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Inter-industry Contagion and the Competitive Effects of Financial Distress Announcements: Evidence from Commercial Banks and Life Insurance Companies

Elijah Brewer III and William E. Jackson III

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by

Elijah Brewer III
Research Department, 11th Floor
230 S. LaSalle Street
Federal Reserve Bank of Chicago
Chicago, Illinois 60604-1413
(312) 322-5813
(312) 322-5214 - FAX
ebrewer@frbchi.org

and

William E. Jackson III
Kenan-Flagler Business School
Campus Box 3490
McColl Building
University of North Carolina
Chapel Hill, North Carolina 27599-3490
(919) 962-3214
(919) 962-2068 - FAX
wej3@unc.edu

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Abstract

In this paper, we investigate the "inter-industry" contagion effects of financial distress announcements by commercial banks on the stock returns of life insurance companies, and vice-versa. We focus on inter-industry contagion effects because the vast majority of the extant literature about contagion has neglected this important potential cost to shareholders. We examine adverse information about commercial real estate portfolios from three separate sets of announcements.

Our results provide very strong evidence of significant inter-industry shareholder wealth effects. However, these shareholder wealth effects do not appear to be purely contagious in nature. The wealth effects are directly linked to such factors as: geographic proximity, asset portfolio composition, liability portfolio composition, and regulatory expectations. Thus, it appears that the market considers both expected changes in the revenue produced by assets as well as the cost of liabilities when determining the magnitude of shareholder wealth effects. This helps to explain why in some instances competitors benefit from a rival firm's financial distress announcement. And, that this positive competitive benefit may outweigh any negative re-evaluation effects of the announcement. Unlike previous contagion studies, we also attempt to evaluate the proportion of the contagion effect that is informational relative to that proportion which is pure contagion.

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1. Introduction

Contagion usually refers to the spillover of the effects of shocks from one or more firms to other firms (Kaufman, 1994). Most studies of contagion limit their analysis to how shock affect firms in the same industry, or "intra-industry" contagion (e.g., Aharony and Swary, 1983; Lang and Stulz, 1992; Docking, Hirschey, and Jones, 1997; and Akhigbe and Madura, 2001). The purpose of this paper is to explore and document the likely magnitude of "inter-industry" contagion. In their comprehensive study of intra-industry contagion using many individual industries Lang and Stulz (1992) argue that if contagion is not simply an informational effect it will impose a social cost on our economic system. If this is true for intra-industry contagion, then the same argument must hold for inter-industry contagion as well. We focus on inter-industry contagion effects in this paper because the vast majority of the extant literature about contagion has neglected its important potential cost to shareholders.

Most of the studies on contagion follow the pioneering work of Aharony and Swary (1983) by differentiating between a "pure" contagion effect and a signaling or information-based contagion effect. An example of a pure contagion effect would be the negative effects of a bank failure spilling over to other banks regardless of the cause of the bank failure. And, an example of a signaling contagion effect would be if a bank failure is caused by problems whose revelation is correlated across banks, and the correlated banks are impacted negatively.[1]

[1] For a recent analysis see Brewer, Genay, Hunter, and Kaufman (2002). For reviews of the earlier literature, see Flannery (1998) and Kaufman (1994).

Lang and Stulz (1992) provide the most comprehensive treatment of intra-industry contagion effects in the extant literature. They investigate the effects of bankruptcy announcements on the equity value of the bankrupt firm's competitors. They find that the market value of a value-weighted portfolio of the stocks of the competitors of the bankrupt firms declines significantly at the time of the bankruptcy announcements. Lang and Stulz (1992) argue that bankruptcy announcements need not convey only bad news for other firms in the industry. By redistributing wealth from the bankrupt firm to its competitors, Lang and Stulz (1992) suggest that a bankruptcy announcement may have a positive impact under certain circumstances. They document empirically, that when industries are more concentrated and firms are less levered, the average value of competitors' equity increases significantly. This suggests that in some industries, competitors benefit from the difficulties of the bankrupt firms.

Aharony and Swary (1983) pioneered the distinction between pure and signaling-based contagious effects. And, Lang and Stulz (1992) significantly add to the literature by introducing the importance of the competitive effects in contagion analysis. However, both of these contributions focused on intra-industry impacts only. In this paper, we focus on both the intra-industry and "inter-industry" effects of potential contagion producing announcements. Following the intuition in Lang and Stulz (1992), we reason that firms which produce similar output and use similar input, may be impacted by the same announcements, even if they are classified in different industries (SIC codes). And, thus the inter-industry impacts of contagion may be as costly and important as the intra-industry consequences.

We use three major announcements of financial distress in this study. The first announcement is by a large commercial bank (the Bank of New England), the second announcement consists of a series of events—from several large banking organizations and a

regulatory agency (the Office of the Comptroller of the Currency), and the third announcement is by a large life insurance company (Travelers). We first establish that the commercial bank announcements negatively impact the equity values of life insurance companies (and vice versa). Next, we demonstrate that the bank regulatory agency announcement negatively impacts the equity values of life insurance companies as well as commercial banks. We then explicitly test if the shareholder wealth effects are linked to a set of specific firm characteristics.

Consistent with previous contagion studies, our results provide strong evidence of "intra-industry" contagion related wealth effects. We also find that these contagion effects, to a significant degree, can be explained by firm specific variables. This implies that the intra-industry spillover effects associated with our three events are not of the totally "pure" contagion variety, but have an informational component as well.

We also find very strong evidence of significant "inter-industry" contagion-based shareholder wealth effects. Again, these contagion-based wealth effects do not appear to be purely contagion-based. Wealth effects can also be explained by such factors as: geographic proximity, asset composition, liability composition, leverage, size, and regulatory expectations.

Thus, it appears that the market considers both expected changes in the revenue produced by assets as well as the expected changes in costs due to competitive and regulatory influences when determining the magnitude of shareholder wealth effects. This helps to explain why in some instances competitors benefit from a rival firm's financial distress announcement. Further, this positive competitive benefit may outweigh any negative revaluation effects of the announcement. Lastly, our results implicitly suggest that the market's regulatory expectations for commercial banks were different from those for life insurance companies during the period of our study.

This paper adds to the market efficiency literature by explicitly investigating and documenting the importance of inter-industry contagion effects. The remainder of the paper is organized as follows. In section 2, we provide some background and motivation about why inter-industry contagion is important, why we use commercial banks and life insurance companies in our analysis, and why we selected the events that we study. In section 3, we present the hypotheses we are testing. In section 4, we discuss some aspects of the commercial real estate market that are useful for interpreting our main results. In section 5, we provide a chronology of the three events analyzed in this paper. In section 6, we present our data and methodology. In section 7, we present our main results and discuss their implications. In this section, unlike previous contagion studies, we offer an attempt to evaluate the proportion of the contagion effect that is informational relative to that proportion which is pure contagion. Lastly, in section 8, we offer a brief summary and some concluding remarks.

2. Background and motivation

The purpose of this paper is to explore the likely magnitude of inter-industry contagion. Three specific questions underpin the motivation for pursuing this research. First, why investigate inter-industry contagion? Second, why use commercial banks and life insurance companies (LICs) in our investigation? And, third, why use the announcements (or events) that we have chosen in this investigation.

Why investigate inter-industry contagion?

Lang and Stulz (1992) argue that if intra-industry contagion is not simply an informational effect it will impose a social cost on our economic system. If this is true for intra-industry contagion, then the same argument must hold for inter-industry contagion as well. At a

more fundamental level, there may also be an industry definition problem. That is, the standard industry classification codes (SICs) used in most empirical research may not adequately capture the underlying economics of industry operations. For example, it may be difficult to classify firms that face similar factor input markets, but different output markets. Additionally, Fenn and Cole (1994) report evidence that the equity market considered the likely response of LIC policyholders (factor inputs) in valuing the impact on individual LIC equity of Travelers' financial distress announcement. If the market is smart enough to discern the likely reaction of factor input suppliers; then market efficiency, as discussed in Fama (1998), would demand that the market also be smart enough to look across SIC codes to consider the true economic markets in which firms compete. That is, economic markets are more important than SIC codes [see Stigler and Sherwin (1985) and Jackson (1992)]. Thus, inter-industry contagion is also worth investigating.

Why banks and LICs?

With the passage of the Gramm-Leach-Bliley Act of 1999, the financial services landscape became less disjoint and more integrated. It is now possible for life insurance companies and commercial banking organizations to become fully affiliated through a new structure called a financial holding company. However, long before this official affiliation was possible, banking organizations and LICs had begun to compete in similar input factor markets as well as product markets. For example, both LICs and banking organizations have been major players in the commercial real estate mortgage market for several decades (see Tables 1 and 2). And, it has been recognized that banking organizations and LICs share certain similar intermediary functions (Fama 1980). However, there also are differences between the two organizations. As James (1987) points out, there appears to be something special about banking

organizations. This specialty may be a result of the amount of private information banking organizations produce relative to LICs as characterized in models such as Boyd and Prescott (1986), Diamond (1984, 1991), Bhattaharya and Thakor (1993), and Kamakrishnan and Thakor (1984). Or, it may stem from the different public policy and regulatory considerations to which banking organizations are privy as mentioned in Diamond and Dybvig (1983, 1986), Fama (1980, 1985), and Boot and Thakor (1991, 1993). One specific characteristic that large banking organizations were thought by many to possess at the time of this study was the benefits of the too-big-to-fail (TBTF) doctrine, as described in Kaufman (1994). TBTF suggested that if a banking organization was large (and important) enough, regulators would not close the firm and simply pay insured depositors if the banking organization went bankrupt. Rather, if a banking organization was TBTF and went bankrupt, regulators would seek to keep the banking organization's operations intact perhaps by merging the insolvent TBTF banking organization with another TBTF banking organization. Of course, this action would likely provide some protection even for uninsured depositors and shareholders. Thus, it is not simply deposit insurance that separates banking firms from LICs (as LICs have a form of liability guarantee also). Rather, it is a more general and subtle difference between investors' expectations of the implicit regulatory treatment of banking firms and LICs that may cause their market equity to respond differently to similar financial crises. Because of their many similarities and significant differences, LICs and banking firms provide an excellent laboratory to test our inter-industry experiment.

Why these events?

Recall that we conduct our investigation by examining three separate announcements involving adverse information about commercial real estate portfolios. One of these

announcements is from a large commercial bank (the Bank of New England), one is a series of announcements by banking organizations and a regulatory agency (the Office of the Comptroller of the Currency), and one is from a large life insurance company (Travelers).

There are two reasons we chose these particular events. First, the events seemed to be very unusual and very significant indicators of future (and present) financial distress. Second, the events shared a common theme of financial distress caused by problems with commercial real estate portfolios.

3. The major hypotheses

Our earlier discussion suggests that announcements of commercial real estate problems, asset write-downs and dividend cuts, and regulatory concerns about the condition of the commercial real estate market could produce negative equity price reactions from the shares of institutions dealing in commercial real estate. Like much of the extant literature, we test the following four hypotheses about the impact of these announcements on share prices of institutions dealing in commercial real estate: *a.) the irrelevance hypothesis, b.*) *the positive revaluation hypothesis, c.) the negative revaluation hypothesis, and, d.) the pure or noninformational contagion hypothesis*. Unlike the extant literature, we evaluate the inter-industry as well as the intra-industry effects of these announcements.

3.1 The irrelevance hypothesis

Under the irrelevance hypothesis, commercial real estate financial distress announcements have no significant impact on the share prices of non-announcement firms. This may occur because; 1) the announcements revealed new information for the values of non-

announcement firms, but shareholders did not, or could not, fully incorporate the information into share prices in a timely manner due to market inefficiency, 2) the financial distress announcements were fully anticipated by market participants and provided no new information, or 3) the causes of the financial distress and the regulators' response to the firms' weakening condition were perceived to be idiosyncratic and not relevant to the non-announcement firms.

3.2 The positive revaluation hypothesis

Under the positive revaluation hypothesis, investors perceive the commercial real estate financial distress announcements as relatively positive news for both the banking and insurance companies that do not announce financial distress, generating positive abnormal returns for these non-announcement firms. This would occur if the financial distress announcements were perceived as improving the competitive conditions for the non-announcement firms, increasing their earnings and share prices (Lang and Stulz, 1992; and Kaufman, 1994).

3.3 The negative revaluation hypothesis

Under the negative revaluation hypothesis, the commercial real estate financial distress announcements have a significant negative impact on the share prices of non-announcement firms by signaling higher operating and regulatory costs. The financial distress announcements could have revealed previously undisclosed or understated problems in the commercial real estate market. In addition, firms that were perceived to be similar to the announcing firms could face increased surveillance and various regulatory actions to restrict their activities (Grammatikos and Saunders, 1990).

3.4 The pure or noninformational contagion hypothesis

Under the pure contagion or noninformational contagion hypothesis, investors perceive the announcements to affect all non-announcement firms stocks similarly, regardless of differences in the financial condition or other characteristics of the individual firms. The ability of the market to differentiate among firms is affected by the quality and timeliness of the information that is publicly disclosed about these institutions. The less accurate, precise, or timely the information, the less likely are security prices to fully reflect the actual financial and risk characteristics of the individual firms. In such environments, even if the financial distress announcements revealed new information and had a significant impact on the banking and insurance sectors, their impact on individual firm share prices will not be correlated with the reported condition of the organizations.

In contrast, if accurate and timely information were available, investors could assess the relevance of the financial distress announcements to the operation of individual firms. The responses of shareholders would then be related to financial and other characteristics of the non-announcement firms and be inconsistent with the noninformational hypothesis. For example, if the financial distress announcements revealed previously undisclosed problems in the commercial real estate sector of the economy, one would expect firms in weaker financial condition or with greater exposures to the problem institutions to be more adversely affected.

4. The commercial real estate market

About two-thirds of the commercial real estate market (which provides a market for loans on nonresidential properties such as office buildings and manufacturing plants) traditionally has been financed by commercial banking organizations and LICs. For example, Table 1 shows that

commercial banking organizations and LICs accounted for about 73 percent of all commercial real estate loans in 1990. During the 1980s, the commercial mortgage holdings of commercial banking organizations grew at a faster rate than those of LICs. While commercial banking organizations are the larger holders of these loans, these loans make up a larger proportion of LICs' total assets (see Table 2).

Lending in the commercial real estate market requires substantial amounts of information gathering in the form of credit evaluation and monitoring of borrowers' management through covenant enforcement. Borrowers in this market are typically small firms that do not have access to alternative sources of funds.

A study of the commercial real estate market has indicated that the loans made in these markets generally have less uniform terms than do other investments such as publicly traded corporate bonds (Cabanilla, 1992). As a result, mortgage loans are less liquid. Yields are higher to reflect information gathering costs and greater default risk. Because of these characteristics, the commercial real estate market is an intermediated market similar to that for business loans.

Commercial banking organizations real estate problems could convey *bad* news about LICs since the values of their real estate investments may be correlated. All else equal, one would expect that announcements of commercial real estate problems would have intra- and inter-industry impact on firm share prices. That is, announcements by banking organizations of commercial real estate problems should affect the stock market valuation of other banking organizations and LICs. Similarly, announcements by LICs should affect the stock market of other LICs and banking organizations.

Table 3 provides information about the ex post rate of return from holding commercial properties and vacancy rates of commercial and industrial structures.[2] A group of institutional investors is surveyed by the National Council of Real Estate Investment Fiduciaries (NCREIF) on the rates of return they earn from their properties. This survey was started in 1977 and has increased over time in scope and the number of reporting investors. The properties, which include offices, warehouses, hotels, retail establishments, and apartments, are located in a variety of regions in the United States.[3]

Information on the overall Russell-NCREIF property index (total) and its two components is provided in the table. The *income* rate of return component is computed by taking net operating income and dividing by the market value of the properties. The *capital* rate of return component measures the percentage change in the market values of the properties. Since 1980, the trend in all three return series has been downward. The capital rate of return was negative in 1990. As the rates of return series indicate, conditions in the commercial real estate market had been deteriorating for some time before the announcements of commercial real estate related problems by financial intermediaries in the late 1980s and early 1990s.

Table 3 also shows the national vacancy rates for commercial and industrial properties.[4] Each vacancy rate pertains to the first quarter of the year. The results in the table show that both vacancy rate series were trending upward over the 1980-1990 period. This rise was remarkably

[2] See Hester (1992) for a discussion of the role of financial institutions in real estate markets.
[3] Hester (1992) provides an excellent discussion of features of the Russell-NCREIF property index.
[4] Coldwell Banker Commercial Real Estate Group, Inc. publishes quarterly vacancy rate information for both office buildings and industrial structures. The commercial vacancy index is computed for office buildings in downtown areas. Coldwell Banker's industrial index is based on results from a survey of industrial properties that could accommodate a tenant requiring at least 100,000 square feet. See Hester (1992) for additional discussion of the features of these vacancy rate series.

steady over those 11 years, suggesting that commercial real estate markets could be overbuilt which would adversely affect net operating income and property values.

5. Chronology of events relating to commercial real estate problems

Clearly the information in Table 3 indicates that the deteriorating conditions in the commercial real estate market should not have caught market participants by surprise. On the other hand, market participants may have had difficulty assessing mortgage loan values in a declining real estate market in which there are very few transactions. Consequently, announcements of commercial real estate related problems may convey new and unfavorable information about the quality of real estate investors' assets, causing real estate investors' share prices to decline. This asset-information hypothesis pertains to the information content of commercial real estate related announcements.

5.1 Event 1: Bank of New England Corporation boosts reserve for loan losses, December 15-18, 1989

On December 15, 1989 the *Wall Street Journal* (*WSJ*) reported that Bank of New England Corporation (BNEC) was expected to disclose that day the magnitude of a major fourth-quarter loss, because of the northeast region's real estate slump. The same story noted that rumors had been circulating over the past month that federal bank examiners were taking a hard look at the Bank of New England's books, increasing speculation that there would be a major increase in nonperforming loans. The *WSJ* reported on December 18 that rumors about BNEC led the New York Stock Exchange to delay the opening bell for two hours for trading in the stock. BNEC announced on December 15 that its nonperforming loans would increase by $700 million by year-end. This surge in problem real estate loans at BNEC after a third quarter increase at Bank of Boston Corporation raised concerns about the outlook for New England's

real estate market. The *WSJ* story indicated that the projected 78 percent fourth quarter jump in Bank of New England's nonperforming loans to $1.6 billion from $900 million at the end of the third quarter was far worse than had been expected. In addition, the *WSJ* story indicated that analysts were concerned about whether all of BNEC's real estate problems had been identified, leading to speculation that more losses would be announced in the future.

5.2 Event 2: Announcements by the Comptroller of the Currency and several East Coast banks, September 20-26, 1990.

On September 20, 1990, the Comptroller of the Currency Robert L. Clarke warned that real estate conditions were likely to worsen, especially on the East Coast (see Trigaux, 1990). On September 21, Chase Manhattan Corporation announced that it would cut its dividend in half and increase its loan loss reserves by $650 million. On the same day, Midlantic Corporation and Southeast Banking Corporation announced that they were increasing nonperforming loans in the third quarter of 1990 and reducing or eliminating their dividend (see Goodwin, 1990; and Horowitz and Leander, 1990). On September 27 Bank of Boston Corporation announced that it was reducing its dividend because of worse than expected losses in its commercial real estate loan portfolio.

5.3 Event 3: Travelers Corporation announces that it was reserving $650 million for anticipated losses in its commercial real estate portfolio, October 5-8, 1990

On Friday October 5, Travelers Corporation, the seventh largest life insurance firm, with more than $57 billion in assets, announced that it was reserving $650 million for anticipated losses in its commercial real estate portfolio. According to *WSJ* reports on Monday, October 8, this announcement surprised investors. Travelers expected to report a $500 million third quarter loss as a result of the increase in loan loss reserves. The company also announced a 33 percent

cut in its common stock dividends from $0.60 per share to $0.40 per share. At the close of the New York Stock Exchange on Friday, Travelers stock price ended at a 52-week low of $16.375, down $4.375 from the previous day's closing price. Some analysts had expected an addition to reserves because of Travelers' huge real estate exposure. Travelers' mortgage and real estate portfolio amounted to $17.4 billion, 30 percent of its total $57.3 billion in assets (see *WJS*, October 8). At the end of the second quarter of 1990, $3.5 billion of the portfolio was classified as underperforming loans.

On Monday, October 8, Travelers made additional substantive disclosures during a meeting with security analysts in New York. Travelers' executives said the company might sell more assets, cut some operations, and even sell some stocks and bonds in its investment portfolio, but analysts and major investors said these moves still might not be enough. On Monday, Travelers' stock slid $2.00 more to close at $14.375. Travelers' problems spilled over to most other insurance stocks, much like the effect of Chase Manhattan Corporation's problems on other banks following its announcement on September 21. However, insurers' real estate portfolios were viewed as a little less risky than those of banks, because insurers generally lend to completed projects such as office buildings where space is already leased, while banks lend much earlier on in the process of real estate development. Nevertheless, analysts expected Travelers' actions to presage similar moves by other insurance companies with substantial real estate holdings, and might lead them to re-evaluate their dividend policy. Most analysts believed that Travelers would have to cut its payout again if the real estate market did not recover. During the meeting on October 8, Travelers' executives told analysts that the company's $3.5 billion in non-performing mortgage loans could increase by 10 percent to 15 percent within the next year.

Fenn and Cole (1994) argued that Travelers Corporation's announcement was significant to shareholders of other insurance companies, not for what it revealed about the state of the commercial real estate market, but because of the anticipated impact of the announcement on the behavior of policyholders, especially guaranteed investment contracts holders.

Guaranteed investment contracts (GICs) are widely used as funding instruments for defined contribution pension plans, typically obligate a life company to repay principal and interest accruing at a predetermined rate in a single payment at maturity. Thus, GICs provide a close substitute for bank certificates of deposit (see Todd and Wallace, 1992).[5]

Fenn and Cole (1994) pointed out that the Travelers Corporation's announcement concerning investment losses could have a negative impact on other LICs' profitability by inducing policyholders to exercise their withdrawal options and discouraging new policy sales. LICs' increased reliance on annuity contracts and GICs has at least three implications for the financial condition of life insurance companies. First, policyholders appear to shop around for high rates of return, forcing profit margins down. Second, policyholders appear to be more sensitive to LICs' capital. Third, holders of annuity contracts and GICs are more willing to exercise their withdrawal options, causing liquidity problems for companies with poor asset quality. If shareholders anticipate these reactions from policyholders, it should be reflected in stock market prices. LICs shareholders' returns should be below those that they would normally receive for companies that held large concentrations of risky assets, and whose products offered significant withdrawal options, or whose products were potentially rating sensitive.

[5] Todd and Wallace (1992) argue that GICs were used by many LICs in the 1980s to facilitate rapid growth. Since these liabilities, along with single premium deferred annuities (SPDAs), have payoff characteristics similar to bank certificates of deposit, Todd and Wallace argue that LICs could use SPDAs and GICs to draw on savings previously held in other forms without the constraint imposed by the growth in the demand for insurance.

6. Data and Methodology

We examine share price responses to these three announcements for 134 banking organizations and 61 life insurance companies. Banking organizations are segregated into big banks (money center and super-regional banking organizations), Northeast (excluding banking organizations in the big bank group), and other firms. Northeastern banking organizations have headquarters and substantial operations in the following states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania.

Stock returns of life insurance companies are also examined to determine whether the comptroller's statement in September 1990 and banks' announcements revealed unfavorable information about the quality of insurance company assets.

Daily share prices for banking organizations and life insurance companies are obtained from the Center for Research in Securities Prices (CRSP) file. The stock market index employed in this study is the value-weighted portfolio (NYSE and AMEX) obtained from the CRSP database.

6.1 Event study procedure

We test the previously described research hypotheses by applying a standard event-study methodology similar to that described in detail in Dodd and Warner (1983). For each security i, under the assumption of multivariate normality, the market model is used to calculate abnormal return ($AR_{i,t}$) for event day t as:

$$AR_{i,t} = R_{i,t} - \hat{a}_i - \hat{b}_i R_{m,t}, \qquad \textbf{(1)}$$

where

$R_{i,t}$ = return to firm i on day t,

$\hat{a}_i$, $\hat{b}_i$ = market model parameter estimates, and

$R_{m,t}$ = return to the value-weighted CRSP market portfolio on day t.

The market model parameter estimates for each firm are obtained using a maximum of 240 trading days of daily returns data beginning 260 days before the first event.

The cumulative abnormal return ($CAR_{i,t}$) from event day T1 to event day T2 is computed as:

$$CAR_{T1,T2} = \sum_{t=T1}^{T2} AR_{i,t} \ . \qquad \textbf{(2)}$$

Following Patell's (1976), we employ the Z-statistic to determine whether the abnormal returns are statistically significant. First, we compute the standardized abnormal return to the ith firm (portfolio) on day t, $SAR_{i,t}$:

$$\mathrm{SAR}_{i,t} = \mathrm{AR}_{i,t} \Big/ \left[s_{i,t} \left(1 + \frac{1}{T_i} + \frac{(R_{m,t} - \bar{R}_m)^2}{\sum_{t}^{T_i} (R_{m,t} - \bar{R}_m)^2} \right)^{1/2} \right] , \qquad \textbf{(3)}$$

where

$\sigma_{i,t}$ = standard deviation of the residuals in the market model estimation period,

T_i = number of days in the estimation period, and

$\bar{R}_m$ = mean return to the market portfolio over the estimation period.

Next, the $SAR_{i,t}$ is then used to obtain the standardized CAR_i over the K_i event days:

$$SCAR_i = \left[\sum_{t=1}^{K_i} SAR_{i,t} \right] / \sqrt{K_i} \, . \qquad \textbf{(4)}$$

Finally, the Z-statistic for firm i is computed as:

$$Z_{\mathrm{i}} = SCAR_i / \left[((T_i - 2)/(T_i - 4))\right]^{1/2} \quad . \tag{5}$$

and for a portfolio of N_P firms is computed as:

$$Z = \left[\sum_{i=1}^{N_P} SCAR_{\mathrm{i}}\right] / \left[\sum_{i=1}^{N_P} ((T_i - 2)/(T_i - 4))\right]^{1/2} . \tag{6}$$

We examine the individual firms' abnormal returns -- $AR_{i,t}$ -- for each event. If the impact of the financial distress announcements were consistent with the positive revaluation hypothesis and had unanticipated positive implications for the banking and insurance industries by reducing competition, we would expect the abnormal returns during the event window to be positive and statistically significant. If the impact of the events were consistent with the negative revaluation hypothesis and revealed previously unanticipated adverse news for the banking and insurance industries by indicating greater weakness or risk of more timely regulatory closure, we would expect the individual firm reactions to be significantly negative. If the impact of the events were consistent with the irrelevance hypothesis and revealed no new information or were considered irrelevant by the shareholders of non-announcing firms, the abnormal returns would be statistically indistinguishable from zero. To distinguish among the positive revaluation, the negative revaluation, and the irrelevance hypotheses, we test the hypothesis H_0^1, that the abnormal returns for the portfolios non-announcing institutions equal to zero for each event *e*:

$$H_0^1 : AR_{p,e} = 0 \; or \; CAR_{p,e} = 0 \; .$$

In addition, we report the number of negative abnormal returns among the non-announcing institutions, the number of firms in the portfolio, and the Z-statistic testing the hypothesis that 50% of the abnormal returns are positive. A rejection of this hypothesis would be consistent with the negative revaluation hypothesis.

6.2 Firms operating characteristics

We also test *the pure or noninformational contagion hypothesis* to explore whether there is evidence of cross-sectional variation in the responses of banking organizations and LICs based on their own financial condition. Specifically, we examine whether the variations in firms' cumulative abnormal returns are related to that firm's commercial real estate exposure, capitalization, funding sources, geographic location, and market conditions.

6.3 Life insurance companies

For each of the three events, the announcement effect on life insurance companies' cumulative abnormal returns is examined by cross-sectionally estimating the following regression equation:

$$CAR_i = g_0 + \sum_k g_{1,k} COND_{i,k} + e_i, \qquad (7)$$

where $COND_{i,k}$ is a variable that describes the kth financial condition of firm i at the time of the event and ε_i is an error term with assumed standard properties. In consideration of Fenn and Cole (1994), the financial condition variables (COND) that we use are: 1) the ratio of commercial real estate loans to total assets (CRE); 2) the ratio of book value of equity to total assets (CAP); 3) the ratio of guaranteed investment contracts to total assets (GIC); and 4) the cumulative abnormal return over the 22 trading days ending one day before each event (SURPRISE).

The relationship between commercial real estate exposure and cumulative abnormal returns should be negative, with large-exposure life insurance companies showing more return sensitivity than small-exposure banking organizations. Fenn and Cole (1994) found that the runs

at Travelers Corporation pushed down share prices at other LICs. They also found that, among LICs holding relatively high amounts of commercial real estate loans, the negative impact of the announced asset quality problems was worse for companies with larger GICs and annuities and smaller capital. To investigate these possibilities, we test the hypothesis

$$H_0^2: g_{i,k} = 0,$$

for each of the three events and each of the financial condition variables.

Each of the 61 insurance companies specialized in life insurance (greater than 60% of their assets). Balance sheet variables for the LICs are from the Statutory Reports of Condition that insurance companies are required to file with state regulators at the end of each year. For multiple LIC holding companies, we aggregate (sum) the assets and liabilities of individual subsidiaries.

6.4 Banking organizations

In previous intra-industry contagion studies Aharony and Swary (1996) found that geographic distance and capital were negatively related to the contagion effect, but bank size was positively related. Docking, Hirschey, and Jones (1997) found that money-center and large regional banks reacted differently than other banks. Akhigbe and Madura (2001) reported that the informational element of the contagion effect varies over time, bank size, capital levels.

We considered the findings of these previous studies when determining the variables to use in estimating equation (7) for our banking organizations. Consistent with these previous studies, we use the following financial and market condition variables to describe our banking organizations at each event date. First, NONRESIDENTIAL is the ratio of nonresidential real estate loans to total assets. Second, CONSTRUCT is the ratio of construction loans to total assets. Third, CAPITAL is the ratio of book value of equity to total assets. Fourth,

NORTHEAST is an indicator variable for northeastern banking organizations. Fifth, BIG BANK is an indicator variable for money center or super-regional banks. And, sixth, SURPRISE is the cumulative abnormal return over the 22 trading days ending one day before each event. To prevent possible estimation problems caused by the correlation of our NORTHEAST and BIG BANK variables, banks in the BIG BANK category are excluded from the NORTHEAST category even if they are located in the northeast region.

Estimation of equation (7) allows us to test whether the market's ability to distinguish among banking organizations varies by the degree of commercial real estate exposure, as well as other financial and market conditions. For example, the negative or positive signal resulting from commercial real estate related announcements should cause a greater revaluation of those banking organizations in the northeastern area that were more susceptible to the same type of problems. Because of proximity, those banking organizations may have had a greater exposure to problem commercial real estate. We obtain balance sheet data for individual banking organizations from the Federal Reserve Y-9 data files.

7. Empirical results

After the groundbreaking study of Aharony and Swary (1983), most studies of intra-industry contagion followed a two step evaluation process. In the first step the researchers sought to establish that a contagious event had occurred. And, in the second step, the researchers tested whether the contagious event (given a positive finding in step one) was of a pure contagion nature or if it exhibited evidence of an informational component. For example, this is the basic procedure used in Lang and Stulz (1992), Fenn and Cole (1994), Aharony and Swary

(1996), Slovin, Sushka, and Polonchek (1999), Bessler and Nohel (2000), Akhigbe and Madura (2001).

For the first step in this research procedure, a market model was usually used to establish if the market responded to the event. The event was usually defined around an announcement (often of a negative orientation) reported in a well-regarded business newspaper (e.g., *The Wall Street Journal*). If the abnormal returns of the announcing firm (or firms) were significant and/or the abnormal returns of a portfolio of firms in the same industry were significant, the researchers usually concluded that a contagious event had occurred. For step two, the researchers typically used the individual abnormal returns for the firms in the industry portfolio, that is, the non-announcing firms, to test whether the event had any informational contagion elements to it. This was done by testing for any significant cross sectional correlation between the abnormal returns of the individual firms, and specific characteristics of those firms that should be related to the information released by the event. For example, an event releasing new information to the market about commercial real estate should have a relatively larger impact on firms with relatively more commercial real estate in their portfolios (all else equal).

This same type of two-step process is followed in this study. However, we attempt to go beyond the extant literature by using our individual firm abnormal returns in several novel ways. The rest of this section proceeds as follows. In subsections 7.1 and 7.2, we establish that both intra- and inter- industry contagious type events occurred. In subsection 7.3, we present the cross sectional regression results for life insurance companies (LICs) for the three events. The responses of the LICs to the two bank-related events appear to have less of an informational component relative to the LICs response to the LIC related event. In subsection 7.4, we present the corresponding cross-sectional results for banking organizations and show that the cumulative

abnormal returns (CARs) for our individual banks exhibit an informational component in response to the two bank-related events. We also show that the cross sectional CARs for our banks exhibit an informational component in response to the life insurance event. These findings suggest that both the intra- and inter-industry contagion effects that we document in this study have an informational component within. We discuss in much more detail the issues of relative informational components across intra- and inter-industry events in subsection 7.5.

7.1 Performance of distressed financial institutions to own announcement and that by other firms

Panel A of Table 4 provides estimates of abnormal returns for Travelers Corporation and five major BHCs making announcements of problems in their commercial real estate portfolios over our sample period. The five BHCs are, BNEC, Bank of Boston Corporation, Chase Manhattan, Midlantic Corporation, and Southeast Banking Corporation. On December 15, 1989, BNEC disclosed that it was raising its loan loss reserves (event 1), and this disclosure led to a negative and statistically significant stock market reaction. The cumulative abnormal return (CAR) over a two-day event period (i.e., Friday, December 15 and Monday, December 18) was a negative 42.65% for BNEC. The CARs are negative for all of the other four BHCs as well; but only two are significant (-11.48% and -8.97% for Bank of Boston Corporation and Southeast Banking Corporation, respectively). Notice that Travelers Corporation (an insurance company) had a negative and significant CAR (-3.60%), suggesting that this announcement by BNEC (a banking organization) had a significant inter-industry effect also.

Notice that event 2 (a banking event) also provides evidence of an inter-industry effect as it produced a negative and statistically significant impact on the shares of Travelers Corporation (as well as the five BHCs). From Table 4, observe that Chase Manhattan's CAR was -14.86%

over the 6-day event period (September 20-27) that included its announcement of a 50% cut in dividend and increase in loan loss reserves by $650 million. The CARs for the other banking organizations announcing dividend reductions and suspensions during the event 2 period was -12.66% for Bank of Boston Corporation, -17.12% for Midlantic Corporation, and -9.12% for Southeast Banking Corporation.

The Comptroller of the Currency announcement during event 2, might have raised concerns that a large number of banks would be forced to make additions to their loan loss reserves in the future to cover commercial real estate loans. Future additions would be expected to lower banks' future capital ratios and raise regulatory costs in the form of increased surveillance by regulators and/or the costs of raising additional equity capital to comply with regulatory imposed minimum capital standards (see Grammatikos and Saunders, 1990). The loan loss reserve announcements by Chase Manhattan, Midlantic Corporation, and Southeast Banking Corporation served to reinforce the Comptroller's statement concerning commercial problems at northeastern banks. Moreover, these announcements highlighted the deteriorating condition of the commercial real estate market in generally, sending a *negative* information signal to outside investors about the valuation of institutions exposed to commercial real estate problems. As at the BNEC's announcement, at the Comptroller of the Currency and East Coast BHC's announcements, Travelers Corporation's CARs are negative and statistically significant. Again, this suggests an inter-industry contagion effect of banking organizations related financial distress announcements on this life insurance company.

The announcement (event 3) by Travelers of an increase in loan loss reserves and decrease in dividends per share was associated with a significant CAR of -33.41% for the Travelers Corporation. More interestingly, the CARs were positive for four of the five BHCs, of

which, three were significant. Like the bank announcements, the Travelers' announcement had a substantial inter-industry impact. However, unlike the financial distress announcements associated with banking organizations, the Travelers' announcement had a positive inter-industry impact. Taking together, these results suggest that asset write-downs (and dividend reductions and suspensions) can have both positive and negative inter-industry impacts.

7.2 Abnormal returns of non-announcing banks and life insurance companies

Panel A of Table 4 also provides estimates of the abnormal returns for portfolios of non-announcing banking organizations and life insurance companies over our three events. In the column labeled "Other Banks," we report the results for non-announcing banks and in the column labeled "Other Life Insurance Companies" we present the results for non-announcing life insurance companies. The Z-statistic is reported beneath the abnormal returns. In each column, the row beneath the Z-statistics reports the number of negative abnormal returns, the number of firms in the sample, and the Z-statistic testing the hypothesis that 50% of the abnormal returns are positive. For non-announcing banks, the CARs are negative and statistically significant for the first two events. As a portfolio, non-announcing banks did not exhibit a significant change in shareholder value at the announcement of Travelers Corporation's loan loss reserves addition and dividend reduction. The two-day CAR for the portfolio of non-announcing banking organizations of 0.15% has a corresponding Z-statistic of 0.34.

To determine whether non-announcing banks with negative abnormal returns statistically outnumbered those with positive returns, we computed the proportion of positive abnormal returns minus 0.5 divided by the standard deviation of a binomial distribution (the "sign test"). The sign test indicates that the number of banks with negative abnormal returns exceeded those

with positive returns in all three cases, although statistically significant so in only the first two events. The results for non-announcing BHCs' reactions to the bank-related announcements are consistent with the negative revaluation hypothesis. However, the result for the Travelers Corporation's announcement is not consistent with the negative revaluation hypothesis.

Unlike non-announcing banking organizations, the CARs for non-announcing LICs are all negative and statistically significant. Moreover, the sign test for the *other* LICs indicates more negative CARs in all three events, supporting the negative revaluation hypothesis. Thus, bank- and life insurance-related announcements have a statistically significant effect on the portfolio of *other* LICs overall, suggesting that there are substantial inter- and intra-industry effects of the three events analyzed in this paper.

Next, we investigate whether the average response of non-announcing banking organizations was equal to the average response of non-announcing life insurance companies for each event. These results are reported in Panel B of Table 4. The results indicate that the portfolio of non-announcing banks was more adversely affected by the bank-related announcements than was the portfolio of non-announcing LICs. However, the portfolio of non-announcing LICs was more adversely affected by Travelers Corporation's announcement. Although there are substantial inter-industry effects at each event, these financial distress announcements appear to have a greater impact on firms in the same industry as the announcing institutions.

7.3 Cross-section tests of LICs commercial real estate exposure

Obviously, our announcements need not have equal effects on all non-announcing organizations within the same industry. Indeed, Fama (1991, 1998) argues that in a semi-

efficiency market, if information is publicly available about the characteristics of the firms involved, then those firms with characteristics more similar to those of the announcing firm(s) should respond differently than those with less similar exposures. And, from table 5 we observe that there is a wide range for the exposure characteristics associated with our sample of non-announcing bank holding companies and life insurance companies. In order to examine this issue, we estimate equation (7) for both banking organizations and LICs.

Table 6 presents the cross sectional CAR results for LICs. The LICs with relatively more commercial mortgages experienced significantly more negative CARs at Travelers Corporation's announcement. At BNEC's announcement (event 1) this effect is not statistically significant. Nor, is it significant at the Comptroller of the Currency and East Coast banking organizations' announcements (event 2). Unlike the specification for the Travelers Corporation's announcement (event 3), these specifications have low adjusted-R^2, suggesting that the correlates explain a small amount of the variability in CARs.

For our non-announcing LIC sample, commercial real estate exposure has very little impact on how shareholders react to our two bank-related announcements, but has a significant negative effect for our LIC related announcement. A possible explanation for this is that the bank events provide little new information about LICs because public information about the market value of LIC assets is substantial, and better than public information about bank assets. The results for the GIC variable suggests that the market expected the cost of GIC funding to rise, decreasing the market value of LICs that heavily depend on GIC funding (Fenn and Cole, 1994). For every case presented in Table 6, the coefficient on the GIC variable is negative, and it is statistically significantly for both events 1 and 3.

7.4 Cross-section tests of BHCs commercial real estate exposure

Previous research on intra-industry contagion (e.g., Aharony and Swary, 1996) suggests that geographic proximity, bank size, and capitalization may help explain the variation in contagion effects across firms. Our binary variables (NORTHEAST and BIG BANK) allow us to differentiate along geographic and size dimensions the impact of each of the events on BHC share prices. And, we include a capital ratio variable (CAPITAL) also.

The relationship between the capitalization ratio and CARs should be positive, with well-capitalized BHCs showing less return sensitivity than poorly capitalized ones. On the other hand, the relationship between commercial real estate exposure (nonresidential real estate and construction loans) and CARs should be negative, with large-exposure BHCs showing more return sensitivity than small-exposure BHCs.

Results of the cross-sectional estimation of equation (7) for BHCs for the three events are presented in Table 7. Our results indicate a significant relationship between the capitalization ratio (CAPITAL) and the cross sectional CARs for each of the first two events. In general, for our sample of non-announcing BHCs, those less well capitalized had more negative CARs. Note that the coefficients on the CONSTRUCT variable are negative and statistically significant for all three events. Thus, non-announcing BHCs with greater loan exposures to the riskier construction sector were significantly more adversely affected by all three announcements. At BNEC's announcement (event 1), the market penalty was greater for northeast BHCs, while it was relatively less for BIG BANK institutions. BIG BANK institutions were also less adversely affected by the announcement of Travelers Corporation's addition to its loan loss reserves and dividend reduction (event 3).

7.4.1 When do competitive effects dominate contagion effects?

We observe from tables 6 and 7 that our independent variables do a reasonable job of explaining cross-sectional variation in the distribution of CARs for most events. However, it would be impossible from tables 6 and 7 to investigate whether the average CARs for a select portfolio of non-announcing firms was positive (or negative) for a specific event. Such analysis is important because it would allow us to investigate when the competitive effects of our financial distress announcements dominate the contagion effects.

Lang and Stulz (1992) were the first to demonstrate that the positive revaluation effect (what they defined as their competitive effect) might dominate the negative revaluation effect (what they defined as their contagion effect) for a certain group of firms. Recall that the positive revaluation effect stems from the financial distress announcements being perceived as improving the competitive conditions for the non-announcement firms. And, the negative revaluation effect is associated with the perception that firms similar to the announcing firms may face increased operational and regulatory costs.

To investigate this issue, we grouped our non-announcing firms into portfolios based on high (above the median) or low for continuous variables and yes or no for the binary variables. We did this for each explanatory variable for each event listed in table 6 or 7. We also investigated portfolios based on various combinations of our explanatory variables.

We searched for pairs of portfolios where the response of one portfolio had a different sign than the response of the other portfolio. Portfolios were matched by explanatory variable. We found only one instance of a portfolio that exhibited signs of the competitive effect dominating the contagion effect.

A summary of our results for this analysis is presented in table 8. Notice that for event 3 the response for the portfolio of BIG banks is a significant and positive 1.83%, while the response for the portfolio of NON-BIG banks is a significant and negative 0.31%. This suggests that the announcement by Travelers had a positive and significant impact on money-center and super-regional banks. Or, that for this group of banks, the positive revaluation associated with the competitive effects dominated the negative revaluation associated with the contagion effects. To understand why this is a reasonable result, notice the response by GIC and NON-GIC life insurance companies to event 3. The portfolio of LICs with GICs in their liability structure exhibited a negative and significant 4.37% response to the Travelers' announcement, but the portfolio of LICs without GICs declined by only 1.90%. This difference is statistically (and economically) significant.

It appears the market expected LICs using GICs to face higher funding costs as their GIC policyholders fled LICs and, benefiting those banking organizations with relatively more purchased funds per dollar of assets. Purchased funds equal gross purchased funds (the sum of time deposit of $100,000 or more, federal funds purchased and securities sold under agreements to repurchase in domestic offices, deposits in foreign offices and in Edge and Agreement subsidiaries, commercial paper, and other borrowings with an original maturity under 1 year) less federal funds sold and securities purchased under agreements to resell in domestic offices. One year before the Travelers' announcement the purchased funds ratio was 35.6% and 26.6% for money center and super-regional banking organizations, respectively, while the ratio was 16.8% for other banking organizations. Thus, those banking organizations with relatively more confident-sensitive funding vehicles experienced positive ARs at Travelers' announcement.

This is one of the main results of our paper. That is, we not only find evidence of inter-industry contagion, and that this inter-industry contagion has a significant informational component. But, we also find evidence that the positive revaluation effect sometimes dominates the negative revaluation effect for inter-industry contagion. Or, using the terminology of Lang and Stulz (1992), the competitive effect dominates the contagion effect.

7.5 Discussion of Inter-Industry Results

Our results suggest that there is a significant inter-industry impact of the three financial distress announcements, and that this impact is correlated with the financial characteristics of the non-announcing firms. We would like to know whether, after controlling for the financial characteristics of the non-announcing firms, the stock market reaction of life insurance companies to each event is different from that of banking organizations. Table 4 results suggest that the stock market reactions of LICs are different from that of banking organizations. However, these differences could be related to differences in financial characteristics as suggested in tables 6 and 7. To address this issue, we pooled the time series observations for both banking and insurance organizations to estimate the correlation between cumulative abnormal returns and the financial characteristics of banking and insurance organizations in the following model:

$$\tilde{g}_j = g_1 Event1 + g_2 Event2 + g_3 Event3 + \sum_k f_{k,B} COND_{k,B} + \sum_i f_{i,L} COND_{i,L} + l_{B1} BL_1 + l_{B2} BL_2 + l_L LB + h_j, \quad \textbf{(8)}$$

where the bank financial condition variables ($COND_{k,B}$) are the ratio of commercial real estate loans to total assets (NONRES); the ratio of construction loans to total assets (CONSTRUCT);

the ratio of book value of equity to total assets (CAPITAL); an indicator variable for money center banking and super-regional banking organizations (BIG BANKS); and an indicator variable for northeastern banking organizations other than BIG BANKS (NORTHEAST). Life insurance financial condition variables ($COND_{i,L}$) are the ratio of commercial real estate loans to total general account assets (CMORT); the ratio of book value of equity to total general account assets (CAP); and the ratio of life insurance issuance of guaranteed investment contracts to total assets(GIC). SURPRISE is the cumulative abnormal return over the 22 trading days ending one day before each event announcement. BL_1 is an indicator variable for life insurance companies and bank event 1 - Bank of New England loan loss addition; BL_2 is an indicator variable for life insurance companies and bank event 2 - the Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions; and LB is an indicator variable for banks and event 3 – Travelers Corporation's loan loss addition and dividend reduction. Our regression equation also includes indicator variables for each event (*Event1*, *Event2*, and *Event3*). We suppress the intercept term to avoid the "dummy variable trap." By including an intercept term and separate indicator variables for each event, we would have a problem of perfect multicollinearity, whereby for each observation the sum of the event indicator variables is equal to one and is perfectly correlated with the intercept term. To avoid this dummy variable trap, researchers typically omit one of the indicator variables or the intercept term (Greene, 1997, p. 230). Here, we omit the intercept term.

Conditioned on the financial characteristics of banking organizations, the coefficients on *Event1* and *Event2* measure the average response of banking organizations to events 1 and 2, respectively, while conditioned on the financial characteristics of life insurance companies the coefficient on *Event3* measures the average response of life insurance companies to event 3. The

coefficient on BL_1, λ_{B1}, captures the stock market reaction to event 1 of life insurance companies relative to banking organizations. The coefficient on BL_2, λ_{B2}, captures the stock market reaction to event 2 of life insurance companies relative to banking organizations. The coefficient on LB, λ_L, captures the stock market reaction to event 3 of banking organizations relative to life insurance companies.

The results of estimating equation (8) are reported in table 9. The coefficient on BL_1 (BANK EVENT1 - LIFE REACTION) is 0.0640 (t-statistic = 3.18), suggesting that, after controlling for differences in financial characteristics, CARs of non-announcing LICs were less negative relative to those of non-announcing banking organizations. However, the coefficient on BL_2 (BANK EVENT2 - LIFE REACTION) is insignificant. Thus, there is little, if any, differences in the stock market reactions of life insurance companies and banking organizations at event 2 announcement dates. The coefficient on LB (LIFE EVENT - BANK REACTION) is 0.0420 (t-statistic = 2.15), suggesting that CARs of non-announcing banking organizations were less negative relative to those of non-announcing LICs. Overall, these results suggest that, controlling for differences in financial characteristics, there remain differences in between banking and life insurance organizations' responses to two of the three financial distress announcements.

7.5.1. What proportion of the contagion effect is informational?

The differences, mentioned in the previous section, between the responses of LICs and banking organizations to financial distress announcements may provided some insight into the relative amount of informational content in the contagion effects examined in this study. Most modern contagion studies make a distinction between pure and informational-based contagion

effects. However, there are no modern contagion studies that systematically quantify contagious responses into the percentage that is pure contagion versus the percentage that is informational contagion.

If a model can explain all of the cross-sectional variations in the distribution of CARs of firms responding to a contagious event, then that contagious effect could be considered totally informational. However, if a model can explain none of this cross-sectional variation, it does not mean that the contagious effect can be considered totally pure contagion. The latter may simply mean that the model is a "bad" model. This bad model problem makes it extremely difficult, if not impossible, to precisely quantify the informational (or pure) proportion of the contagion effect. This may explain, to some extent, why previous attempts to disentangle the component of contagion effects are rare.

Our attempt at separating these two effects recognizes the impossibility of absolute precision and thus focuses on providing some relative comparisons between LICs and banks for our three events. For this comparison, note that the (adjusted) R^2 in table 9 is 0.48. This suggests that our model does a relatively good job of explaining the cross-sectional variation in the pooled CARs of our LICs and banking organizations. (By comparison, very few of the contagion studies in the literature report adjusted R-squares above 0.40.) From table 9, we focus on event1, event2, and event3. These three dummy variables function as intercept terms for banks' response to a banking event (event1 and event2) and LICs' response to a LIC event (event3). Given that the variables in our model have been scaled properly and that our set of independent variables is reasonably robust, then we may consider the intercept terms as indicators of "common trends" unexplained by our model. And, these common trends may be

loosely interpreted as pure contagion. A significant coefficient for event1, event2, or event3 would suggest a significant common trend and a significant amount of pure contagion.

For example, notice that the coefficient on event1 is negative and significant at the one-percent level. This suggests that for the first banking event banks responded in a manner consistent with some negative pure contagion component. This is also the case with event2, the second banking event. However, the coefficient on event3 is not significantly different from zero. This suggests that there was no significant common trend in the response of LICs to the LIC event. When we compare the coefficients for event3 with event2 or event1, we develop the following relative qualitative measure of pure contagion. There is much more pure contagion associated with the banks' response to the banking events than that there is for the LICs response to the LIC events. This is consistent with the results from tables 6 and 7.

8. Conclusions

This paper adds to the market efficiency literature by explicitly investigating the potential importance of inter-industry contagion and competitive effects.

Our results provide very strong evidence of significant inter-industry shareholder wealth effects. However, these shareholder wealth effects do not appear to be purely contagious in nature. The wealth effects are directly linked to such factors as: geographic proximity, asset portfolio composition, leverage, and regulatory expectations. Thus, it appears that the market considers both expected changes in the revenue produced by assets as well as the expected changes in costs due to competitive and regulatory influences when determining the magnitude of shareholder wealth effects. This helps to explain why in some instances competitors benefit from a rival firm's financial distress announcement. And, that this positive competitive benefit may outweigh any negative revaluation effects of the announcement. We find evidence of a net

positive revaluation effect for large banks responding to the Travelers announcement. We also find evidence that there is less pure contagion associated with life insurance companies' financial distress announcements to similar bank holding companies' announcements.

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Table 1. Year-end holdings of commercial mortgages, billions of dollars

This table presents the relative importance of banks and life insurance companies in the commercial real estate market. Commercial mortgages include amounts for construction and permanent loans on commercial properties (office buildings, industrial structures, resorts, etc.). Percent of total commercial mortgage loans is in parentheses beneath the dollar amount. The data comes from the Board of Governors of the Federal Reserve System, *Flow of Funds Accounts, Assets and Liabilities*, various issues.

Year	Total commercial mortgage market	Total commercial mortgages held by banking organizations	Total commercial mortgages held by life Insurance Companies (LICs)	Total commercial mortgages held by commercial banking organizations and life insurance companies
1980	256	81 (31.6)	81 (31.6)	162 (63.3)
1981	278	91 (32.7)	88 (31.6)	179 (64.4)
1982	301	103 (34.2)	94 (31.2)	197 (65.4)
1983	352	120 (34.1)	104 (29.5)	224 (63.6)
1984	418	153 (36.6)	111 (26.5)	264 (63.1)
1985	480	181 (37.7)	128 (26.7)	309 (64.4)
1986	553	223 (40.3)	149 (26.9)	372 (67.3)
1987	651	267 (41.0)	167 (25.6)	434 (66.7)
1988	699	305 (43.6)	184 (26.3)	489 (70.0)
1989	745	340 (45.6)	195 (26.2)	535 (71.8)
1990	756	336 (44.4)	215 (28.4)	551 (72.9)

Table 2. Percentage of total financial assets held as commercial mortgage loans

This table presents the relative importance of commercial mortgage holdings for banks and life insurance companies as a percent of total financial assets for each group of firms. The data comes from the Board of Governors of the Federal Reserve System, *Flow of Funds Accounts, Assets and Liabilities*, various issues.

Year	Banks	Life Insurance Companies
1980	5.4	17.4
1981	5.6	17.4
1982	5.9	16.5
1983	6.4	16.4
1984	7.2	16.0
1985	7.6	16.0
1986	8.5	16.5
1987	9.6	16.6
1988	10.3	16.3
1989	10.5	15.6
1990	10.1	15.7

Table 3. Annual rates of return and vacancy rates on commercial properties, nationwide

This table provides data on the rate of return of holding commercial real estate and vacancy rates for downtown commercial office buildings and industrial properties from 1980 to 1990. Rates of return on commercial properties are from National Council of Real Estate Investment Fiduciaries (Copyright 1992 by NCREIF and Frank Russell Company, Tacoma, WA. All rights reserved). Data are for year-end March 31. Vacancy rates are from CB Commercial Real Estate Group, Inc. The values of the vacancy rates are for March in each year.

	NCREIF Property Rate of Return Indices Annual Rates of Returns			Coldwell Banker Vacancy Rate Indices	
Year	Total	Income	Capital	Downtown Commercial Office	Industrial
1980	18.1	8.4	9.1	3.4	3.5
1981	16.6	8.1	8.1	3.8	3.8
1982	9.4	7.9	1.5	5.5	3.8
1983	13.1	7.9	4.9	10.8	4.8
1984	13.8	7.6	5.9	13.1	4.8
1985	11.2	7.5	3.5	15.4	4.8
1986	8.3	7.4	0.9	16.5	5.3
1987	8.0	7.3	0.7	16.3	5.9
1988	9.6	7.0	2.5	16.3	5.8
1989	7.7	6.6	1.1	16.1	6.0
1990	2.3	6.6	-4.1	16.7	6.5

Table 4. Abnormal returns of banking organizations and life insurance companies

This table presents the abnormal returns for announcing firms, other banking organizations, and other life insurance companies surrounding the three events. The three events are: Event 1: Bank of New England (BNEC). BNEC announced on December 15 that its nonperforming loans would increase by $700 million by year-end. This surge in problem real estate loans at BNEC after a third quarter increase at Bank of Boston Corporation raised concerns about the outlook for New England's real estate market. The *WSJ* story indicated that the projected 78 percent fourth quarter jump in Bank of New England's nonperforming loans to $1.6 billion from $900 million at the end of the third quarter was far worse than had been expected. In addition, the *WSJ* story indicated that analysts were concerned about whether all of BNEC's real estate problems had been identified, leading to speculation that more losses would be announced in the future; Event 2: On September 20, 1990 the Comptroller of the Currency Robert L. Clarke warned that real estate conditions are likely to worsen, especially on the East Coast (see *American Banker*, September 21). On September 21 Chase Manhattan Corporation announced that it would cut its dividend in half and increase its loan loss reserves by $650 million. On the same day, Midlantic Corporation and Southeast Banking Corporation announced that they were increasing nonperforming loans in the third quarter of 1990 and reducing or eliminating their dividend (see *American Banker*, September 24). On September 27 Bank of Boston Corporation announced that it was reducing its dividend because of worse than expected losses in its commercial real estate loan portfolio; and Event 3: On October 5, 1990, Travelers Corporation announced that it was reserving $650 million for anticipated losses in its commercial real estate portfolio and reducing its dividend by 33 percent.

Results are reported for Bank of New England Corporation, Bank of Boston Corporation, Chase Manhattan Corporation, Midlantic Corporation, and Southeast Banking Corporation, Travelers Corporation, and other banking organizations and life insurance companies. The statistics beneath each abnormal return is the Z-statistics testing the hypothesis that the event parameter is equal to zero. In the columns labeled "Other Banks" and "Other Life Insurance Companies" row beneath the Z-statistics reports the number of negative abnormal returns, the number of firms in the sample, and the statistic Z testing the hypothesis that ½ of the abnormal returns are positive. The statistic Z is computed using

$$\frac{(G - N * p)}{\sqrt{N * p * (1 - p)}},$$

where N is the number of firms, G is the number of positive abnormal returns, and p is the probability of a positive abnormal return (1/2).

Table 4. Abnormal returns of banking organizations and life insurance companies (continued)

Panel A: Daily and cumulative abnormal returns

Events	Bank of New England Corporation	Bank of Boston Corporation	Southeast Banking Corporation	Midlantic Corporation	Chase Manhattan Corporation	Travelers Corporation	Other Banks	Other Life Insurance Companies
Event 1 – Bank of New England nonperforming loans additions								
1989:1215	-26.91 (-15.87)[c]	-8.20 (-6.11)[c]	-6.19 (-4.38)[c]	-0.14 (-0.15)	-0.33 (-0.29)	-1.41 (-1.49)	-1.46 (-12.98)[c]	-0.23 (-1.65)
1989:1218	-15.73 (-9.16)[c]	-3.28 (-2.41)[b]	-2.78 (-1.94)[a]	-0.98 (-1.00)	-1.28 (-1.09)	-2.19 (-2.28)[b]	-1.64 (-14.39)[c]	-0.91 (-3.35)[c]
1989:1215-1989:1218	-42.65 (-17.70)[c]	-11.48 (-6.03)[c]	-8.97 (-4.47)[c]	-1.12 (-0.81)	-1.61 (-0.96)	-3.60 (-2.66)[c]	-3.10 (-19.36)[c] [103/129: -6.78[c]]	-1.14 (-3.53)[c] [38/60: -2.06[b]]
Event 2 – The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions								
1990:0920 – Comptroller of the currency warning	-5.79 (-3.38)[c]	-1.22 (-0.90)	5.97 (4.18)[c]	-5.57 (-5.73)[c]	1.04 (0.89)	0.50 (0.52)	-1.20 (-10.97)[c]	-0.50 (-2.11)[b]
1990:0921 – East Coast banks' loan loss additions and dividend reductions	0.29 (0.17)	0.30 (0.22)	-2.36 (-1.67)[a]	7.21 (7.55)[c]	-7.07 (-6.09)[c]	-0.97 (-1.02)	-1.45 (-12.65)[c]	-0.52 (-2.80)[c]
1990:0924	1.10 (0.64)	-2.25 (-1.64)	-8.86 (-6.14)[c]	0.02 (0.03)	-10.11 (-8.55)[c]	-2.40 (-2.48)[b]	-2.03 (-18.87)[c]	-1.37 (-5.51)[c]
1990:0925	-0.21 (-0.13)	-4.02 (-2.99)[c]	2.20 (1.55)	-3.22 (-3.34)[c]	6.58 (5.65)[c]	-2.38 (-2.50)[b]	-0.39 (-2.07)[b]	-1.68 (-6.12)[c]
1990:0926	-6.49 (-3.81)[c]	-2.06 (-1.53)	5.96 (4.20)[c]	-10.57 (-10.94)[c]	-5.99 (-5.14)[c]	-3.33 (-3.49)[c]	-1.72 (-14.79)[c]	-0.48 (-3.51)[c]
1990:0927 – Bank of Boston's dividend reduction	0.83 (0.48)	-3.41 (-2.52)[b]	-12.03 (-8.43)[c]	-5.40 (-5.56)[c]	0.70 (0.59)	-2.02 (-2.11)[b]	-2.64 (-23.22)[c]	-1.66 (-6.33)[c]
1990:0920-1990:0927	-10.28 (-2.46)[b]	-12.66 (-3.82)[c]	-9.12 (-2.58)[b]	-17.12 (-7.37)[c]	-14.86 (-5.16)[c]	-10.60 (-4.53)[c]	-9.45 (-33.71)[c] [117/129: -9.24[c]]	-6.21[c] (-10.77)[c] [45/60: -3.87[c]]

Table 4. Abnormal returns of banking organizations and life insurance companies (continued)

Panel A: Daily and cumulative abnormal returns

Events	Bank of New England Corporation	Bank of Boston Corporation	Southeast Banking Corporation	Midlantic Corporation	Chase Manhattan Corporation	Travelers Corporation	Other Banks	Other Life Insurance Companies
Event 3 – Travelers Corporation's loan loss addition and dividend reduction								
1990:1005	8.08 (4.77)[c]	5.47 (4.07)[c]	0.22 (0.13)	1.91 (1.98)[b]	7.89 (6.79)[c]	-20.81 (-21.92)[c]	-0.09 (-1.14)	-2.02 (-9.51)[c]
1990:1008	-0.02 (-0.01)	-3.57 (-2.66)[c]	-0.33 (-0.23)	1.28 (1.33)	-1.70 (-1.47)	-12.60 (-13.28)[c]	0.24 (1.62)	-0.74 (-3.35)[c]
1990:1005- 1990:1008	8.06 (3.36)[c]	1.90 (1.00)	-0.12 (-0.06)	3.19 (2.34)[b]	6.18 (3.77)[c]	-33.41 (-24.89)[c]	0.15 (0.34) [67/129: -0.53]	-2.76 (-9.09)[c] [44/60: -3.61[c]]

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

Table 4. Abnormal returns of banking organizations and life insurance companies (continued)

Panel B: Intra-industry tests of the equivalence of average cumulative abnormal returns across events

To determine whether the difference in abnormal returns is statistically significant, we use the following formula:

$$Z = \frac{ASCAR_1 - ASCAR_2}{\left[\frac{T2-T1+1}{N_1} + \frac{T2-T1+1}{N_2}\right]^{0.5}},$$

where $ASCAR_1$ and $ASCAR_2$ are the average standardized cumulative abnormal returns over the period t=T1 to t=T2, respectively, and N_1 and N_2 represent the number of observations in the two portfolios, respectively.

Events	Difference between other banking organizations and other life insurance companies cumulative abnormal returns
Event 1 – Bank of New England nonperforming loans additions 1989:1215- 1989:1218	-5.67[c]
Event 2 – The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions 1990:0920- 1990:0927	-4.14[c]
Event 3 – Travelers Corporation's loan loss addition and dividend reduction 1990:1005- 1990:1008	5.47[c]

[c] Significant at the 1% level

Table 5. Summary statistics for bank holding companies and life insurance companies (percent of total assets), 1988 – 1989.

Panel A: *Bank holding companies*

Variables	Mean	Standard deviation	Minimum	Maximum
Nonresidential loans	6.90	4.09	0	20.14
Construct loans	4.19	3.35	0	22.27
Book capitalization	6.56	1.35	1.88	11.89

Panel B: *Life insurance companies*

Variables	Mean	Standard deviation	Minimum	Maximum
Commercial mortgage loans	12.66	12.01	0	47.48
Book capitalization	12.87	8.33	2.01	46.04
Guaranteed investment contracts	3.61	9.41	0	48.16

Table 6. Correlation of abnormal returns and the financial characteristics of life insurance companies

This table presents estimates of the correlation between the stock market reaction to each financial distress announcement and selected measures of life insurance companies' financial condition modeled as:

$$\tilde{g}_j = g + \sum_k f_k COND_k + e_j,$$

where the financial condition variables (COND) are the ratio of guaranteed investment contracts to total assets (GIC); the ratio of commercial real estate loans to total assets (CRE); and the ratio of book value of equity to total assets (CAPITAL). SURPRISE is the cumulative abnormal return over the 22 trading days ending one day before each event. To account for the possibility of heterokedasticity in the data, all observations are divided by the standard error of the K_i-day CAR. This is equivalent to using weighted least squares to estimate the regression parameters, where the standard error of the firm's CAR is the relevant weight. This standard error is computed as the square root of the sum of the variances of the prediction error over the K_i days.
The standard error of CAR is given by

$$\sum_{t=1}^{K_i} \left[s_{i,t} \left(1 + \frac{1}{T_i} + \frac{(R_{m,t} - \overline{R}_m)^2}{\sum_t^{T_i} (R_{m,t} - \overline{R}_m)^2} \right)^{1/2} \right]$$

where $\sigma_{i,t}$ = standard deviation of the residuals in the market model estimation period, T_i = number of days in the estimation period, and $\overline{R}_m$ = mean return to the market portfolio over the estimation period.

Panel A: *Cross-section tests of life insurance companies commercial real estate exposure*

	Event 1 **Bank of New England nonperforming loans additions** 1989:1215- 1989:1218	**Event 2** **The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions** 1990:0920- 1990:0927	**Event 3** **Travelers Corporation's loan loss addition and dividend reduction** 1990:1005- 1990:1008
Intercept	0.0004 (0.04)	-0.0540 (-2.18)[b]	-0.0180 (-1.35)
CRE	-0.0242 (-0.66)	0.0166 (0.21)	-0.1035 (-2.51)[b]
CAPITAL	-0.0277 (-0.48)	0.1536 (1.23)	0.1170 (1.77)[a]
GIC	-0.0676 (-1.77)[a]	-0.0485 (-0.55)	-0.1984 (-4.53)[c]
SURPRISE	0.1102 (2.85)[c]	0.2127 (2.21)[b]	-0.0620 (-1.92)[a]
Adj. R-square	0.0650	0.033	0.2058
F-statistic	2.03	1.05	4.82[c]

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

Table 6. Correlation of abnormal returns and the financial characteristics of life insurance companies (continued)

Panel B: *Test statistics on the equality of the coefficient estimates over the three events*
This panel of the table provides a test of the hypothesis that the coefficient estimates are the same for each of the events. The tests of these pairwise comparisons utilized an F-statistic.

	Event 1 vs. Event 2	**Event 1 vs. Event 3**	**Event 2 vs. Event 3**
CRE	0.23	2.83[a]	2.28
CAPITAL	1.78	3.66[a]	0.08
GIC	0.04	6.80[c]	2.85[a]
SURPRISE	0.98	12.38[c]	8.14[c]

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

Table 7. Correlation of abnormal returns and the financial characteristics of banking organizations

This table presents estimates of the correlation between the stock market reaction to each financial distress announcement and selected measures of banking firms' financial condition modeled as:

$$\tilde{g}_j = g + \sum_k f_k COND_k + e_j,$$

where the financial condition variables (COND) are the ratio of nonresidential real estate loans to total assets (NONRESIDENTIAL); the ratio of construction loans to total assets (CONSTRUCT); the ratio of book value of equity to total assets (CAPITAL); an indicator variable for northeastern banking organizations (NORTHEAST); and an indicator variable for money center and super-regional banking organizations (BIG BANKS); SURPRISE is the cumulative abnormal return over the 22 trading days ending one day before each event. To account for the possibility of heterokedasticity in the data, all observations are divided by the standard error of the K_i-day CAR. This is equivalent to using weighted least squares to estimate the regression parameters, where the standard error of the firm's CAR is the relevant weight. This standard error is computed as the square root of the sum of the variances of the prediction error over the K_i days. The standard error of CAR is given by

$$\sum_{t=1}^{K_i}\left[s_{i,t}\left(1+\frac{1}{T_i}+\frac{(R_{m,t}-\overline{R}_m)^2}{\sum_t^{T_i}(R_{m,t}-\overline{R}_m)^2}\right)^{1/2}\right]$$

where $\sigma_{i,t}$ = standard deviation of the residuals in the market model estimation period, T_i = number of days in the estimation period, and $\overline{R}_m$ = mean return to the market portfolio over the estimation period.

Panel A *Cross-section tests of bank holding companies commercial real estate exposure*

	Event 1 **Bank of New England nonperforming loans additions** 1989:1215-1989:1218	**Event 2** **The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions** 1990:0920- 1990:0927	**Event 3** **Travelers Corporation's loan loss addition and dividend reduction** 1990:1005- 1990:1008
Intercept	-0.0651 (-3.18)[c]	-0.1557 (-3.76)[c]	0.0222 (1.37)
Nonresidential	0.0096 (1.76)[a]	0.0885 (0.47)	0.0053 (0.07)
Construct	-0.0167 (-2.53)[b]	-0.9062 (-3.60)[c]	-0.2517 (-2.58)[b]
Capital	0.5429 (2.02)[b]	1.2786 (2.25)[b]	-0.3340 (-1.52)
BIG Banks	0.0168 (2.23)[b]	0.0011 (0.07)	0.0147 (2.33)[b]
NORTHEAST	-0.0211 (-2.23)[b]	0.0017 (0.09)	0.0024 (0.30)
Surprise	0.0481 (0.89)	-0.098 (-1.24)	-0.0596 (-2.28)[b]
Adj. R-square	0.1358	0.1096	0.1146
F-statistic	4.35[c]	3.63[c]	3.76[c]

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

Table 7. Correlation of abnormal returns and the financial characteristics of banking organizations (continued)

Panel B: *Test statistics on the equality of the coefficient estimates over the three events*

This panel of the table provides a test of the hypothesis that the coefficient estimates are the same for each of the events. The tests of these pairwise comparisons utilized an F-statistic.

	Event 1 vs. Event 2	**Event 1 vs. Event 3**	**Event 2 vs. Event 3**
Nonresidential	0.18	0.00	0.19
Construct	12.49[c]	5.77[b]	6.55[b]
Capital	1.32	6.26[b]	7.77[c]
BIG Banks	0.70	0.04	0.64
NORTHEAST	0.98	3.58[a]	0.00
Surprise	2.30	3.20[a]	0.22

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

Table 8. Market model cumulative abnormal returns for subsamples of banking organizations and life insurance companies

This table presents the cumulative abnormal returns for different types of banking organizations and life insurance companies. The different types of banking organizations are big and non-big banking organizations. Big banking organizations (BIG) are money center and superregional banking organizations. Non-big banking organizations (NON-BIG) are those firms that are not money center or superregional banking organizations. The different types of life insurance companies are based on whether a life insurance company has guaranteed investment contracts (GICs) in its liability structure. The statistics beneath each abnormal return is the Z-statistic. The row beneath the Z-statistics reports the number of firms in each portfolio. To determine whether the difference in abnormal returns is statistically significant, we use the following formula:

$$Z = \frac{ASCAR_1 - ASCAR_2}{\left[\frac{T2-T1+1}{N_1} + \frac{T2-T1+1}{N_2}\right]^{0.5}}$$

where $ASCAR_1$ and $ASCAR_2$ are the average standardized cumulative abnormal returns over the period t=T1 to t=T2, respectively, and N_1 and N_2 represent the number of observations in the two portfolios, respectively. These results are reported in the columns and rows labeled difference.

	Event 1 – Bank of New England nonperforming loans additions, 1989:1215- 1989:1218				**Event 2 – The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions, 1990:0920- 1990:0927**				**Event 3 – Travelers Corporation's loan loss addition and dividend reduction, 1990:1005- 1990:1008**		
Banking organizations	BIG	NON-BIG	Difference		BIG	NON-BIG	Difference		BIG	NON-BIG	Difference
	-2.13 (-6.79)[c] [28]	-3.37 (-18.30)[c] [101]	**1.79[a]**		-10.44 (-18.99)[c] [28]	-9.17 (-28.10)[c] [101]	**-1.52**		1.83 (4.98)[c] [28]	-0.31 (-2.23)[b] [101]	**3.87[c]**
Northeast	-3.43 (-7.35)[c] [13]	-5.62 (-11.74)[c] [18]			-10.70 (-13.65)[c] [13]	-9.59 (-11.27)[c] [18]			1.86 (3.48)[c] [13]	0.24 (-0.02) [18]	
Others	-1.00 (-2.43)[b] [15]	-2.88 (-14.72)[c] [83]			-10.21 (-13.24)[c] [15]	-9.08 (-25.75)[c] [83]			1.81 (3.56)[c] [15]	-0.44 (-2.46)[b] [83]	
Difference	**-2.64[c]**	**-3.14[c]**			**-0.68**	**0.46**			**0.09**	**0.72**	

Table 8. Market model cumulative abnormal returns for subsamples of banking organizations and life insurance companies (continued)

Life insurance companies	GIC	NON-GIC			GIC	NON-GIC			GIC	NON-GIC	
	-2.55 (-5.21)[c] [17]	-0.58 (-0.89) [43]	**-2.79[c]**		-8.19 (-9.93)[c] [21]	-5.15 (-6.08)[c] [39]	**-1.80[a]**		-4.37 (-11.44)[c] [21]	-1.90 (-2.89)[c] [39]	**-5.33[c]**

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

Table 9. Pooled cross-section time series estimates of the correlation of abnormal returns and the financial characteristics of banking and insurance companies

This table provides pooled cross-section time series estimates of the correlation between cumulative abnormal returns and the financial characteristics of banking and insurance organizations modeled as:

$$\tilde{g}_j = g_1 Event1 + g_2 Event2 + g_3 Event3 + \sum_k f_{k,B} COND_{k,B}$$

$$+ \sum_i f_{i,L} COND_{i,L} + l_{B1} BL_1 + l_{B2} BL_2 + l_L LB + h_j ,$$

where the bank financial condition variables ($COND_{k,B}$) are the ratio of commercial real estate loans to total assets (NONRES); the ratio of construction loans to total assets (CONSTRUCT); the ratio of book value of equity to total assets (CAPITAL); an indicator variable for money center banking and super-regional banking organizations (BIG BANKS); and an indicator variable for northeastern banking organizations other than BIG BANKS (NORTHEAST BANKS). Life insurance financial condition variables ($COND_{i,L}$) are the ratio of commercial real estate loans to total general account assets (CMORT); the ratio of book value of equity to total general account assets (CAP); and the ratio of life insurance issuance of guaranteed investment contracts to total assets(GIC). SURPRISE is the cumulative abnormal return over the 22 trading days ending one day before each event announcement. BL_1 is an indicator variable for life insurance companies and bank event 1 - Bank of New England loan loss addition; BL_2 is an indicator variable for life insurance companies and bank event 2 - the Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions; and *LB* is an indicator variable for banks and event 3 – Travelers Corporation's loan loss addition and dividend reduction. Our regression equation also includes indicator variables for each event (*Event1*, *Event2*, and *Event3*). We suppress the intercept term to avoid the "dummy variable trap." By including an intercept term and separate indicator variables for each event, we would have a problem of perfect multicollinearity, whereby for each observation the sum of the event indicator variables is equal to one and is perfectly correlated with the intercept term. To avoid this dummy variable trap, researchers typically omit one of the indicator variables or the intercept term (see Greene, 1997, p.230). Here, we omit the intercept term. Conditioned on the financial characteristics of banking organizations, the coefficients on *Event1* and *Event2* measure the average response of banking organizations to events 1 and 2, respectively, while conditioned on the financial characteristics of life insurance companies the coefficient on *Event3* measures the average response of life insurance companies. The coefficient on BL_1, λ_{B1}, captures the stock market reaction to event 1 of life insurance companies relative to banking organizations. The coefficient on BL_2, λ_{B2}, captures the stock market reaction to event 2 of life insurance companies relative to banking organizations. The coefficient on *LB*, λ_L, captures the stock market reaction to event 3 of banking organizations relative to life insurance companies. To account for the possibility of heterokedasticity in the data, all observations are divided by the standard error of the K_i-day CAR. This is equivalent to using weighted least squares to estimate the regression parameters, where the standard error of the firm's CAR is the relevant weight. This standard error is computed as the square root of the sum of the variances of the prediction error over the K_i days. The standard error of CAR is given by

$$\sum_{t=1}^{K_i} \left[s_{i,t} \left(1 + \frac{1}{T_i} + \frac{(R_{m,t} - \overline{R}_m)^2}{\sum_t^{T_i} (R_{m,t} - \overline{R}_m)^2} \right)^{1/2} \right]$$

where $\sigma_{i,t}$ = standard deviation of the residuals in the market model estimation period, T_i = number of days in the estimation period, and $\overline{R}_m$ = mean return to the market portfolio over the estimation period.

Table 9. Pooled cross-section time series estimates of the correlation of abnormal returns and the financial characteristics of banking and insurance companies (continued)

Variables	Coefficient estimates
Event1	-0.0638 (-4.02)[c]
Event2	-0.1464 (-3.07)[c]
Event3	-0.0062 (-1.35)
NONRES	0.1427 (1.98)[b]
CONSTRUCT	-0.2436 (-2.85)[c]
CAPITAL	0.5503 (2.51)[b]
BIG BANKS	0.0168 (2.69)[c]
NORTHEAST BANKS	-0.0203 (-2.61)[c]
CMORT	-0.0265 (-0.67)
CAPITAL-LIFE	-0.0213 (-0.34)
GIC	-0.0657 (-1.59)
NONRES2	-0.0430 (-0.19)
CONSTRUCT2	-0.6319 (-2.09)[b]
CAPITAL2	0.6304 (0.91)
BIG BANKS2	-0.0198 (-0.98)
NORTHEAST BANKS2	0.0183 (0.74)
CMORT2	0.0685 (0.56)

Life insurance response to event 1: Bank of New England nonperforming loans additions, 1989:1215-1989:1218

$\gamma_1 + \lambda_{B1} = -0.0638 + 0.0640 = -0.0002$

F-statistic =0.00 (p-value =0.9919)

Life insurance response to event 2: The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions, 1990:0920- 1990:0927

$\gamma_2 + \lambda_{B2} = -0.1464 + 0.0761 = -0.0703$

F-statistic = 3.86 (p-value = 0.0501)

Bank response to event 3: Travelers Corporation's loan loss addition and dividend reduction, 1990:1005-1990:1008

$\gamma_3 + \lambda_L = -0.0062 + 0.0420 = 0.0358$

F-statistic =2.62 (p-value = 0.1061)

Test: $\gamma_1 + \lambda_{B1} = \gamma_3 + \lambda_L$
F-statistic =1.61 (p-value = 0.2045)

Test: Event2+ BANK EVENT2-LIFE REACTION =Event3+ LIFE EVENT-BANK REACTION

$(\gamma_2 + \lambda_{B2} = \gamma_3 + \lambda_L)$

F-statistic =6.01 (p-value = 0.0145)

Test: Bank response to bank events vs. Life response to bank events
Event 1: Bank of New England nonperforming loans additions, 1989:1215- 1989:1218
Event1= Event1 +BANK EVENT1-LIFE REACTION
Coefficient estimate=0.0640
T-statistic=3.18 (p-value =0.0016)

Event 2: The Comptroller of the Currency warning; East Coast banking organizations' dividend reductions and suspensions, 1990:0920- 1990:0927
Event2= Event2 +BANK EVENT2-LIFE REACTION
Coefficient estimate=0.0761
T-statistic=1.29 (p-value=0.1972)

Event 3:Travelers Corporation's loan loss addition and dividend reduction, 1990:1005- 1990:1008

Test: Event3+ LIFE EVENT-BANK REACTION=Event3
Coefficient estimate=0.0420
T-statistic=2.15 (p-value=0.0317)

Table 9. Pooled cross-section time series estimates of the correlation of abnormal returns and the financial characteristics of banking and insurance companies (continued)

Variables	Coefficient estimates
CAPITAL-LIFE2	0.2060 (1.05)
GIC2	-0.0545 (-0.42)
NONRES3	-0.1346 (-1.32)
CONSTRUCT3	0.0046 (0.04)
CAPITAL3	-0.9148 (-2.96)[c]
BIG BANKS3	0.0022 (0.24)
NORTHEAST BANKS3	0.0226 (2.06)[b]
CMORT3	-0.0780 (-1.41)
CAPITAL-LIFE3	0.1462 (1.67)[c]
GIC3	-0.1351 -2.33)[b]
SURPRISE1	0.0822 (2.63)[c]
SURPRISE2	-0.790 (-0.94)
SURPRISE3	-0.1190 (-3.20)[c]
BANK EVENT1 - LIFE REACTION	0.0640 (3.18)[c]
BANK EVENT2 - LIFE REACTION	0.0761 (1.29)
LIFE EVENT - BANK REACTION	0.0420 (2.15)[b]
Adj. R-Squared	0.4802
F-statistic	16.88[c]

[a,b,c] Significant at the 10%, 5%, and 1% levels, respectively.

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