This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Prudential Supervision: What Works and What Doesn't

Volume Author/Editor: Frederic S. Mishkin, editor

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-53188-0

Volume URL: http://www.nber.org/books/mish01-1

Conference Date: January 13-15, 2000

Publication Date: January 2001

Chapter Title: Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring versus Influencing

Chapter Author: Robert R. Bliss, Mark J. Flannery

Chapter URL: http://www.nber.org/chapters/c10759

Chapter pages in book: (p. 107 - 146)

4

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

Robert R. Bliss and Mark J. Flannery

4.1 Introduction

That markets discipline firms and their managers is an article of faith among financial economists, with surprisingly little direct empirical support. The market discipline paradigm requires (a) that the necessary information is publicly available and that the private benefits to monitoring outweigh the costs, (b) that rational investors continually gather and process information about traded firms whose securities they hold and about the markets in which they operate, (c) that investors' assessments of firm condition and future prospects are impounded into the firm's equity and debt prices, and (d) that managers operate in the security holders' interests. The prices of a firm's traded securities are the most obvious public signal by which 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

Robert R. Bliss is an economic advisor at the Federal Reserve Bank of Chicago. Mark J. Flannery is the BankAmerica Eminent Scholar at the University of Florida.

The authors thank Lisa Ashley, Allen Berger, Mark Carey, Doug Evanoff, Jon Garfinkel, Alton Gilbert, Rick Mishkin, Raghuram Rajan, two anonymous referees, and conference participants, as well as the Indiana University Finance Symposium, the Federal Reserve Bank of Chicago, and the Atlanta Finance Workshop for information and helpful discussions. John Banko, Genny Pham-Kantor, Kasturi Rangan, Mike Rorke, and Reem Tanous provided excellent research assistance. Remaining errors are our own. The analysis and conclusions expressed here represent the authors' personal opinions, which do not necessarily coincide with those of the Federal Reserve Bank of Chicago.

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 firm's true condition quite well. The Basel Committee on Banking Supervision's (1999) consultative paper on capital adequacy 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 Gramm-Leach-Bliley Act, which overhauled banking regulation in the United States, required that the fifty largest nationally insured banks, if nationally chartered, have at least one issue of debt outstanding rated A or better.

The concept of market discipline incorporates two distinct components: the ability of investors 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 hypothetically respond.

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

2. Just as the term market discipline is frequently used without sufficient refinement, so too do academics tend to use the term monitoring in various senses. Diamond's (1984) pathbreaking 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, a bank pays to audit and uncover fraud.

- *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 may want management to make changes, whereas positive signals generally do not 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] However, accurate market signals are not sufficient to ensure that investors can collectively influence the actions of firm management. 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 optimal contracting literature is premised on the idea that investor/owners are disadvantaged vis-à-vis managers in ensuring that the firm is run in the investors' interests. 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]

We have comparatively little evidence about the ability of equity or (especially) debt owners to influence routine managerial actions. 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 takeover. However, policy proposals for using market discipline to enhance

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.

banking supervision usually envisage something more commonplace, constructive, and benign than precipitating bankruptcy or replacing management through takeovers.

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 processes, an empirical investigation of market influence on bank holding companies (BHCs) 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 subordinated 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 managerial actions appear to be associated with prior returns on BHC stocks and bonds. 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 managers consistently respond to quarter-to-quarter changes in bond or stock prices.

The paper is organized as follows: Section 4.2 discusses agency problems pertaining to complex U.S. BHCs that generate the need for disciplinary forces. Section 4.3 discusses the construction of the study's data set. Section 4.4 presents evidence on the extent to which bondholders and shareholders have common—as opposed to conflicting—goals in disciplining firm managers. Section 4.5 describes and motivates our tests for market influence, and the results of those tests are presented in Section 4.6. The last section discusses the regulatory implications of our findings.

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.

4.2 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. Correspondingly, there are three possible types of agency conflict in the typical corporation:

1. Stockholders must induce managers to maximize firm value by working hard and making appropriate risk-return tradeoffs.
2. Bondholders have an analogous attitude toward managerial effort, but different preferences about risk bearing.
3. Stockholders may use their control rights to impose unanticipated risks on the firm's bondholders.

Numerous theoretical analyses have evaluated the first and third of these conflicts, but we have relatively little empirical information about the importance of either. Jensen and Meckling (1976) first observed that shareholders need to align managers' interests with their own. This can occur through performance-related managerial compensation (e.g., Morck, Shleifer, and Vishny 1988; Kaplan 1994a, b; Hadlock and Lummer 1997).[7] Managers' employment prospects are also related to prior firm performance (Mikkelson and Partch 1997; Martin and McConnell 1991; Denis and Denis 1995; Canella, Fraser, and Lee 1995; Brickley, Linck, and Coles 1999). Finally, firm value responds significantly to board composition (Cotter, Shivdasani, and Zenner 1997; Hirshleifer and Thakor 1998; and, for banking in particular, Brickley and James 1987) and the presence of block shareholders (DeYoung, Spong, and Sullivan 2001 for banking, and Ang, Cole, and Lin 2000 more generally).

It is difficult to demonstrate the efficacy of these control mechanisms. Although they appear to work well in most situations, sufficiently large private gains from perquisite consumption or self-dealing could still lead managers to ignore the compensation consequences of their actions.[8] Furthermore, much of the existing literature deals with "large" events such as takeovers or managerial terminations, as opposed to more mundane events that can cumulatively affect firm performance.

The existing studies concern the ability of shareholders to affect managerial actions. We have located no previous research into the ability of bondholders to influence managers. Both bondholders and stockholders may wish to monitor managerial slacking and perquisite consumption. An increase in a firm's asset value raises both share and (weakly) debt

7. Hubbard and Palia (1995) specifically evaluate management compensation in banking.
8. See, for example, Jensen and Murphy (1990), or Core, Holthausen, and Larcker (1999).

prices.[9] Ceteris paribus, bondholders and stockholders share an interest in the firm's continued profitability. But ceteris rarely is paribus. Bondholder and stockholder interests strongly diverge regarding the risk that may accompany higher firm profits. 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, but 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.

Section 4.4 provides some evidence about the relative frequency with which bond and stock investors are affected in opposite directions when new market information arrives.

4.3 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, http://www.chicagofed.org), the Center for Research in Security Prices (CRSP) Stock Returns and Master Files, and the Warga/Lehman Brothers Corporate Bond Database (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 1986–88 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

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

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 estimated the market model parameters for each firm, using a sixty-month moving window. The resulting parameters were used to compute the following 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 excess returns provide the smallest number of usable observations because their computation requires a continuous five-year stock price history. We therefore present results only for raw returns and simple excess returns when analyzing the interaction between stocks and bonds in section 4.4, and only simple excess returns when analyzing evidence of market influence in section 4.6.

BHC bond information, taken from the Warga/Lehman Brothers Corporate Bond Database, includes price, monthly credit rating, yield, price, accrued interest, and face value outstanding applicable to the end of each calendar month. We computed quarterly holding period returns and quarter-to-quarter yield changes. The 107 BHCs had a total of 761 bonds outstanding for at least some part of the sample period. The literature provides little guidance for constructing benchmarks to measure excess bond performance. We constructed multiple indexes to ensure robustness of our reported results. Within indexes, bonds were assigned to buckets containing bonds of similar terms to maturity and ratings (using Moody and Standard & Poor's [S&P] ratings to produce two sets of indexes). Ratings were grouped into eleven 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: zero to five years, five to ten years, and more than ten years. Two alternative bond populations were used to form indexes. "All Firms" indexes were constructed using all domestic industrial, utility, transportation, and financial industry bonds in the Warga database. The "All Financials" indexes were constructed using only bonds of corporations classified as financial institutions. Both the "All Firms" and "All Financials" indexes included the BHC 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 eight indexes—each containing thirty-three yield, yield-change, and return series—against which to measure excess bond performance.

Each BHC has a single common stock issue outstanding (we restricted our analysis to common stock—those with Committee on Uniform Security Identification Procedures [CUSIP] numbers ending in 10) but may have multiple bonds outstanding at any given time. For BHCs 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 BHC each quarter.[10] 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 changes, 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 measures aggregated within BHCs.

The final data set includes stock and bond returns and contemporaneous accounting information for 2,490 firm-quarters over the period June 1986 to March 1998.

4.4 Correlations between Bond and Stock Returns

As we pointed out in section 4.2, the potential divergence of stock- and bondholders' preferences affects the search for evidence of market influence. Previous studies presenting evidence on the comovements 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 value of a BHC's security reflect, for the most part, the expected asset payoffs, and not the assets' return volatility. Accordingly, a firm's stock and bond returns tend to be positively correlated because both groups tend to evaluate new developments similarly. In this situation, the influence of bondholders may be difficult to separate from that of shareholders. Requiring banks to issue subordinated debentures might then be a questionable policy, 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 4.1 reports the Pearson correlations and rank order correlations for stock and bond returns and excess returns. Given the leptokurtic distri-

10. Treating each outstanding bond for a given BHC separately, matching each bond with repeated stock and BHC variables, would have given undue weight to BHCs with large numbers of bonds outstanding.

Table 4.1 **Stock and Bond Return Correlations**

	Stock Returns		Bond Returns	
	Raw	Excess	Raw	Excess
	A. Pearson Correlations			
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
	B. Rank Correlations			
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

Notes: 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.

bution of returns, the rank correlations provide a robust confirmation of the Pearson correlation measures. Table 4.1 indicates a strong positive correlation between raw and excess returns within each type of security. The excess stock and bond returns are much less strongly correlated with each other than are the raw returns. Nonetheless, both the Pearson and the rank-order correlations are all significantly positive (at the 5 percent level). Other stock and bond excess return measures yield results similar to those shown in table 4.1.

Table 4.2 provides information about an alternative way to summarize the interaction of BHC stock and bond values: according to the sign of their contemporaneous quarterly movements. Headings A and B classify each (raw or excess) return as either positive or negative. Whether we measure returns as raw or excess, chi-square tests reject (with p-values of 0.001) the hypothesis that stock and bond return classifications were independent.[11] Raw stock and bond returns have the same sign in a majority of the BHC-quarters we analyze. (Raw returns are like-signed 65.1 percent of the time, whereas excess stock and bond returns move together 55.0

11. 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, and so on.

Table 4.2 Coincidence of Quarterly Stock and Bond Returns' Signs

	Bond Returns		Stock Signal Marginal Distribution
	Down	Up	
A. Raw Returns			
Stock returns			
	290	662	952
Down	10.6%	24.2%	34.8%
	293	1489	1782
Up	10.7%	54.5%	65.2%
	583	2151	2734
Bond signal marginal distribution	21.3%	78.6%	100%
B. Excess Returns			
Stock returns			
	764	534	1,289
Down	27.9%	19.5%	47.5%
	694	742	1,436
Up	25.4%	27.1%	52.5%
	1,458	1,276	2,490
Bond signal marginal distribution	55.3%	46.7%	100%

	Bond Returns			Stock Signal Marginal Distribution
	Down	Flat	Up	
C. Raw Returns Tertiary Breakdown				
Stock returns				
Down	411	283	217	911
	15.0%	10.3%	7.9%	33.3%
Flat	333	286	293	912
	12.2%	10.5%	10.7%	33.3%
Up	167	343	401	911
	6.1%	12.5%	14.7%	33.3%
Bond signal marginal	911	912	911	2734
distribution	33.3%	33.3%	33.3%	100%
D. Excess Returns Tertiary Breakdown				
Stock returns				
Down	391	251	269	911
	14.3%	9.2%	9.8%	33.3%
Flat	276	344	292	912
	10.1%	12.6%	10.7%	33.3%
Up	244	317	350	911
	8.9%	11.6%	12.8%	33.3%
Bond signal marginal	911	912	911	2,734
distribution	33.3%	33.3%	33.3%	100%

percent of the time.) This positive correlation between stock and bond returns is consistent with the hypothesis that most security returns reflect changes in the firm's overall value, and not simply a redistribution of value between equity and debt.

We would expect market influence to be most readily apparent in the upper-left cells of headings A and B, where all investors lose money. 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 preferences conflict, and we may be able to identify which group, if either, influences firm managers more strongly.

Headings C and D of table 4.2 elaborate this analysis with a three-part taxonomy for security returns. Each stock and bond return was assigned to one of three equally sized groups: Up, Flat, or Down. Chi-square statistics reject the hypothesis that the stock and bond returns are independent in either C or D. We expect to see the strongest evidence of market influence when the signals are large and negative—in Down-Down cells. Conversely, strong but contradictory signals (Up-Down and Down-Up) should provide the best opportunity to compare the efficacy of equity versus bond preferences. 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 left-most column. Contradictory stock and bond signals are common, with strong contradictory signals (Up-Down or Down-Up) occurring about 14 percent of the time for raw returns and 19 percent of the time for excess returns.

Figures 4.1 and 4.2 present year-by-year information about the proportion of firm-quarters falling into each of the four binary categories.[12] 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-square test rejects the hypothesis that bond and stock values move independently of one another in six of the twelve sample years for the raw returns in figure 4.1 (at the 5 percent level of significance). Although the excess returns are more symmetrically distributed, chi-square tests reject the independence of stock and bond returns in eight of twelve sample years. Finally, these two figures indicate that the distribution of stock and bond return signs varies substantially across years. Accordingly, we will include a dummy variable identifying each calendar year in our regression models below.

To summarize, a typical BHC's stock and bond returns are moderately positively correlated overall. However, the data include enough contrasting

12. 1998 data were omitted from the figures because the Warga/Lehman Brothers database ends in March of that year.

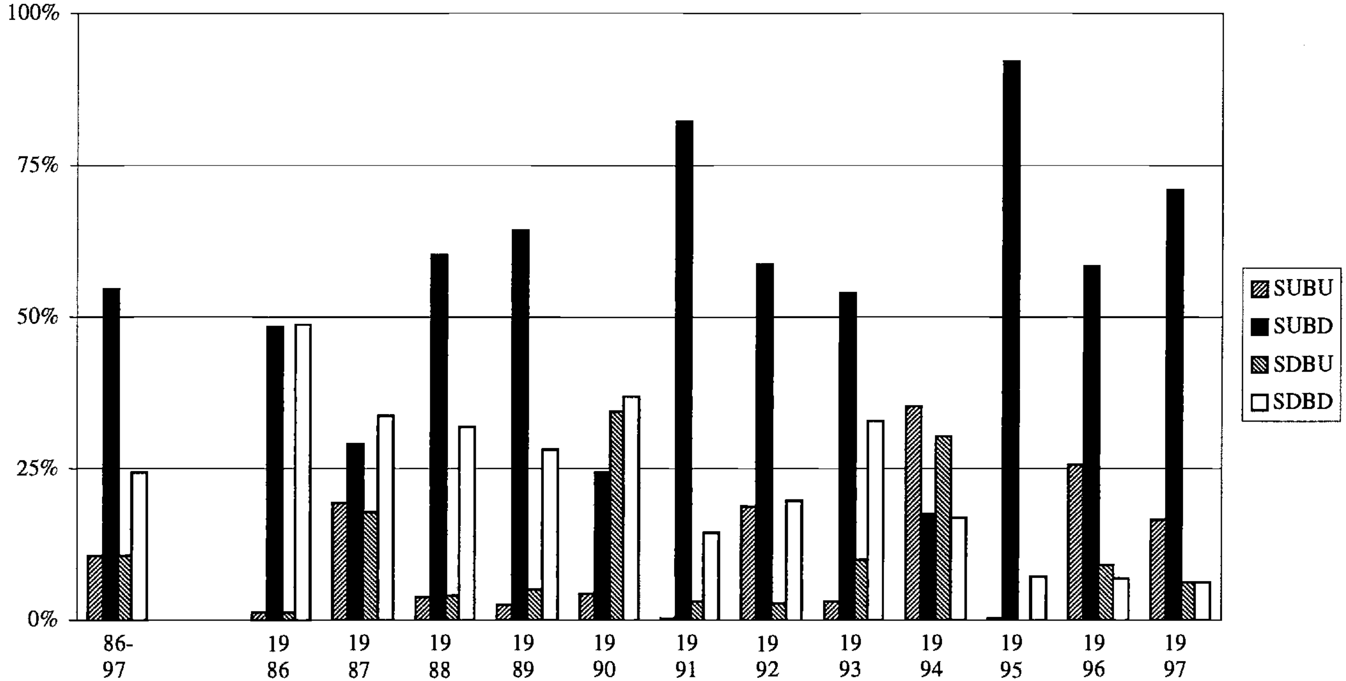

Fig. 4.1 Raw stock and bond returns, proportions in each cell of the 2×2

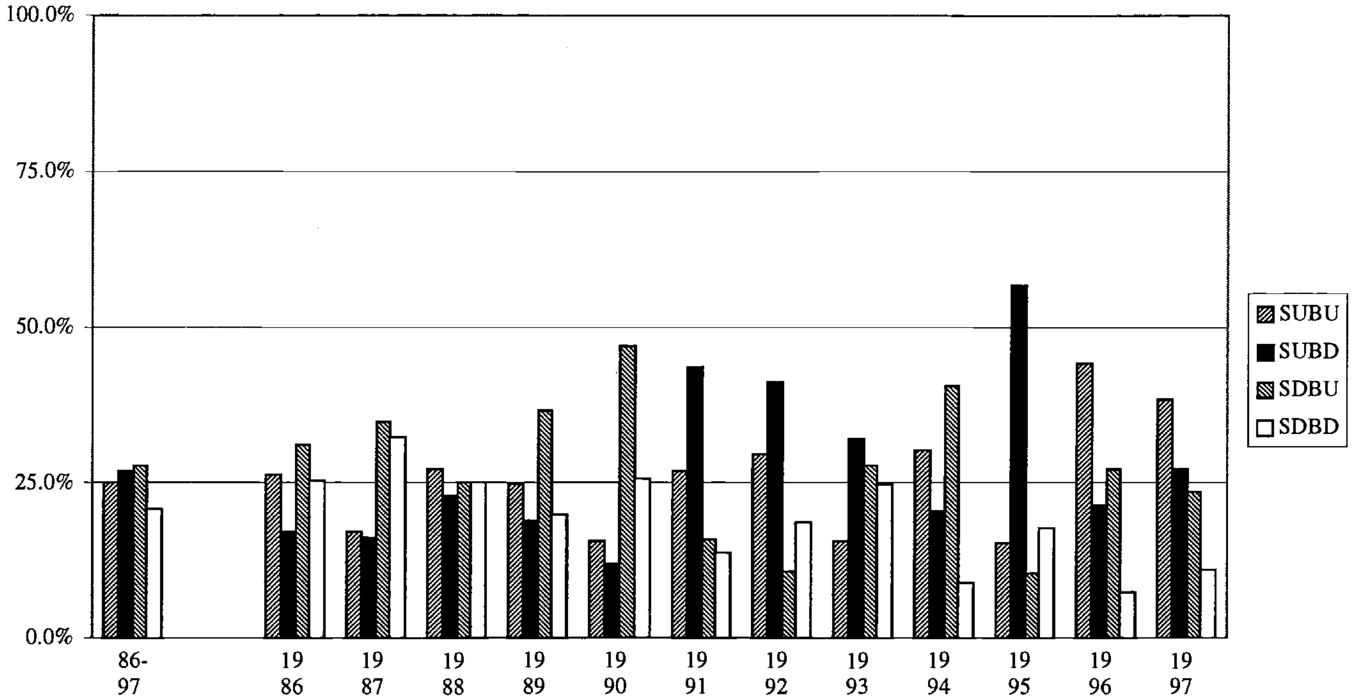

Fig. 4.2 Excess stock and bond returns, proportions in each cell of the 2×2

price signals to provide hope that we can identify separate stock market and bond market influences (if there are any), and to determine if one source of discipline dominates or reinforces the other.

4.5 Methodology for Detecting Stock and Bond Market Influences

We begin with a working definition of market influence: Market influence obtains when the return on the firm's securities induces managerial actions, which in turn increases security value.[13] 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 4.5.1 indicates which inferences can (or cannot) be drawn about market influence. Section 4.5.2 describes how we implement the model estimation.

4.5.1 Identifying Influence

Consider a firm whose value is affected by a single exogenous variable (X) and one endogenous variable (A) controlled by the manager. The firm has a single security, a stock, whose price reflects the firm's expected future value. At time $t-1$ stockholders observe the exogenous shock, form an expectation of the action the manager will take in response, and adjust the stock price. The net effect of all these changes is the stock's quarterly return R_{t-1}. The manager's *expected* action during quarter t depends on the past stock return R_{t-1} and/or X_{t-1}: $E_{t-1}(A_t) = f_A(R_{t-1}, X_{t-1})$. 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 $t-1$.[14] The manager's action is observed at the end of quarter t, and it is composed of an expected and an unexpected component: $A_t = E_{t-1}(A_t) + \varepsilon_t$. If the stockholders are rational, the unexpected component (ε_t) of the action A_t will be mean zero and uncorrelated with the information available at time $t-1$.[15] We can therefore combine these last two equations to get

13. 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 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.

14. The structure of our model assumes that the 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.

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

$$A_t = a_0 + a_1 R_{t-1} + a_2 X_{t-1} + \tilde{\varepsilon}_t, \tag{1}$$

which can be estimated with OLS. Investor influence appears in the form of a *nonzero* a_1.

Unfortunately, investor rationality may cause a bias in the estimated coefficient a_1. Investors' expectations about managerial actions will be impounded in $R_{t-1:}$

$$R_{t-1} = g[X_{t-1}, E_{t-1}(A_t)] + \tilde{\delta}_{t-1}. \tag{1a}$$

Here, $\tilde{\delta}_{t-1}$ is a random residual. Linearizing equation (1a) and substituting it into equation (1) gives

$$A_t = a_0 + a_1[g_0 + g_1 X_{t-1} + g_2 E_{t-1}(A_t) + \tilde{\delta}_{t-1}] + a_2 X_{t-1} + \tilde{\varepsilon}_t. \tag{1b}$$

The bracketed term in equation (1b)—the lagged stock return—contains the (unbiased) expected value of A_t, hence biasing the estimated a_1 coefficient upward (away from zero). We try to minimize the impact of this endogeneity by proxying for security returns with dummy variables in one of our implemented regressions models, as is shown in equation (3b).

The linear specification in equation (1) assumes that managers respond equally to positive and negative equity returns. This seems unlikely—why change a winning strategy? We therefore partition R_{t-1} into two variables, R^+_{t-1} and R^-_{t-1}, defined as:

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

$$R^-_{t-1} = \begin{cases} |R_{t-1}| & \text{if } R_{t-1} \le 0 \\ 0 & \text{otherwise} \end{cases}$$

and change equation (1) to

$$A_t = a_0 + a^+_1 R^+_{t-1} + a^-_1 R^-_{t-1} + a_2 X_{t-1} + \varepsilon_t. \tag{1c}$$

If managers make fewer changes in response to positive stock returns than to negative returns, a^-_1 should be more prominent than a^+_1. Moreover, an action taken in the wake of a negative stock return is readily interpreted as a corrective response, whereas a managerial action following a positive stock return is more difficult to interpret. The specification in equation (1c) should thus provide more power than the specification in equation (1).

At time t, the firm's value responds to the *surprise* component of A_t, plus any new exogenous shock X_t.[16] Stockholders then update their estimate of firm value, giving a (linearized) realized return over period t of

16. We assume that neither the manager nor the stockholder can predict future exogenous shocks.

(2) $R_t = b_0 + b_1[A_t - E_{t-1}(A_t)] + b_2X_t + \tilde{\eta}_t = b_0 + b_1\hat{\varepsilon}_t + b_2X_t + \tilde{\eta}_t,$

where $\hat{\varepsilon}_t$ is the estimated residual from equation (1c). The sign of b_1 indicates what action shareholders desire. Suppose the action being evaluated is a cut in dividends. Under most circumstances, a dividend cut is interpreted as bad news for the firm. At the start of period t, investors know there is some probability that their dividend will be cut. If the cut actually happens, $\hat{\varepsilon}_t > 0$ and R_t falls. If the dividend cut does not happen, $\hat{\varepsilon}_t < 0$ and R_t rises. Equation (2) thus has $b_1 < 0$ if an action is *not* thought to enhance firm value. By contrast, if stockholders thought that the action under consideration was a good idea—e.g., an increase in consumer loans—a surprise realization of this policy would *increase* R_t and we should find $b_1 > 0$ in equation (2).

Market influence requires that both $\hat{a}_1$ and $\hat{b}_1$ differ significantly from zero: Lagged returns help predict managerial actions, and security values increase when those actions are actually taken. If $\hat{a}_1 = 0$, managers seem *not* to respond reliably to recent security returns. This finding would not support the hypothesis of investor influence.[17] An estimated $\hat{\alpha}_1 \neq 0$ implies that managers respond to past returns in choosing how to act, but we must still determine if the action enhances share value.

Turning now to the response regression in equation (2), our most common finding (shown later) is that $\hat{b}_1 = 0$, indicating that the action surprise does not affect investor beliefs about firm value. A possible alternative explanation for this result is that we have chosen inappropriate measures of managerial action. (Investors do not care about changes in our measured actions, or management cannot closely control the "action" variables.) However, we selected a large number of disparate action variables in hopes that at least a few would be relevant. Still a third possibility is that we have appropriate action variables, but equation (1c) poorly estimates their surprise component. (The relatively high R^2 statistics in table 4.6 suggest that this is not a serious problem for at least some of the action variables.)

Advocates of market discipline generally think of *beneficial* influence, but agency problems in the firm's governance may cause managers to behave perversely. We use a combination of the b_1 and a_1 coefficients to distinguish good from bad managerial responses. Consider first the case of $b_1 > 0$, for which a positive action surprise at time t is associated with a positive contemporaneous stock return. Beneficial influence thus requires that managers be more likely to take this action when preceding stock

17. Regression misspecification or errors in variables can also cause $\hat{a}$ to equal 0. One such problem is particularly relevant to examining market influence. Suppose investors expect that managers will always take the most appropriate action in response to an external shock, but that action varies across shocks. This is an omitted (unobservable) variables problem that mistakenly biases us against finding evidence of investor influence.

Table 4.3 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
$$R_{t-1}^+ = \begin{cases} |R_{t-1}| & \text{if} \quad R_{t-1} > 0 \\ 0 & \text{otherwise} \end{cases}$$

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

	$a_1^- > 0$	$a_1^- < 0$
$b_1 > 0$	beneficial	perverse
$b_1 < 0$	perverse	beneficial

returns were negative.[18] That is, we want $a_1^- > 0$; large negative returns make it more likely that managers will do the appropriate thing. Conversely, if $b_1 < 0$, shareholders want *less* of this action to follow a stock price decline. Beneficial influence would therefore have $a_1^- < 0$ for this sort of managerial action. These requirements are summarized in table 4.3.

Equations (1c) and (2) lay out the basic framework for detecting market influence. Applying this methodology to actual data requires a considerable increase in complexity, although the core ideas remain unchanged.

4.5.2 Implementation

Estimating the regression model in equations (1c) 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. Because an individual firm's managers cannot be held accountable for the systematic component of returns, we measure each BHC's stock and bond returns as the *excess* return, over appropriate market return indexes.[19] We

18. Interpreting managerial responses to positive security returns is difficult to justify as an indication of investor control. Accordingly, we concentrate our subsequent discussion on the a_1^- coefficients from equation (1c), rather than the a_1^+ estimates.

19. We investigated whether our results 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.

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.[20] Because our interest lies with managerial influence, we will need to control for the latter.

The Influence Equation

The corporate governance literature has focused primarily on stockholder-manager interactions, but the regulatory benefits of market discipline focus on bank 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. In order to evaluate whether investors can reliably influence managers, we must control for both stockholders' and bondholders' preferences. Moreover, we must *interact* these preferences in order to account for potentially offsetting pressures coming from the two groups. Finally, we conjecture that positive market signals may elicit less reaction from managers than do negative signals (why change a winning strategy?). Although 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 pressure for change.

Our illustrative specification of the influence equation (1c) 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 one, two, or three, 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 (1c) 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:

20. Our use of bond returns as one measure of BHC value necessarily assumes that subordinated debenture holders felt exposed to default risks. Although there is some question whether this was true for most of the 1980s, by the end of that decade BHC debenture rates clearly reflected cross-sectional variations in default probabilities (Flannery and Sorescu 1996; DeYoung et al. 2001).

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

where A_{it} is one of the action variables available to BHC *i*'s managers during quarter *t*; $k(\leq 3)$ is the lag length, in quarters, between market signal (return) and managerial action; $I_{i,t}(S^u B^u)$ is a dummy variable equal to one for a quarter for which BHC *i*s stock return (S) was up and its bond return (B) was up, and the variables $I_{i,t}(S^m B^n)$ are defined analogously, where m, $n = u$ indicates that the security's value went up, and m, $n = d$ indicates that the security's value fell down; $|R^{\text{stk}}_{i,t-k}|$ is the absolute value of the *i*th BHC's stock return over period $t - k$; $|R^{\text{bnd}}_{i,t-k}|$ is the absolute value of the *i*th BHC's bond 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 in equation (3a) captures the interaction of the BHC's stock and bond returns, as well as the magnitude of each return. The coefficients on lagged values of $I_{i,t}(S^d B^d)|R^{\text{stk}}_{i,t-k}|$ (for example) measure the impact of a negative stock return accompanied by a decline in bond value. (As noted in section 4.4, this combination of stock-bond movements is consistent with a decrease in the firm's asset value.) The coefficients on $I_{i,t}(S^d B^d)|R^{\text{bnd}}_{i,t-k}|$ 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 the welfare of shareholders than to that of 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 $I_{i,t}(S^d B^d)$ $|R^{\text{bnd}}_{i,t-k}|$ and $I_{i,t}(S^d B^u)|R^{\text{bnd}}_{i,t-k}|$ 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 in equation (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, and this endogeneity may bias the estimated a_1 in equation (1c). Moreover, the absolute returns specification in equation (3a) requires that the scale or probability of managerial action be proportional to the return. To assess whether our results depend on this implied restriction, we repeated the analysis using a three-way classification scheme for returns (as shown in table 4.2, headings A and B).

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

where A_{it} and X_t are defined as in equation (3a) and the dummy variables $J_{i,t}(S^a B^b)$ take 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. The regression in equation (3b) permits managers to respond to eight types of market signal, corresponding to the outside cells of headings C and D of table 4.2. These measures of stock and bond returns permit us to incorporate some information about return magnitudes while minimizing the potential bias caused by the reflection of anticipated managerial actions in R_{t-1}. Note that we retain a constant term in equation (3b) while omitting the least interesting case ($S^f B^f$) from the specification.

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:

$$\text{(4a)} \quad R_t^{\text{stk}} = b_0 + \gamma R_{t-1}^{\text{stk}} + b_1[A_{1,t} - E_{t-1}(A_{1,t})] + \ldots + b_n[A_{n,t} - E_{t-1}(A_{n,t})]\Phi X_t + \Lambda D_t + \eta_t,$$

$$\text{(4b)} \quad R_t^{\text{bnd}} = b_0^* + \gamma^* R_{t-1}^{\text{bnd}} + b_1^*[A_{1,t} - E_{t-1}(A_{1,t})] + \ldots + b_n^*[A_{n,t} - E_{t-1}(A_{n,t})] + \Phi^* X_t^* + \Lambda D_t^* + \eta_t^*.$$

The observed managerial actions ($A_{i,t}$) can be combined with the influence regression shown in equation (3a) or (3b) to compute the surprise component of each action. The sign of b_i (b_i^*) immediately implies the stockholders' (bondholders') preferred managerial action. We can thus determine whether, on average over the entire sample, an unexpected dividend cut, for example, is viewed as valuable to bondholders. The vector $\mathbf{X}_t$ contains both lagged and contemporaneous (time t) exogenous shock variables.

The Set of Managerial Actions

We have implicitly assumed that managers can effectively control the actions that investors are trying to affect. 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. In the long run, managers can surely reduce book leverage if they wish. In the short run, however, an effort to lower leverage by tightening credit standards might be ineffective. Because loan demand is not perfectly controllable or predictable, leverage might still increase in the short run despite management's sincere efforts to reduce it.[21] Leverage is thus an ambiguous indicator of managerial action. One response to this situation is to permit (empirically) managerial changes to occur over several quarters, and we do this. Another response is to define managerial action more narrowly, for example, as the sale of new stock or a dividend cut. Managers unambiguously control dividends and stock issues.

It is difficult to establish that a particular set of action measures is complete or appropriate. Some legitimate action measures may be omitted, and managers may only imperfectly control some of the included measures. 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. Table 4.4 lists our measures of managerial action. We divide these actions into three subgroups: those affecting leverage, those affecting asset portfolio risk, and others. For some action variables we include both a binary classification (e.g., dividends up versus not up) and a continuous measure.[22]

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

21. One reason why managers cannot perfectly control loan volumes is that many customers have prenegotiated lines of credit, which can be draw down (or not) without advance notice.

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

Table 4.4 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 payment (measured in dollars) 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.

order to isolate the effect of past security returns on managerial actions, therefore, we must control for these exogenous factors. We use 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. Table 4.5 lists the income and balance sheet variables we include to model predetermined changes in the action variables. Importantly, these exogenous shock variables do not include past stock and or bond returns. 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. recent quarterly changes in the (dependent) decision variable in the influence equation (1); and
3. one quarterly lag of the dependent variable (a stock or bond return) in the response equation (2).

Note that the lagged BHC ratios in equation (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 and security return variables.

4.6 Empirical Results

We now present and interpret estimation results for the influence (equations [3a] and [3b]) and response (equations [4a] and [4b]) regressions. We first consider the estimated coefficients' parametric statistical significance, in the context of table 4.3 and the discussion in section 4.5.2. This approach 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

Table 4.5 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.

Notes: 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).

all consistent, and we can only note the tendency one way or the other in the data.

4.6.1 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 4.6 presents these sums and their corresponding statistical significance for the influence specification in equation (3a), and table 4.7 presents the results for the specification in equation (3b). The "HO: All return coefficients = 0" rows provide the formal test of the no-influence null hypothesis. In both specifications the null is rejected for twelve of eighteen action variables at the 10 percent level. Applying a 5 percent confidence level, we reject the null for eleven action variables in table 4.6 and nine action variables using the alternative specification of table 4.7.

The two influence specifications in equations (3a) and (3b) exhibit a good deal of similarity in the actions they identify as responding to lagged returns. Both specifications reject the no-influence hypothesis (10 percent level) for nearly half of our continuous action variables (CMINCR, EQINCR, dCDIVP, TAGROW, and dUININS) and four of the five binary action variables (DCOMUP, DPFUP, DEQUP, DSND). Several variables (dSHCRSP, dQSUBDB, dSECPCT) carry jointly insignificant coefficient sums (10 percent level) in both tables. Overall, the frequencies with which we reject the no-influence null hypothesis in tables 4.6 and 4.7 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, though not overwhelmingly: Table 4.6 exhibits nine significant coefficients (10 percent level) for the S^dB^d combinations, against five for S^uB^u. Table 4.7 exhibits eight significant S^dB^d coefficients against five for S^uB^u.

We illustrate the degree to which past security returns contribute to subsequent actions by comparing the full influence model's $\overline{R}^2$ statistic against the $\overline{R}^2$ value when subsets of explanatory variables have been omitted. $\overline{R}^2$ 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 right-hand side reduces the explanatory power of the model only marginally, and so does dropping the exogenous shocks. A significant fraction of the explanatory power of these regressions comes from the lagged dependent variables. Thus, although the coefficients on the returns in the influence equation are sometimes statistically significant, the lagged returns do not provide a great deal of additional information.

Finding that managerial actions follow past return patterns is consistent

Table 4.6 **Summary Results for "Influence" Regressions (equation [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 $S^u B^u \|R^{stk}\|$	0.00062**	0.00021	0.00091**	0.00035	−0.00004	−0.00005	0.00000	0.00005	0.00019**
Sum 3 $S^u B^d \|R^{stk}\|$	0.00198**	0.00001	0.00215**	0.00304*	0.00013	0.00010	0.00001	0.00001	0.00010
Sum 3 $S^d B^u \|R^{stk}\|$	0.00073*	−0.00014	0.00054	0.00051	−0.00050**	−0.00046**	0.00000	−0.00007	0.00025**
Sum 3 $S^d B^d \|R^{stk}\|$	0.00116**	−0.00003	0.00118**	−0.00035	−0.00016	−0.00014	0.00002	−0.00015**	0.00015**
Sum 3 $S^u B^u \|R^{bnd}\|$	0.00006	0.00051	0.00067	0.00171	−0.00016	−0.00021	−0.00003	−0.00015*	0.00021
Sum 3 $S^u B^d \|R^{bnd}\|$	0.00239	−0.00012	0.00255	0.00657	−0.00110**	−0.00109*	−0.00021**	−0.00013	0.00013
Sum 3 $S^d B^u \|R^{bnd}\|$	0.00088	0.00051	0.00170	0.00378	−0.00021	−0.00020	−0.00003	0.00003	−0.00003
Sum 3 $S^d B^d \|R^{bnd}\|$	0.00135	−0.00024	0.00115	0.00421	−0.00079**	−0.00083**	−0.00005	0.00034**	0.00075**
H0: all return coefficients = 0	0.0001**	0.7225	0.0004**	0.2975	0.0000**	0.0000**	0.2021	0.0181**	0.0006**
Adjusted R^2									
All variables	0.5843	0.3428	0.5370	0.1081	0.7671	0.7886	0.0626	0.3804	0.9826
Without returns	0.5462	0.3377	0.5080	0.1074	0.7617	0.7841	0.0653	0.3702	0.9822
Without shocks	0.5332	0.3206	0.4939	0.0249	0.7374	0.7597	0.0192	0.0694	0.0323
Without shocks or years	0.5252	0.3145	0.4833	0.0036	0.7298	0.7528	0.0074	0.0412	0.0316
No. of observations	2,045	2,032	2,028	2,043	2,053	2,049	2,053	2,053	2,053

(*continued*)

Table 4.6 (continued)

	OLS Using Continuous Dependent Action Variables				Probit Using Binary Dependent Action Variables				
	dSECPCT	dFTEMP	dUININS	dUNINTA	DCDIVUP	DCOMUP	DPFUP	DEQUP	DSND
Sum 3 $S^uB^u\|R^{stk}\|$	−0.00013	0.00102**	0.00002	−0.00005	0.01001	0.02711**	0.01807	0.01728	0.00286
Sum 3 $S^uB^d\|R^{stk}\|$	−0.00008	0.00036	0.00019	0.00006	−0.00417	0.01924	0.00267	0.01184	−0.02538*
Sum 3 $S^dB^u\|R^{stk}\|$	0.00053	0.00023	−0.00084	−0.00039	−0.13247**	−0.02192	0.00918	−0.00680	0.01424
Sum 3 $S^dB^d\|R^{stk}\|$	−0.00028	0.00016	0.00059	0.00023	−0.05781**	0.03606**	0.04518**	0.03299**	0.01851
Sum 3 $S^uB^u\|R^{bnd}\|$	0.00058	0.00009	0.00028	0.00017	−0.18891**	0.07786*	−0.02001	0.07263*	−0.11977**
Sum 3 $S^uB^d\|R^{bnd}\|$	0.00123	0.00078	0.00459*	0.00202	−0.28775**	0.17336**	−0.25008**	0.06670	−0.07733
Sum 3 $S^dB^u\|R^{bnd}\|$	−0.00020	−0.00098	0.00028	0.00043	−0.05021	0.16597**	−0.08554	0.07705	−0.24919**
Sum 3 $S^dB^d\|R^{bnd}\|$	0.00041	0.00003	−0.00376**	−0.00162**	−0.09991**	0.04178	−0.16078*	0.02792	−0.10480**
H0: All return coefficients = 0	0.7108	0.1891	0.0713*	0.1045	0.0000**	0.0000**	0.0195**	0.0009**	0.0005**
Adjusted R^2									
All variables	0.3034	0.6341	0.1521	0.1852	0.7404	0.5407	0.4969	0.4816	0.3139
Without returns	0.3031	0.6338	0.1516	0.1831	0.6937	0.5151	0.4741	0.4642	0.2951
Without shocks	0.1429	0.0157	0.0368	0.0613	0.2289	0.4972	0.4052	0.4339	0.2738
Without shocks or years	0.1310	0.0112	0.0205	0.0281	0.2073	0.4723	0.3870	0.4123	0.2686
No. of observations	2,053	2,053	1,851	1,856	2,053	2,045	2,032	2,029	2,053

Notes: 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 4.5, 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, 651). The numbers reported for "H0: All return coefficients = 0" are *p*-values.

**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 4.7 **Summary Results for “Influence” Regressions (equation [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 S^uB^u	0.0019	0.0054	0.0083	−0.0091	−0.0004	0.0000	−0.0002	0.0011*	0.0047**
Sum 3 S^uB^f	−0.0118*	0.0010	−0.0116	0.0103	0.0038	0.0040	−0.0001	0.0004	0.0024
Sum 3 S^uB^d	0.0143**	−0.0013	0.0141*	0.0194	0.0009	0.0011	−0.0007*	0.0003	0.0007
Sum 3 S^fB^u	−0.0013	0.0035	0.0017	−0.0293	0.0013	0.0017	−0.0004	0.0004	−0.0001
Sum 3 S^fB^d	0.0063	0.0051*	0.0102*	−0.0409	0.0004	0.0003	−0.0007	0.0004	−0.0004
Sum 3 S^dB^u	−0.0014	−0.0039	−0.0053	−0.0107	−0.0040**	−0.0033*	−0.0002	0.0004	0.0036
Sum 3 S^dB^f	0.0112*	0.0052	0.0162**	−0.0669**	−0.0011	−0.0006	−0.0001	0.0002	0.0039
Sum 3 S^dB^d	0.0136**	0.0039	0.0180**	−0.0304	−0.0025*	−0.0019	−0.0002	−0.0003	0.0042**
H0: all returns coefficients = 0	0.0037**	0.0593*	0.0003**	0.2695	0.256**	0.1538	0.4367	0.5975	0.0170**
Adjusted R^2									
All variables	0.5523	0.3387	0.5153	0.1071	0.7617	0.7840	0.0630	0.3696	0.9823
Without returns	0.5462	0.3377	0.5080	0.1074	0.7617	0.7841	0.0653	0.3702	0.9822
Without shocks	0.5012	0.3180	0.4703	0.0271	0.7297	0.7526	0.0151	0.0473	0.0190
Without shocks or years	0.4833	0.3106	0.4515	0.0124	0.7180	0.7416	0.0067	0.0247	0.0147
No. of observations	2,045	2,032	2,028	2,043	2,053	2,049	2,053	2,053	2,053

(*continued*)

Table 4.7 (continued)

	OLS Using Continuous Dependent Action Variables				Probit Using Binary Dependent Action Variables				
	dSECPCT	dFTEMP	dUININS	dUNINTA	DCDIVUP	DCOMUP	DPFUP	DEQUP	DSND
Sum 3 S^uB^u	−0.0059	0.0232**	0.0027	−0.0026	−0.0308	1.2913**	0.2144	0.7876**	−0.4960
Sum 3 S^uB^f	−0.0034	0.0190*	0.0150	0.0038	0.4883	0.7684	−0.2497	0.2488	−0.0286
Sum 3 S^uB^d	−0.0030	0.0149*	0.0230**	0.0070*	0.0554	0.8836**	−0.6848*	0.2761	−0.7379**
Sum 3 S^fB^u	−0.0001	0.0037	0.0130	0.0039	−0.1024	0.9687**	0.0481	0.5929	−0.4904**
Sum 3 S^fB^d	0.0009	−0.0004	0.0209*	0.0083*	0.0657	1.4587**	−0.4863	0.5064	−0.2577
Sum 3 S^dB^u	0.0093	0.0144	0.0004	−0.0016	−1.1968**	0.2956	−0.7983*	−0.2177	−0.5376**
Sum 3 S^dB^f	−0.0045	0.0111	0.0015	0.0000	0.0750	1.3575**	0.4237	0.7848**	−0.0847
Sum 3 S^dB^d	−0.0051	0.0088	0.0149*	0.0044	−0.9633**	1.4655**	0.5190	0.8410**	−0.1623
H0: All returns coefficients = 0	0.5559	0.0413**	0.0496**	0.0646*	0.0002	0.0002**	0.0041**	0.0029**	0.0506*
Adjusted R^2									
All variables	0.3061	0.6367	0.1593	0.1905	0.7136	0.5484	0.4972	0.4854	0.3093
Without returns	0.3031	0.6338	0.1516	0.1831	0.6937	0.5151	0.4741	0.4642	0.2951
Without shocks	0.1475	0.0123	0.0469	0.0690	0.1274	0.4947	0.3976	0.4317	0.2677
Without shocks or years	0.1344	0.0066	0.0259	0.0291	0.0914	0.4640	0.3801	0.4070	0.2642
No. of observations	2,053	2,053	1,851	1,856	2,053	2,045	2,032	2,029	2,053

Notes: See table 4.6.

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.

4.6.2 Parametric Evidence about Influence

Tables 4.8 and 4.9 combine new information about estimated response equations (4a) and (4b) with the influence equation coefficient estimates already presented in tables 4.6 and 4.7. The influence hypothesis is not strongly supported by the response regression coefficients. Stock excess returns respond significantly to only three and four action variable surprises in tables 4.8 and 4.9, respectively, 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 4.9 seem puzzling.) One of the three significant response variables in table 4.8 (dSECPCT) is not associated with significant influence. Table 4.9 provides only two additional actions (dCDIVP and dUININS) that are affected by past returns and that, 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 4.8, and dFTEMP in table 4.9; both are significant only at the 10 percent level.

Investor influence requires $a_1 \neq 0$ and $b_1 \neq 0$. The dearth of significant return responses (b_1) therefore provides scant evidence of investor influence. In table 4.8 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 S^dB^d), and the signs are consistent with beneficial influence. Unhappily, this picture is spoiled by the fact that the significant *stock* response is associated with a significant *bond* influence. Table 4.9 is not much more encouraging. The significant stock response coefficient for dCDIVP is associated with two weak influences in turn associated with stock-down states, consistent with influence. However, the coefficient signs imply 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^uB^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,

Table 4.8 **"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" Equation (1a): Absolute Value of Stock Return Multiplies				"Influence" Equation (1a): Absolute Value of Bond Return Multiplies				"Response" Equation (1b)		Beneficial/ Perverse Influence	
	S^uB^u	S^uB^d	S^dB^u	S^dB^d	S^uB^u	S^uB^d	S^dB^u	S^dB^d	Stock	Bonds	Stock	Bonds
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

Notes: Influence regression results are repeated (in transposed form) from tables 4.6 and 4.7. 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 4.5.

Beneficial/perverse influence tests were based on coefficient signs, without regard for significance levels. The classifications from table 4.3 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 *all* 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.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 4.9 **"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	"Influence" Equation (1a)								"Response" Equation (1b)		Beneficial/ Perverse Influence	
Variables	S^uB^u	S^uB^f	S^uB^d	S^fB^u	S^fB^d	S^dB^u	S^dB^f	S^dB^d	Stock	Bonds	Stock	Bonds
					Continuous Action Variables							
CMINCR	0.0019	−0.118*	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

Notes: See table 4.8.

in both tables 4.6 and 4.7 the significant stock response on the DCDIVUP action variable is associated with several influences; again predominantly of bond-down states and of signs consistent with perverse influence.

In summary, although there appears to be significant association between return variables and subsequent managerial actions, the evidence from combining the influence and response regression results is very weak, and in no case is there clear evidence of beneficial influence. Obviously, failure to reject a null hypothesis of no influence is not conclusive evidence against stock and bondholder influence, but neither is it evidence for influence. The few instances of influence that we can detect parametrically are consistent with perverse, rather than beneficial, influence.

4.6.3 Nonparametric 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, nonparametric signs test can provide consistent interpretations of the results in tables 4.6 and 4.7. To conserve space we discuss only the tertiary specification results in table 4.9. The results in table 4.8 are similar.

The influence equation specification in table 4.9 includes six explanatory variables that can reasonably be associated with stock return influence on managerial actions: S^uB^u, S^uB^f, S^uB^d, S^dB^u, S^dB^f, and S^dB^d (stock flat combinations are unlikely to be associated with stock influence). The analogous variables are consistent with bond return influence: S^uB^u, S^fB^u, S^dB^u, S^uB^d, S^fB^d, and S^dB^d. The probability that six coefficients will carry the same sign by chance alone is approximately 1.6 percent. Five out of six coefficients bearing the same sign would appear by chance 18.8 percent of the time. A nonparametric sign test of beneficial or perverse influence would reject the no-influence null at the 5 percent level if all six stock influence coefficients are the same sign as the stock response coefficient (beneficial) or the opposite sign (perverse). Where fewer than six 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 the top row of table 4.9 (for the managerial action CMINCR) as an example, the stock response coefficient (5.642) 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 two 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 4.8 can only provide weak evidence of influence. For stocks there are only four 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.

These nonparametric sign tests of beneficial and perverse influence produce mixed results. Over both specifications we find eight (of 36) significant cases of beneficial stock influence, and four significant cases of perverse stock influence. The "suggestive" stock results break down seven beneficial to ten perverse. Less rigorously, some indication (significant or otherwise) of beneficial stock influence obtains in fifteen versus fourteen cases for perverse influence, with seven cases being completely neutral. The corresponding bond results are eight cases of significant beneficial bond influence, seven cases of significant perverse bond influence, fifteen cases at least suggestive of beneficial bond influence, sixteen cases at least suggestive of perverse influence, and five 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.

4.7 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.

We assembled information about large U.S. BHCs' stock and bond returns for the period 1986–97. One view of corporate capital structure emphasizes the potential conflicts between shareholders and debtholders in a levered firm. In examining quarterly excess returns for our sample, we find that stock and bond prices move in the *same* direction more than half the time. Despite the potential importance of stockholder-bondholder conflicts, the two groups frequently share common interests with respect to firm performance.

To assess whether bondholders can effectively influence banking firms, we explicitly modeled the interaction between investors and managers and showed how beneficial influence should be manifested in the data. Although the methodology is not perfect, we had hoped it would identify appropriate managerial responses to observable, exogenous events that affect BHC value. Some types of beneficial influence will be undetectable: for example, if managers *refrain* from taking actions that they know would elicit investor chagrin, or if managers always respond appropriately to exogenous shocks. 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 inconsistent with influence. It is simply inconclusive.

A less rigorous, nonparametric 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 nonparametric 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.

References

Ang, James S., Rebel A. Cole, and James Wuh Lin. 2000. Agency costs and ownership structure. *Journal of Finance* 55 (1): 81–106.

Basel Committee on Banking Supervision. 1999. A new capital adequacy framework. Consultative paper issued by the Basel Committee on Banking Supervision, June.

Berger, Allen N. 1991. Market discipline in banking. Proceedings of a conference on bank structure and competition, 419–39. Federal Reserve Bank of Chicago.

Brickley, James A., and Christopher M. James. 1987. The takeover market, corporate board composition, and ownership structure: The case of banking. *Journal of Law and Economics* 30 (1): 161–80.

Brickley, James A., James S. Linck, and Jeffrey L. Coles. 1999. What happens to CEOs after they retire? New evidence on career concerns, horizon problems, and CEO incentives. *Journal of Financial Economics* 52 (3): 341–77.

Core, John E., Robert W. Holthausen, and David F. Larcker. 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51 (3): 371–406.

Cotter, James F., Anil Shivdasani, and Marc Zenner. 1997. Do independent directors enhance target shareholder wealth during tender offers? *Journal of Financial Economics* 43 (2): 195–218.

Denis, David J., and Diane K. Denis. 1995. Performance changes following top management dismissals. *Journal of Finance* 50 (4): 1029–57.

DeYoung, Robert, Mark J. Flannery, William Lang, and Sorin M. Sorescu. 2001. The information content of bank exam ratings and subordinated debt prices. *Journal of Money, Credit and Banking,* forthcoming.

DeYoung, Robert, Kenneth Spong, and Richard J. Sullivan. 2001. Who's minding the store? motivating and monitoring hired managers at small, closely held commercial banks. *Journal of Banking and Finance,* forthcoming.

Diamond, Douglas W. 1984. Financial intermediation and delegated monitoring. *Review of Economic Studies* 51 (3): 393–414.

Ellis, David M., and Mark J. Flannery. 1992. Does the debt market assess large banks' risk? *Journal of Monetary Economics* 30 (3): 481–502.

Flannery, Mark J. 1998. Using market information in prudential bank supervision: A review of the U.S. empirical evidence. *Journal of Money, Credit and Banking* 30 (3): 273–305.

Flannery, Mark J., and Sorin M. Sorescu. 1996. Evidence of bank market discipline in subordinated debenture yields. *Journal of Finance* 51 (4): 1347–77.

Gilbert, R. Alton. 1990. Market discipline of bank risk: Theory and evidence. *Federal Reserve Bank of St. Louis Review* 72 (1): 3–18.

Greene, William H. 1993. *Econometric analysis,* 2nd ed. New York: Macmillan Publishing Company.

Hadlock, Charles J., and Gerald B. Lumer. 1997. Compensation, turnover, and top management incentives: Historical evidence. *Journal of Business* 70 (2): 153–87.

Hirshleifer, David, and Anjan V. Thakor. 1998. Corporate control through board dismissals and takeovers. *Journal of Economics and Management Strategy* 7 (4): 489–520.

Hubbard, R. Glenn, and Darius Palia. 1995. Executive pay and performance: Evidence from the U.S. banking industry. *Journal of Financial Economics* 39 (1): 105–30.

Jensen, Michael C., and William H. Meckling. 1976. Theory of the firm, managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics* 3 (4): 305–60.

Jensen, Michael C., and Kevin J. Murphy. 1990. Performance pay and top-management incentives. *Journal of Political Economy* 98 (2): 225–65.

Kaplan, Steven N. 1994a. Top executive rewards and firm performance: A comparison of Japan and the United States. *Journal of Political Economy* 102 (3): 510–46.

———. 1994b. Top executives turnover and firm performance in Germany. *Journal of Law, Economics and Organization* 10 (1): 142–59.

Kwan, Simon H. 1996. Firm-specific information and the correlation between individual stocks and bonds. *Journal of Financial Economics* 40 (1): 63–80.

Martin, Kenneth J., and John J. McConnell. 1991. Corporate performance, corporate takeovers, and management turnover. *Journal of Finance* 46 (2): 671–87.

Mikkelson, W., and M. Partch. 1997. The decline of takeovers and disciplinary managerial turnover. *Journal of Financial Economics* 44 (2): 205–28.

Morck, Randall, Andrei Shleifer, and Robert W. Vishny. 1988. Management ownership and market valuation: An empirical analysis. *Journal of Financial Economics* 20 (1/2): 293–315.

Myers, Stewart C. 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5 (2): 147–75.

Prowse, Stephen. 1997. Corporate control in commercial banks. *The Journal of Financial Research* 20 (4): 509–27.

Shleifer, Andrei, and Robert W. Vishny. 1997. A survey of corporate governance. *Journal of Finance* 52 (2): 737–83.

Smith, Clifford W., Jr., and Jerold B. Warner. 1979. On financial contracting: An analysis of bond covenants. *Journal of Financial Economics* 7 (2): 117–62.

Warga, Arthur D. 1995. *A fixed income database.* University of Houston, Fixed Income Research Program.

Williamson, Stephen. 1986. Costly monitoring, financial intermediation and equilibrium credit rationing. *Journal of Monetary Economics* 18 (2): 159–79.

Comment Raghuram G. Rajan

This paper examines whether bank actions are, in fact, disciplined by markets. It starts by arguing that market discipline has two components. The first is monitoring, which implies the market's ability to reflect what is happening inside the firm and, sometimes, to predict what will happen to it. The second is influence, which refers to the effect of market movements on managerial actions. The authors argue that both components are necessary for market discipline to work. The paper is very timely in that regulatory authorities are increasingly despairing of supervising the complicated processes that go on inside a modern financial institution and would like to rely on the market to take over some of their tasks. Taken at face value, the results of the paper suggest that it may be premature to delegate supervisory functions to the market because although the market seems to recognize when something is going on, managerial actions do not seem to be influenced by market movements.

Raghuram G. Rajan is the Joseph Gidwitz Professor of Finance at the University of Chicago's Graduate School of Business and a research associate of the National Bureau of Economic Research.

The task the authors undertake is to be commended. There are, however, difficulties in the methodology. They must be able both to interpret what the market reaction suggests is wrong and to specify precisely what actions will be taken to remedy it. This is difficult at the level of a case study, let alone in large samples. But there is a more fundamental concern. If, in fact, market discipline works well, then managers should anticipate the reactions of the market and not mess up. The market should react only to factors beyond managers' control. In this case, however, we should indeed see no effect of the market on managerial actions. So does one conclude from the results that market discipline does not work or that it works too well?

Most of us start with the preconception that managers are not angels, so let us assume, as the authors do, that managers do not do everything perfectly. The problem is that the methodology is even now biased against finding that markets exert influence. As the authors recognize, positive market reactions are unlikely to change managerial actions—if it ain't broke, why fix it? But what does a negative market reaction indicate? The authors' preferred interpretation is that the market may be uncertain about whether managers will be shamed into fixing the problem, and hence it reacts adversely to signs of the problem. The most negative reaction, however, will be when the market is convinced that managers will not fix the problem or that they cannot fix it. In other words, the most adverse reactions will be met by no action, whereas moderate reactions will be met by substantial action. These nonlinear possibilities cloud interpretation of the results. The authors do recognize that the magnitude of the market reaction may not be representative, and also present regressions with dummy variables. I would focus on these.

The last difficulty the authors have is in correlating market reaction to specific operational responses. The problem is that a market reaction could come for any reason. Because the authors do not know why the market has reacted, they can only rely on some very coarse reasoning (I do not use this term pejoratively) about what the appropriate managerial action should be.

In short, even modulo all the caveats, predicting operational reactions is hard. In fact, would a regulator be happy if she saw a bank changing its operations with every blip in market prices? Clintonian management may be appropriate in politics, but what would one conclude about a bank manager who let the market determine his every decision?

This suggests that if one were to look for more comfort about the effects of markets, one may have to rely on coarser but more significant responses. For example, as in Steve Kaplan's studies of German and Japanese firms, does a fall in stock (or subordinate bond) price presage more managerial turnover than the average?

The bottom line is that this paper is interesting in large part because the authors ask very good questions about how one could test for the existence of market influence. I also like the model they present, which highlights the precise assumptions they need to find any evidence of market discipline. Whether the reader leans to their view that the tests have some power, or to the skeptical view that they do not, the paper gives the reader a good way of thinking about the issue. Nevertheless, because the questions they raise are only partially answered, the conclusions must be viewed as tentative.

Discussion Summary

Mark Carey began the discussion by suggesting that the authors augment their work by focusing on events. *Robert Eisenbeis* wondered what the authors were trying to capture. He noted that often firms away from the efficient frontier move back to the frontier using different combinations of actions. He suggested that this might be a good framework.

Charles Calomiris had a somewhat different take on the paper's results for policy. He noted that before the implementation of deposit insurance in the United States markets disciplined banks through depositer exit. He observed that as equity fell, banks had to respond or lose deposits. He noted that bond market discipline might be less organized because covenants are hard to enforce and bondholders are unable to run. He observed that this problem is even more difficult with insured deposits; as bondholders exit banks shift from bond funding to insured deposits. Empirical evidence, he further observed, suggests that bank bond debt shrinks as banks get into trouble.

Doug Diamond began by asking what we should see and do. He noted that from a financial perspective, managers maximize the value of the firm across all claimants. Absent regulation, we should not expect to see actions favoring one claimant over another. He pointed out that at banks there are three claimants—debt, equity and regulators—and that this third claimant will have more clout. This, he observed, leads to the question of whether regulatory interventions cause changes. He concluded that if regulatory actions lead to market response, then we might not expect to see a further response.

Alan Berger noted a key link that has not been investigated—an identification problem. He noted that some apparent actions might in fact be the outcome of previous actions. He suggested that the authors look at nonperforming loans; these may not be actions of the bank but may have been previously identified as bad loans by bondholders. Finally, he noted that the authors face a challenge similar to that of Berger, Kyle, and Scalise: After supervisors identify problems, they then show up as nonperforming loans, making it hard to identify the action and the reaction.

Following up on Berger's argument, *Frederic Mishkin* wondered whether we can identify actions and reactions given that bonds are forward looking. He observed that we might never be able to infer causality: With forward-looking variables it is even harder to get a controlled experiment.

Mark Flannery began the response by noting that these issues are linked. He suggested that the focus on the three claimants may be key. In terms of predicting versus influencing, he noted that the authors do regress residuals on market returns in order to address these concerns partially. He agreed that they should think about Modigliani and Miller and stay away from stockholders.

In response to Eisenbeis, *Robert Bliss* noted that movement back to the frontier might be a third step. He agreed with Calomiris that the current regulatory environment will undermine discipline and could continue under a subordinated debt proposal. To Berger he responded that if there is influence, then it is hard to find evidence. This finding suggests that monitoring-based subordinated debt proposals should be evaluated more closely.

Michael Dooley reopened the discussion by asking what the objective of the third claimant (the regulator) is. He noted that if the insurance fund has a different objective function, then this should be explicit. Berger noted that research (by Flannery and others) suggests that bondholders and supervisors seem to have the same objectives and reactions.

James Wilcox suggested looking at the response to merger announcements—if the acquiring banks stock value falls on the announcement, then why aren't mergers called off? Flannery noted that this related to discussant *Raghuram Rajan*'s first point. He observed that managers who expect a big fall in stock value might not bring mergers to market. He argued that in this case we may not see evidence of discipline even though it is in fact strong.