreditkassen, the country's second largest bank, after repeated losses wiped out its share capital. Then, in December, the government took over Fokus Bank, the third largest bank, because its share capital was also exhausted. The largest bank, Den norske Bank, announced it would have insufficient capital because of loan losses and the government pumped substantial funds into this bank to keep it afloat and maintain a semblance of private ownership. After the capital injection, the government owned 50% of DnB.

### **3. The banking crisis events and the data**

We divide our events into two categories: savings-bank financial distress events and commercial-bank financial distress events. These events are listed chronologically in Table 1. We separate savings-bank events from commercial-bank events because savings banks differ from commercial banks in a number of ways. Savings banks are organized as mutual companies; commercial banks as shareholder owned corporations. Savings banks also serve a somewhat different market than commercial banks. As noted earlier, savings banks are the primary servers of the retail market; commercial banks are servers of the corporate market. Furthermore, within the corporate market, savings banks serve the 'smaller' companies, while the large

Table 1  
Norwegian banking crisis events

| Date              | Event type <sup>a</sup> | Event   |
|-------------------|-------------------------|---|
| 18 March 1988     | CD                      | Sunnmørsbanken must turn around losses in order to sustain operations (Oslo Børs).  |
| 13 September 1988 | CD                      | Sunnmørsbanken losses adjusted upward. Schedules meeting with Kredittilsynet (Oslo Børs).   |
| 19 September 1988 | CD                      | Sunnmørsbanken equity is lost. CBGF guarantees all commitments (Oslo Børs and CBGF 1988 Annual Report).   |
| 11 November 1988  | SD                      | Kredittilsynet takes over administration of Sparebanken Nord and Tromsø Sparebank after Kredittilsynet 11 November 1988 visit where it discovers equity of savings bank is lost. SBGF makes NOK 300m available to the two savings banks (SBGF 1988 Annual Report). Norges Bank will provide the two savings banks with necessary liquidity support. (Norges Bank press release 11 November 1988.) |
| 23 December 1988  | SD                      | Sparebanken Romsdal sends letter to Kredittilsynet saying capital is lost (SBGF 1989 Annual Report).  |
| 2 March 1989      | SD                      | Spareskillingsbanken Trøndelag informs Kredittilsynet that capital is lost (SBGF 1989 Annual Report).   |
| 8 October 1989    | SD                      | Kredittilsynet reports that Sparebanken Nord–Norge has lost its capital. SBGF and Norges Bank provide guarantees and loans (SBGF 1989 Annual Report).   |
| 27 October 1989   | CD                      | Norion Bank informs the Kredittilsynet that the bank is out of capital (CBGF 1989 Annual Report).   |
| 30 October 1989   | CD                      | CBGF guarantees Norion Bank non bank deposits and bank is liquidated (CBGF 1989 Annual Report).   |
| 13 March 1990     | SD                      | Moss–Høbol capital is lost and receives NOK 50m guarantee from SBGF (SBGF 1990 Annual Report).  |
| 31 May 1990       | SD                      | Kredittilsynet informs SBGF that Skiptvedt Sparebank has lost its capital. Bank receives guarantee from SBGF (SBGF 1990 Annual Report).   |
| 12 September 1990 | SD                      | Nordkapp Sparebank receives guarantee from Norges Bank and agrees to merge with Sparebanken Nord–Norge (SBGF 1990 Annual Report).   |
| 24 October 1990   | SD                      | Sparebanken Nordland comes under scrutiny of Kredittilsynet (SBGF 1990 Annual Report).  |
| 2 November 1990   | SD                      | SBGF gives Hemnes Sparebank a temporary guarantee of capital (SBGF 1990 Annual Report).   |
| 11 December 1990  | CD                      | Report about financial problems at Fokus Bank appears in Dagens Naeringsliv. Fokus neither acknowledges nor denies report (Oslo Børs).  |
| 21 December 1990  | CD                      | CBGF makes a NOK 1500m guarantee to Fokus Bank. Fokus Bank must write down its share capital by 50% from NOK 100 to NOK 50 a share. Fokus Bank also becomes the first bank to receive preference capital from the CBGF (Oslo Børs and CBGF 1990 Annual Report).   |
| 17 June 1991      | CD                      | CBGF endorses applications from DnB (NOK 938.8m) and Kreditkassen (NOK 624.3m) for preference capital. Samvirkebanken receives assurances of preference capital (SBGF 1991 Annual Report).  |
| 26 June 1991      | CD                      | CBGF converts Fokus capital guarantee to preference capital and requires an additional share writedown (CBGF 1991 Annual Report).   |
| 19 August 1991    | CD                      | GBIF provides a NOK 1800m loan to the CBGF to advance preference capital to Kreditkassen. CBGF will add an additional NOK 300m for a total of NOK 2100m (CBGF press release).   |

Table 1 (continued)

| Date            | Event type <sup>a</sup> | Event  |
|-----------------|-------------------------|--|
| 26 August 1991  | CD                      | GBIF grants a NOK 650m loan to CBGF to provide additional preference capital to Fokus Bank (CBGF press release).                                       |
| 14 October 1991 | CD                      | Kreditkassen declared technically insolvent. Trading in stock halted (Oslo Børs).  |
| 23 October 1991 | CD                      | DnB warns that it will need capital to meet domestic capital adequacy requirements (Oslo Børs on 22 October 1991; Financial Times on 23 October 1991). |
| 2 December 1991 | CD                      | DnB rescued by Norwegian government and forced to write down share capital value (Oslo Børs).  |
| 9 December 1991 | CD                      | Fokus Bank sends letter to Kredittsynet saying capital is lost (Oslo Børs).  |

<sup>a</sup>CD = commercial bank financial distress event; SD = savings bank financial distress event.

publicly held Norwegian firms use (the large) commercial banks. Lastly, until Norway established a government funded bank insurance agency, savings banks were insured by their industry fund, the SBGF; and, commercial banks by their industry fund, the CBGF.

These differences between savings banks and commercial banks (and also big commercial banks versus other commercial banks) could affect the reaction of commercial-bank stock prices to announcements of savings-bank and commercial-bank financial distress events. Lang and Stulz (1992) report that bankruptcy spillover effects are more likely to be observed in industries where entity cash flows are highly correlated with one another – in other words the more homogeneous the industry, the more likely investors will conclude that financial distress problems disclosed about one firm are also present in competitor firms. Consequently, given the differences between savings banks and commercial banks, failures of savings banks and commercial banks could have differential impacts on Norwegian stock prices, especially with respect to the reaction of the publicly traded companies listed on the Oslo Børs.

Our event dates are the days when the information was reported on the Oslo Børs news tape and/or the day the information was released by a governmental or quasi-governmental agency. Our banks are the universe of the 18 commercial banks listed on the Oslo Børs between 1984 when bank lending was deregulated, and December 1991 when over 90% of the country's commercial banking assets had been 'nationalized'. The banks are listed in Table 2, where we also report what happened to each bank with stock no longer publicly traded. Our stock market indexes are the value weighted indexes compiled by the Oslo Børs. They are the All Share Index, the Bank Index, the Industrial Index, the Shipping Index and the Insurance Index.

Our price data, obtained from the Oslo Børs, are daily closing bid prices for the banks. Bid data was adjusted for rights offerings and converted into daily percentage price changes which were used for the statistical analyses. We do not include savings banks because they are mutual organizations with no outstanding common stock. In terms of total Norwegian banking assets, the split is roughly 2/3 commercial banks and 1/3 savings banks.



Table 2  
Oslo Børs banks

| Survivor banks         | Ticker symbol | Trading dates and outcome  |
|------------------------|---------------|--|
| Bergens Skillingsbank  | BSK           | 1984 through December 31 1991.   |
| Industri & Skipsbanken | ISB           | May 1990 (organized) through December 31 1991.                                   |
| Nordlandsbanken        | NBK           | 1984 through December 31 1991.   |
| Oslobanken             | OBK           | 1984 through December 31 1991.   |
| Merged banks           |               |  |
| Kjøbmandsbanken        | KBK           | 1984 through acquisition by Banque Nationale Paris in 1990.                      |
| Oslo Handelsbank       | OHB           | 1984 through June 1990 acquisition by Svenska Handelsbanken.                     |
| Failed banks           |               |  |
| DnB                    | DNB           | From April 1990, merger of Bergen Bank and DnC through December 31 1991.         |
| Bergen Bank            | DNB           | 1984 through April 1990, merger creating DnB.                                    |
| DnC                    | DNC           | 1984 through April 1990, merger creating DnB.                                    |
| Fokus Bank             | FOB           | From October 1987 until December 2 1991.   |
| Buskerudbanken         | BUS           | 1984 through October 1987, merger creating Fokus Bank.                           |
| Bøndernes Bank         | BON           | 1984 through October 1987, merger creating Fokus Bank.                           |
| Forretningsbanken      | FOR           | 1984 through October 1987, merger creating Fokus Bank.                           |
| Vestlandsbanken        | VES           | 1984 through October 1987, merger creating Fokus Bank.                           |
| Kreditkassen           | CBK           | 1984 through October 1991, failure.  |
| Sunnmørsbanken         | SBK           | 1984 through November 1988, delisting. Bank is merged with Kreditkassen in 1991. |
| Rogalandsbanken        | RBK           | 1984 through February 1991, merger with Fokus Bank.                              |
| Sørlandsbanken         | SØR           | 1984 through November 1990, merger with Kreditkassen.                            |

#### 4. Banking crisis events and bank equity returns

We investigate whether bank financial distress announcements affected non-bank equity prices by examining abnormal returns for the non-bank indexes constructed by the Oslo Børs. These indexes are the All Share Index (which includes bank stocks), the Industrial Index, the Shipping Index and the Insurance Index. All Oslo Børs indexes are value-weighted indexes. We also investigate whether bank financial distress announcements affected other banks by examining event period abnormal returns for four specially constructed portfolios of bank stocks and for the Oslo Børs Bank Index. The specially constructed bank portfolios are: an equally weighted index of bank stocks which we call EWBK, a Survivor Bank portfolio, a Failed Bank portfolio and a Big Bank portfolio.

Our EWBK Index has been constructed for each event using daily bid returns for all Oslo Børs banks except the event bank. For example, for the Sunnmørsbanken events all banks except Sunnmørsbanken are included in the EWBK Index. Our Survivor Bank portfolio contains banks which were traded in 1984 or were established after 1984 and were still listed on the Oslo Børs on December 31 1991. We exclude DnB from this category even though its shares were traded because the

Norwegian government had become the majority share owner. The Failed Bank portfolio includes the five outright failures, their predecessor banks, and any banks merged into the failed banks between 1984 and 1991. The predecessor banks for Fokus Bank are Buskerudbanken, Bøndernes Bank, Forretningsbanken, Vestlandsbanken, Rogalandsbanken, which was ‘forcefully’ merged with Fokus Bank in 1991, is also part of the failed bank portfolio. The predecessor banks for DnB are Bergen Bank and DnC. Sørlandsbanken, which was forced to merge with Kredikassen in 1990, completes the Failed Bank portfolio. The Big Bank portfolio consists of DnB (before 1990, Bergen Bank and DnC), Kredikassen and Fokus Bank. These banks are the ‘international’ banks of Norway; the Norwegian government has recognized their special status by recommending that three ‘large’ banks be preserved. Two banks, Kjøbmandsbanken and Oslo Handelsbank, appear only in the EWBK Index. These banks were acquired by non-Norwegian banks and there is no reason to believe the acquisitions were ‘forced’ by Norges Bank or driven by financial problems at the two banks. When we analyze individual bank abnormal returns, we identify these banks as merged banks so as to distinguish them from failed and survivor banks.

We calculate abnormal returns based on a 250 day estimation period which begins 20 days prior to each event ( $t = -20$ ). The abnormal returns used to investigate the effects of financial distress announcements on the non-bank Oslo Børs indexes are calculated by first calculating the mean Index daily return over the 250 day estimation period. Event period abnormal returns are then calculated as the event period daily return less the mean daily return over the 250 day estimation period. We call these abnormal returns ‘own index abnormal returns’. Notationally, the calculation is:

$$AR_{j,t} = R_{j,t} - \frac{1}{250} \sum_{t=-20}^{-269} R_{j,t}, \tag{1}$$

where  $AR_{j,t}$  = own index or portfolio  $j$  abnormal return for event period day  $t$ ; and  $R_{j,t}$  = daily return on index or portfolio  $j$  for event period day  $t$ .

The  $t$ -statistic with 249 degrees of freedom used to test the significance of the daily abnormal returns during the event periods is:

$$t = \frac{AR_{j,t}}{S_{R,j}}, \tag{2}$$

where

$$S_{R,j} = \left[ \frac{1}{249} \sum_{t=-20}^{-269} (R_{j,t} - \bar{R}_{j,t})^2 \right]^{1/2}. \tag{3}$$

Cumulative own abnormal returns ( $CAR$ ) over  $k$  days from  $T$  to  $T+k$  are calculated as:

$$CAR_{T,T+k} = \sum_{t=T}^{T+k} AR_t. \tag{4}$$

The significance of  $CAR_{T,T+k}$  is tested with:

$$t = \frac{CAR_{T,T+k}}{(\sqrt{k})(S_{R,j})} \tag{5}$$

The test statistic is assumed to be distributed Student-*t* with 249 degrees of freedom. The test statistics are calculated as in Holthausen and Leftwich (1986) and Kaen and Tehranian (1990).

The abnormal returns used for investigating the effects of bank financial distress announcements on other banks are market model adjusted abnormal returns. Market model abnormal returns ( $MAR_{j,t}$ ) for individual bank stocks are calculated by estimating market model parameters using the Oslo Børs All Share Index as the market portfolio. As with the own index abnormal returns, the estimation period is  $t-20$  to  $t-269$  days where  $t=0$  is the event date. For a sample of  $N$  banks in a given bank portfolio, the average market model abnormal return ( $MAAR_t$ ) is calculated as:

$$MAAR_t = \frac{\sum_{j=1}^N MAR_{j,t}}{n} \tag{6}$$

Cumulative market model adjusted abnormal returns ( $MCAR$ ) over  $k$  days from  $T$  to  $T+k$  for individual bank stocks are calculated as:

$$MCAR_{T,T+k} = \sum_{t=T}^{T+k} MAR_t \tag{7}$$

and for bank portfolios ( $MCARP$ ) of  $N$  securities as:

$$MCARP_{T,T+k} = \sum_{t=T}^{T+k} MARR_t \tag{8}$$

The *t*-statistic used to test for the significance of individual bank stock daily and cumulative market model adjusted abnormal returns is calculated in the same manner as described for the own index abnormal returns. The *t*-statistic for daily bank portfolio abnormal returns was calculated as:

$$t = \frac{MAAR_{p,t}}{S_{Rp}} \tag{9}$$

where

$$S_{Rp} = \left[ \frac{1}{250} \sum_{t=-20}^{-269} (MAAR_t - \overline{MAAR})^2 \right]^{1/2} \tag{10}$$

and

$$\overline{MAAR} = \frac{1}{250} \sum_{t=-20}^{-269} MAAR_t \tag{11}$$

The calculation for market model cumulative abnormal return  $t$ -statistic over  $k$  days from  $T$  to  $T+k$  is:

$$t = \frac{MCAR_{T,T+k}}{(\sqrt{k})(S_{Rp})}. \quad (12)$$

We report our findings by event category. First, we report the savings-bank financial distress results followed by the commercial-bank financial distress results. Whenever we use the term significant, we mean statistically significant at the 0.05 level unless otherwise noted.

#### 4.1. Savings-banks financial distress events

##### 4.1.1. Equity market-wide systemic effects

The abnormal excess returns used to evaluate whether savings-bank financial distress announcements were associated with market-wide systemic effects on the Oslo Børs are reported in Table 3. We report event day  $-1$ , event day (day 0), cumulative 2 day  $(-1,0)$  and cumulative 3 day  $(-1,0,+1)$  abnormal returns and their respective  $t$ -statistics. We include own index abnormal returns on our specially constructed EWBK Index (which does not include equity returns of the distress bank) for comparative purposes.

None of the savings-bank failure announcements produced statistically significant abnormal returns for the non-bank Oslo Børs indexes. In fact, the All Share Index, as well as the non-bank specialty indexes, were as likely to register as negative abnormal returns. Savings-bank failure announcements also had little effect on the broad-based indexes. The Oslo Børs (value weighted) Bank Index actually exhibited positive event day and 2 day abnormal returns for the first three savings-banks failures. However, for the subsequent six savings-banks failures, negative event day and primarily negative 2 and 3 day abnormal returns were obtained. Only one savings-banks failure was associated with significant negative Oslo Børs Bank Index abnormal returns; the failure of Sparebanken Nord-Norge. Over all nine events, the cumulative event day abnormal returns for the Oslo Børs Bank Index were  $-5.65\%$ ; the cumulative 2 day abnormal returns,  $-4.90\%$ ; and the cumulative event 3 day abnormal returns,  $-4.33\%$ . None are statistically significant.

Our EWBK (equally weighted) Index own abnormal returns exhibit more negative abnormal returns than the Oslo Børs Bank Index. Eight of the nine events have negative 3 day abnormal returns, a number significantly different from zero.<sup>6</sup> Significantly negative EWBK own index abnormal returns are associated with the October 9 1989 failure of Sparebanken-Nord and the March 13 1990 failure of Moss-Hobøl.

<sup>6</sup> We used a proportionality test and a  $\chi^2$  test statistic for this and subsequent tests of whether the frequency of negative abnormals was significantly different from zero.

Table 3

Savings bank financial distress events: Oslo Børs and EWBK Index own abnormal returns<sup>1</sup>

| Event   | Day -1   |          | Day 0    |          | Day -1 to 0 |          | Day -1 to +1 |          |
|---|----------|----------|----------|----------|-------------|----------|--------------|----------|
|   | AR       | <i>t</i> | AR       | <i>t</i> | AR          | <i>t</i> | AR           | <i>t</i> |
| 11 November 1988: Sparebanken Nord and Tromsø equity lost; SGBF guarantee.      |          |          |          |          |             |          |              |          |
| All Share Index   | -0.0008  | -0.048   | -0.0030  | -0.187   | -0.0038     | -0.167   | -0.0045      | -0.162   |
| Bank Index  | 0.0075   | 0.566    | 0.0041   | 0.309    | 0.0116      | 0.620    | -0.0001      | -0.004   |
| Industrial index  | -0.0033  | -0.185   | -0.0027  | -0.148   | -0.0060     | -0.237   | -0.0074      | -0.239   |
| Shipping Index  | -0.0003  | -0.014   | 0.0009   | 0.050    | 0.0006      | 0.024    | -0.0068      | -0.225   |
| Insurance Index   | 0.0173   | 0.714    | 0.0199   | 0.823    | 0.0372      | 1.087    | 0.0597       | 1.424    |
| EWBK Index  | 0.0015   | 0.114    | 0.0016   | 0.123    | 0.0031      | 0.171    | -0.0222      | -1.002   |
| 23 December 1988: Sparebanken Romsdal informs BISC that capital is lost.        |          |          |          |          |             |          |              |          |
| All Share Index   | 0.0054   | 0.467    | -0.0008  | -0.068   | 0.0046      | 0.282    | 0.0042       | 0.210    |
| Bank Index  | -0.0012  | -0.098   | 0.0121   | 0.971    | 0.0109      | 0.617    | 0.0120       | 0.555    |
| Industrial index  | 0.0028   | 0.219    | -0.0020  | -0.159   | 0.0008      | 0.044    | 0.0024       | 0.108    |
| Shipping Index  | 0.0045   | 0.332    | -0.0036  | -0.263   | 0.0009      | 0.047    | -0.0052      | -0.222   |
| Insurance Index   | 0.0208   | 0.926    | -0.0002  | -0.009   | 0.0206      | 0.647    | 0.0373       | 0.961    |
| EWBK Index  | 0.0129   | 1.061    | 0.0248*  | 2.030*   | 0.0376      | 2.188*   | 0.0416       | 1.977*   |
| 2 March 1989: Spareskillingsbanken Trøndelag informs BISC that capital is lost. |          |          |          |          |             |          |              |          |
| All Share Index   | 0.0077   | 0.826    | 0.0157   | 1.675    | 0.0234      | 1.772    | 0.0428*      | 2.646*   |
| Bank Index  | 0.0040   | 0.287    | 0.0043   | 0.313    | 0.0083      | 0.423    | 0.0115       | 0.478    |
| Industrial index  | 0.0065   | 0.629    | 0.0165   | 1.582    | 0.0230      | 1.564    | 0.0474*      | 2.631*   |
| Shipping Index  | 0.0104   | 0.941    | 0.0173   | 1.568    | 0.0277      | 1.774    | 0.0369       | 1.930    |
| Insurance Index   | 0.0256   | 1.121    | 0.0181   | 0.792    | 0.0437      | 1.354    | 0.0614       | 1.553    |
| EWBK Index  | 0.0019   | 0.138    | -0.0327* | -2.379*  | -0.0308     | -1.568   | -0.0275      | -1.156   |
| 9 October 1989: Sparebanken Nord-Norge capital lost. SGBF provides guarantee.   |          |          |          |          |             |          |              |          |
| All Share Index   | -0.0064  | -0.730   | -0.0099  | -1.145   | -0.0163     | -1.323   | -0.0247      | -1.637   |
| Bank Index  | -0.0204  | -1.312   | -0.0278  | -1.781   | -0.0481*    | -2.189*  | -0.0260      | -0.966   |
| Industrial Index  | -0.0002  | -0.017   | -0.0091  | -0.952   | -0.0093     | -0.685   | -0.0162      | -0.974   |
| Shipping Index  | -0.0185  | -1.640   | -0.0070  | -0.623   | -0.0255     | -1.602   | -0.0287      | -1.466   |
| Insurance Index   | -0.0026  | 0.149    | 0.0084   | 0.490    | 0.0058      | 0.239    | -0.0304      | -1.023   |
| EWBK Index  | -0.0134  | -0.995   | -0.0011  | -0.079   | -0.0144     | -0.759   | -0.0343      | -1.476   |
| 13 March 1990: Moss-Høbøl capital lost. SGBF provides guarantee.                |          |          |          |          |             |          |              |          |
| All Share Index   | -0.0022  | -0.179   | 0.0027   | 0.223    | 0.0005      | 0.029    | 0.0052       | 0.249    |
| Bank Index  | 0.0019   | 0.121    | -0.0031  | -0.204   | -0.0013     | -0.059   | -0.0065      | -0.243   |
| Industrial Index  | -0.0059  | -0.472   | -0.0016  | -0.132   | -0.0075     | -0.428   | -0.0055      | 0.256    |
| Shipping Index  | 0.0063   | 0.446    | 0.0170   | 1.199    | 0.0233      | 1.165    | 0.0404       | 1.650    |
| Insurance Index   | -0.0032  | -0.041   | -0.0046  | -0.060   | -0.0078     | -0.071   | -0.0206      | -0.154   |
| EWBK Index  | -0.0284* | -2.071*  | -0.0034  | -0.251   | -0.0318     | -1.641   | -0.0368      | -1.551   |
| 31 May 1990: Skipvedt Sparebank capital is lost. SGBF provides guarantee.       |          |          |          |          |             |          |              |          |
| All Share Index   | 0.0037   | 0.311    | 0.0005   | 0.041    | 0.0042      | 0.250    | 0.0015       | 0.000    |
| Bank Index  | -0.0041  | -0.278   | -0.0146  | -0.999   | -0.0187     | -0.902   | -0.0287      | -1.130   |
| Industrial index  | 0.0072   | 0.595    | 0.0025   | 0.208    | 0.0097      | 0.568    | 0.0086       | 0.411    |
| Shipping Index  | -0.0037  | -0.249   | -0.0008  | -0.057   | -0.0045     | -0.215   | -0.0109      | -0.425   |
| Insurance Index   | 0.0023   | 0.030    | 0.0035   | 0.045    | 0.0058      | 0.053    | 0.0058       | 0.043    |
| EWBK Index  | -0.0074  | -0.576   | -0.0024  | -0.188   | -0.0098     | -0.539   | -0.0181      | -0.814   |

Table 3 (continued)

| Event  | Day -1   |          | Day 0    |          | Day -1 to 0 |          | Day -1 to +1 |          |
|--|----------|----------|----------|----------|-------------|----------|--------------|----------|
|  | AR       | <i>t</i> | AR       | <i>t</i> | AR          | <i>t</i> | AR           | <i>t</i> |
| 12 September 1990: Nordkapp Sparebank capital lost. SBGF provides guarantee. |          |          |          |          |             |          |              |          |
| All Share Index  | 0.0107   | 0.874    | -0.0045  | -0.366   | 0.0063      | 0.362    | 0.0017       | 0.000    |
| Bank Index   | 0.0156   | 1.084    | -0.0107  | -0.746   | 0.0049      | 0.241    | 0.0024       | 0.096    |
| Industrial index   | 0.0123   | 1.002    | -0.0001  | -0.009   | 0.0122      | 0.704    | 0.0083       | 0.391    |
| Shipping Index   | 0.0072   | 0.478    | -0.0165  | -1.090   | -0.0093     | -0.435   | -0.0154      | -0.588   |
| Insurance index  | -0.0140  | -0.181   | -0.0079  | -0.102   | -0.0219     | -0.162   | -0.0404      | -0.302   |
| EWBK Index   | -0.0109  | -0.882   | 0.0168   | 1.357    | 0.0059      | 0.338    | -0.0045      | -0.210   |
| 24 October 1990: Sparebanken Nordland capital lost.                          |          |          |          |          |             |          |              |          |
| All Share Index  | -0.0066  | -0.508   | -0.0048  | -0.374   | -0.0017     | 0.093    | 0.0021       | 0.094    |
| Bank Index   | 0.0037   | 0.235    | -0.0095  | -0.605   | -0.0058     | -0.262   | -0.0093      | -0.343   |
| Industrial index   | 0.0030   | 0.238    | -0.0049  | -0.388   | -0.0019     | -0.106   | 0.0005       | 0.023    |
| Shipping Index   | 0.0162   | 0.936    | -0.0027  | -0.157   | 0.0135      | 0.552    | 0.0077       | 0.257    |
| Insurance Index  | 0.0176   | 0.227    | -0.0142  | -0.182   | 0.0034      | 0.032    | 0.0068       | 0.050    |
| EWBK Index   | 0.0074   | 0.542    | -0.0057  | -0.418   | 0.0017      | 0.088    | -0.0058      | -0.245   |
| 2 November 1990: Hemnes Sparebank capital lost. SBGF provides guarantee.     |          |          |          |          |             |          |              |          |
| All Share Index  | -0.0144  | -1.114   | -0.0085  | -0.657   | -0.0229     | -1.249   | -0.0327      | -1.457   |
| Bank Index   | 0.0005   | 0.032    | -0.0113  | -0.722   | -0.0108     | -0.487   | 0.0014       | 0.052    |
| Industrial index   | -0.0146  | -1.158   | -0.0075  | -0.596   | -0.0222     | -1.242   | -0.0328      | -1.495   |
| Shipping Index   | -0.0199  | -1.153   | -0.0123  | -0.712   | -0.0321     | -1.318   | -0.0473      | -1.580   |
| Insurance Index  | -0.0088  | -0.113   | -0.0037  | -0.048   | -0.0125     | -0.139   | -0.0153      | -0.113   |
| EWBK Index   | -0.0154  | -1.123   | -0.0014  | -0.103   | -0.0168     | -0.868   | -0.0139      | -0.586   |
| Savings banks financial distress events cumulative event abnormal returns    |          |          |          |          |             |          |              |          |
| All Share Index  | 0.0103   | 0.305    | -0.0126  | -0.360   | -0.0023     | 0.016    | -0.0044      | -0.019   |
| Bank Index   | 0.0075   | 0.212    | -0.0565  | -1.154   | -0.0490     | -0.666   | -0.0433      | -0.502   |
| Industrial index   | 0.0078   | 0.284    | -0.0089  | -0.397   | 0.0011      | 0.061    | 0.0053       | 0.371    |
| Shipping Index   | -0.0022  | 0.026    | -0.0077  | -0.028   | -0.0055     | -0.003   | -0.0293      | -0.223   |
| Insurance Index  | 0.0550   | 0.944    | 0.0193   | 0.583    | 0.0743      | 1.013    | 0.0643       | 0.813    |
| EWBK Index   | -0.0518  | -1.264   | -0.0035  | 0.031    | -0.0553     | -0.863   | -0.1215      | -1.688   |
| Savings banks financial distress events: Number negative and positive        |          |          |          |          |             |          |              |          |
|  | Negative | Positive | Negative | Positive | Negative    | Positive | Negative     | Positive |
| All Share Index  | 4        | 5        | 6        | 3        | 4           | 5        | 3            | 6        |
| Bank Index   | 3        | 6        | 6        | 3        | 5           | 4        | 5            | 4        |
| Industrial index   | 4        | 5        | 7        | 2        | 5           | 4        | 4            | 5        |
| Shipping Index   | 4        | 5        | 6        | 3        | 4           | 5        | 6            | 3        |
| Insurance Index  | 4        | 5        | 5        | 4        | 3           | 6        | 4            | 5        |
| EWBK Index   | 5        | 4        | 6        | 3        | 5           | 4        | 8*           | 1        |

\* Indicates abnormal return is statistically significant at the 0.05 level.

AR is the abnormal return for the indicated Oslo Børs Indexes and for our constructed equally weighted index of bank stocks (EWBK) for day -1, 0, and the 2 and 3 day cumulative return periods. The abnormal returns are based on deviations from the expected daily changes in the respective Index returns; the expected daily Index returns are based on the mean daily return of the Index for the period from 260 to 20 days prior to the event. The event day is the day the announcement appears on the Oslo Børs news ticker. *t*-statistics are reported for each abnormal return.

**Table 4**  
**Savings bank financial distress events: all share market model abnormal returns**

| Event   | Day - 1   |          | Day 0     |          | Day - 1 to 0 |          | Day - 1 to + 1 |           |
|---|-----------|----------|-----------|----------|--------------|----------|----------------|-----------|
|   | AR        | t        | AR        | t        | AR           | t        | AR             | t         |
| 11 November 1988: Sparebanken Nord and Tromsø equity lost; SBGF guarantee.      |           |          |           |          |              |          |                |           |
| EWBK Index  | 0.00249   | 0.2156   | 0.00332   | 0.2874   | 0.00581      | 0.3556   | -0.01846       | -0.9227   |
| Failed Bank portfolio   | 0.00104   | 0.0818   | -0.00045  | -0.0353  | 0.00059      | 0.0329   | -0.02154       | -0.9810   |
| Survivor Bank portfolio   | 0.00390   | 0.2079   | -0.00352  | -0.1876  | 0.00038      | 0.1439   | -0.00365       | 0.1124    |
| Big Bank portfolio  | 0.00999   | 0.9668   | -0.00179  | -0.1740  | 0.00819      | 0.560    | 0.00220        | 0.1230    |
| 23 December 1988: Sparebanken Romsdal informs BISC that capital is lost.        |           |          |           |          |              |          |                |           |
| EWBK Index  | 0.01166   | 1.0006   | 0.02490   | 2.1374   | 0.03656*     | 2.2187*  | 0.04076*       | 2.0198*   |
| Failed Bank portfolio   | -0.00003  | -0.0026  | 0.02013   | 1.5872   | 0.02009      | 1.1206   | 0.02464        | 1.1219    |
| Survivor Bank portfolio   | 0.04231*  | 2.3266*  | -0.03290  | -1.8091  | 0.00941      | 0.3659   | 0.00597        | 0.1895    |
| Big Bank portfolio  | -0.01406  | -1.3079  | 0.01455   | 1.3538   | 0.00049      | 0.0324   | 0.00678        | 0.3644    |
| 2 March 1989: Spareskillingsbanken Trøndelag informs BISC that capital is lost. |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.00150  | -0.0113  | -0.03929* | -2.9666* | -0.04079*    | -2.1769* | -0.04079*      | -2.0073*  |
| Failed Bank portfolio   | -0.00245  | -0.1855  | -0.01403  | -1.0601  | -0.01648     | -0.8809  | -0.01998       | -0.8719   |
| Survivor Bank portfolio   | 0.00573   | 0.2806   | -0.03285  | -1.6074  | -0.02712     | -0.9380  | -0.01755       | -0.4958   |
| Big Bank portfolio  | -0.00292  | -0.1397  | -0.00908  | -0.4348  | -0.01199     | -0.4060  | -0.01561       | -1.2949   |
| 8 October 1989: Sparebanken Nord-Norge capital lost. SBGF provides guarantee.   |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.01048  | -0.8292  | 0.00364   | 0.2878   | -0.00684     | -0.3826  | -0.02288       | -1.0452   |
| Failed Bank portfolio   | 0.00883   | 0.7405   | 0.00883   | 0.7405   | -0.00861     | -0.5102  | -0.02429       | -1.1759   |
| Survivor Bank portfolio   | -0.00329  | -0.1578  | 0.01083   | 0.5196   | 0.00754      | 0.2558   | -0.00054       | -0.0150   |
| Big Bank portfolio  | -0.00668  | -0.4944  | -0.02342  | -1.7336  | -0.03009     | -1.5750  | -0.05299       | *-2.2647* |
| 13 March 1990: Moss-Høbal capital lost. SBGF provides guarantee.                |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.27040* | -2.2989* | -0.00485  | -0.4121  | -0.03189     | -1.9173  | -0.03942       | -1.9354   |
| Failed Bank portfolio   | -0.02906* | -2.9841* | -0.00202  | -0.2069  | -0.03108*    | -2.2561* | -0.04274*      | -2.5335*  |
| Survivor Bank portfolio   | -0.02142  | -1.1762  | -0.00988  | -0.5424  | -0.03131     | -1.2150  | -0.03100       | -0.9823   |
| Big Bank portfolio  | 0.00014   | 0.0132   | -0.00280  | -0.2571  | -0.00266     | -0.1726  | -0.01244       | -0.6589   |
| 31 May 1990: Skipvedt Sparebank capital is lost. SBGF provides guarantee.       |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.00953  | 0.8615   | -0.00269  | -0.2437  | -0.01222     | -0.7813  | -0.01891       | -0.9872   |
| Failed Bank portfolio   | -0.00942  | -0.8387  | -0.01614  | -1.4370  | -0.02556     | -1.6093  | -0.03065       | -1.5758   |
| Survivor Bank portfolio   | -0.01577  | -0.9096  | 0.02390   | 1.3784   | 0.00813      | 0.3315   | -0.00569       | -0.1897   |
| Big Bank portfolio  | -0.00829  | -0.7100  | -0.02054  | -1.7578  | -0.02884     | -1.7444  | -0.03677       | -1.8162   |
| 12 September 1990: Nordkapp Sparebank capital lost. SBGF provides guarantee.    |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.01530  | -1.4236  | 0.01876   | 1.7451   | 0.00346      | 0.2276   | -0.00501       | -0.2692   |
| Failed Bank portfolio   | -0.01856  | -1.4172  | 0.00995   | 0.7597   | -0.00861     | -0.4648  | -0.01862       | -0.8204   |
| Survivor Bank portfolio   | -0.01123  | -0.7708  | 0.02976*  | 2.0434*  | 0.01854      | 0.8998   | 0.01199        | 0.4751    |
| Big Bank portfolio  | -0.01473  | -1.2125  | 0.00926   | 0.7619   | -0.00547     | -0.3186  | -0.00896       | -0.4258   |
| 24 October 1990: Sparebanken Nordland capital lost.                             |           |          |           |          |              |          |                |           |
| EWBK Index  | 0.00378   | 0.3276   | -0.00288  | -0.2498  | 0.00090      | 0.0550   | -0.00672       | -0.3366   |
| Failed Bank portfolio   | 0.02370   | 1.7477   | -0.00315  | -0.2327  | 0.02055      | 1.0716   | 0.01294        | 0.5511    |
| Survivor Bank portfolio   | -0.02113  | -1.2860  | -0.00254  | -0.1545  | -0.02367     | -1.0186  | -0.03130       | -1.0999   |
| Big Bank portfolio  | -0.00585  | -0.4613  | -0.00482  | -0.3804  | -0.01067     | -0.5953  | -0.02324       | -1.0591   |
| 2 November 1990: Hennes Sparebank capital lost. SBGF provides guarantee.        |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.00708  | -0.6142  | 0.00352   | 0.3049   | -0.00357     | -0.2189  | 0.00485        | 0.2428    |
| Failed Bank portfolio   | 0.00787   | 0.5802   | 0.00197   | 0.1454   | 0.00984      | 0.5131   | 0.02708        | 1.1529    |
| Survivor Bank portfolio   | -0.02577  | -1.5687  | 0.00545   | 0.3316   | -0.02033     | -0.8748  | -0.092294      | -0.8061   |
| Big Bank portfolio  | 0.01418   | 1.1192   | 0.00396   | 0.3129   | 0.01815      | 1.0129   | 0.04763*       | 2.1706*   |
| Savings banks financial distress events average abnormal return                 |           |          |           |          |              |          |                |           |
| EWBK Index  | -0.00589  | -1.3833  | 0.00049   | 0.1152   | -0.00540     | -0.8969  | -0.01243       | -1.6846   |
| Failed Bank portfolio   | -0.00201  | -0.4402  | -0.00235  | -0.5157  | -0.00436     | -0.6761  | -0.01035       | -1.3104   |
| Survivor Bank portfolio   | -0.00517  | -0.7663  | -0.00130  | -0.1928  | -0.00649     | -0.6783  | -0.01052       | -0.8977   |
| Big Bank portfolio  | -0.00313  | -0.7095  | -0.00385  | -0.8722  | -0.00699     | -1.1190  | -0.01038       | -1.3568   |

Table 4 (continued)

| Event   | Day -1   |          | Day 0    |          | Day -1 to 0 |          | Day -1 to +1 |          |
|---|----------|----------|----------|----------|-------------|----------|--------------|----------|
|   | AR       | <i>t</i> | AR       | <i>t</i> | AR          | <i>t</i> | AR           | <i>t</i> |
| Savings banks financial distress events: Number Negative and Positive |          |          |          |          |             |          |              |          |
|   | Negative | Positive | Negative | Positive | Negative    | Positive | Negative     | Positive |
| EWBK Index  | 6        | 3        | 4        | 5        | 5           | 4        | 7            | 2        |
| Failed Bank portfolio   | 5        | 4        | 5        | 4        | 5           | 4        | 6            | 3        |
| Survivor Bank portfolio   | 6        | 3        | 5        | 4        | 4           | 5        | 7            | 2        |
| Big Bank portfolio  | 5        | 4        | 5        | 4        | 7           | 2        | 7            | 2        |

\* Indicates abnormal return is statistically significant at the 0.05 level.

AR is market model adjusted abnormal return for our constructed equally weighted index of bank stocks (EWBK) and for equally weighted portfolios of failed banks, survivor banks and big banks for day -1, 0, and the 2 and 3 day cumulative return periods. The market index used was the Oslo Børs All Share Index. The abnormal returns are estimated using the Oslo Børs All Share Index as the market portfolio with the estimation period running from 260 to 20 days prior to each event. The event day is the day the announcement appears on the Oslo Børs news ticker. *t*-statistics are reported for each abnormal return.

#### 4.1.2. Bank portfolio effects: all share market model adjusted abnormal returns

Table 4 contains day -1, day 0 and 2 and 3 day market model abnormal returns for our four bank portfolios: the WBK Index, Failed Bank Portfolio, Survivor Bank Portfolio and Big Bank Portfolio. Negative abnormal returns predominate but are significant for only three events, events which occur after three savings banks have already failed. The average market model cumulative abnormal returns across the nine events are negative for all windows and portfolios except the event day EWBK Index. None of the cumulative nine event abnormal returns, though, is statistically significant.

We tested whether individual bank abnormal returns on survivor banks were different from those on failed and big banks by regressing the event window abnormal returns for each bank against indicator values representing whether the bank was a member of the failed bank portfolio (*FAIL*), a member of the big bank portfolio (*BIG*), or a bank which voluntarily merged into another bank (*MERGE*). The results of these regressions for event day, 2 and 3 day abnormal returns are reported in Table 5. Regressions were performed using both actual and standardized individual bank abnormal returns. Standardized abnormal returns were calculated by dividing the individual bank abnormal returns by the standard deviation of the residuals from the respective regression equations used to estimate the individual bank's respective market model parameters.

The coefficients on the failed bank indicator variable for all of the regressions are positive. However, the coefficients for big banks are negative and statistically significant. Since all big banks eventually failed, we have confounding results. With respect to the complete sample of failed banks, though, we conclude that for the savings-banks failure events there was no difference in the abnormal returns of failed banks and survivor banks. (We also ran the regressions with only two indicator variables - *FAIL* and *BIG* - and obtained the same signs and statistical significance on the indicator variables as we did when we included the *MERGE* indicator variable.)



Table 5  
Indicator variable regressions for savings bank financial distress events

| Abnormal Return              | Constant           | Fail              | Big                 | Merge              | R <sup>2</sup> | F-value (P-value) |
|------------------------------|--------------------|-------------------|---------------------|--------------------|----------------|-------------------|
| <b>Raw returns</b>           |                    |                   |                     |                    |                |                   |
| Day 0                        | -0.0043<br>(-0.41) | 0.0047<br>(0.26)  | -0.0041<br>(-0.23)  | 0.01807<br>(0.95)  | 0.0%           | 0.35<br>(0.791)   |
| Day -1,0                     | -0.0047<br>(-0.60) | 0.0410<br>(2.94)* | -0.0454*<br>(-3.35) | 0.0002<br>(0.02)   | 11.1%          | 4.00*<br>(0.011)  |
| Day -1, +1,0                 | -0.0055<br>(-0.52) | 0.0347<br>(1.78)  | -0.0464*<br>(-2.44) | -0.0088<br>(-0.42) | 4.3%           | 2.06<br>(0.114)   |
| <b>Standardized returns*</b> |                    |                   |                     |                    |                |                   |
| Day 0                        | -0.0625<br>(-0.41) | 0.0683<br>(0.26)  | -0.0591<br>(-0.23)  | 0.2616<br>(0.95)   | 0.0%           | 0.35<br>(0.791)   |
| Day -1,0                     | -0.0927<br>(-0.60) | 0.8289*<br>(2.99) | -0.9062*<br>(-3.36) | -0.1526<br>(-0.51) | 12.1%          | 4.32<br>(0.008)   |
| Day -1,0, +1                 | -0.1060<br>(-0.53) | 0.7456*<br>(2.01) | -0.9423*<br>(-2.60) | -0.3218<br>(-0.80) | 6.3%           | 2.56<br>(0.062)   |

\* Indicates significance at the 0.05 level.

\* Standardized returns are abnormal returns divided by the residuals from the market model estimating equation.

The regression equation is  $R_{j,e} = a + b_1(FAIL)_{j,e} + b_2(BIG)_{j,e} + b_3(MERGE)_{j,e}$  where  $R_{j,e}$  is the window abnormal return for bank  $j$  for event  $e$  and  $FAIL$ ,  $BIG$  and  $MERGE$  are dummy variables.  $t$ -statistics are in parentheses.

#### 4.2. Savings-bank events: summary

We found no equity market-wide systemic information effects associated with savings-banks failures. However, we did uncover evidence of banking industry information effects. Three of the savings-banks failures were associated with significantly negative abnormal returns on bank stocks. Furthermore, the cumulative abnormal returns over the nine events were negative for all event windows. We also uncovered confounding evidence with regard to the abnormal returns of failed banks and survivor banks. Failed banks, as a group, did not have more negative returns than survivor banks. However, big banks, all of which eventually failed, did exhibit more negative returns than survivor banks.

#### 4.3. Commercial-bank financial distress events

##### 4.3.1. Equity market-wide systemic effects

In contrast to the savings-banks financial distress events, commercial-bank financial distress events were associated with significantly negative abnormal returns on non-bank Oslo Børs indexes indicating that these events were market-wide systemic events. Information was being released which caused investors to revise downward the value of non-bank Norwegian equities. The abnormal returns on the Oslo Børs Indexes for the commercial-bank financial distress events are reported in Table 6.

Table 6

Commercial bank financial distress events: Oslo Børs and EWBK index returns

| Event   | Day -1   |         | Day 0    |         | Day -1 to 0 |         | Day -1 to +1 |         |
|---|----------|---------|----------|---------|-------------|---------|--------------|---------|
|   | AR       | t       | AR       | t       | AR          | t       | AR           | t       |
| 18 March 1988: Sunnmørsbanken must turn around to sustain operations.       |          |         |          |         |             |         |              |         |
| All Share Index   | 0.0090   | 0.360   | 0.0105   | 0.424   | 0.0195      | 0.555   | 0.0346       | 0.804   |
| Bank Index  | 0.0055   | 0.299   | 0.0046   | 0.252   | 0.0101      | 0.391   | 0.0211       | 0.668   |
| Industrial index  | 0.0189   | 0.693   | 0.0091   | 0.333   | 0.0280      | 0.262   | 0.0406       | 0.860   |
| Shipping Index  | -0.0101  | -0.378  | 0.0149   | 0.556   | 0.0048      | 0.126   | 0.0025       | 0.054   |
| Insurance Index   | -0.0182  | -0.698  | 0.0274   | 1.051   | 0.0092      | 0.249   | 0.0533       | 1.180   |
| EWBK Index  | 0.0273*  | 2.109*  | -0.0010  | -0.078  | 0.0263      | 1.434   | 0.0164       | 0.733   |
| 13 September 1988: Sunnmørsbanken schedules meeting with Kredittilsynet.    |          |         |          |         |             |         |              |         |
| All Share Index   | -0.0042  | -0.241  | 0.0015   | 0.085   | -0.0027     | -0.111  | 0.0055       | 0.184   |
| Bank Index  | 0.0033   | 0.232   | -0.0029  | -0.201  | 0.0004      | 0.020   | -0.0042      | -0.171  |
| Industrial index  | -0.0019  | -0.098  | 0.0031   | 0.163   | 0.0012      | 0.045   | 0.0021       | 0.064   |
| Shipping Index  | -0.0089  | -0.477  | -0.0103  | -0.556  | -0.0192     | -0.730  | -0.0096      | -0.299  |
| Insurance Index   | -0.0063  | -0.252  | -0.0055  | -0.218  | -0.0118     | -0.331  | -0.0090      | -0.206  |
| EWBK Index  | -0.0105  | -0.874  | -0.0266* | -2.209* | -0.0371     | -2.179* | -0.0095      | -0.456  |
| 19 September 1988: Sunnmørsbanken equity is lost. CBGF guarantees deposits. |          |         |          |         |             |         |              |         |
| All Share Index   | 0.0263   | 1.526   | 0.0041   | 0.238   | 0.0304      | 1.246   | 0.0229       | 0.766   |
| Bank Index  | -0.0104  | -0.736  | 0.0037   | 0.261   | -0.0067     | -0.334  | -0.0116      | -0.472  |
| Industrial index  | -0.0134  | -0.712  | 0.0553*  | 2.929*  | 0.0419      | 1.566   | 0.0292       | 0.893   |
| Shipping Index  | 0.0156   | 0.840   | 0.0013   | 0.068   | 0.0169      | 0.642   | 0.0132       | 0.410   |
| Insurance Index   | 0.0449   | 1.781   | 0.0184   | 0.728   | 0.0633      | 1.775   | 0.0581       | 1.330   |
| EWBK Index  | -0.0028  | -0.236  | -0.0270* | -2.237* | -0.0298     | -1.750  | -0.0733*     | -3.515* |
| 27 October 1989: Norion Bank informs Kredittilsynet bank is out of capital. |          |         |          |         |             |         |              |         |
| All Share Index   | -0.0015  | -0.170  | -0.0182* | -2.088* | -0.0197     | -1.599  | -0.0380*     | -2.519* |
| Bank Index  | -0.0099  | -0.642  | -0.0161  | -1.033  | -0.0260     | -1.183  | -0.0509      | -1.891  |
| Industrial Index  | 0.0003   | 0.036   | -0.0179  | -1.863  | -0.0176     | -1.289  | -0.0329*     | -1.978* |
| Shipping Index  | -0.0021  | -0.182  | -0.0195  | -1.729  | -0.0216     | -1.350  | -0.0434*     | -2.217* |
| Insurance Index   | -0.0112  | -0.654  | -0.0221  | -1.291  | -0.0333     | -1.373  | -0.0683*     | -2.300* |
| EWBK Index  | -0.0025  | -0.018  | -0.0469* | -3.491* | -0.0494     | -2.598* | -0.0277      | -1.192  |
| 30 October 1989: CBGF guarantees Norion Bank deposits. Bank is liquidated.  |          |         |          |         |             |         |              |         |
| All Share Index   | -0.0182* | -2.088* | -0.0184* | -2.111* | -0.0366*    | -2.971* | -0.0371*     | -2.459* |
| Bank Index  | -0.0161  | -1.033  | -0.0249  | -1.603  | -0.0410     | -1.861  | -0.0391      | -1.453  |
| Industrial Index  | -0.0179  | -1.863  | -0.0154  | -1.606  | -0.0333*    | -2.453* | -0.0356*     | -2.141* |
| Shipping Index  | -0.0195  | -1.729  | -0.0218* | -1.929  | -0.0413*    | -2.584* | -0.0392*     | -2.003* |
| Insurance Index   | -0.0221  | -1.291  | -0.0350* | -2.043* | -0.0572*    | -2.358* | -0.0526      | -1.771  |
| EWBK Index  | -0.0469* | -3.491* | 0.0217   | 1.616   | -0.0252     | -1.328  | -0.0174      | -0.749  |
| 11 December 1990: Report of problems at Fokus Bank in Dagens Naeringsliv.   |          |         |          |         |             |         |              |         |
| All Share Index   | -0.0073  | -0.671  | -0.0200  | -1.833  | -0.0274     | -1.774  | -0.0409*     | -2.162* |
| Bank Index  | -0.0326* | -2.334* | -0.0481* | -3.447* | -0.0807*    | -4.410  | -0.0694      | -2.872* |
| Industrial index  | -0.0010  | -0.093  | -0.0141  | -1.308  | -0.0151     | -0.992  | -0.0288      | -1.545  |
| Shipping Index  | -0.0194  | -1.236  | -0.0330* | -2.101* | -0.0524*    | -2.362* | -0.0739*     | -2.719* |
| Insurance Index   | -0.0095  | -0.122  | -0.0080  | -0.103  | -0.0174     | -0.159  | -0.0255      | -0.190  |
| EWBK Index  | -0.0165  | -1.169  | -0.0110  | -0.777  | -0.0275     | -1.375  | -0.0374      | -1.527  |

Table 6 (continued)

| Event  | Day -1   |         | Day 0    |         | Day -1 to 0 |         | Day -1 to +1 |         |
|--|----------|---------|----------|---------|-------------|---------|--------------|---------|
|  | AR       | t       | AR       | t       | AR          | t       | AR           | t       |
| 21 December 1990: Fokus Bank is first bank to receive preference capital from CBGF. Must write down share value.   |          |         |          |         |             |         |              |         |
| All Share Index  | -0.0278  | -2.544* | -0.0128  | -1.170  | -0.0406*    | -2.629* | -0.0165      | -0.872  |
| Bank Index   | -0.0319* | -2.289* | -0.0481* | -3.445* | -0.0800     | -4.055* | -0.0487      | -2.016* |
| Industrial index   | -0.0249* | -2.309* | -0.0068  | -0.635  | -0.0317*    | -2.083* | -0.0128      | -0.687  |
| Shipping Index   | -0.0373* | -2.377* | -0.0155  | -0.985  | -0.0528*    | -2.380* | -0.0221      | -0.813  |
| Insurance Index  | -0.0236  | -0.305  | -0.0530  | -0.685  | -0.0766     | -0.699  | -0.0021      | -0.016  |
| EWBK Index   | -0.0378* | -2.673* | -0.0936* | -6.621* | -0.1314*    | -6.571* | -0.0031      | -0.127  |
| 17 June 1991: CBGF endorses preference capital for DnB and Kreditkassen.   |          |         |          |         |             |         |              |         |
| All Share Index  | 0.0013   | 0.109   | 0.0047   | 0.389   | 0.0061      | 0.354   | 0.0080       | 0.379   |
| Bank Index   | -0.0097  | -0.546  | -0.0121  | -0.682  | -0.0218     | -0.868  | -0.0730*     | -2.361* |
| Industrial index   | -0.0006  | -0.053  | 0.0058   | 0.516   | 0.0052      | 0.330   | 0.0086       | 0.445   |
| Shipping Index   | 0.0071   | 0.354   | 0.0069   | 0.345   | 0.0141      | 0.496   | 0.0252       | 0.723   |
| Insurance Index  | 0.0070   | 0.353   | -0.0055  | -0.278  | 0.0015      | 0.053   | -0.0178      | -0.516  |
| EWBK Index   | -0.0336  | -1.707  | 0.0048   | 0.244   | -0.0288     | -1.034  | -0.0212      | -0.622  |
| 26 June 1991: CBGF converts Fokus capital guarantee to preference capital and requires additional share writedown. |          |         |          |         |             |         |              |         |
| All Share Index  | -0.0083  | -0.683  | -0.0031  | -0.252  | -0.0114     | -0.661  | -0.0156      | -0.738  |
| Bank Index   | -0.0078  | -0.439  | 0.0011   | 0.062   | -0.0067     | -0.265  | 0.0009       | 0.029   |
| Industrial index   | -0.0069  | -0.617  | -0.0052  | -0.464  | -0.0121     | -0.761  | -0.0163      | -0.844  |
| Shipping Index   | -0.0084  | -0.416  | 0.0001   | 0.003   | -0.0083     | -0.292  | -0.0141      | -0.405  |
| Insurance Index  | -0.0281  | -1.410  | 0.0056   | 0.284   | -0.0224     | -0.796  | -0.0285      | -0.826  |
| EWBK Index   | 0.0150   | 0.801   | 0.0174   | 0.931   | 0.0324      | 1.223   | 0.0308       | 0.949   |
| 19 August 1991: GBIF provides loan to CBGF to advance preference capital to Kreditkassen.                          |          |         |          |         |             |         |              |         |
| All Share Index  | 0.0036   | 0.293   | -0.0871* | -7.125* | -0.0835*    | -4.828* | -0.0440*     | -2.077* |
| Bank Index   | -0.0001  | -0.008  | -0.0718* | -3.642* | -0.0719*    | -2.580* | -0.0548      | -1.604  |
| Industrial index   | 0.0021   | 0.190   | -0.0779* | -6.951* | -0.0758*    | -4.781* | -0.0395*     | -2.034* |
| Shipping Index   | -0.0091  | 0.449   | -0.1138* | -5.643* | -0.1229*    | -3.674* | -0.0525      | -1.503  |
| Insurance Index  | -0.0013  | -0.067  | -0.0948* | -4.720* | -0.0961*    | -2.763* | -0.0567      | -1.630  |
| EWBK Index   | -0.0201  | -0.971  | -0.0572* | -2.757* | -0.0773     | -2.635* | -0.0361      | -0.761  |
| 26 August 1991: GBIF provides loan to CBGF to advance Fokus Bank preference capital.                               |          |         |          |         |             |         |              |         |
| All Share Index  | 0.0049   | 0.402   | 0.0188   | 1.538   | 0.0237      | 0.969   | 0.0211       | 0.996   |
| Bank Index   | 0.0097   | 0.491   | -0.0200  | -1.015  | -0.0103     | -0.369  | -0.0078      |         |
| Industrial index   | 0.0038   | 0.339   | 0.0183   | 1.634   | 0.0221      | 1.394   | 0.0192       | 0.989   |
| Shipping Index   | 0.0054   | 0.269   | 0.0285   | 1.412   | 0.0339      | 1.188   | 0.0293       | 0.839   |
| Insurance Index  | 0.0115   | 0.571   | 0.0060   | 0.301   | 0.0175      | 0.616   | 0.0221       | 0.635   |
| EWBK Index   | 0.0080   | 0.388   | -0.0194  | -0.948  | -0.0114     | -0.397  | -0.0044      | -0.124  |
| 14 November 1991: Kreditkassen declared insolvent.   |          |         |          |         |             |         |              |         |
| All Share Index  | -0.0082  | -0.644  | -0.0266* | -2.083* | -0.0348*    | -3.860* | -0.0449*     | -2.033* |
| Bank Index   | -0.0647* | -3.312* | -0.0949* | -4.864* | -0.1596*    | -5.781* | -0.1430*     | -4.230* |
| Industrial index   | -0.0065  | -0.548  | -0.0222  | -1.880  | -0.0287     | -1.715  | -0.0370      | -1.806  |
| Shipping Index   | -0.0093  | -0.479  | -0.0302  | -1.554  | -0.0395     | -1.438  | -0.0526      | -1.564  |
| Insurance Index  | -0.0008  | -0.042  | -0.0370* | -1.983* | -0.0378     | -1.434  | -0.0706*     | -2.187* |
| EWBK Index   | -0.0565* | -2.456* | -0.0647* | -2.810* | -0.1212     | -5.267* | -0.1309      | -3.284* |

Table 6 (continued)

| Event   | Day -1   |         | Day 0    |         | Day -1 to 0 |         | Day -1 to +1 |         |
|---|----------|---------|----------|---------|-------------|---------|--------------|---------|
|   | AR       | t       | AR       | t       | AR          | t       | AR           | t       |
| 23 October 1991: DnB warns it will need capital to meet domestic capital adequacy requirements. |          |         |          |         |             |         |              |         |
| All Share Index   | 0.0015   | 0.120   | -0.0107  | -0.839  | -0.0092     | -0.511  | -0.0240      | -1.088  |
| Bank Index  | -0.0482* | -2.450* | -0.0947* | -4.813* | -0.1429*    | -5.137* | -0.1346*     | -3.951* |
| Industrial index  | 0.0027   | 0.232   | -0.0100  | -0.852  | -0.0073     | -0.438  | -0.0232      | -1.137  |
| Shipping Index  | 0.0005   | 0.027   | -0.0003  | -0.018  | 0.0002      | 0.006   | -0.0113      | -0.336  |
| Insurance Index   | 0.0119   | 0.639   | -0.0306  | -1.651  | -0.0188     | -0.717  | -0.0474      | -1.475  |
| EWBK Index  | -0.0178  | -0.706  | 0.0027   | 0.107   | -0.0151     | -0.423  | -0.0629      | -1.438  |
| 2 November 1991: DnB rescued by Norwegian government. Forced to write down share value.         |          |         |          |         |             |         |              |         |
| All Share Index   | -0.0194  | -1.521  | -0.0503* | -3.949* | -0.0697*    | -3.866* | -0.0659*     | -2.984* |
| Bank Index  | -0.0208  | -1.067  | -0.0375* | -1.918  | -0.0583*    | -2.112* | -0.0892*     | -2.638* |
| Industrial index  | -0.0147  | -1.243  | -0.0457* | -3.860* | -0.0604*    | -3.610  | -0.0549      | -2.679* |
| Shipping Index  | -0.0288  | -1.483  | -0.0605* | -3.114* | -0.0893*    | -3.252* | -0.0873*     | -2.595* |
| Insurance Index   | -0.0463* | -2.483* | -0.2081* | -4.404* | -0.1284*    | -4.871* | -0.1310*     | -4.058* |
| EWBK Index  | -0.0020  | -0.089  | -0.1372* | -6.095* | -0.1392*    | -4.376* | -0.1591*     | -4.081  |
| 9 December 1991: Fokus Bank fails.  |          |         |          |         |             |         |              |         |
| All Share Index   | 0.0193   | 1.515   | 0.0296*  | 2.324*  | 0.0489*     | 2.712*  | 0.0455*      | 2.060*  |
| Bank Index  | 0.0305   | 1.562   | 0.0215   | 1.102   | 0.0520      | 1.884   | 0.0499       | 1.476   |
| Industrial index  | 0.0179   | 1.515   | 0.0258*  | 2.182*  | 0.0437*     | 2.612*  | 0.0385       | 1.879   |
| Shipping Index  | 0.0163   | 0.838   | 0.0306   | 1.576   | 0.0469      | 1.708   | 0.0474       | 1.409   |
| Insurance index   | 0.0535*  | 2.867*  | 0.0882*  | 4.731*  | 0.1417*     | 5.375*  | 0.1445*      | 4.475*  |
| EWBK Index  | 0.0412   | 1.831   | 0.0010   | 0.043   | 0.0422      | 1.326   | 0.0375       | 0.962   |

\* Indicates significance at the 0.05 level.

AR is the abnormal return for the indicated Oslo Børs Indexes and for our constructed equally weighted index of bank stocks (EWBK) for day -1, 0, and the 2 and 3 day cumulative return event periods. The abnormal returns are based on deviations from expected daily changes in the respective Index returns; the expected daily Index returns are based on the mean daily return of the Index for the period from 260 to 20 days prior to the event. The event day is the day the announcement appears on the Oslo Børs news ticker. *t*-statistics are reported for each abnormal return.

With respect to the cumulative abnormal returns across all 15 events, commercial-bank financial distress event-day abnormal returns were negative and statistically significant for every Oslo Børs equity index. The cumulative event-day abnormal returns for all 15 events on the Oslo Børs All Share Index was -17.80%; the Industrial Index, -9.78%; the Shipping Index, -22.26%; the Insurance Index, -22.80%; the Bank Index, -44.02%; and the EWBK Index, -43.70%. The cumulative 2 and 3 day equity indexes abnormal returns were also negative and statistically significant at the 0.05 level, except for the Oslo Børs Insurance Index where the significance level was 0.10.

As reported in Table 6, market-wide systemic effects of commercial-bank financial distress announcements were not apparent for the first commercial-bank distress event - the March and September, 1989 problems at Sunnmørsbanken. The first statistically significant negative market-wide spillover effects occur with the failure

of Norion Bank and the announcement that Norion Bank would be liquidated, the latter announcement being associated with a  $-3.66\%$  2 day abnormal return on the All Share Index. Prior to the Norion Bank distress announcement, problem banks – either savings or commercial – were not liquidated; instead, they were supported with capital guarantees or merged into stronger institutions. Perhaps the major policy shift to liquidation from capital guarantees communicated information about the seriousness of the problems faced by the banking industry and the likelihood that financial problems at banks would affect bank loan customers as well as the owners of bank stock. However, the absence of market-wide systemic effects for subsequent savings-banks failures does not support this interpretation although it should be noted that these subsequent failures were again dealt with through capital guarantees and mergers – in no case was a savings bank liquidated.

Relatively large negative abnormal returns on the non-bank Oslo Børs indexes are registered when information about financial problems at the three large Norwegian money center/international banks is reported. Reports of problems at Fokus Bank, the third largest bank, produce a  $-4.09\%$  3 day abnormal return on the All Share Index and negative returns on the other non-bank indexes. A subsequent announcement that Fokus is to receive financial support from the commercial-bank industry's guarantee fund produces statistically negative abnormal returns on all but the Oslo Børs Insurance Index. When Kreditkassen, the second largest bank, is declared insolvent, the All Share Index registers a negative  $4.449\%$  3 day abnormal return. When DnB, the country's largest bank, is forced to write down its equity capital value, every Oslo Børs Index registers statistically significant 2 day negative abnormal returns.

Clearly, information was being released about non-bank equities with these commercial-bank financial distress announcements. Perhaps investors interpreted commercial-bank financial problems as being caused by a deterioration in the ability of non-bank borrowers to meet their credit obligations, which, in turn, led investors to revise downward the value of non-bank equities. Alternatively or additionally, investors may have concluded that the problems faced by large commercial banks would affect their willingness and ability to lend funds to the non-bank sector thereby also adversely affecting non-bank equity values.

The asymmetric response of the Oslo Børs indexes to commercial-bank failures (negative reactions) and savings-banks failures (no response) may be related to the loan portfolios of the banks and the sources of debt financing for the companies listed on the Oslo Børs. Virtually all of the companies on the Børs have lending relationships with the (large) Norwegian commercial banks (these are the corporate sector loans referred to in section 2). In the absence of a well-developed domestic bond market, these companies were quite dependant on the banks for credit. Thus, news about commercial bank financial distress, especially with regard to loan losses, could also have been news about the deteriorating condition of the bank's corporate clients – the companies listed on the Oslo Børs.

This interpretation is consistent with the abnormal returns reported for the failure of the first commercial bank (Sunnmørsbanken) which was a regional medium-sized bank with few large corporate clients. The only index with sufficient negative returns

for these failure announcements was our equally weighted EWBK Index which weights small banks with portfolios similar to Sunnmørsbanken and the same as the large national banks,

#### 4.3.2. *Banking industry effects*

Sizable industry-wide information effects were also associated with commercial-bank financial distress announcements. As reported in the summary section of Table 7, the 2 day average abnormal return on the EWBK Index was  $-3.233\%$  with the cumulative 2 day return over the 15 events being  $-48.495\%$ . Respective average and cumulative 2 day returns over all 15 events for the other bank portfolios were  $-2.877\%$  and  $-40.278\%$  for the Failed Banks;  $-2.877\%$  and  $-43.155\%$  for the Survivor Banks; and  $-2.2357\%$  and  $-31.230\%$  for the Big Banks. All abnormal returns are statistically significant at the 0.05 level. We report the average of the cumulative returns over the 15 events for our bank portfolios because the Failed and Big Bank portfolios contain returns for 14 events, while the EWBK and Survivor Bank portfolios contain returns for 15 events. (When the last bank fails there are no longer any members of the Failed and Big Bank portfolios.)

A review of the individual commercial-bank distress announcements reveals that only the EWBK and Survivor Bank portfolio registered statistically significant negative abnormal returns for the first two commercial banks which encountered problems. Because the EWBK Index is an equally weighted index and the Survivor Bank portfolio does not include the four largest banks, we conclude that early announcements of commercial-banking problems affected primarily regional and local banks. No statistically significant abnormal returns are registered on the Big Bank Portfolio until information is released about problems at Fokus Bank. However, once big banks begin to report problems and fail, all bank portfolios begin registering statistically negative abnormal returns.

This pattern of early failures of small and medium-sized banks only affecting the returns of other small and medium-sized banks is consistent with our earlier interpretation of the response of the stock prices of large listed Norwegian corporations to these bank failures. Given the banking relationships and loan portfolios of these 'smaller' banks, investors may have concluded that the banking problems were confined to 'small' regional banks and the quality of their 'local' loans, with the larger banks and their customers not at risk.

Overall, statistically significant banking industry-wide information effects were uncovered for 11 of the 15 commercial-bank financial distress events. Therefore, we conclude that these distress announcements released information about the banking industry in general and that investors believed (rightly or wrongly) that the problems leading to financial difficulties at the distressed bank were also present at other banks, although at first only at the regional and local banks.

As we did for the saving banks financial distress events, we tested whether abnormal returns on the survivor banks were different from those on the failed and big banks. We did so by regressing the event window abnormal returns for each bank against indicator values representing whether the bank was a failed bank, a merged bank and/or a big bank. These regressions results are reported in Table 8.

Table 7

Commercial bank financial distress events: all share market model abnormal returns

| Event   | Day -1    |          | Day 0     |          | Day -1 to 0 |          | Day -1 to +1 |          |
|---|-----------|----------|-----------|----------|-------------|----------|--------------|----------|
|   | AR        | t        | AR        | t        | AR          | t        | AR           | t        |
| 18 March 1988: Sunnmørsbanken must turn around to sustain operations.   |           |          |           |          |             |          |              |          |
| EWBK Index  | 0.02422*  | 2.5179*  | -0.00412  | -0.4279  | 0.02011     | 1.4779   | 0.00513      | 0.3078   |
| Failed Bank portfolio   | 0.00867   | 0.6021   | -0.01015  | -0.7051  | -0.00148    | -0.0073  | 0.005001     | 0.2009   |
| Survivor Bank portfolio   | 0.1154    | 0.7474   | 0.00137   | 0.0889   | 0.01291     | 0.5912   | -0.02830     | -0.5774  |
| Big Bank portfolio  | 0.01473   | 1.3428   | -0.01308  | -1.1929  | 0.00164     | 0.1060   | 0.00371      | 0.1954   |
| 13 September 1988: Sunnmørsbanken schedules meeting with Kredittilsynet.  |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.00956  | -0.9152  | -0.02716* | -2.5999* | -0.03671*   | -2.4866* | -0.01148     | -0.6351  |
| Failed Bank portfolio   | 0.00463   | 0.3661   | -0.02229  | -1.7636  | -0.01767    | -0.9885  | -0.00323     | -0.1475  |
| Survivor Bank portfolio   | -0.04450* | -2.5526* | -0.00310  | -0.1779  | -0.04760    | -1.9312  | -0.04791     | -1.5869  |
| Big Bank portfolio  | 0.00518   | 0.4911   | -0.00574  | -0.5433  | -0.00055    | -0.0370  | -0.00869     | -0.4751  |
| 19 September 1988: Sunnmørsbanken equity is lost. CBGF guarantees deposits.   |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.00988  | -0.9455  | -0.02803* | -2.6835* | -0.03790*   | -2.5672* | -0.07928*    | -4.3846* |
| Failed Bank portfolio   | -0.01796  | -1.4203  | 0.00100   | 0.0796   | -0.00595    | -0.3320  | -0.02823     | -1.2896  |
| Survivor Bank portfolio   | -0.00356  | -0.0204  | -0.05427* | -3.1127* | -0.05782*   | -2.3458* | -0.05494     | -1.8197  |
| Big Bank portfolio  | -0.02137* | -2.0246* | 0.00151   | 0.1429   | -0.01986    | -1.3299  | -0.01414     | -1.0859  |
| 27 October 1989: Norion Bank informs Kredittilsynet bank is out of capital.   |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.00208  | -0.1643  | -0.03858* | -3.0523* | -0.04065*   | -2.2741* | -0.01060     | -0.2935  |
| Failed Bank portfolio   | -0.00868  | -0.7274  | -0.00750  | -0.6287  | -0.01618    | -0.9588  | -0.01542     | -0.7463  |
| Survivor Bank portfolio   | 0.00655   | 0.3144   | -0.02972  | -1.4263  | -0.02317    | -0.7861  | -0.03204     | -0.8876  |
| Big Bank portfolio  | -0.01233  | -0.9126  | 0.01030   | 0.7628   | -0.00202    | -0.1059  | -0.01427     | -0.6099  |
| 30 October 1989: CBGF guarantees Norion Bank deposits. Bank is liquidated.  |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.03858* | -3.0523* | 0.03006*  | 2.3783*  | -0.00852    | -0.4766  | -0.00038     | -0.0175  |
| Failed Bank portfolio   | -0.00750  | -0.6287  | 0.00076   | 0.0634   | -0.00674    | -0.3997  | 0.00448      | 0.2168   |
| Survivor Bank portfolio   | -0.02972  | -1.4263  | -0.00887  | -0.4257  | -0.03859    | -1.3093  | -0.03199     | -0.8862  |
| Big Bank portfolio  | 0.01030   | 0.7628   | -0.01224  | -0.9066  | -0.00194    | -0.1017  | -0.00304     | -0.1299  |
| 11 December 1990: Report of problems at Fokus Bank in Dagens Naeringsliv.   |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.01188  | -0.9309  | 0.00136   | 0.1068   | -0.01052    | -0.5825  | -0.01173     | -0.5302  |
| Failed Bank portfolio   | -0.02246  | -1.2678  | -0.01545  | -0.8721  | -0.03792    | -1.5130  | -0.02003     | -0.6527  |
| Survivor Bank portfolio   | -0.00395  | -0.2424  | 0.01398   | 0.8574   | 0.01002     | 0.4349   | -0.00550     | -0.1949  |
| Big Bank portfolio  | -0.03390* | -2.3001* | -0.02318  | -1.5726  | -0.05708*   | -2.7381* | -0.03025     | -1.1849  |
| 21 December 1990: Fokus Bank is first bank to receive preference capital from CBGF. Must write down share value.      |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.02012  | -1.5762  | -0.08592* | -6.7301  | -0.10604*   | -5.8716* | 0.00750      | 0.3391   |
| Failed Bank portfolio   | -0.00066  | -0.0375  | -0.03481* | -1.9642* | -0.03792    | -1.5130  | -0.02003     | -0.6527  |
| Survivor Bank portfolio   | -0.03472* | -2.1299* | 0.02949   | 1.8096   | -0.00522    | -0.2264  | 0.03053      | 1.0814   |
| Big Bank portfolio  | -0.00099  | -0.0676  | -0.05213* | -3.5369* | -0.05312*   | -2.5485* | -0.02906     | -1.3939  |
| 17 June 1991: CBGF endorses preference capital for DnB, Kreditkassen and Samvirkebanken.                              |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.03443  | -1.8659  | 0.00184   | 0.09980  | -0.03259    | -1.2491  | -0.02611     | -0.8170  |
| Failed Bank portfolio   | -0.08934* | -1.9970* | 0.03544   | 0.9144   | -0.05390    | -0.8651  | -0.08346     | -1.0851  |
| Survivor Bank portfolio   | -0.02071  | -0.9712  | -0.00656  | -0.3076  | -0.02726    | -0.9043  | -0.01177     | -1.1704  |
| Big Bank portfolio  | -0.08934* | -1.9970* | 0.03544   | 0.9144   | -0.05390    | -0.8551  | -0.08346     | -1.0851  |
| 26 October 1991: CBGF converts Fokus capital guarantee to preference capital and requires additional share writedown. |           |          |           |          |             |          |              |          |
| EWBK Index  | 0.02100   | 1.3216   | 0.01992   | 1.2145   | 0.04161*    | 3.5858*  | 0.04340      | 1.5269   |
| Failed Bank portfolio   | 0.02100   | 1.0485   | 0.00343   | 0.1714   | 0.02444     | 0.8626   | 0.05086      | 1.4661   |
| Survivor Bank portfolio   | 0.02727   | 1.2792   | 0.02903   | 1.3616   | 0.05630     | 1.8674   | 0.05238      | 1.4186   |
| Big Bank portfolio  | 0.02100   | 1.0485   | 0.00343   | 0.1714   | 0.02444     | 0.8626   | 0.05086      | 1.4661   |
| 19 August 1991: GBIF provides loan to CBGF to advance preference capital to Kreditkassen.                             |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.02205  | -1.1574  | -0.00392  | -0.2060  | -0.02698    | -0.9643  | -0.00892     | -0.2703  |
| Failed Bank portfolio   | -0.01841  | -0.5489  | 0.9229*   | 2.7521*  | 0.07388     | 1.5581   | 0.07361      | 1.2675   |
| Survivor Bank portfolio   | -0.02388  | -1.0283  | -0.05203* | -2.2411* | -0.07591*   | -2.3116* | -0.05018     | -1.2477  |
| Big Bank portfolio  | -0.01841  | -0.5489  | 0.9229*   | 2.7521*  | 0.07388     | 1.5581   | 0.07361      | 1.2675   |

Table 7 (continued)

| Event   | Day -1    |          | Day 0     |          | Day -1 to 0 |          | Day -1 to +1 |          |
|---|-----------|----------|-----------|----------|-------------|----------|--------------|----------|
|   | AR        | t        | AR        | t        | AR          | t        | AR           | t        |
| 26 August 1991: GBIF provides loan to CBGF to advance Fokus Bank preference capital.            |           |          |           |          |             |          |              |          |
| EWBK Index  | 0.00468   | 0.2543   | -0.03217  | -1.7463  | -0.02749    | -1.0552  | -0.01827     | -0.5728  |
| Failed Bank portfolio   | 0.01691   | 0.6817   | -0.03861  | -1.5564  | -0.02169    | -0.6184  | -0.03966     | -0.9229  |
| Survivor Bank portfolio   | -0.00143  | -0.0616  | -0.02895  | -1.2471  | -0.03038    | -0.9252  | -0.00758     | -0.1885  |
| Big Bank portfolio  | 0.01691   | 0.6817   | -0.03861  | -1.5564  | -0.02169    | -0.6184  | -0.03966     | -0.9229  |
| 14 October 1991: Kreditkassen declared technically insolvent.                                   |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.05354* | -2.4652* | -0.05519* | -2.5410* | -0.10874*   | -3.5400* | -0.11504*    | -3.0580* |
| Failed Bank portfolio   | -0.13466* | -3.1535* | -0.09838* | -2.3040* | -0.23304*   | -3.8592* | -0.19611*    | -2.6516* |
| Survivor Bank portfolio   | -0.01299  | -0.5338  | -0.03359  | -1.3809  | -0.04658    | -1.3538  | -0.07451     | -1.7681  |
| Big Bank portfolio  | -0.13466* | -3.1535* | -0.09838* | -2.3040* | -0.23304*   | -3.8592* | -0.19611*    | -2.6516* |
| 23 October 1991: DnB warns it will need capital to meet domestic capital adequacy requirements. |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.01803  | -0.7336  | 0.00441   | 0.1794   | -0.01362    | -0.3919  | -0.05908     | -1.3877  |
| Failed Bank portfolio   | 0.00849   | 0.1096   | -0.01025  | -0.1324  | -0.00176    | -0.0161  | -0.24211     | -1.8053  |
| Survivor Bank portfolio   | -0.02466  | -1.0158  | 0.00808   | 0.3326   | -0.01659    | -0.4830  | -0.01332     | -0.3168  |
| Big Bank portfolio  | 0.00849   | 0.1096   | -0.01025  | -0.1324  | -0.00176    | -0.0161  | -0.24211     | -1.8053  |
| 2 December 1991: DnB rescued by Norwegian government. Forced to write down share value.         |           |          |           |          |             |          |              |          |
| EWBK Index  | 0.00163   | 0.0669   | -0.11904* | -4.8934* | -0.11742*   | -3.4125* | -0.13877*    | -3.2930* |
| Failed bank portfolio (no quotes on Fokus)  |           |          |           |          |             |          |              |          |
| Survivor Bank portfolio   | 0.00163   | 0.0669   | -0.11904* | -4.8934* | -0.11742*   | -3.4125* | -0.13877*    | -3.2930* |
| Big bank portfolio (no quotes on Fokus)   |           |          |           |          |             |          |              |          |
| 9 December 1991: Fokus Bank fails.  |           |          |           |          |             |          |              |          |
| EWBK Index  | 0.03059   | 1.4735   | -0.01101  | -0.5303  | 0.01958     | 0.6669   | 0.01632      | 0.4533   |
| Failed Bank portfolio (only DnB)  | -0.02253  | -0.8659  | -0.03571  | -1.3725  | -0.05824    | -1.5828  | -0.09669*    | -2.1454* |
| Survivor Bank portfolio   | 0.04387   | 1.8033   | -0.00483  | -0.1985  | 0.03904     | 1.1346   | 0.04458      | 1.0578   |
| Big Bank portfolio (only DnB)   | -0.02253  | -0.8659  | -0.03571  | -1.3725  | -0.05824    | -1.5828  | -0.09669*    | -2.1454* |
| Commercial bank financial distress events average abnormal returns                              |           |          |           |          |             |          |              |          |
| EWBK Index  | -0.00916  | -1.4178  | -0.02317* | -3.5875* | -0.03233*   | -3.5383* | -0.02715*    | -2.4268* |
| Failed Bank portfolio   | -0.01875* | -1.9733* | -0.01002  | -1.5041  | -0.02877*   | -2.1411* | -0.05887*    | -3.5779* |
| Survivor Bank portfolio   | -0.00728  | -0.8814  | -0.01727* | -2.0899* | -0.02455*   | -2.1016* | -0.02462     | -1.7208  |
| Big Bank portfolio  | -0.01835* | -2.0138* | -0.01045  | -1.1471  | -0.02880*   | -2.2357* | -0.04495*    | -2.8486* |
| Commercial bank financial distress: Events number negative and Positive                         |           |          |           |          |             |          |              |          |
|   | Negative  | Positive | Negative  | Positive | Negative    | Positive | Negative     | Positive |
| EWBK Index  |           | 10       | 5         | 10       | 5           | 12*      | 3            | 11*      |
| Failed Bank portfolio   |           |          |           | 9        | 5           | 9        | 5            | 12*      |
| Survivor Bank portfolio   |           |          |           | 10       | 5           | 10       | 5            | 11       |
| Big Bank portfolio  |           |          | 9         | 5        | 9           | 5        | 11*          | 3        |

\* Indicates significance at the 0.05 level.

AR is market model adjusted abnormal return for our constructed equally weighted index of bank stocks (EWBK) and for equally weighted portfolios of failed banks, survivor banks and big banks for day -1, 0, and the 2 and 3 day cumulative return periods. The market index used was the Oslo Børs All Share Index. The abnormal returns are estimated using the Oslo Børs All Share Index as the market portfolio with the estimation period running from 260 to 20 days prior to each event. The event day is the day the announcement appears on the Oslo Børs news ticker. *t*-statistics are reported for each abnormal return.

None of the regression equations contain statistically significant regression coefficients and none have *F*-values which are statistically significant at the 0.05 level. We conclude that, on average, there is no difference in abnormal returns among the



Table 8  
Indicator variable regressions for savings bank financial distress events

| Abnormal Return                         | Constant           | Fail               | Big                | Merge              | R <sup>2</sup> | F-value (P-value) |
|---|--------------------|--------------------|--------------------|--------------------|----------------|-------------------|
| <b>Raw returns</b>                      |                    |                    |                    |                    |                |                   |
| Day 0                                   | -0.0212<br>(-1.75) | 0.0042<br>(0.14)   | -0.0097<br>(-0.26) | -0.0079<br>(0.26)  | 0.0%           | 0.28<br>(0.841)   |
| Day -1,0                                | -0.0160<br>(-1.52) | 0.0115<br>(-0.42)  | -0.0085<br>(0.31)  | -0.0337<br>(-1.24) | 0.0%           | 0.54<br>(0.655)   |
| Day -1, +1,0                            | -0.0149<br>(-1.37) | 0.0222<br>(0.80)   | -0.0297<br>(-1.07) | -0.0318<br>(1.15)  | 0.0%           | 0.92<br>(0.433)   |
| <b>Standardized returns<sup>a</sup></b> |                    |                    |                    |                    |                |                   |
| Day 0                                   | -0.0212<br>(-1.75) | 0.0042<br>(0.14)   | -0.0097<br>(-0.32) | -0.0079<br>(-0.26) | 0.0%           | 0.28<br>(0.841)   |
| Day -1,0                                | -0.4385<br>(-1.40) | -0.1531<br>(-0.19) | -0.2546<br>(-0.31) | -0.4191<br>(-0.52) | 0.0%           | 0.31<br>(0.821)   |
| Day -1,0, +1                            | -0.3174<br>(-1.03) | 0.4235<br>(0.54)   | -0.9288<br>(-1.18) | 0.5327<br>(0.68)   | 0.1%           | 1.02<br>(0.389)   |

\* Indicates significance at the 0.05 level.

<sup>a</sup> Standardized returns are abnormal returns divided by the residuals from the market model estimating equation.

The regression equation is  $R_{j,e} = a + b_1(FAIL)_{j,e} + b_2(BIG)_{j,e} + b_3(MERGE)_{j,e}$  where  $R_{j,e}$  is the window abnormal return for bank  $j$  for event  $e$  and  $FAIL$ ,  $BIG$  and  $MERGE$  are dummy variables.  $t$ -statistics are in parentheses.

banks for the events we have identified as commercial-bank financial distress events. We reject the hypothesis that abnormal returns for the failed banks were different from the abnormal returns for the survivor banks.

#### 4.4. An inclusive financial distress cross-sectional regression

We estimated a cross-sectional regression equation to test whether banking distress abnormal returns differed depending on bank portfolio classification and whether the financial distress event was a savings-banks or a commercial-bank event. Our dependant variables were, as was the case with our earlier regressions, the actual and standardized event day and 2 and 3 day market market model abnormal returns for the individual banks. The independant variables were indicator variables. *FAIL* represents failed banks, *BIG* represnets big banks, *MERGE* represents merged banks, and *ComFd* represents a commercial-bank financial distress event. The estimated regression equations are contained in Table 9.

We interpret the results as follows. The commercial-bank financial distress variable always has a negative sign. Furthermore, the coefficients are statistically significant for the 2 day abnormal return regressions. Therefore, we conclude that commercial-bank financial distress announcements were associated with statistically significant and more negative abnormal returns than savings-banks financial distress announcements regardless of bank category.

Table 9  
Cross sectional regressions for financial distress events

| Abnormal return                   | Constant           | Fail               | Big                 | Merge              | ComFd               | R <sup>2</sup> | F-value (P-value) |
|-----------------------------------|--------------------|--------------------|---------------------|--------------------|---------------------|----------------|-------------------|
| Raw returns                       |                    |                    |                     |                    |                     |                |                   |
| Day 0                             | -0.0048<br>(-0.46) | 0.0035<br>(0.21)   | 0.0049<br>(0.29)    | 0.0078<br>(0.43)   | -0.0175<br>(-1.66)  | 0.0%           | 0.88<br>(0.475)   |
| Day -1,0                          | -0.0009<br>(-0.10) | 0.0180<br>(1.19)   | -0.0202<br>(-1.34)  | -0.0142<br>(-0.91) | -0.0208*<br>(-2.36) | 3.2%           | 2.38<br>(0.054)   |
| Day -1, +1,0                      | -0.0084<br>(-0.89) | 0.0303<br>(1.79)   | -0.0361*<br>(-2.16) | -0.0118<br>(0.67)  | -0.0069<br>(-0.71)  | 1.3%           | 1.53<br>(0.195)   |
| Standardized returns <sup>2</sup> |                    |                    |                     |                    |                     |                |                   |
| Day 0                             | 0.1578<br>(0.59)   | -0.0758<br>(-0.17) | -0.0917<br>(-0.21)  | 0.0129<br>(0.03)   | -0.6256*<br>(-2.28) | 0.9%           | 1.41<br>(0.233)   |
| Day -1,0                          | 0.0478<br>(0.17)   | 0.6259<br>(1.24)   | -1.0119*<br>(-2.03) | -0.2046<br>(-0.39) | -0.6213*<br>(-2.12) | 3.6%           | 2.54<br>(0.042)   |
| Day -1,0, +1                      | -0.1423<br>(-0.44) | 0.8565<br>(1.49)   | -1.3799*<br>(-2.42) | 0.2025<br>(0.5974) | -0.1928<br>(-0.58)  | 2.1%           | 1.87<br>(0.118)   |

\* Indicates significance at the 0.05 level.

<sup>2</sup> Standardized returns are abnormal returns divided by the residuals from the market model estimating equation.

The regression equation is  $R_{j,e} = a + b_1(FAIL)_{j,e} + b_2(BIG)_{j,e} + b_3(MERGE)_{j,e} + b_4(ComFd)_{j,e}$  where  $R_{j,e}$  is the window abnormal return for bank  $j$  for event  $e$  and  $FAIL$ ,  $BIG$ ,  $ComFd$  and  $MERGE$  are dummy variables.  $t$ -statistics are in parentheses.

The sign of the *FAIL* indicator variable is always positive but never statistically significant. We conclude there were no differences between the abnormal returns for failed and survivor banks. The sign of the *BIG* indicator variable is usually negative and sometimes significantly different from zero. We conclude the big banks had, on average, more negative abnormal returns than survivor banks across all the financial distress events. However, this outcome is driven by the inclusion of savings-banks financial distress events. If only commercial-bank financial distress events are considered, as reported earlier, there is no difference between survivor and failed banks abnormal returns. Our failure to uncover much, if any, difference between the abnormal returns of failed banks and the survivor banks suggests that investors did not or could not distinguish between those banks which would eventually fail and those which would survive. Alternatively, investors considered all banks equally risky and vulnerable to systemic banking problems.

Many studies of US bank stock price reactions to sovereign debt defaults reach a conclusion different from ours about the ability of investors to distinguish among banks with respect to 'bad news'. Cornell and Shapiro (1986), in their examination of the effects of the 1982 Mexican debt moratorium on bank stock prices, conclude that investors were able to differentiate between banks with varying degrees of Latin American risk exposure. Smirlock and Kaufold (1987) and Bruner and Sims (1987) reach qualitatively similar conclusions as Cornell and Shapiro about the same event. Studies of the 1987 Brazilian debt moratorium by Musumeci and Sinkey (1990a,b)

find stock price reactions of banks with relatively large Brazilian loan exposures to be affected more than those with no or relatively little exposure. The only contrary evidence is reported by Madura et al. (1991) who find contagion effects among British banks to Citicorp's eventual write off of the Brazilian loans; an outcome not observed among US banks.

An outcome similar to ours with respect to spillover effects on big banks was reported by Karafiath et al. (1991) in their study of bank stock reactions to the Brazilian debt moratorium announcement. Karafiath et al. report that there may have been a bank size effect with large banks being more affected than smaller banks.

#### *4.5. Commercial-bank failure events: discussion and summary*

An important question facing bank regulatory agencies and central banks in the face of a failing bank is whether to simply let it disappear or whether to reorganize the bank and provide financial assistance, including paying off all creditors – bondholders and depositors – regardless of whether they were insured by a governmental agency such as the FDIC in the US. Ultimately, the public policy decision and response hinges on whether the responsible agency believes the bank failure will cause economy-wide systemic problems and whether the social and economic benefits of 'bailing out' the bank exceed the social and economic costs of shutting it down. One way of measuring whether a particular bank or set of bank failures would lead to systemic banking industry-wide or economy-wide problems is to examine the effects of the failure on the stock prices of other banks and non-bank firms.

Wall and Peterson, 1990 used this approach to determine whether the Continental Illinois bank failure generated banking industry-wide contagion effects around the time of its failure. They wanted to know whether evidence existed to support statements by Federal Deposit Insurance Corporation and Federal Reserve officials that a federal bailout of Continental was necessary in order to prevent bank runs and the spread of the crisis to other banks. The US regulatory agencies bailed out Continental and promised 100% insurance for all creditors of the bank and bank holding company even though this was not legally required.

Wall and Peterson, 1990, based on stock price returns and financial statement data for their sample of US banks, conclude there was little evidence to support the bank run/contagion concerns of FDIC and Federal Reserve officials in the Continental case. Implicit in the discussion of their empirical results is the suggestion that the case for the bailout was very weak because no clearly identifiable systematic effects on bank stock prices were associated with the failure.

Other studies examining banking contagion or systemic effects in the US have reached conclusions similar to those of Wall and Peterson (1990). For example, Peavy and Hempel (1988) studied the 1982 failure of Penn Square Bank. They concluded that the Penn Square failure did not affect banks outside of the Penn Square market area; in other words, they found limited spillover effects. To the extent that contagion or spillover effects have been identified, they have been linked to banks sharing similar loan portfolios or, as just noted, similar market areas. Aharony and Swary (1983) examined the effects of three US bank failures on the

security prices of 73 other US banks and concluded that bank failures resulting from problems specific to the failed bank, such as fraud, did not affect other stock prices. However, if the problems of the failed banks were shared with other banks, such as common loan portfolios which were producing losses, the stock prices of other banks were also affected. These results were confirmed by Swary (1986) in his analysis of the 1984 Continental Illinois National Bank failure. Banks with characteristics similar to Continental's experienced negative stock returns. Banks defined by Swary as solvent were affected less than banks similar to Continental.

Evidence of bank failure spillover effects on the firms which had outstanding loans with the failed banks has been reported by Slovin et al. (1993). They examined excess stock returns for firms which had banking relationships with Continental Illinois Bank and found that the share prices of these companies were adversely affected during the bank's impending insolvency. Thus, if no banking industry-wide contagion effects were associated with the Continental Illinois failure, evidence exists that bank borrowers are adversely affected with attendant implications for their ability to maintain employment levels and sustain operations.

Our finding that commercial-bank financial distress events usually affected all Norwegian banks is contrary to the results reported in the US studies. Our results suggest investors believed all Norwegian banks were facing similar problems. The problems at one bank were not seen as being unique to that bank or caused by managerial policies – good or bad – which were unique to that bank. Instead, investor reaction to banking problems, as belated as it might have been, supported or provided information to Norges Bank and the Norwegian Government that industry-wide problems existed or were perceived to exist – problems which required responses to hold together an entire banking system. Our results, and especially our finding of market-wide spillover effects, confirm Norges Bank's opinion that (Skånland, 1992, p. 136.):

In other countries which experienced a crisis in the banking system, it had mostly been concentrated on one or a few banks of second and third rank. In our country the three major commercial banks, together with some others, are the ones which have been hit. It therefore became a systemic crisis which could not be resolved within the industry itself.

## **5. Conclusions**

We find that Norwegian commercial-bank failures during the Norwegian banking crisis were associated with negative common stock abnormal returns for both Norwegian banks and large Norwegian corporations listed on the Oslo Børs. We interpret this finding as supporting the conclusion of Norges Bank that the banking crisis was an economy-wide systemic crisis and required intervention by Norges Bank and the Norwegian Government. Although we find no systemic market-wide information effects associated with the failure of Norwegian savings-banks, we are reluctant to conclude that that these bank failures had no effect on the households, businesses and local economies served by those banks. The absence of negative abnormal returns on large commercial banks or publicly listed Norwegian corpora-

tions for the savings-banks events may reflect the fact that large commercial banks were serving a different banking clientele than the savings banks and that large Norwegian corporations did not rely on savings banks for financing.

We find little evidence that stock prices of banks which survived the banking crisis responded differently to financial distress announcements than the banks which would eventually fail. We conclude that investors were unable to distinguish between banks which would fail and those which would survive or that investors did not consider the survivor banks to be different from the failed banks.

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