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Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring vs. Influencing

By: Robert R. Bliss and Mark J. Flannery

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Robert R. Bliss
Research Department
Federal Reserve Bank of Chicago
230 S. LaSalle St.
Chicago, IL 60604-1413
312-322-2313
Robert.Bliss@chi.frb.org

and

Mark J. Flannery
Department of Finance, Insurance, and Real Estate
University of Florida
Gainesville, 32611-7168
352-392-3184
flannery@dale.cba.ufl.edu

Abstract

Market discipline is an article of faith among financial economists, and the use of market discipline as a regulatory tool is gaining credibility. Effective market discipline involves two distinct components: security holders' ability to accurately assess the condition of a firm ("monitoring") and their ability to cause subsequent managerial actions to reflect those assessments ("influence"). Substantial evidence supports the existence of market monitoring. However, little evidence exists on market influence, and then only for stockholders and for rare events such as management turnover. This paper seeks evidence that U.S. bank holding companies' security price changes reliably influence subsequent managerial actions. Although we identify some patterns consistent with beneficial market influences, we have not found strong evidence that stock or (especially) bond investors regularly influence managerial actions. Market influence remains, for the moment, more a matter of faith than of empirical evidence.

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I. Introduction

That markets discipline firms and firms' managers is an article of faith amongst financial economists, with surprisingly little direct empirical support. The market discipline paradigm requires: 1) that the necessary information is publicly available and that the private benefits to monitoring outweigh the costs; 2) that rational investors continually gather and process information about traded firms whose securities they hold and about the markets in which they operate; 3) that investors' assessments of firm condition and future prospects are impounded into the firm's equity and debt prices; and 4) that managers operate in the security holders' interests. The prices of a firm's traded securities are the most obvious public signal by which the evaluations of stakeholder/monitors make their evaluations known to management.

The idea that market prices provide informative signals that affect how managers run their companies occupies pride of place in most introductory microeconomic classes. Likewise, finance textbooks assert that investors lead firms toward appropriate decisions by changing security prices in response to apparent trends and managerial policies. Only in the more advanced classes do students learn that product market externalities or deviations from the perfect capital market assumptions can undermine financial market discipline. Indeed, much of modern corporate finance concerns the ways in which markets may *fail* to discipline firms or firm managers appropriately.

Financial regulators are concerned that the increasing complexity of large banking organizations makes them difficult to monitor and control using traditional supervisory tools. Financial regulators have been increasingly drawn to the idea that private investors can affect the actions of financial firms. This interest in harnessing market disciplinary forces to assist regulatory goals reflects the growing evidence that investors can assess a financial firms' true condition quite well. The Basel Committee on Banking Supervision's consultative paper on capital adequacy (Basel [1999]) asserts that "[m]arket discipline imposes strong incentives on banks to conduct their business in a safe, sound and efficient manner," and designates market discipline as one of the three pillars on which future financial regulation should be based.[1] A Federal Reserve task force has recently investigated whether requiring large banking firms to issue subordinated debt on a regular basis would enhance supervision. The 1999 Banking Bill, which overhauled banking regulation in the US, required that the larger nationally chartered banks have debt outstanding.

The concept of "market discipline" incorporates two distinct components: investors' ability to *evaluate* a firm's true condition, and the *responsiveness* of firm managers to the investor feedback impounded in security prices. Although the banking literature often fails to distinguish clearly between these components, their implications for regulatory reform differ substantially. For the sake of clarity, we define two distinct aspects of market discipline in this paper: market monitoring and market influence.[2]

- "Monitoring" refers to the hypothesis that investors accurately understand changes in a firm's condition and incorporate those assessments promptly into the firm's security prices. Monitoring generates the market signals to which managers are thought to respond.
- "Influence" is the process by which a security price change engenders firm (manager) responses to counteract adverse changes in firm condition.

The market discipline paradigm is inherently asymmetric. Negative market signals indicate that investors want management to make changes, while positive signals do not necessarily suggest that change is desired. Regulatory discipline also focuses primarily on avoiding or reversing *adverse* changes in firm condition.

Extensive evidence supports the hypothesis that markets can effectively identify a firm's true financial condition, at least on a contemporaneous basis.[3] Less evidence exists that investors can foresee future changes in firms' fortunes not already manifest in current financial statements. However, accurate market signals are not sufficient to assure that investors can collectively influence the actions of firm management. We have comparatively little evidence about the ability of equity or (especially) debt owners to influence firm activities.

The finance literature provides numerous reasons to be circumspect about the ability of market participants to influence managers: asymmetric information, costly monitoring, principal-agent problems and conflicts of interest among stakeholders.[4] The entire optimal contracting literature is premised on the idea that investor/owners are disadvantaged vis-à-vis managers in monitoring firms and ensuring that the firm is run in the investors' interest. Furthermore, different types of claimants may evaluate managerial actions differently. Bondholders are less interested in upside potential than in seeing that default is avoided. Stockholders, on the other hand, may prefer a riskier investment strategy as long as the expected return compensates them for the additional risk. Thus, the idea of "market" discipline raises the question of "which market?"[5]

Stockholders and bondholders can surely influence managers *in extremis*. For example, Penn Central's management was forced to take action when money market participants refused to roll over its commercial paper. The firm was forced to file for Chapter 11, substantially affecting all concerned. Stockholders can also vote out management, and poor firm performance increases the likelihood of managerial turnover. Sufficiently disgruntled stockholders can also create an environment that facilitates a hostile take-over. However, policy proposals for using market discipline to enhance banking supervision usually envisage something more commonplace, constructive and benign than precipitating bankruptcy or replacing management through takeovers. Yet, so far, we have virtually no empirical evidence concerning market influence in non-extreme situations.

This paper seeks to complement the existing literature on market monitoring by looking for direct evidence of stockholder and bondholder influence in the U.S. banking sector. Because financial regulators are actively considering the formal use of market discipline in their supervisory process, an empirical investigation of market influence on bank holding companies (BHC) is quite timely. Even beyond the obvious policy implications, however, BHCs provide a fruitful area for examining investor influence more generally. First, banking firms have relatively high leverage, which makes shareholders unusually sensitive to changes in asset value or risk. Second, BHC deposits have absolute priority over other financial liabilities, which should increase the urgency with which bondholders feel the results of adverse changes in asset value or risk. Third, the Federal Reserve collects extensive financial data about BHCs, and the industry is relatively homogeneous. It is thus feasible to examine detailed BHC asset, liability, and cash flow changes from one calendar quarter to the next.[6]

We begin by showing that stock and bond prices frequently move in opposite directions, which presumably gives them opposing preferences about managerial action. We then investigate whether returns on BHC stocks and bonds appear to be associated with subsequent managerial changes to firm characteristics. We experiment with multiple measures of market signals, a large number of managerial "action" variables, and various lags between signal and potential action. What evidence we find of market influence is weak and, at best, mixed. Certainly, we find no *prima facie* support for the hypothesis that bondholders or stockholders consistently influence day-to-day (quarter-to-quarter) managerial actions in a prominent manner consistent with their own interests.

The paper is organized as follows. Section II discusses agency problems pertaining to complex U.S. bank holding companies that generate the need for disciplinary forces. Section III discusses the construction of the study's data set. Section IV presents evidence on the extent to which bondholders and shareholders have common – as opposed to conflicting – goals in disciplining firm managers. Section V describes and motivates our tests for market influence, and the results of those tests are presented in Section VI. The last section concludes and discusses the regulatory implications of our findings.

II. Agency Problems and the Rationale for Stakeholder Influence

The governance problem in a levered firm generally involves three groups: shareholders, bondholders and (unless the managers also own the firm) managers. Beginning with Jensen and Meckling [1976], financial economists have studied the problems shareholders have inducing managers to act in the owners' best interests. The literature on executive compensation evaluates the "carrot" approach to managerial control, investigating how managers can be given incentives to perform appropriately (Morck, Shleifer, and Vishny [1988], Kaplan [1994], Hubbard and Palia [1995], Hadlock and Lummer [1997]). Other writers consider the 'stick' provided by board oversight. Mikkelson and Partch [1997], Martin and McConnell [1991], Denis and Denis [1995], and Canella, Fraser, and Lee [1995] studied managerial turnover. Brickley and James [1987], Cotter, Shivdasani, and Zenner [1997], and Hirschleifer and Thakor [1998] studied the impact of board composition on shareholder returns. DeYoung *et al*. [1999] and Ang, Cole, and Lin [2000] studied the influence of large shareholders on banking efficiency.

Whereas shareholders' ability to affect managerial actions has been studied previously, we have located no previous research into the ability of bondholders to influence managers. The primary agency problem in a investor owned corporation involves executive performance. If that performance affects firm value, then bondholders and stockholders may <u>both</u> wish to monitor managerial slacking and perquisite consumption. An increase in a firm's asset value raises both share and (weakly) debt prices.[7] *Ceteris paribus*, bondholders and stockholders share an interest in the firm's continued profitability. But *ceteris* rarely is *paribus* and the rub comes in the *risk* associated with the increase in firm value. Here bondholder and stockholder interests strongly diverge. Greater asset risk or financial leverage, for example, may raise the value of stockholders' option-like claim on the firm's residual cash flows. Stockholders benefit from risk as long as it is associated with a sufficiently high rate of expected return. However, an unanticipated increase in risk generally reduces the value of fixed-income claims. Bond covenants are designed to limit a firm's ability to shift risk by giving bondholders some control rights under some circumstances. Stockholders accept such covenants because they can increase overall firm value (Smith and Warner [1979], Myers [1977]).

The incentives of managers, beyond consuming perquisites, are ambiguous. If managers' incentives are well aligned with those of shareholders (e.g. through performance-based compensation), their actions may tend to harm bondholders. If managers receive insufficient pay-for-performance, managerial claims on the firm resemble bonds more closely than equity, and managers may reduce equity values by acting too conservatively.

III. Sample Selection and Data Sources

We assembled our BHC sample by forming the intersection of three data sets: the Y-9 Reports (Consolidated Financial Statements for Bank Holding Companies, available on the Federal Reserve Bank of Chicago website), the CRSP Stock Returns and Master Files, and the Warga/Lehman Brothers

Corporate Bond Data Base (Warga [1995]). Our sample period began in 1986, prior to which the Y-9 Reports lacked sufficient detail, and continued through December 1997. We did not require that a firm exist for the entire period, but used whatever data were available for each BHC. A total of 107 BHCs were simultaneously listed in all three data sources for at least part of the 1986-1988 period.

The Y-9 Reports provide information on BHC balance sheets and income statements. Although specific Y-9 variable definitions changed over time, we could combine data series to construct variables with reasonably consistent definitions throughout the sample period.

Stock returns, dividends, prices and shares outstanding were obtained from the CRSP monthly stock files. We computed quarterly returns and two measures of excess returns. The simple excess return is the difference between the stock return and the contemporaneous stock market index returns (the CRSP value weighted index of all stocks listed on the NYSE, AMEX, and NASDAQ). We also computed market model excess returns using a 60-month moving window to estimate the market model parameters. The resulting parameters were used to compute the next month's market model excess return. The process was repeated for each month, rolling forward the estimation window and forecast period. Our results are robust to the definition of excess returns used. The simple excess return provides the greatest number of usable observations of the two excess return measures as it requires no prior history of stock returns to compute the market model parameters. We therefore present results for raw returns and simple excess returns when analyzing the interaction between stocks and bonds in Section IV, and only simple excess returns when analyzing evidence of market influence in Section VI.

BHC bond information, taken from the Warga/Lehman Brothers Corporate Bond Database, includes monthly credit rating, yield, price, accrued interest and face value outstanding. The 107 bank holding companies had a total of 761 bonds outstanding for at least some part of the sample period. Quarter-to-quarter changes in yields and quarterly returns were computed in a straightforward manner.

Unlike equities, the literature provides little guidance for constructing benchmarks to measure excess bond performance. We constructed multiple indices to ensure robustness of our reported results. Within indices, bonds were assigned to buckets containing bonds of similar term-to-maturity and ratings (using Moody and S&P ratings to produce two sets of indices). Ratings were grouped into 11 categories that corresponded to Moody and S&P ratings, suppressing the '+' or '–' qualifiers attached to the basic rating definitions. Three term-to-maturity categories were used: 0–5 year; 5–10 years and greater than 10 years. Two alternative bond populations were used to form indices. "All Firms" indices were constructed using all domestic industrial, utility, transportation and financial industry bonds in the Warga Database (thus excluding government, agency, mortgage-backed, sovereign and foreign bonds). The "All Financials" indices were constructed using only bonds of corporations classified as financial institutions in the Warga database. Both the "All Firms" and "All Financials" indices included the bank holding company bonds used in this study. For each rating/term classification bucket, index yields, yield changes and returns were constructed using both equal and value weighting as measured by face value of amounts outstanding at the end of the previous quarter. The result was 8 indices—each containing 33 yield, yield change and return series—against which to measure excess bond performance.

Each bank holding company has a single common stock issue outstanding (we restricted our analysis to common stock—those with CUSIPs ending in '10'), but may have multiple bonds outstanding at any given time. For bank holding companies with multiple bonds outstanding in a given quarter, we constructed BHC-wide bond measures by aggregating the raw and excess bond performance measures across outstanding bonds within each bank holding company each quarter.[8] Aggregation was done using both arithmetic and principal-weighted averages of each performance measure. For each BHC/quarter we thus have two sets of raw yields, yield changes and returns, and 16 sets of yield, yield change and return spreads over various indices.

There is no obviously appropriate manner for aggregating and comparing yields of bonds of differing maturities. We have evaluated a variety of index construction methods, and our results are robust across methods. Therefore, we present results only for raw bond returns and excess returns measured against the principal-weighted, "All Firms" bonds index. BHCs with multiple bonds are assigned returns for a principal-weighted average of their individual bond returns and excess returns. Hereafter, in referring to "bonds" we will mean these within-BHC-aggregated measures. The final data set includes stock and bond returns and contemporaneous accounting information for 2,490 firm-quarters over the period June 1986 – March 1998.

IV. The Correlation between Bond and Stock Returns

As we pointed out in Section II, the potential divergence of stock and bondholders' preferences affects the search for evidence of market influence. Previous studies presenting evidence on the co-movements of stock and bond returns include Kwan [1996] for all industrial firms and Ellis and Flannery [1992] for bank equity and CD rates. In both studies, the evidence suggests that changes in the typical firm's value affect expected asset payoffs, and not the assets' return volatility. Accordingly, a firm's stock and bond returns tend to be positively correlated. In this situation, the influence of bondholders may be difficult to separate from the influence of shareholders, since both groups tend to evaluate new developments similarly. Requiring banks to issue subordinated debentures might then be pointless, because bondholders' assessments and influence would simply replicate those of shareholders. We therefore begin by evaluating whether bond and shareholder preferences are sufficiently different to permit us to identify separate bondholder and stockholder influences on bank managers.

Table 1 reports the Pearson correlations and rank order correlations for stock and bond returns and excess returns. Given the leptokurtic distribution of returns, the rank correlations provide a robust confirmation of the Pearson correlation measures. For both stocks and bonds, Table 1 indicates a strong positive correlation between raw and excess returns for each security type. The excess stock and bond returns are much less strongly correlated with each other than the raw returns are. Nonetheless, both the Pearson and the rank-order correlations are all significantly positive ($\alpha = .05$). Other stock and bond excess return measures yield results similar to those shown in Table 1.

Our empirical work concentrates on the interaction of stock and bond returns, which we measure in two ways. First, we simply classify each return as either positive or negative. Tables 2a and 2b report counts of positive and negative security raw returns and excess returns. In both panels, a Chi-squared test rejected (with p-values of 0.001) the hypothesis that stock and bond return classifications were independent.[9] This confirms the evidence from the correlations reported in Table 1. Raw stock and bond prices move in the same direction nearly two-thirds of the time, consistent with security returns responding to changes in the firm's overall value. In the upper left cell of this table, where all investors lose money, we would expect influence to be most readily apparent. By contrast, the impact on firm claimants derived from (advertent or inadvertent) changes in the firm's leverage or asset volatility is evidenced by stock and bond returns moving in opposite directions (upper right and lower left cells). In these instances, stockholder and bondholder signals conflict and we maybe able to identify which group, if either, influences firm managers more strongly.

A Chi-square test rejects independence of both the two securities' returns and excess returns. Table 2b clearly indicates that stock and bond excess return signs are less likely to coincide than the raw return signs are. Nevertheless, contradictory stock and bond return signals are common: 35% of firm-quarters have stock and bond raw returns moving in opposite directions while 45% of the firm-quarters have excess returns moving in opposite directions.

Categorizing security returns as simply positive or negative fails to distinguish small from large value changes. Some of our empirical work therefore employs the three-part return taxonomy illustrated in Tables 2c and 2d. Each stock and bond return was assigned to one of three equal-sized groups: "Up", "Flat" and "Down." We would expect to see the strongest evidence of market influence when the signals are large and reinforcing, in the "Up, Up" and "Down, Down" cells. Conversely, strong but contradictory signals should provide the weakest evidence of discipline ("Up, Down" and "Down, Up"). Stockholder-only influence will be reflected in particularly strong responses to cells along the top row, while bondholder-only influence should manifest itself in the leftmost column.

Chi-squared statistics again reject the hypothesis that the raw and excess stock and bond returns are independent in Tables 2c and 2d.. Contradictory stock and bond signals are common, with strong contradictory signals ("Up, Down" or "Down, Up") occurring about 14% of the time for raw returns and 19% of the time for excess returns.

Figures 1a and 1b present the proportion of firm-quarters falling into each of the four binary categories each year.[10] These figures show wide variation in the distribution of stock and bond return signs. If the direction of market signals from stocks and bonds were perfectly correlated, the inner two bars (S^uB^d and S^dB^u) would both be zero. This clearly is not the case: a Chi-squared test fails to reject the hypothesis that bond and stock values move independently of one another in 6 of the 12 sample years for the raw returns in Figure 1a ($\alpha = 0.05$). Although the excess returns are more uniformly distributed, Chi-squared tests still fail to reject the independence of stock and bond returns in 4 of 12 sample years.

To summarize, a typical BHC's stock and bond returns are moderately positively correlated overall, however this varies substantially across individual years in the sample. The sample includes a sufficiently diverse set of price of signals to isolate stock market and bond market effects, if there be any, and to determine if one source of discipline dominates the other, or whether they reinforce one another.

V. Methodology for Detecting Stock and Bond Market Influences

In order to detect market influence we look for an effect of stock and bond returns on managerial actions. We first illustrate our methodology with a simplified version of the regressions we actually run. An extensive discussion of this simplified model in Section V.1 indicates which inferences can (or cannot) be drawn about market influence. We describe how we implement the basic model estimation in Section V.2.

V.1. Identifying Influence

We begin with a working definition of market influence:[11]

> *Market influence obtains when the return on the firm's securities impacts expected managerial actions, and those actions in turn affect security value.*

Consider a very simple firm, whose value is impacted by a single exogenous variable (X_t) and an endogenous variable (A_t) controlled by the manager. The firm has a single security, a stock, whose price reflects the firm's expected future value. At time *t-1* the stockholder observes the exogenous shock, forms an expectation of the action the manager will take in response and adjusts the stock price. The net effect of all these changes is the stock's quarterly return, R_{t-1}. The manager's expected action at time *t* depends on past stock returns R_{t-1} and/or on X_{t-1}:

$$E_{t-1}\left(A_t\right) = f_A(R_{t-1}, X_{t-1}).$$

We linearize this relationship and estimate

$$E_{t-1}(A_t) = a_0 + a_1 R_{t-1} + a_2 X_{t-1},$$

which provides an expected managerial action conditional on information available at *t*-1. At time *t* the manager's action is observed.[12] If the stockholder is rational, the unexpected component of that action, $\varepsilon_t = A_t - E_{t-1}\left(A_t\right)$, will be mean zero and uncorrelated with the information available at time *t*-1.[13] These conditions are obtained by estimating

$$A_t = a_0 + a_1 R_{t-1} + a_2 X_{t-1} + \varepsilon_t \qquad (1)$$

using OLS.

At time *t* another exogenous shock X_t occurs and the manager takes his action. This action may depend in part on X_t.[14] Stockholders then update their estimate of firm value based on, X_t and the surprise component of the manager's action ε_t. We (again) model this relation as linear:

$$\begin{aligned} R_t &= b_0 + b_1\left[A_t - E_{t-1}\left(A_t\right)\right] + b_2 X_t + \eta_t \\ &= b_0 + b_1\varepsilon_t + b_2 X_t + \eta_t. \end{aligned} \qquad (2)$$

After estimating these models, we evaluate $\hat{a}_1$ and $\hat{b}_1$ to identify evidence consistent with market influence on BHC managers. As we have defined market influence, both $\hat{a}_1$ and $\hat{b}_1$ should be significantly different from zero: lagged returns help predict managerial actions, and security values in turn respond when those actions are actually taken.

Outcomes with $\hat{a}_1 = 0$ are consistent with absence of influence. They may also be consistent with the managers acting to exactly offset all shocks, and stockholders being aware the manager will do so. While we cannot totally reject this possibility such managerial perfection does seem remote, and the ‘sanguine stockholder” is inconsistent with the strong relation we see between stock (and bond) returns and the variables we use to proxy for exogenous shocks.

Turning now to the response regression (2), $\hat{b}_1 = 0$ indicates that the action surprise does not appear to affect investor beliefs about firm value. One possibility is that we have chosen inappropriate measures of managerial action. (Investors simply do not care about changes in our measured actions.) Another possibility is that our specification is appropriate, but the tests lack power. Finally, investors may predict perfectly what actions managers will take, even though our model fails to do so, and hence we find no return associated with the actions themselves. This latter possibility strains credulity. When $\hat{a}_1 \neq 0$ and $\hat{b}_1 = 0$ we have the appearance of the stockholder influencing an action he does not appear to care about. Alternative, and perhaps more sensible, interpretations are that our tests lacked power to reject $\hat{b}_1 = 0,$ or that the stock return R_{t-1} is proxying for an unobserved omitted variable. Unfortunately, this last (unsatisfying) outcome is the most common one in our results.

Investor influence could be either beneficial or perverse. Beneficial influence is what advocates of market discipline have in mind. While perverse influence (when managers take actions opposite to what the stakeholder wishes) may reflect unresolved agency problems. Modifying the influence equation (1) makes it possible to discriminate between these two types of influence.

The b_1 coefficient reveals the preferred direction of managerial action. If $b_1 > 0,$ then a positive action surprise at time *t* is associated with a positive return at time *t*. Assuming that the time *t* exogenous shock has not reversed the desired direction of action, the time *t*-1 desired action would also be positive. The contribution of the time *t*-1 return to the expected action is $a_1 R_{t-1}$. The sign of $a_1 R_{t-1}$ depends on the sign of R_{t-1}. R_{t-1} is roughly as likely to be positive as it is to be negative, so the sign of $a_1 R_{t-1}$ is indeterminate. The sign of a_1 is thus insufficient for us to determine whether a significant value for a_1 is evidence of beneficial or perverse influence.

However, if we partition R_{t-1} into two variables, R_{t-1}^{+} and R_{t-1}^{-} defined as follows:

$$R_{t-1}^{+} = \begin{cases} |R_{t-1}| & \text{if} \quad R_{t-1} > 0 \\ 0 & \text{otherwise} \end{cases}$$
$$R_{t-1}^{-} = \begin{cases} |R_{t-1}| & \text{if} \quad R_{t-1} \leq 0 \\ 0 & \text{otherwise} \end{cases}$$

and change equation (1) to

$$A_t = a_0 + a_1^{+} R_{t-1}^{+} + a_1^{-} R_{t-1}^{-} + a_2 X_{t-1} + \varepsilon_t \,. \qquad \text{(1a)}$$

we can then determine whether influence is beneficial or perverse. Suppose again that $b_1 > 0$, meaning that investors prefer more of the associated action to less. Then $a_1^{+} > 0$ and $a_1^{-} > 0$ would both be consistent with beneficial investor influence, i.e. the security holder influencing the expected managerial action in the desired positive direction—$a_1^{+} R_{t-1}^{+}$ and $a_1^{-} R_{t-1}^{-}$ would both be positive. By contrast, $a_1^{+} < 0$ and $a_1^{-} < 0$ would imply that the effect of returns on the expected managerial action is the opposite of that desired by the security holder. Similar reasoning applies to the case of $b_1 < 0$. Table 3 summarizes the interpretation of influence regressions in terms of beneficial or perverse influence.

Equations (1a) and (2) lay out the basic idea for detecting observable market influence and discriminating between the beneficial influence we expect if markets work properly and the perverse influence that may obtain if frictions are present. To apply this methodology to actual data requires a considerable increase in complexity, although the core ideas remain unchanged.

V.2. Implementation

Estimating the regression model (1a) and (2) requires explicit selection of security returns, action variables under close managerial control, and a set of balance sheet variables not (completely) under managerial control that proxy for the exogenous shocks to BHC value. We have also included a set of control variables to proxy for changes in the economic environment.

It is usual to think that security returns have a systematic component that reflects exogenous shocks to the economy, and an idiosyncratic component that reflects firm-specific factors including managerial actions. The systematic component of returns is outside the scope of the security holders' (i.e. market) influence on individual firm's manager's actions. We therefore measure each BHC's stock and bond returns as the *excess* return, over appropriate market return indices.[15] We denote these excess returns R_t^{stk} and R_t^{bnd} respectively. Firm excess returns reflect (actual and anticipated) managerial actions, plus idiosyncratic exogenous shocks.[16] Since our interest lies with managerial influence, we will need to control for the latter.

V.2.a. The Influence Equation

We are interested in two sets of investors; stockholders and bondholders. The corporate governance literature focuses primarily on stockholder/management issues. However, the discussion of market discipline as a component of bank regulation focuses on debt. Bondholders and regulators confront similar risk/return tradeoffs: they do not share in the upside return to risky projects, but are exposed to loss if the projects fail. We must take account of both groups' preferences in evaluating whether investors can reliably influence managers. Moreover, because stock and bondholders are often affected differently by managerial actions, we must interact both sets of preferences in order to account for potentially-offsetting influence coming from the two groups. Furthermore, we conjecture that positive market signals may elicit less reaction from managers than do negative signals. (Why change a winning strategy?) While an across-the-board *rise* in equity and bond values appears to require no managerial changes, an across-the-board *decline* might elicit the most intense adjustments.

Our illustrative specification of the influence equation (1a) indicates that past returns may affect managers, but theory provides no indication of the appropriate lag between signal and action. How long should it take a market signal to influence managers? We wished to let the data describe the delays associated with market influence, while preserving a reasonable number of degrees of freedom for our estimates. Accordingly, we include three lags of the market signals in our regressions, and three lags of the exogenous shock variables. We also investigated single-lag models, in which the explanatory variables were lagged 1, 2 or 3 quarters, and these produced qualitatively similar results (not reported). The specifications we employ permit shareholders and bondholders to have differential influence and for the influence to differ for between 'up' and 'down' return signals.

In our first implementation of equation (1a) we classify excess stock and bond returns as either positive or negative, and interact the resulting four dummy variables with the absolute value of each security's return. For each possible action variables, we estimate:

$$\begin{aligned} A_{it} &= \alpha_0 + \sum_k \alpha_k A_{i,t-k} \\ &+ \sum_k \left[\beta_{1k} I_{i,t-k}\left(S^u B^u\right) + \beta_{2k} I_{i,t-k}\left(S^u B^d\right) + \beta_{3k} I_{i,t-k}\left(S^d B^u\right) + \beta_{4k} I_{i,t-k}\left(S^d B^d\right) \right] \left| R^{stk}_{i,t-k} \right| \\ &+ \sum_k \left[\beta_{5k} I_{i,t-k}\left(S^u B^u\right) + \beta_{6k} I_{i,t-k}\left(S^u B^d\right) + \beta_{7k} I_{i,t-k}\left(S^d B^u\right) + \beta_{8k} I_{i,t-k}\left(S^d B^d\right) \right] \left| R^{bnd}_{i,t-k} \right| \\ &+ \mathbf{\Gamma X}_{t-1} + \mathbf{\Delta D}_{t-1} + \varepsilon_{it} \end{aligned} \tag{3a}$$

where A_{it} is one of the *action* variables available to BHC *i*'s managers during quarter *t*;

k (k $\leq$ 3) is the lag length, in quarters, between market signal (return) and managerial action;

$I_{i,t}\left(S^u B^u\right)$ is a dummy variable equal to one for a quarter for which when BHC *i*'s stock return (S) was "up" and its bond return (B) was "up:" The variables $I_{i,t}\left(S^m B^n\right)$ are defined analogously, where m, n = "u" indicates that the security's value went *u*p, and m, n = d indicates that the security's value fell *d*own.

$\left|R^{bnd}_{i,t-k}\right|$ is the absolute value of the i[th] BHC's bond return over period t-k;

$\left|R^{stk}_{i,t-k}\right|$ is the absolute value of the i[th] BHC's stock return over period t-k;

$\mathbf{X}_{t-1}$ is a vector of exogenous shock variables; and

$\mathbf{D}_{t-1}$ is a vector of dummy (control) variables indicating the years.

The specification (3a) captures the BHC's stock and bond returns' interaction, and the magnitude of each return. The coefficients on lagged values of $I_{i,t}\left(S^d B^d\right)\left|R^{stk}_t\right|$ (for example) measure the impact of a negative stock return accompanied by a decline in bond value. (This combination of stock-bond movements is consistent with a decrease in the firm's asset value.) The coefficients on $I_{i,t}\left(S^d B^d\right)\left|R^{bnd}_t\right|$ would indicate the effect of a negative bond return under the same circumstances. Finding that the R^{stk}-related coefficient is significant and of the appropriate sign while the R^{bnd}-related coefficient is not significant would suggest that managers are more responsive to shareholders' welfare than to bondholders'. Of the eight potential combinations of absolute excess returns with direction of movement indicators, only some make good economic sense. Suppose the coefficients on $I_{i,t}\left(S^d B^d\right)\left|R^{bnd}_t\right|$ and $I_{i,t}\left(S^d B^u\right)\left|R^{bnd}_t\right|$ are both significant and signed to suggest influence. This combination of directional dummies suggests that a decrease in stock price is influential, regardless of the direction of bond price movement. However, it is difficult to understand why the influence of a stock decline should be proportional to the magnitude of the bond excess return!

The specification (3a) requires that managerial actions be proportional to preceding realized returns. However, we noted above that a security return reflects in part the anticipated managerial response. Relying on measures of the absolute returns in (3a) requires that the scale or probability of managerial action be proportional to a return that reflects, in part, the investors' expected managerial actions. To assess whether our results depend on this implied restriction, we repeated the analysis using a three-way classification scheme for returns (as in Tables 2c and 2d):

$$
\begin{aligned}
A_{it} &= \alpha_0 + \sum_k \alpha_k A_{i,t-k} \\
&+ \sum_k \Big[\beta_{1k} J_{i,t-k}\left(S^u B^u\right) + \beta_{2k} J_{i,t-k}\left(S^u B^f\right) + \beta_{3k} J_{i,t-k}\left(S^u B^d\right) + \beta_{4k} J_{i,t-k}\left(S^f B^u\right) \\
&+ \beta_{5k} J_{i,t-k}\left(S^f B^d\right) + \beta_{6k} J_{i,t-k}\left(S^d B^u\right) + \beta_{7k} J_{i,t-k}\left(S^d B^f\right) + \beta_{8k} J_{i,t-k}\left(S^d B^d\right) \Big] \\
&+ \mathbf{\Gamma X}_{t-1} + \mathbf{\Delta D}_{t-1} + \varepsilon_{it}
\end{aligned}
\tag{3b}
$$

where A_{it} and X_t are defined as in (3a) and the dummy variables

$J_{i,t}\left(S^a B^b\right)$ takes the value 1 if the excess stock return (*S*) is '*a*' and the excess bond return (*B*) is '*b*.' The superscripts 'a' and '*b*' can take on one of three values:

u = an "up" return, ranking in the upper third of excess returns on like securities in the sample,

f = a "flat" return, ranking in the middle third of excess returns on like securities, and

d = a "down" return, in the lowest third of excess returns for like securities.

Regression (3b) permits managers to respond to eight types of market signal, corresponding to the outside cells of Tables 2c and 2d. These measures of stock and bond returns permit us to incorporate some information about return magnitudes, while still reaping the econometric advantages of categorical variables when the importance of return magnitudes is uncertain. . Note that we retain a constant term in equation (3b) while omitting the least interesting case ($S^f B^f$) from the specification.

V.2.b. The "Response" Equation

The response equation (2) is estimated separately for stock and bond excess returns. Instead of a single action surprise driving the excess return, we now specify that period *t* security returns depend on a complete set of '*n*' action surprises

$$
\begin{aligned}
R_t^{stk} &= b_0 + \gamma R_{t-1}^{stk} + b_1\left[A_{1,t} - E_{t-1}\left(A_{1,t}\right)\right] + \cdots + b_n\left[A_{n,t} - E_{t-1}\left(A_{n,t}\right)\right] \\
&\quad + \mathbf{\Phi X}_t + \mathbf{\Lambda D}_t + \eta_t
\end{aligned}
\tag{4a}
$$

$$
\begin{aligned}
R_t^{bnd} &= b_0^* + \gamma^* R_{t-1}^{bnd} + b_1^*\left[A_{1,t} - E_{t-1}\left(A_{1,t}\right)\right] + \cdots + b_n^*\left[A_{n,t} - E_{t-1}\left(A_{n,t}\right)\right] \\
&\quad + \mathbf{\Phi}^* \mathbf{X}_t^* + \mathbf{\Lambda D}_t^* + \eta_t^*
\end{aligned}
\tag{4b}
$$

The observed managerial actions ($A_{i,t}$) can be combined with the influence regression (3a or 3b) to compute the surprise component of each action. The sign of b_i or b_i* immediately implies the stakeholders' preferred managerial action. We can thus determine whether, on average over the entire sample, an unexpected dividend cut (e.g.) is viewed as valuable to bondholders. The exogenous shock variables $\mathbf{X}_t$ contain the lagged shock variables $\mathbf{X}_{t-1}$, as well the contemporaneous (time *t*) exogenous shock variables.

V.2.c. The Set of Managerial Actions

We have implicitly assumed that managers can effectively control the "actions" that investors are trying to effect. Finding measurable variables with this characteristic presents something of a challenge. Suppose, for example, that BHC share prices fall in response to large loan losses. The firm's leverage therefore rises and bondholders would like managers to reduce leverage back toward its *ex ante* level. (The shareholders' preference is less clear.) In testing for stockholder and bondholder influence, one might be tempted to designate book leverage as a managerial *action* variable. Managers do not entirely control book leverage. Managers might set out to reduce leverage by tightening credit requirements for new borrowers. If loan demand conforms to the managers' expectations, these policies should indeed reduce BHC leverage. Because loan demand is not perfectly controllable or predictable, however, leverage might still increase despite management's sincere efforts to reduce it. For example, customers with pre-negotiated lines of credit might draw down surprisingly large proportions of their credit lines. Leverage is thus an ambiguous indicator of managerial action. The sale of new stock or a dividend cut might be more appropriate managerial action variables, because managers unambiguously control dividends and stock issues. Table 4 presents our measures of managerial *action*. We divide these actions into three sub-groups: those affecting leverage, those affecting asset portfolio risk, and "others." For some action variables we also include a binary classification (e.g. dividends up vs. not up) along with the continuous measures.[17]

It is difficult to establish that a particular set of action measures is complete. Some legitimate *action* measures may be omitted, and managers may only imperfectly control others that are included. Our approach is to seek systematic linkages in the data that appear to be consistent with managers taking responsive actions in the wake of security losses or gains. By considering a number of regression specifications and various ways of measuring the key variables, we hope to determine if the preponderance of the evidence supports the market influence hypothesis.

V.2.d. Exogenous Shock Variables

In a dynamic firm, managerial *action* variables may vary through time for reasons other than the immediate desires of stock or bondholders. In order to isolate the effect of past security returns on managerial actions, therefore, we must control for these exogenous factors. We utilize an agnostic statistical approach to absorb predetermined variation in *action* variables, regressing changes in each action variable against a large set of control variables, intended to capture any path dependence in managers' decisions. Importantly, these exogenous shock variables *do not* include past stock and or bond returns. Table 5 lists the income and balance sheet variables we include to model predetermined changes in the *action* variables. We also include in the set of exogenous variables:

1) Year dummy variables, to control for omitted variations in the banking industry's condition, ease of access to stock and bond markets, regulatory pressures, and so forth.

2) In the influence equation (1): recent quarterly changes in the (dependent) decision variable.

3) In the response equation (2): one quarterly lag of the dependent variable (a stock or bond return).

Note that the lagged BHC ratios in (3a or 3b) may be correlated with the lagged security returns. We include both sets of explanatory variables in the regression, thereby permitting the data to apportion explanatory power between the lagged returns and lagged control variables. As one indicator of the importance of market influence, we will report the marginal contribution to $\overline{R}^2$ for the accounting variables (given the lagged returns), and vice versa.

VI. Empirical Results

We now present estimation results for the influence and response regressions, (3a-3b) and (4a-4b). We first consider the estimated coefficients' parametric statistical significance, in the context of Table 3 and the discussion in Section V.2. This approach is conservative, and yields little evidence of beneficial investor influence. We then apply a sign-based analysis that ignores parametric statistical significance and looks for patterns consistent with the beneficial and perverse influence hypotheses. We find some extreme cases, where the signs of all coefficients are consistent with one hypothesis or the other, for which we can reject the null hypothesis of 'no influence.' However, in most cases the signs are not all consistent, and we can only note the tendency one way or the other in the data.

VI.1. Analysis of Influence Regressions

We identify significant influence coefficients (the analogs of a_1 in equation (1)) on the basis of the sum of the three lagged coefficients for each action variable. Table 6a presents these sums and their corresponding statistical significance for the influence specification (3a), and Table 6b presents the results for specification (3b). The 'H0: All 8 sums = 0' rows provide the formal test of the 'no influence' null hypothesis. In both specifications the null is rejected for 12 of 18 action variables at the 10% level. Applying a 5% confidence level, we reject the null for 11 action variables in Table 6a and 9 action variables using the alternative specification of Table 6b.

The two influence specifications exhibit a good deal of similarity in the actions they identify as responding to lagged returns. Both specifications reject the "no influence" hypothesis for half of our continuous action variables (CMINCR, EQINCR, dCDIVP, TAGROW) and four of the five binary action variables (DCOMUP, DPFUP, DEQUP, DSND). Several variables (dSHCRSP, dQSUBDB, dSECPCT) carry jointly insignificant coefficient sums (10% level) in both tables. PFINCR also looks quite weak in both specifications. Overall, the frequencies with which we reject the ‘no influence’ null hypothesis in Table 6a and Table 6b strongly suggest more than simple sampling variation. These results are consistent with investors exerting some influence over BHC managers.

Moreover, many of the individually significant summed return coefficient combinations are economically sensible. We expect influence to be weakest for S^uB^u combinations and strongest for S^dB^d combinations. The coefficient estimates reflect this general pattern, although not overwhelmingly: Table 6a exhibits 9 significant coefficients (10% level) for the S^dB^d combinations, against 5 for S^uB^u. Table 6b exhibits 8 significant S^dB^d coefficients against 5 for S^uB^u.

The R^2 statistics for the full influence model and with subsets of explanatory variables omitted, provide further, though informal, information on the degree to which returns contribute to subsequent actions. R^2 statistics indicate that the full model explains a large fraction of the observed variation in most of the action variables. Dropping the lagged return variables from the RHS reduces the explanatory power of the model only marginally. So does dropping the exogenous shocks. This is consistent with our (unreported) evidence that excess returns are predictable from the exogenous shocks. A significant fraction of the explanatory power of these regressions comes from the lagged dependent variables. Thus while the coefficients on the returns in the influence equation are sometimes significant, the returns are not providing a great deal of information beyond that contributed by other independent variables.

The observed rates of rejection of the ‘no influence’ null in Tables 6a and 6b are inconsistent with simple sampling variation. The fact that managerial actions follow past return patterns is consistent with influence, but we must look at the response equations to determine if this apparent influence is associated with actions that actually enhance security values.

VI.2. Parametric Evidence about Influence

Tables 7a and 7b combine new information about the estimated response equations with the influence equation coefficient estimates already presented in Tables 6a and 6b. The influence hypothesis is not strongly supported by the response regression coefficients. Stock excess returns respond significantly to only 3 (4) action variable surprises in Table 7a (7b), but the only significantly valuable actions that appear in both specifications are dUNINTA and DCDIVUP. (Even then, the significant, opposite signs on the similar variables dUININS and dUNINTA in Table 7b seem puzzling.) One of the three significant response variables in Table 7a (dSECPCT) is not associated with significant influence. Table 7b provides only two additional actions (dCDIVP and dUININS) that are affected by past returns and, in turn, significantly affect excess stock returns when action is taken.

The bonds' response regressions exhibit even fewer significant effects. The only action surprises with significant return response coefficients are dSECPCT in Table 7a, and dFTEMP in Table 7b; both only weakly significant.

Investor influence requires $a_1 \neq 0$ and $b_1 \neq 0$. The dearth of significant return responses (b_1) therefore leaves us with scant evidence in favor of influence. In Table 7a the significant stock and bond response coefficients for dSECPCT are not associated with any significant influence coefficients. The significant coefficient on stock response to dUNINTA is associated with a significant influence variable, on the $S^d B^d$ combination and the signs are consistent with beneficial influence. Unhappily, this picture is spoilt by the fact that the significant <u>stock</u> response is associated with a significant <u>bond</u> influence. Table 7b is not much more encouraging. The significant stock response coefficient for dCDIVP is associated with two weak influences associated with stock down states, consistent with influence. However, the signs of the coefficients are consistent with perverse, rather than beneficial, influence. The weakly significant bond response coefficient on dFTEMP is associated with a weakly significant influence coefficient on the action for $S^u B^d$, consistent with influence, although again perverse rather than beneficial. The significant dUININS stock response coefficient is associated with three significant influence variables. In this case the signs are consistent with beneficial influence, but the three return states that appear to be influencing the dUININS action variable are all bond down states. This seems inconsistent with stocks influencing actions. The significant dUNINTA stock response is associated with bond-down-related influence coefficients and the signs are consistent with perverse influence. Finally, in both tables the significant stock response on the DCDIVUP action variable is associated with several influences; again predominantly of bond-down and of signs consistent with perverse influence.

In summary, while there appears to be significant association between return variables and subsequent managerial actions, the evidence of influence from combining the influence and response regression results is very weak, and in no case is there clear evidence of beneficial influence. As was pointed out earlier, this is not conclusive evidence against stock and bondholder influence, but neither is it evidence for influence. That the few instance of influence that we can detect are consistent with perverse, rather than beneficial influence is not promising.

VI.3. Non-Parametric Evidence about Influence

The broadly insignificant results for the response regressions might reflect a general power failure for the parametric tests applied in the usual sort of regression analysis. We therefore evaluate whether a simple, non-parametric signs test can provide consistent interpretations of the results in Tables 7a and 7b. To conserve space we discuss only the tertiary specification results in Table 7b. The results in Table 7a are similar.

The influence equation specification in Table 7b includes six explanatory variables that can reasonably be associated with stock return influence on managerial actions, $S^u B^u$, $S^u B^f$, $S^u B^d$, $S^d B^u$, $S^d B^f$, $S^d B^d$ (stock flat combinations are unlikely to be associated with stock influence), and another six for bond influence, $S^u B^u, S^f B^u, S^d B^u, S^u B^d, S^f B^d, S^d B^d$. The probability of six coefficients carrying the same sign by chance alone is approximately 1.6%. Five out of six coefficients bearing the same sign would appear by chance 18.8% of the time. A non-parametric sign test of beneficial or perverse influence would reject the no-influence null at the 5% level if all 6 stock influence coefficients are the same sign as the stock response coefficient (beneficial) or the opposite sign (perverse). Where fewer than 6 relevant influence coefficients have the same sign, the influence coefficient signs may suggest a relation one way or the other (if not half positive and half negative) but these results are statistically inconclusive. Taking Table 7b CMINCR as an example, the stock response coefficient is positive, so beneficial influence requires positive coefficients on the three stock-up and three stock-down influence coefficients. Four of the relevant influence coefficients are positive (S^uB^u, S^uB^d, S^dB^f, S^dB^d) and 2 are negative (S^uB^f, S^dB^u). This is suggestive of beneficial influence, but not significant. A single 'B' in the stock column of the 'Beneficial/perverse influence' results column denotes this. The dUNINTA results provide clear, significant evidence of beneficial stock influence — denoted 'BB' in the stock 'Beneficial/perverse influence' results column—as well as significant perverse bond influence—denoted 'PP' in the bond column. Table 7a can only provide weak evidence of influence. For stocks there are only 4 relevant influence coefficients, those associated with the absolute value of the stock return. The chance of all four coefficients having the same sign is 6.3 percent. Even though this is significant at only the 10% level, we also denote this outcome with 'BB' or 'PP', if appropriate, in Table 7a.

These non-parametric sign tests of beneficial and perverse influence produce mixed results. Over both specifications we find 8 (of 36) significant cases of beneficial stock influence, and 4 significant cases of perverse stock influence. The 'suggestive' stock results break down 7 beneficial to 10 perverse. Less rigorously, some indication (significant or otherwise) of beneficial stock influence obtains in 15 cases versus 14 cases for perverse influence, with 7 cases being completely neutral. The corresponding bond results are: 8 cases of significant beneficial bond influence; 7 cases of significant perverse bond influence; 15 cases at least suggestive of beneficial bond influence; 16 cases at least suggestive of perverse influence, and 5 cases completely neutral. Once again, the only strong conclusion we can draw from these results is that the data are not uniformly consistent with the presence of beneficial investor discipline for sample banking firms.

VII. Summary and Conclusions

The concept of "market discipline" has attained great popularity in discussions of regulatory reform, both in the United States and abroad. “Market discipline” implies two quite distinct notions, which we have tried to separate: private investors' ability to understand ("monitor") a financial firm's true condition, and their ability to "influence" managerial actions in appropriate ways. A large body of evidence suggests that markets monitor financial firms effectively and promptly, but specific tests of investor influence have been much more limited. Previous research provides some information about shareholders' ability to influence firm managers, particularly in extreme situations, but empirical evidence about bondholders' ability to influence firm behavior has been lacking.

In order to assess whether bondholders can effectively influence banking firms, we assembled information about large U.S. bank holding companies' stock and bond returns, and their financial condition, for the period 1986-1997. We explicitly modeled the interaction between investors and managers, and showed how beneficial influence should be manifested in the data. Our methodology should identify appropriate managerial responses to observable, exogenous events that affect BHC value. Some types of beneficial influence will be undetectable: for example, if managers <u>refrain</u> from taking actions that they know would elicit investor chagrin. Accordingly, we note that our methodology probably identifies a lower bound on the extent of beneficial investor influence.

The empirical results fall into two categories. First, the standard parametric tests provided very little evidence for investor influence. Despite many statistically significant associations between returns and subsequent managerial actions, we could not interpret the overall coefficient estimates as supporting beneficial influence. The weakness in the parametric tests derives from the paucity of meaningful return responses to our managerial action variables. The parametric evidence is not <u>in</u>consistent with influence. It is simply inconclusive.

A less rigorous, non-parametric interpretation of the regression results identifies evidence consistent with both beneficial and perverse influence. For bondholders, the instances of beneficial and perverse influence are equal in number. Stockholders appear to exert significant beneficial influence about twice as often as they exert perverse influence, consistent with the fact that equity has much more extensive control rights in normal circumstances. However one chooses to interpret these non-parametric results, the evidence cannot be said to unambiguously support the presence of beneficial investor influence on BHC firms over the sample period.

If these conclusions withstand further analysis, the implications for regulatory reliance on market forces are important, but simple. Other research indicates that private investors monitor financial firms and may even anticipate changes in their financial condition. Our results do not address this question and so carry no implication for proposals to more formally incorporated market signals into the government supervisory process. However, in the absence of specific evidence that BHC stock and bondholders can effectively influence managerial actions under normal operating conditions, supervisors would be unwise to rely on investors—including subordinated debenture holders—to constrain BHC risk-taking. At least under current institutional arrangements, supervisors must retain the responsibility for influencing managerial actions.

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Table 1: Stock and bond return correlations

Table 1a: Pearson correlations

		Stock Returns		Bond Returns	
		Raw	**Excess**	**Raw**	**Excess**
Stock Returns	**Raw**	1.00			
	Excess	0.652	1.00		
Bond Returns	**Raw**	0.310	0.212	1.00	
	Excess	0.238	0.179	0.815	1.00

Table 1b: Rank correlations

		Stock Returns		Bond Returns	
		Raw	**Excess**	**Raw**	**Excess**
Stock Returns	**Raw**	1.00			
	Excess	0.848	1.00		
Bond Returns	**Raw**	0.271	0.189	1.00	
	Excess	0.157	0.129	0.449	1.00

- Raw stock returns are quarterly, inclusive of dividends.
- Raw bond returns are quarterly, inclusive of accrued interest.
- Excess stock returns are the difference between the stock return and the CRSP value-weighted combined NYSE, AMEX and NASDAQ market index.
- Excess bond returns are the bond return relative to the rating/term-matched bucket in the value weighted all bonds S&P-based index.

Table 2: Coincidence of stock and bond returns' directional movements

Table 2a: Raw returns

Stock Returns ↓	**Bond Returns** Down	**Bond Returns** Up	**Stock Signal Marginal Distribution:**
Down	**290** **10.6%**	**662** **24.2%**	952 34.8%
Up	**293** **10.7%**	**1489** **54.5%**	1782 65.2%
Bond Signal Marginal Distribution:	583 21.3%	2151 78.6%	2734 100%

Table 2b: Excess returns

Stock Returns ↓	**Bond Returns** Down	**Bond Returns** Up	**Stock Signal Marginal Distribution:**
Down	**764** **27.9%**	**534** **19.5%**	1289 47.5%
Up	**694** **25.4%**	**742** **27.1%**	1436 52.5%
Bond Signal Marginal Distribution:	1458 55.3%	1276 46.7%	2490 100%

Table 2c: Raw returns tertiary breakdown

Stock Returns ↓	Bond Returns Down	Bond Returns Flat	Bond Returns Up	Stock Signal Marginal Distribution:
Down	**411** **15.0%**	**283** **10.3%**	**217** **7.9%**	911 33.3%
Flat	**333** **12.2%**	**286** **10.5%**	**293** **10.7%**	912 33.3%
Up	**167** **6.1%**	**343** **12.5%**	**401** **14.7%**	911 33.3%
Bond Signal Marginal Distribution:	911 33.3%	912 33.3%	911 33.3%	2734 100%

Table 2d: Excess returns tertiary breakdown

Stock Returns ↓	Bond Returns Down	Bond Returns Flat	Bond Returns Up	Stock Signal Marginal Distribution:
Down	**391** **14.3%**	**251** **9.2%**	**269** **9.8%**	911 33.3%
Flat	**276** **10.1%**	**344** **12.6%**	**292** **10.7%**	912 33.3%
Up	**244** **8.9%**	**317** **11.6%**	**350** **12.8%**	911 33.3%
Bond Signal Marginal Distribution:	911 33.3%	912 33.3%	911 33.3%	2734 100%

Table 3: Interpretation of influence as 'beneficial' or 'perverse'

Influence Regression $A_t = a_0 + a_1^+ R_{t-1}^+ + a_1^- R_{t-1}^- + a_2 X_{t-1} + \varepsilon_t$

where $R_{t-1}^+ = \begin{cases} |R_{t-1}| & \text{if} \quad R_{t-1} > 0 \\ 0 & \text{otherwise} \end{cases}$

$R_{t-1}^- = \begin{cases} |R_{t-1}| & \text{if} \quad R_{t-1} \leq 0 \\ 0 & \text{otherwise} \end{cases}$

	$a_1^+ > 0$	$a_1^+ < 0$	$a_1^- > 0$	$a_1^- < 0$
$b_1 > 0$	Beneficial	Perverse	Beneficial	Perverse
$b_1 < 0$	Perverse	Beneficial	Perverse	Beneficial

Table 4
Action variables used to measure managerial responses to market signals

Variable Name	Variable Description
	"Factors affecting BHC leverage (continuous variables)"
CMINCR	Increase in value of common stock, as percentage of book value of equity.
PFINCR	Increase in value of preferred stock, as percentage of book value of equity.
EQINCR	Increase in equity, as percentage of book value of equity (sum of CMINCR and CFINCR).
dSHCRSP	Percentage change in number of CRSP common shares outstanding.
dCDIVP	Change in common dividend declared as percentage of book value of equity.
dDIVP	Change in common plus preferred dividends declared, as a percentage of book value of equity.
dQSUBDB	Percentage change in sub debt as percentage of quarter-average total assets.
dBVEQ	Change in book value of equity as a percentage of total assets.
TAGROW	Quarter to quarter change in total assets divided by beginning of quarter total assets.
	"Factors affecting BHC leverage (dummy variables)"
DCDIVUP	1 if $ dividend increased from prior quarter, 0 otherwise.
DCOMUP	1 if increase in common outstanding, 0 otherwise.
DPFUP	1 if increase in preferred outstanding, 0 otherwise.
DEQUP	1 if increase in either type of equity, 0 otherwise.
DSND	1 if debentures rose in $ value, 0 otherwise.
	"Factors affecting asset risk"
dSECPCT	Change in securities portfolio as a proportion of total assets.
	"Other Measures" of managerial action
dFTEMP	Percentage change in number of full-time-equivalent employees.
dUINSINS	Change in uninsured liabilities as a percentage of insured liabilities.
dUNINTA	Change in uninsured liabilities as a proportion of total assets.

Table 5: Exogenous variables

Variable Name	Variable Description
CASHTA	BHC's cash, divided by total assets.
CILNTA	BHC's commercial and industrial loans, divided by total assets.
CPTA	BHC's commercial paper outstanding, divided by total assets.
GLOANSTA	BHC's gross loans, divided by total assets.
TRADETA	BHC's assets held in trading portfolio, divided by total assets.
NINCTA	BHC's net income, divided by total assets.
TOTLIATA	BHC's total liabilities, divided by total assets.
LNPDTA	BHC's loans past due 90 days or more, divided by total assets.
LNSNATA	BHC's loans on non-accrual status, divided by total assets.
CHRGOTA	BHC's loan chargeoffs, divided by total assets.
RECVRTA	BHC's recoveries on loans previously charged off , divided by total assets.
LNTA	BHC's natural log of total assets.

- All BHC ratios are measured as *changes*, from one end-of-quarter to the next.
- The "total assets" divisor is the quarterly average of total assets, not the quarter-end value. Except
- Three quarterly lags (*t*-1, *t*-2, *t*-3) of all control variables are included in 'influence' equations (3).
- Contemporaneous and three quarterly lags (*t* , *t*-1, *t*-2, *t*-3) of all control variables are included in 'response' equations (4).

Notes for Table 6a and 6b: Summary results for 'influence' regressions.

- Italicized coefficients are significant at the 10% level; bold denotes significance at the 5% level.
- Reported coefficients are sums of the three lagged coefficients. Influence regressions were run separately for each action variable, using stock/bond directional dummies for past three quarters, three lags of the dependent variable, three lags of the exogenous variables in Table 5, and a set of "year" dummy variables. The "Adjusted R^2" statistic indicating goodness-of-fit for the probit regressions is the likelihood ratio index (Greene [1993], page 651).
- The numbers reported for "H0: All 8 sums = 0" are p-values.

Notes for Table 7a and 7b: 'Influence' and 'response' regression results and sign-based test of beneficial/perverse influence.

- Italicized coefficients are significant at the 10% level; bold denotes significance at the 5% level.
- Influence regression results are repeated (in transposed form) from Tables 6a and 6b. The numbers reported are sums of the three coefficients on lagged stock/bond return measures.
- Response equations (4a and 4b) were estimated separately for stock and bond returns. For each security return, we estimated separate regressions for the set of continuous and discrete action variables. (Including both the OLS and the probit residuals in the same response equation yields very similar results.) Explanatory variables were the unexpected components of all action variables (residuals from the Influence regressions), the lagged security return, year dummies, and the contemporaneous and three lags of the exogenous variables from Table 5.
- Beneficial/perverse influence tests were based on coefficient signs, without regard for significance levels. The classifications from Table 3 were applied to combinations of influence and response equation coefficients. The sign of 'b_1' implies which direction the action variable must move to increase a security's value. If <u>all</u> relevant stock/bond 'a_1' coefficient signs were consistent with beneficial influence, the result was classified as 'BB'. If the majority of influence coefficients were consistent with beneficial influence, the result was classified as 'B'; if evenly divided, as '?', etc.

Table 6a: Summary results for ‘influence’ regressions (3a) using 2-way classification of returns as ‘down’ and ‘up’, multiplied by absolute value of return.

	OLS using continuous dependent action variables								
	CMINCR	**PFINCR**	**EQINCR**	**dSHCRSP**	**dCDIVP**	**dDDIVP**	**dQSUBDB**	**dBVEQ**	**TAGROW**
Sum 3 SuBu $\|R^{stk}\|$	**0.00062**	0.00021	**0.00091**	0.00035	-0.00004	-0.00005	0.00000	0.00005	**0.00019**
Sum 3 SuBd $\|R^{stk}\|$	**0.00198**	0.00001	**0.00215**	*0.00304*	0.00013	0.00010	0.00001	0.00001	0.00010
Sum 3 SdBu $\|R^{stk}\|$	*0.00073*	-0.00014	0.00054	0.00051	**-0.00050**	**-0.00046**	0.00000	-0.00007	**0.00025**
Sum 3 SdBd $\|R^{stk}\|$	**0.00116**	-0.00003	**0.00118**	-0.00035	-0.00016	-0.00014	0.00002	**-0.00015**	**0.00015**
Sum 3 SuBu $\|R^{bnd}\|$	0.00006	0.00051	0.00067	0.00171	-0.00016	-0.00021	-0.00003	*-0.00015*	0.00021
Sum 3 SuBd $\|R^{bnd}\|$	0.00239	-0.00012	0.00255	0.00657	**-0.00110**	*-0.00109*	**-0.00021**	-0.00013	0.00013
Sum 3 SdBu $\|R^{bnd}\|$	0.00088	0.00051	0.00170	0.00378	-0.00021	-0.00020	-0.00003	0.00003	-0.00003
Sum 3 SdBd $\|R^{bnd}\|$	0.00135	-0.00024	0.00115	0.00421	**-0.00079**	**-0.00083**	-0.00005	**0.00034**	**0.00075**
H0: All return coefs = 0	**0.0001**	0.7225	**0.0004**	0.2975	**0.0000**	**0.0000**	0.2021	**0.0181**	**0.0006**
Adj R^2s: All variables	0.5843	0.3428	0.5370	0.1081	0.7671	0.7886	0.0626	0.3804	0.9826
Adj R^2s: w/o returns	0.5462	0.3377	0.5080	0.1074	0.7617	0.7841	0.0653	0.3702	0.9822
Adj R^2s: w/o shocks	0.5332	0.3206	0.4939	0.0249	0.7374	0.7597	0.0192	0.0694	0.0323
Adj R^2s: w/o shocks or years	0.5252	0.3145	0.4833	0.0036	0.7298	0.7528	0.0074	0.0412	0.0316
Nobs	2045	2032	2028	2043	2053	2049	2053	2053	2053

	OLS using continuous dependent action variables				Probit using binary dependent action variables				
	dSECPCT	**dFTEMP**	**dUININS**	**dUNINTA**	**DCDIVUP**	**DCOMUP**	**DPFUP**	**DEQUP**	**DSND**
Sum 3 SuBu $\|R^{stk}\|$	-0.00013	**0.00102**	0.00002	-0.00005	0.01001	**0.02711**	0.01807	0.01728	0.00286
Sum 3 SuBd $\|R^{stk}\|$	-0.00008	0.00036	0.00019	0.00006	-0.00417	0.01924	0.00267	0.01184	*-0.02538*
Sum 3 SdBu $\|R^{stk}\|$	0.00053	0.00023	-0.00084	-0.00039	**-0.13247**	-0.02192	0.00918	-0.00680	0.01424
Sum 3 SdBd $\|R^{stk}\|$	-0.00028	0.00016	0.00059	0.00023	**-0.05781**	**0.03606**	**0.04518**	**0.03299**	0.01851
Sum 3 SuBu $\|R^{bnd}\|$	0.00058	0.00009	0.00028	0.00017	**-0.18891**	*0.07786*	-0.02001	*0.07263*	**-0.11977**
Sum 3 SuBd $\|R^{bnd}\|$	0.00123	0.00078	*0.00459*	0.00202	**-0.28775**	**0.17336**	**-0.25008**	0.06670	-0.07733
Sum 3 SdBu $\|R^{bnd}\|$	-0.00020	-0.00098	0.00028	0.00043	-0.05021	**0.16597**	-0.08554	0.07705	**-0.24919**
Sum 3 SdBd $\|R^{bnd}\|$	0.00041	0.00003	**-0.00376**	**-0.00162**	**-0.09991**	0.04178	*-0.16078*	0.02792	**-0.10480**
H0: All return coefs = 0	0.7108	0.1891	*0.0713*	0.1045	**0.0000**	**0.0000**	**0.0195**	**0.0009**	**0.0005**
Adj R^2s: All variables	0.3034	0.6341	0.1521	0.1852	0.7404	0.5407	0.4969	0.4816	0.3139
Adj R^2s: w/o returns	0.3031	0.6338	0.1516	0.1831	0.6937	0.5151	0.4741	0.4642	0.2951
Adj R^2s: w/o shocks	0.1429	0.0157	0.0368	0.0613	0.2289	0.4972	0.4052	0.4339	0.2738
Adj R^2s: w/o shocks or years	0.1310	0.0112	0.0205	0.0281	0.2073	0.4723	0.3870	0.4123	0.2686
Nobs	2053	2053	1851	1856	2053	2045	2032	2029	2053

Table 6b: Summary results for ‘influence’ regressions (3b) using 3-way classification of returns as ‘down’, ‘flat’, and ‘up’.

	OLS using continuous dependent action variables								
	CMINCR	**PFINCR**	**EQINCR**	**dSHCRSP**	**dCDIVP**	**dDDIVP**	**dQSUBDB**	**dBVEQ**	**TAGROW**
Sum 3 SuBu	0.0019	0.0054	0.0083	-0.0091	-0.0004	0.0000	-0.0002	*0.0011*	**0.0047**
Sum 3 SuBf	*-0.0118*	0.0010	-0.0116	0.0103	0.0038	0.0040	-0.0001	0.0004	0.0024
Sum 3 SuBd	**0.0143**	-0.0013	*0.0141*	0.0194	0.0009	0.0011	*-0.0007*	0.0003	0.0007
Sum 3 SfBu	-0.0013	0.0035	0.0017	-0.0293	0.0013	0.0017	-0.0004	0.0004	-0.0001
Sum 3 SfBd	0.0063	*0.0051*	*0.0102*	-0.0409	0.0004	0.0003	-0.0007	0.0004	-0.0004
Sum 3 SdBu	-0.0014	-0.0039	-0.0053	-0.0107	**-0.0040**	*-0.0033*	-0.0002	0.0004	0.0036
Sum 3 SdBf	*0.0112*	0.0052	**0.0162**	**-0.0669**	-0.0011	-0.0006	-0.0001	0.0002	0.0039
Sum 3 SdBd	**0.0136**	0.0039	**0.0180**	-0.0304	*-0.0025*	-0.0019	-0.0002	-0.0003	**0.0042**
H0: All return coefs = 0	**0.0037**	*0.0593*	**0.0003**	0.2695	**0.0256**	0.1538	0.4367	0.5975	**0.0170**
Adj R^2s: All variables	0.5523	0.3387	0.5153	0.1071	0.7617	0.7840	0.0630	0.3696	0.9823
Adj R^2s: w/o returns	0.5462	0.3377	0.5080	0.1074	0.7617	0.7841	0.0653	0.3702	0.9822
Adj R^2s: w/o shocks	0.5012	0.3180	0.4703	0.0271	0.7297	0.7526	0.0151	0.0473	0.0190
Adj R^2s: w/o shocks or years	0.4833	0.3106	0.4514	0.0124	0.7180	0.7416	0.0067	0.0247	0.0147
Nobs	2045	2032	2028	2043	2053	2049	2053	2053	2053

	OLS using continuous dependent action variables				Probit using binary dependent action variables				
	dSECPCT	**dFTEMP**	**dUININS**	**dUNINTA**	**DCDIVUP**	**DCOMUP**	**DPFUP**	**DEQUP**	**DSND**
Sum 3 SuBu	-0.0059	**0.0232**	0.0027	-0.0026	-0.0308	**1.2913**	0.2144	**0.7876**	-0.4960
Sum 3 SuBf	-0.0034	*0.0190*	0.0150	0.0038	0.4883	0.7684	-0.2497	0.2488	-0.0286
Sum 3 SuBd	-0.0030	*0.0149*	**0.0230**	*0.0070*	0.0554	**0.8836**	*-0.6848*	0.2761	**-0.7379**
Sum 3 SfBu	-0.0001	0.0037	0.0130	0.0039	-0.1024	**0.9687**	0.0481	*0.5929*	**-0.4904**
Sum 3 SfBd	0.0009	-0.0004	*0.0209*	*0.0083*	0.0657	**1.4587**	-0.4863	0.5064	-0.2577
Sum 3 SdBu	0.0093	0.0144	0.0004	-0.0016	**-1.1968**	0.2956	*-0.7983*	-0.2177	**-0.5376**
Sum 3 SdBf	-0.0045	0.0111	0.0015	0.0000	0.0750	**1.3575**	0.4237	**0.7848**	-0.0847
Sum 3 SdBd	-0.0051	0.0088	*0.0149*	0.0044	**-0.9633**	**1.4655**	0.5190	**0.8410**	-0.1623
H0: All return coefs = 0	0.5559	**0.0413**	**0.0496**	*0.0646*	0.0002	**0.0002**	**0.0041**	**0.0029**	*0.0506*
Adj R^2s: All variables	0.3061	0.6367	0.1593	0.1905	0.7136	0.5484	0.4972	0.4854	0.3093
Adj R^2s: w/o returns	0.3031	0.6338	0.1516	0.1831	0.6937	0.5151	0.4741	0.4642	0.2951
Adj R^2s: w/o shocks	0.1475	0.0123	0.0469	0.0690	0.1274	0.4947	0.3976	0.4317	0.2677
Adj R^2s: w/o shocks or years	0.1344	0.0066	0.0259	0.0291	0.0914	0.4640	0.3801	0.4070	0.2642
Nobs	2053	2053	1851	1856	2053	2045	2032	2029	2053

Table 7a: 'Influence' and 'response' regression results and sign-based test of beneficial/perverse influence using 2-way classification of returns as 'down' and 'up', multiplied by absolute value of stock or bond return.

Action variables ↓	'Influence' equations (a1)								'Response' equation (b1)		Beneficial/perverse influence	
	Absolute value of stock return multiplies				Absolute value of bond return multiplies				Stock	Bonds	Stock	Bonds
	SuBu	SuBd	SdBu	SdBd	SuBu	SuBd	SdBu	SdBd				
Continuous action variables												
CMINCR	**0.0006**	**0.0020**	*0.0007*	**0.0012**	0.0001	0.0024	0.0009	0.0014	13.975	-42.191	BB	PP
PFINCR	0.0002	0.0000	-0.0001	0.0000	0.0005	-0.0001	0.0005	-0.0002	-16.964	-44.674	P	?
EQINCR	**0.0009**	**0.0022**	0.0005	**0.0012**	0.0007	0.0026	0.0017	0.0012	14.645	41.517	BB	BB
dSHCRSP	0.0004	*0.0030*	0.0005	-0.0004	0.0017	0.0066	0.0038	0.0042	3.582	0.068	B	BB
dCDIVP	0.0000	0.0001	**-0.0005**	-0.0002	-0.0002	-0.0011	-0.0002	**-0.0008**	207.221	-161.162	?	BB
dDDIVP	-0.0001	0.0001	**-0.0005**	-0.0001	-0.0002	**-0.0011**	-0.0002	**-0.0008**	-116.735	141.188	B	PP
dQSUBDB	0.0000	0.0000	0.0000	0.0000	0.0000	*-0.0002*	0.0000	-0.0001	-129.724	-56.052	PP	?
dBVEQ	0.0001	0.0000	-0.0001	**-0.0002**	*-0.0002*	**-0.0001**	0.0000	**0.0003**	136.120	45.047	?	?
TAGROW	**0.0002**	0.0001	**0.0003**	**0.0002**	0.0002	0.0001	0.0000	**0.0008**	-15.753	-3.711	PP	PP
dSECPCT	-0.0001	-0.0001	0.0005	-0.0003	0.0006	0.0012	-0.0002	0.0004	**19.708**	*6.775*	P	B
dFTEMP	**0.0010**	0.0004	0.0002	0.0002	0.0001	0.0008	-0.0010	0.0000	-6.234	-2.944	PP	P
dUININS	0.0000	0.0002	-0.0008	0.0006	0.0003	*0.0046*	0.0003	**-0.0038**	18.375	-4.308	B	P
dUNINTA	-0.0001	0.0001	-0.0004	0.0002	0.0002	0.0020	0.0004	**-0.0016**	**-70.996**	-7.397	?	P
Binary action variables (1 if increase, 0 if decrease)												
DCDIVUP	0.0100	-0.0042	**-0.1325**	**-0.0578**	**-0.1889**	**-0.2878**	-0.0502	**-0.0999**	**2.145**	0.111	P	PP
DCOMUP	**0.0271**	0.0192	-0.0219	**0.0361**	*0.0779*	**0.1734**	**0.1660**	0.0418	1.478	0.182	B	BB
DPFUP	0.0181	0.0027	0.0092	**0.0452**	-0.0200	**-0.2501**	-0.0855	*-0.1608*	0.258	0.204	BB	PP
DEQUP	0.0173	0.0118	-0.0068	**0.0330**	*0.0726*	0.0667	0.0771	0.0279	-0.920	-0.055	P	PP
DSND	0.0029	*-0.0254*	0.0142	0.0185	**-0.1198**	-0.0773	**-0.2492**	**-0.1048**	-0.284	-0.061	P	BB

Table 7b: ‘Influence’ and ‘response’ regression results and sign-based test of beneficial/perverse influence using 3-way classification of returns as ‘down’, ‘flat’, and ‘up’.

Action variables ↓	‘Influence’ equations (a1)								‘Response’ equation (b1)		Beneficial/perverse influence	
	SuBu	**SuBf**	**SuBd**	**SfBu**	**SfBd**	**SdBu**	**SdBf**	**SdBd**	**Stock**	**Bonds**	**Stock**	**Bonds**
Continuous Action Variables												
CMINCR	0.0019	*-0.0118*	0.0143	-0.0013	0.0063	-0.0014	*0.0112*	**0.0136**	5.462	-3.758	B	P
PFINCR	0.0054	0.0010	-0.0013	0.0035	*0.0051*	-0.0039	0.0052	0.0039	-40.373	-9.828	P	P
EQINCR	0.0083	-0.0116	*0.0141*	0.0017	*0.0102*	-0.0053	**0.0162**	**0.0180**	35.558	5.519	B	B
dSHCRSP	-0.0091	0.0103	0.0194	-0.0293	-0.0409	-0.0107	**-0.0669**	-0.0304	4.529	0.028	P	P
dCDIVP	-0.0004	0.0038	0.0009	0.0013	0.0004	**-0.0040**	-0.0011	*-0.0025*	**124.920**	38.052	P	?
dDDIVP	0.0000	0.0040	0.0011	0.0017	0.0003	*-0.0033*	-0.0006	-0.0019	-17.072	-68.724	?	P
dQSUBDB	-0.0002	-0.0001	*-0.0007*	-0.0004	-0.0007	-0.0002	-0.0001	-0.0002	-160.207	-89.684	BB	BB
dBVEQ	*0.0011*	0.0004	0.0003	0.0004	0.0004	0.0004	0.0002	-0.0003	128.711	78.941	B	B
TAGROW	**0.0047**	0.0024	0.0007	-0.0001	-0.0004	0.0036	0.0039	**0.0042**	9.102	18.495	BB	B
dSECPCT	-0.0059	-0.0034	-0.0030	-0.0001	0.0009	0.0093	-0.0045	-0.0051	13.075	7.778	P	P
dFTEMP	0.0232	0.0190	*0.0149*	0.0037	-0.0004	0.0144	0.0111	0.0088	-5.451	*-5.222*	PP	P
dUININS	0.0027	0.0150	**0.0230**	0.0130	**0.0209**	0.0004	0.0015	*0.0149*	*23.194*	-8.080	BB	PP
dUNINTA	-0.0026	0.0038	*0.0070*	0.0039	**0.0083**	-0.0016	0.0000	0.0044	**-76.657**	-3.221	P	P
Binary action variables (1 if increase, 0 if decrease)												
DCDIVUP	-0.0308	0.4883	0.0554	-0.1024	0.0657	**-1.1968**	0.0750	**-0.9633**	**1.648**	-0.101	?	B
DCOMUP	**1.2913**	**0.7684**	**0.8836**	**0.9687**	**1.4587**	0.2956	**1.3575**	**1.4655**	0.933	-0.313	BB	PP
DPFUP	0.2144	-0.2497	*-0.6848*	0.0481	-0.4863	*-0.7983*	0.4237	0.5190	-0.718	-0.423	?	?
DEQUP	**0.7876**	0.2488	0.2761	*0.5929*	0.5064	-0.2177	**0.7848**	**0.8410**	-0.216	0.631	P	B
DSND	**-0.4960**	-0.0286	**-0.7379**	**-0.4904**	-0.2577	*-0.5376*	-0.0847	-0.1623	-0.362	-0.131	BB	BB

Figure 1a: Raw Stock and Bond Returns, proportions in each cell of the 2x2 matrix.

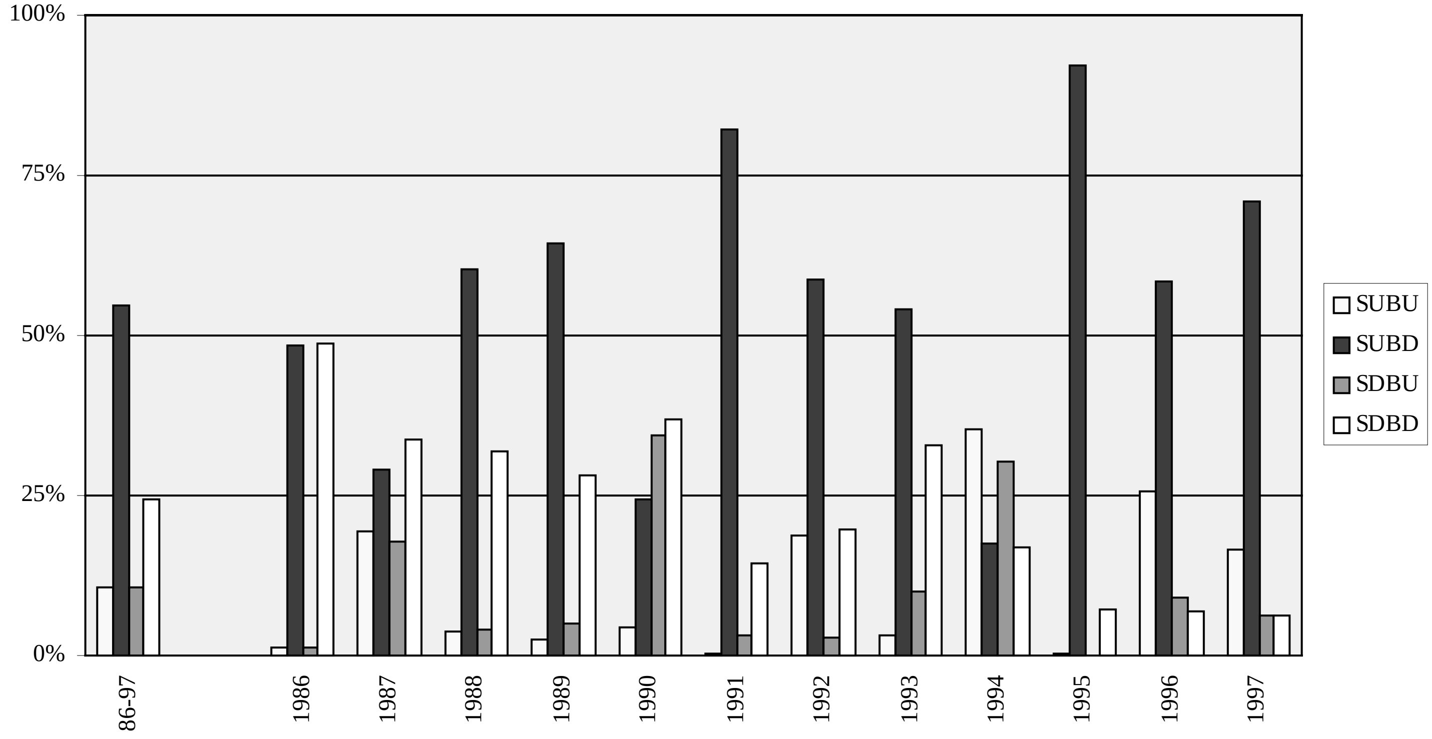
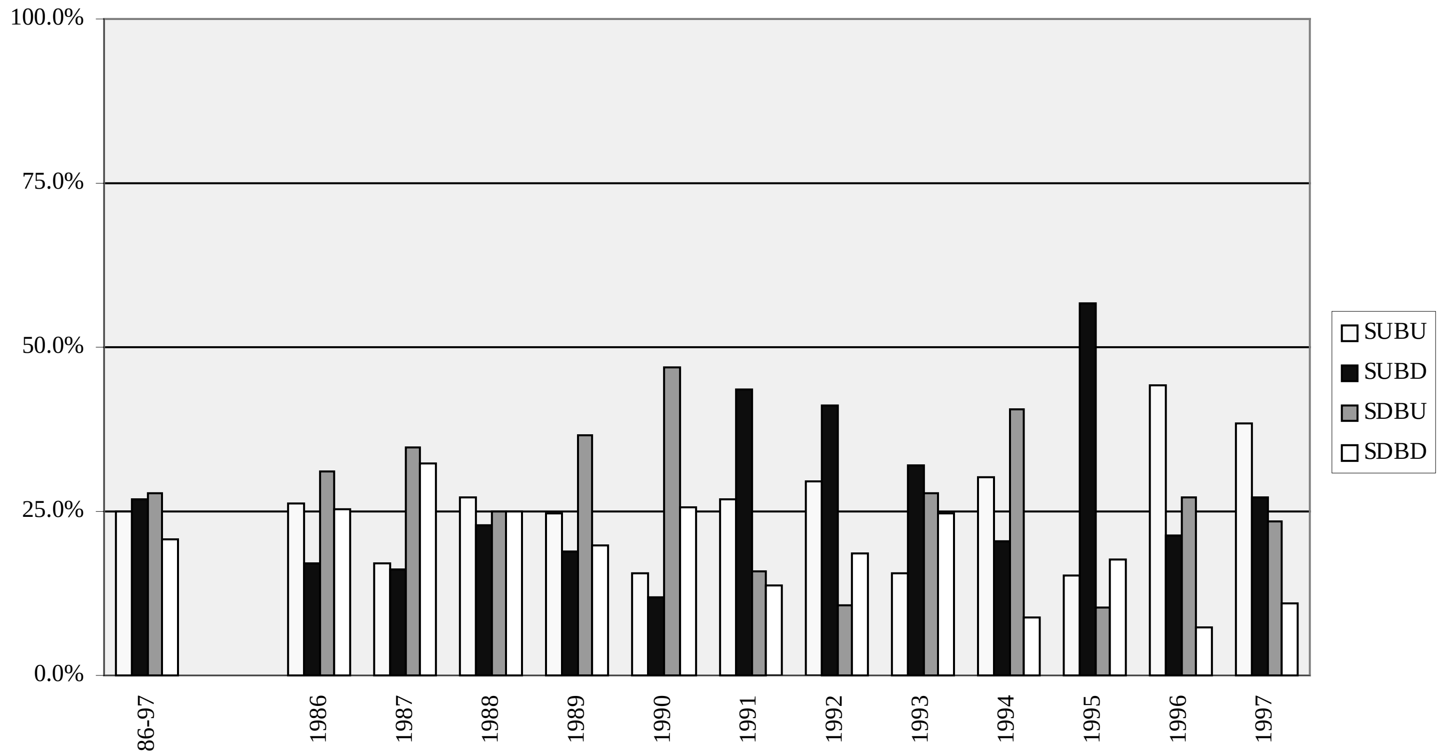


Figure 1b: Excess Stock and Bond Returns, proportion in each cell of the 2x2 matrix



Endnotes

[1] The other two pillars are minimum capital standards and supervisory review of capital adequacy.

[2] Just as "market discipline" is frequently used without sufficient refinement, so too do academics also tend to use the term "monitoring" in various senses. Diamond's [1984] path-breaking paper on "delegated monitoring" requires that the lender make advance arrangements to assess what actually happens to a borrower's cash flows. Other writers envision monitoring as an ongoing process by which a lender deters manager/owners from transferring wealth from the debt holders to themselves, usually through monitoring and enforcement of *ex ante* negotiated covenants that restrict managerial discretion. Williamson [1986] models monitoring as an *ex post* activity: given default, bank pays to audit and uncover fraud.

[3] See the recent survey by Flannery [1998], and earlier papers by Gilbert [1990] and Berger [1991].

[4] Another impediment to market discipline is sometimes a legal environment that makes stockholder activism and hostile takeovers difficult. The recent failures of a number of hostile takeover attempts in France and Germany, with the active participation of governments on the side of target management, are examples.

[5] Markets, other than the securities markets considered in this paper and in recent regulatory proposals, also influence managers. These include the market for corporate control (takeovers), the managerial labor market (turnover) and the direct influence exerted by large stockholders. See Shleifer and Vishny [1997]) for a review of the relevant theory and evidence.

[6] Prowse [1997] concludes that government supervisors are more likely than investors to impose extreme discipline (such as managerial turnover or forced mergers) for banking firms. To the extent that institutional arrangements have reduced investors' incentives to monitor and influence, our study will be biased toward finding no effective market influence.

[7] The impact of a debt overhang on shareholders' investment incentives is one exception to this statement. Again, this is an extreme circumstance.

[8] Treating each outstanding bond for a given BHC separately, matching each bond with repeated s-tock and BHC variables, would have given undue weight to bank holding companies with a large number of bonds outstanding.

[9] If x is the percentage of stock up (S^u) moves and y is the percentage of bond up (B^u) moves, then if stock and bond movements were independent we would expect to see xy S^uB^u moves, x(1-y) S^uB^d moves, etc.

[10] 1998 data were omitted from the Figures because the Warga-Lehman Brothers database ends in March of that year.

[11] Our methodology for seeking what we call "influence" is tied to observed managerial actions. Allen Berger has pointed out that influence can also result in managers deciding not to take certain actions, for example not undertaking certain risky types of investments because the bondholders would be harmed and this would subsequently drive up the firm's cost of capital. Such "absence of action" cannot be measured, so we cannot conclude whether or not this 'anticipatory influence' exists. However, if influence is apparent in the observed managerial actions, it may provide some support for the belief that unobserved anticipatory influence also obtains.

[12] The structure of our model assumes that manager's response to shocks in one period cannot be completed in the same period. In our empirical implementation this means that managers cannot offset, in the same quarter, exogenous shocks that we observe as changes in the firm balance sheet over the same quarter.

[13] Another implication of rational expectations is that returns will be serially uncorrelated, even if market influence (discipline) obtains.

[14] We assume that neither the manager nor the stockholder can predict future exogenous shocks.

[15] We investigated whether the results we present here depend on the particular return variables used. They do not. We therefore used the simple stock excess return—the return relative to the value-weighted stock market index—and the within-BHC value-weighted bond excess return measured relative to the value-weighted index using S&P credit classifications.

[16] Our use of bond returns as one measure of BHC value necessarily assumes that subordinated debenture holders felt exposed to default risks. While there is some question whether this was true for most of the 1980's, by the end of that decade BHC debenture rates clearly reflected cross-sectional variations in default probabilities (Flannery and Sorescu [1996], DeYoung *et al*. [1999a]).

[17] For binary action measures, we estimate (3a) or (3b) as a probit, and report the likelihood ratio index (Greene [1993], page 651) as a goodness-of-fit statistic.