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Monitoring Debt Market Information for Bank Supervisory Purposes

Bank supervisors monitor bank holding companies (BHCs) in order to enforce regulations and gauge their soundness so as to guard against systemic risk in the financial system. This monitoring is chiefly conducted using supervisory resources, such as bank examinations and quarterly filings of balance sheet information. BHCs are also monitored by other parties, in particular investors in their public securities; this type of monitoring is commonly referred to as market discipline, and the market assessments from it are reflected in the prices of BHC public securities.

In the past few years, supervisors have expressed an intent to incorporate more market information into their monitoring efforts. Researchers and policymakers have advocated using BHC subordinated debt as a tool for increasing the degree of market discipline applied to BHCs. A recent study by the Board of Governors of the Federal Reserve System and the Secretary of the Treasury (2000) found evidence supporting this assertion and concluded that subordinated debt issuance might enhance both direct and indirect market discipline.

In this *Economic Letter*, we present empirical evidence on the potential usefulness of BHC debt market information, and securities market information more broadly, for supervisory monitoring. We find that changes in BHC bond yields precede corresponding changes in supervisory BHC ratings by a year. We also assess the contribution of BHC debt yields in the context of an off-site monitoring model that includes both supervisory and equity market variables. Our results indicate that debt market information is useful for supervisory monitoring, even in the presence of equity market data. In fact, debt yields contributed more explanatory power for BHCs that are relatively closer to insolvency.

Debt market information and supervisory monitoring

Publicly traded BHC debt, and subordinated debt in particular, may be useful for supervisory monitoring because, in general, BHC debtholders have incentives roughly in line with supervisors. That

is, investors in BHC subordinated debt are among the first to lose their investments, after equity investors, if the bank defaults, but they do not benefit directly from any gains that accrue beyond the face value of their holdings. Like supervisors, these investors have an incentive to monitor BHC conditions, and their assessments could be imputed from changes in public BHC debt prices. However, as a BHC nears insolvency, the incentives of subordinated debt holders become more like those of equity investors, who are willing to participate in riskier transactions to “save” the concern. Such transactions would not be aligned with the concerns of supervisors, who would be most interested in safeguarding the existing assets. Note, however, that changes in equity prices still should contain information on investor assessments of BHC performance that could be useful for supervisory monitoring.

We gauged the potential supervisory value of BHC debt market information by incorporating it into models of BHC supervisory ratings. The Federal Reserve supervises U.S. BHCs, which make up the bulk of public bond issuance by banking institutions. (The remainder of these bonds are issued by individual banks within BHCs.) The primary component of BHC supervision is on-site inspections, which generally are conducted once a year, although the largest and most complex BHCs have a continuous supervisory presence. At the conclusion of a BHC inspection, the supervisors assign a composite BOPEC rating that summarizes the five key areas of supervisory concern: the condition of the BHC’s **B**ank subsidiaries, **O**ther nonbank subsidiaries, **P**arent company, **E**arnings, and **C**apital adequacy. BOPEC ratings are assigned according to an absolute scale from the highest rating of one to the lowest rating of five; these ratings are confidential and are not made public.

Can BHC debt spreads anticipate BOPEC changes?

If BHC debt market information is to be useful to supervisors, it should agree with supervisory assessments a reasonably large fraction of the time. That is, large changes in BHC debt yields should

give supervisors an early warning of changes in BHC conditions. To examine this possibility, we analyzed changes in BHC debt yields leading up to BOPEC assignments. The yields were adjusted to account for multiple bond issues by the same BHC, bond maturities, public credit ratings, and prior BOPEC ratings; see Krainer and Lopez (2003). One caveat to our analysis is that bonds are largely traded over-the-counter with greatly varying degrees of liquidity, which should have an impact on the quality and reliability of the observed bond yields.

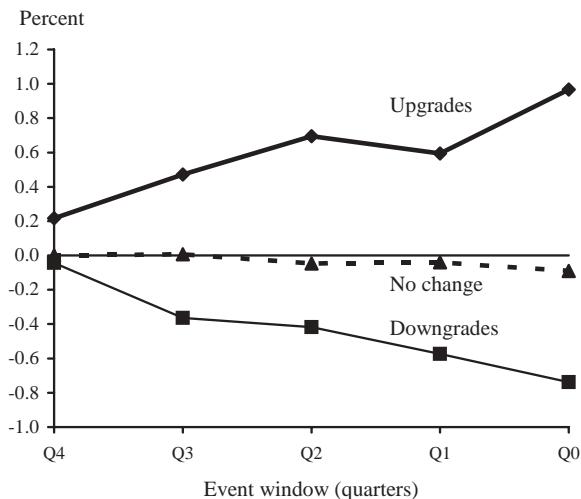
As shown in Figure 1, changes in adjusted BHC yields moved in accordance with and up to a year prior to the future BOPEC assignments. For the BOPEC downgrades in our sample, the average cumulative increase in yields was statistically significant at about one percentage point by the time of the inspection, which is a signal that debt market investors were demanding an increase in their investment return. For the sample's upgrades, adjusted yields dropped by 75 basis points by the time of the inspection. For the inspections without BOPEC changes, the yield changes were effectively zero on average. We thus conclude that changes in adjusted BHC debt yields are consistent with future supervisory assessments and could be useful for supervisory monitoring.

Debt market information in an off-site monitoring model

We gauged the potential usefulness of BHC debt market information for supervisory monitoring by combining it with supervisory variables in an off-site monitoring model. Securities market data are, in general, available sooner than supervisory data from quarterly financial statements, which could assist an off-site monitoring model in detecting sudden changes in BHC conditions. Since the cost of incorporating securities market variables into the model is low, even small net improvements in forecast accuracy could be valuable. We used our proposed BOPEC off-site monitoring (BOM) model (Krainer and Lopez 2001). The benchmark, or core, BOM model examines the relationship between BOPEC ratings and selected supervisory variables; this model was extended to incorporate our adjusted BHC debt yields. When the model was estimated over our full sample of BOPEC ratings assigned from 1990 to mid-1998, adjusted BHC debt yields were statistically significant and contributed to the model's empirical fit of the data.

BHC debt yields, of course, represent only one source of market information. As shown in Krainer

Figure 1
Average cumulative change in yield spreads prior to inspection



Note: The sample consists of 315 inspections of which 30 are downgrades, 57 are upgrades, and 228 are no changes.

and Lopez (2001), changes in BHC equity prices also contain information useful for supervisory monitoring within the context of the BOM model. When we extended the core model to include equity market variables, both sets of securities market variables were statistically significant and improved the model's empirical fit of the data more so than models using just one set of market variables. This result suggests that the BHC assessments expressed by both sets of investors via changes in BHC securities prices could contribute to supervisory monitoring.

We further examined whether securities market variables might provide different information depending on how close a BHC is to default, measured as the point at which BHC liabilities exceed assets. Using a measure of a firm's default probability, commonly known as the distance-to-default, based on the market value of BHC assets and outstanding liabilities, we ranked the publicly traded BHCs in our sample and used those rankings within the BOM model. We found that measures of equity returns had a greater impact when BHCs were further away from default and that debt yields had more impact when BHCs were closer to (but not in) default. The asymmetric contributions of debt and equity return variables are consistent with the theory that debtholders do not benefit directly from gains accruing beyond the face value of their investment, but are affected by actions that the BHC takes while relatively closer to default. In contrast, equity holders should be less sensitive to changes in firm value close to default because their

investment might disappear entirely, while further from default, they would be more sensitive to changes in BHC condition.

To be useful for supervisory monitoring, the extended BOM model with both BHC debt and equity market variables also must forecast BOPEC ratings accurately. To mimic actual practices, we re-estimated the BOM model with and without securities market variables every quarter based on a rolling four quarter sample of data. The estimated models were then used to generate one-quarter-ahead BOPEC forecasts. They generated a forecasted change in supervisory rating if the forecast was more than three-quarters of a rating grade different from its corresponding lagged BOPEC rating. When compared to all our sample's ratings at four quarters prior to assignment, this extended model correctly signaled 67% of all the BOPEC assignments and almost 60% of all BOPEC changes. These percentages increase to 70% and 88%, respectively, at one quarter prior to assignment.

Another dimension of accuracy for an off-site monitoring model is the mix of correct and incorrect forecast signals; for example, if the model signals a downgrade, what is the probability that the signal is correct? This dimension of accuracy is measured using the ratio of correctly signaled downgrades to the total number of signaled downgrades. We find "no change" signals were the most common and were correct 67% of the time. Downgrade signals, which are of more interest to supervisors, were correct 58% of the time at four quarters prior and improved to 86% at one quarter prior. Upgrade signals occurred with the same frequencies. Our results indicate that forecast signals from the extended BOM model were accurate a large percentage of the time, even up to a year prior to the BOPEC assignments, and could thus be useful for off-site BHC monitoring.

A critical question is whether forecasts from the extended model including both sets of securities market variables provides further information about BOPEC ratings beyond that obtained using forecasts from the core model using only supervisory variables. To make this assessment, we compared the accuracy of the two sets of forecasts statistically, which in this case is the percentage of BOPEC ratings accurately forecast. By this measure, we found little difference between the accuracy of these two sets of competing forecasts.

This result, however, does not mean that the forecasted BOPEC ratings from the two models are identical. Since the forecasting literature has shown that combining forecasts from different models can improve forecast accuracy, we decided to gauge the contribution of securities market information by examining the additional forecast signals for BHCs with public securities generated by the extended model relative to the core model's signals. At four quarters prior, the extended model signaled 54 additional BOPEC changes, of which 27 were correct and were almost evenly split between upgrades and downgrades. For one quarter prior, 65 additional BOPEC changes were signaled, of which 42 (or 65%) were correct and again almost evenly split between upgrades and downgrades.

Seen in this light, the marginal benefit of incorporating securities market variables into the BOM model is notable. At four quarters prior, the additional 27 correct signals regarding BOPEC changes increased the total to 93, a 40% increase. At one quarter prior, the additional 42 correct signals increased the total of correct BOPEC change forecasts by over 30% to 175. The benefits from having the additional correct early-warning signals provided by these forecasts could very well be worth the supervisory costs of dealing with the additional incorrect signals.

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