The Informational Role of Bond Analysts

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Abstract: This study uses a large sample of sell-side bond analysts' reports to examine the effectiveness of bond analysts as information intermediaries in the U.S. corporate bond market. We document that the distribution of bond analysts' buy, hold, and sell recommendations is skewed positive, and less so than the distribution of equity analysts' recommendations. In terms of trading volume and price changes, bond analysts' reports generate bond market reactions that are economically significant and greater than that of equity analysts. These reactions are robust to controls for other sources of information in the bond market such as rating agency and firm-specific disclosures. Finally, we provide evidence that bond analysts' reports lead rating agency disclosures. We obtain this result while controlling for equity analysts' reports, which also lead rating agencies. Overall, the evidence suggests that sell-side bond analysts provide relevant and timely information to bond investors, and hence play an active role in supporting the informational efficiency of the corporate bond market.

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The Informational Role of Bond Analysts

"Fixed income research analysts play an important role in informing the marketplace about particular issues or securities. Indeed, such analysts and the research they provide are critical in promoting market efficiency in the fixed income price discovery process."

– Bond Market Association (BMA 2004)

1. Introduction

The U.S. corporate bond market is a large and economically significant source of capital for U.S. corporations.[1] Sell-side bond analysts, employed by brokerage firms, gather, analyze, and interpret information about public corporate bond securities and the firms that issue them. These analysts write reports that summarize their analysis and make investment recommendations. While bond analysts represent potentially important information providers in the bond market, at least according to the Bond Market Association, little research exists to prove this claim. We study the distribution of buy, hold, and sell recommendations contained in bond analysts' reports, and the effect of these reports on bond trading volume and bond returns to determine the informational role of bond analysts. Our objective is to better understand what bond analysts do and their effectiveness as information intermediaries.

The nature of bond analysts' task, as described above, is in some ways similar to that of sell-side equity analysts. Fundamental differences between the equity and bond markets, however, can affect the type of research bond analysts produce and the impact of bond analysts' reports on investors. First, bond investors are almost exclusively institutions. This implies that the average level of investor sophistication is higher than in the equity market. Institutional investors are likely to access multiple sources of information (including their own research) and better understand how to utilize the information provided by bond analysts. Second, the U.S. corporate debt market is less transparent and less liquid than the equity market. The majority of corporate bonds are traded in an opaque over-the-counter dealer market (see, e.g., Hong and Warga 2000; Warga, 2004) and many bonds become absorbed in "buy-and-hold" portfolios shortly after issuance.

[1] Bessembinder and Maxwell (2007) provide summary statistics about the bond markets. For example, outstanding principal in U.S. corporate bonds in 2006 was $5.37 trillion. During the decade 1997 to 2006, U.S. firms issued $4.6 trillion in corporate bonds, which is approximately three times the $1.5 trillion of equity issued via initial and seasoned public common stock offerings, over the same period.

Third, bonds are graded by independent certified rating agencies, such as S&P, Moodys, or Fitch. These agencies receive fees from the firms that issue the bonds they rate and have access to information that is not publicly available. Rating agencies represent an alternative intermediary with extensive reputational capital at stake. Hence, their disclosures provide relevant information that can substitute for or complement bond analysts' information, and can serve as an independent check on the accuracy and reliability of bond analysts' research. Fourth, the prices of many debt securities are, by their nature, more-objectively determined. The value of debt securities is established in large part by macro-economic factors, such as interest rates and historical credit spreads or default rates. Further, other debt securities with similar cash flows and credit risk can be close substitutes to a bond covered by the bond analyst, and thus can be used as benchmarks to price it. Last, bond investors have fixed claims against the borrowing firm, which limits bond investors' upside potential. This important feature generates an asymmetric demand for negative information from investors in the bond market.

We test whether bond analysts' research reflects these fundamental differences between bond and equity markets with a sample of 15,918 (hand-collected and coded) analysts' reports about 633 firms for the years 2002 to 2006. In our first set of analyses we find that bond analysts' recommendations are skewed positive. Buys and sells represent 39.1% and 13.6%, respectively, of total recommendations. This result is consistent with bond analysts injecting positive strategic bias into their recommendations, perhaps to improve access to management, to expand the number of potential investors, or to gain investment-banking business. Compared to equity analysts, however, the recommendations of bond analysts are skewed *less* positive. A potential explanation for this finding is the presence of negative asymmetric demand for information, which is not present in equity markets. Another explanation is that bond analysts act less strategically and acquiesce less to pressure for positive optimism compared to equity analysts.

We also show that the positive skewness in bond analysts' recommendations is much stronger when credit ratings are worse or when the bond analysts are affiliated. In the case of superior-rated firms (i.e., AA- and AAA-rated), the percentage of buys (14.1%) is less than half that of sells (33.7%), which is consistent with the lack of upside return potential for these high-quality bonds and asymmetric demand for negative information by bond investors. However, for high-yield bonds (below BBB), which have return characteristics more similar to stocks, bond analysts' recommendations are more positively skewed (46.1% buys and 8.6% sells). As further evidence of this pattern, the difference in recommendation skewness between bond and equity analysts is driven by firms with investment-grade bonds. The bond analyst recommendation distribution of high-yield bonds is actually more positively skewed compared to that of equity analysts. In the case of affiliated bond analysts, we find they have a more positive distribution of recommendations than non-affiliated bond analysts. Although the distribution of recommendations is about the same for affiliated bond and affiliated equity analysts, the distribution for unaffiliated bond analysts is less positively skewed than the distribution for unaffiliated equity analysts.

Our next set of analyses documents that bond analysts' reports affect the bond market. First, results show a significant increase in bond trading volume in the five-day window centered on the date of bond analysts' reports. Over this event window an incremental 0.90% of bonds' principal is traded. This volume "reaction" to bond analyst reports is about one-half larger than the reaction to equity analysts' reports and thus it is particularly important given the low transparency and liquidity of the corporate debt market. Further, equity analysts' buy recommendations are associated with less trading volume than their hold recommendations. This lower bond market reaction to equity analysts, particularly around buys, suggests that equity analysts inject more strategic optimism into their recommendations and that the bond market expects and adjusts for this bias. Alternatively, equity recommendations are less relevant to bond investors because the news and arguments underlying equity analysts' recommendations (particularly buys) are targeted to equity investors. Second, bond prices also react to bond analysts' reports. The treasury-adjusted return for the difference between bond analysts' buy and sell recommendations is 0.5% while it is only 0.1% for that of equity analysts. This latter result is consistent with the idea that bond analysts' reports provide new and more relevant information to the market about bond values than equity analysts' reports do.

We also compare the bond market reaction to bond analysts' reports with the reaction to other types of events, such as rating agency and firm disclosures. While the market volume reaction per individual bond analyst report is about two fifths that for rating changes, bond reports are over ten times as frequent as rating changes. This implies that, relative to rating changes, bond analysts' reports are economically important. Firm disclosures (earnings announcements, conference calls and management forecasts) impact the bond market. However, they seem to be associated with a lower volume reaction than bond analysts' reports.

In a third set of analyses, we document that the bond market reaction to analysts' reports is higher when bonds are riskier, consistent with bond price sensitivity to news increasing when the firm is closer to default. Given the low sensitivity of news for high quality bonds, it is perhaps not surprising that bond analysts issue reports about twice as frequently for firms with high-yield bonds compared to firms with superior (AAA and AA) rated bonds. As a benchmark, equity analysts who by their nature are targeting equity investors, produce far more reports about superior-rated firms than they do about firms with high-yield bonds, the opposite pattern to that of bond analysts. Further, we find no evidence that the market reaction between affiliated and unaffiliated bond analysts is different. This is consistent with two explanations. There is no strategic bias and bond-issuing firms are awarding their underwriting business to brokers with analysts who truly have positive views of the firm. Alternatively, affiliated analysts are adding positive bias but their superior knowledge of the firm offsets the bias, resulting in a net no difference in the bond market reaction.

In our last set of analyses, we compare the timeliness of bond and equity analysts' reports relative to rating agencies' disclosures of rating changes and watch list additions. The evidence is consistent with bond analysts' leading (i.e., Granger causing) rating agency downgrades and upgrades. Bond analysts' sells (buys) also lead negative (positive) watch list additions, which represent credit agencies' attempts at providing timelier disclosures. The finding of timely bond analysts' reports corroborates and helps explain why the bond capital markets react to bond analysts' recommendation. The results for lagged equity analysts' buys and sells show a similar pattern to those of bond analysts. We find no evidence of a difference in timeliness for bond and equity analysts. Hence, the stronger bond market reactions we observe for bond analysts compared to equity analysts are not due to bond analysts issuing more timely recommendations than equity analysts. Instead, the different market reaction we observe must be due to the different information provided in bond analysts' reports.

Our study makes a number of contributions. We contribute directly to the limited literature on bond analysts. Johnston, Markov, and Ramnath (2008) also examine sell-side bond analysts. They find evidence that bond analysts' choice of firms to cover varies systematically with the costs and benefits of providing research coverage and that bond analysts affect equity stock prices. An advantage of our tests is that by directly examining bond market effects, and controlling for alternative events, including equity analysts' reports, credit rating changes, watch list and outlook change announcements, firm disclosures, and macro-economic news, our inference that bond analysts provide new information to bond investors is more likely to be valid. Our result that bond analysts' reports lead rating agency disclosures helps to explain why bond analyst reports are informative. Further, while a large number of studies have documented that the distribution of equity analysts' recommendations is positively skewed (e.g., Barber, Lehavy, McNichols and Trueman 2001; Malmendier and Shanthikumar 2007; Ke and Yu 2006), there is no research about the distribution of bond analysts' recommendations. We also contribute to the literature on analysts broadly defined by showing that fundamental similarities and differences between the bond and equity markets lead to systematic similarities and differences in the patterns of bond analysts' recommendations and bond market reactions to bond analysts' reports.

Last, our work is related to research on bond market information intermediaries. A number of studies have examined the information and properties of certified rating agencies (e.g., Pinches and Singleton 1978; Holthausen and Leftwich 1986; Hand, Holthausen, and Leftwich 1992; Dichev and Piotroski 2001).

As a different example, Beaver, Shakespeare, and Soliman (2006) study the differential properties of certified versus non-certified bond-rating agencies. We contribute to this literature by exploring the effectiveness of bond analysts as alternative information providers in the bond market.

The remainder of the paper proceeds as follows. Section 2 discusses the institutional background and our predictions. Section 3 describes the data and the sample selection process. Sections 4 and 5 present our empirical analyses of bond analysts' recommendations and the bond market reactions to bond analysts' reports, respectively. Section 6 investigates the timeliness of bond analysts' reports relative to rating agencies' disclosures. Section 7 concludes.

2. Bond analysts and bond markets

In Section 2.1, we describe the activities of bond analysts; this discussion is based on our reading of bond analysts' reports and institutional articles, and our conversations with practitioners. Section 2.2 provides predictions about the distribution of analysts' buy, hold, and sell recommendations. Section 2.3 discusses our predictions about the bond market reaction to bond analysts' reports.

2.1. Description of bond analysts' activities

Bond analysts identify whether firms' credit fundamentals are improving or weakening, and forecast whether firms' bond securities are likely to outperform (or underperform) relative to bonds of comparable risk with similar contractual features. This analysis is reflected in an investment recommendation (e.g., buy, hold, or sell) issued to bond investors. To obtain accurate valuation and pricing information for debt securities, bond analysts can work in close cooperation with sales and trading personnel as well as with equity analysts. These people can help bond analysts gather and interpret critical market information (BMA 2004).

Bond analysts forecast important upcoming events (e.g., earnings announcements, relevant credit events), and offer analysis and interpretation subsequent to these events. Besides an investment recommendation, bond analysts' reports provide an extensive review of firms' financial performance, including detailed examination of EBITDA, free cash flow, capital expenditures, and liquidity and leverage ratios. The reports often discuss the implications of firms' growth potential on these measures.

Bond analysts pay special attention to credit rating changes, changes in outlooks and additions to watchlists by credit rating agencies. This information is essential in the valuation of corporate bond securities. In recent years, analysts have started to integrate into their analysis information on credit derivatives, which offer investors protection against firms defaulting on their debt. These instruments allow analysts to better understand the relative value of a firm's credit, and subsequently to provide better advice and trading ideas for their clients (Ronan 2006).

Bond analysts also provide a comprehensive analysis of event risks stimulated by shareholder-bondholder conflicts of interest. Event risks include a variety of financial engineering techniques that enhance share price performance, but increase uncertainty and reduce the value of bond holdings (Currie 2005). The most common examples of event risks are share repurchases, divestments of assets, spin-offs, leveraged buyouts and debt-funded acquisitions. Bond analysts provide detailed coverage of exposure to event risks, and discuss the event risks' potential or realized impact on rating changes, bond valuation, and firms' long-term credit prospects. Their reports can also discuss if bond covenants offer investors sufficient protection against the event risk in question.

2.2. Distribution of buy, hold, and sell recommendations

Our first research question investigates the distribution of bond analysts' recommendations, and in particular, whether it is skewed differently than equity analysts. Compared to equity analysts, we expect that bond analysts will act less strategically (i.e., adding bias to their unobserved true recommendation). A basic premise of benefiting from strategic behavior is that the biased recommendations cannot be revealed or detected by at least some investors. More-sophisticated investors likely have the capability and resources to unravel any potential analyst bias, while less-sophisticated investors, often proxied by retail investors or small traders, do not. Consistent with this idea, Ljungqvist et al. (2007) show the positive skewness of equity analyst recommendations is decreasing in institutional investor holdings. Malmendier and Shanthikumar (2007) show that small traders follow equity analysts' recommendations literally, while large traders "discount" the recommendations. De Franco, Lu, and Vasvari (2007) provide results suggesting that when analysts mislead investors by publicly-issuing positive recommendations inconsistent with their private negative views, wealth is transferred from individuals to institutions. Further, if investors make more efficient investment decisions in general by using independent and unbiased information, then more strategic bias is likely associated with less efficient investor decisions.

Unlike the equity market, bond investors are almost exclusively institutions. For example, Warga (2004) states that institutions account for an estimated 98% of the dollar volume of trade. Without smaller, less sophisticated investors, there is no one to "fool" in the bond market. For example, the chairman of the SEC (2005) links bond analysts' ability "to resist the pressure to hype" favored clients to the "counterweight provided by the institutional nature of the buy-side customer base." In addition, bond analysts have to compete with more objective information about bond prices. Rating agencies provide credit ratings and other information that can be used as information substitutes by investors (BMA 2004). Ease of comparability across bond securities is another source. In recent years, credit default swaps provide an additional market-based benchmark in the valuation of debt securities. Hence, all else equal, we expect to observe less bias for bond analysts than for equity analysts.

We discuss two sources of demand for bias that we investigate in our empirical tests:

Asymmetric demand for negative information. Bond returns are, by their nature, negatively skewed because of the capped payoff, which leads to increased demand by bond investors for negative information. This argument suggests that demand for analysts' sell reports is greater in the bond market, which could lead bond analysts to add negative bias to their reports (e.g., by providing broader coverage of the negative news). In contrast, returns for equity securities are positively skewed (see, e.g., Campbell, Lo, and MacKinlay 1997; Kothari, Sabino, and Zach 2005), which for the same reasons should lead to more demand by equity investors for positive news, and hence to equity analysts adding positive bias. This argument suggests that bond analysts' recommendation distribution will be less positive than that of equity analysts. It also suggests a cross-sectional prediction. As the firm becomes more distressed the negative skewness of bond returns decreases and the bond security behaves more like an equity security. Consistent with this effect, Collin-Dufresne, Goldstein, and Martin (2001) find that the relation between bond returns and equity returns is increasing in the riskiness of the bond. Hence, we predict that the distribution of bond analysts' recommendations is skewed more positive for riskier bond securities.

Affiliation. It has been alleged that affiliated analysts routinely issue overly-optimistic disclosures (i.e., analysts act strategically) to curry favor with corporate clients and to win lucrative investment-banking business (SEC 2003a,b; Smith, Craig, and Solomon 2003). Although there is some dissent (e.g., Bradley, Jordan, and Ritter 2006), the extant literature is generally consistent with this notion. Affiliated equity analysts issue more optimistic earnings growth forecasts, more favorable recommendations, and are slower to downgrade in the face of negative news.[2] Affiliated bond analysts suffer similar conflicts of interest because their brokerage firm employer earns significant fees from underwriting debt securities. Firms frequently issue debt, often redeem the debt before maturity, and usually have multiple debt issues outstanding. This leads to pressure on bond analysts to optimistically bias their research in order to help sell the deal (Coelho, 2002; Lucchetti and Craig 2004). An alternative explanation for the positive relation between affiliation and positively skewed recommendations, put forward by Kolasinski and Kothari (2008), is that there is no strategic behavior. Firms about to issue new securities simply select investment banks with analysts who truly have positive views of the firm.[3]

[2] See, e.g., Dugar and Nathan (1995), Lin and McNichols (1998), Michaely and Womack (1999), Dechow, Hutton, and Sloan (2000), and O'Brien, McNichols, and Lin (2005).

[3] The environment for equity analysts changed in 2002 when the Global Analyst Settlement was passed to address the investment-banking conflicts of interest (SEC 2003a,b). During the 1990s, analyst compensation could be linked directly to investment banking profitability and be influenced by investment banking personnel (SEC 2001). With the passage of the Global Analyst Settlement, this practice is no longer allowed (SEC 2003a). Further, NASD and the NYSE passed rules in 2002 that require analysts' reports to display the percentage of the issuing broker's recommendations that are buys, holds, and sells. Barber, Lehavy, McNichols and Trueman (2006) state that the rules were presumably meant to pressure those brokers and analysts who were consistently issuing a relatively high percentage of buy recommendations to adopt a more balanced rating distribution. Barber et al. (2006) and Kadan, Madureira, Wang, and Zach (2008) document that the positive skewness was reduced but not eliminated at this time. Bond analysts' independence from investment banking also increased after 2002. For example, the Bond Market Association (2004) published a report on potential conflicts of interest in bond research departments, and many of the recommended restrictions were similar to equity departments: not allowing bankers to evaluate or compensate analysts, not using analysts to solicit or market investment banking services, and not permitting traders

There are other sources of demand for bias that we do not directly investigate but potentially affect our tests. For example, analysts provide positively-biased news about firms to retain access to management, who prefer positive recommendations.[4] Since management pay is tied to stock prices (e.g., Bushman and Smith 2001; Core, Guay, and Verrecchia 2003), managers are motivated to pressure equity analysts but not necessarily bond analysts. The October 2000 passage of Regulation Fair Disclosure (which prohibits firms from making selective, non-public disclosures to favoured analysts) should reduce, but not necessarily eliminate, this management-access effect. As an additional example, there is evidence that equity analysts strategically issue more buy recommendations because buys are positively associated with increased trading volume, and hence increased trading commissions (SEC 2001). According to Boni and Womack (2002), while brokerage firms' sales people can approach any client with a "buy" recommendation to encourage trade, many client investors are reluctant or unable to sell because they do not currently own the security. Similarly, we expect that bond analysts who wish to appeal to a broader client base will add positive bias to their recommendations.

In summary, the asymmetric demand for negative information predicts that bonds analysts' recommendations will be skewed less positively than those of equity analysts. We cross-sectionally predict that the distribution of bond analysts' recommendations is skewed more positively for riskier bonds than for less-riskier bonds due to this demand. The analyst affiliation predicts a positive effect on the distribution of both bond and equity analysts' recommendations. Given that we expect less strategic behavior by bond analysts than by equity analysts due to the fundamental differences between the bond and equity markets, we expect that, overall, bond analysts' recommendations are skewed less positive than those of equity analysts.

2.3. Bond market reaction to bond analysts' reports

Our second research question investigates the market reaction to bond analysts' reports compared to

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or bankers to influence the content or timing of research (see also, Institutional Investor 2004; Lucchetti and Craig 2004). Our sample spans the period after the Settlement.

[4] See, e.g., Francis and Philbrick (1993), Das et al. (1998), Lim (2001), and Chen and Matsumoto (2006) for support, although research by Eames et al. (2002), and Eames and Glover (2003) question these conclusions.

equity analysts' reports and other events. Our tests rely primarily on the bond market reaction measured in terms of trading volume. If bond analysts' reports matter to market participants then they should generate additional trading. Cready and Hurtt (2002) study the differential ability of equity volume and price return metrics to assess equity investor response to information events. They find that volume-based metrics provide more powerful tests of investor response than do return-based metrics. However, an issue with the trading volume tests is that it is harder to make precise inferences as to what exactly is driving the increased trading. The theoretical and empirical literature offers three non-mutually-exclusive reasons for trading: i) investors' need for liquidity (e.g., Benston and Hagerman 1974); ii) investors' reaction to information in the news (e.g., Karpoff 1987; Kim and Verrecchia 1991); and, iii) investors' divergence of opinions (e.g., Harris and Raviv 1993; Kandel and Pearson 1995; Kim and Verrecchia 1994). Bond analysts' reports could cause trading via all three mechanisms; hence our volume tests can not distinguish among these mechanisms. When feasible, we supplement the volume-reaction tests with bond price reaction tests. The next sub sections highlight several cross-sectional predictions.

2.3.1. Bond analysts' reports versus equity analysts' reports and other events

Equity analysts. The extant literature shows that the equity market reacts to equity analysts' disclosures, consistent with the idea that these analysts' reports are informative.[5] We expect that the bond markets will also react to both bond and equity analysts' reports. If most of the news in both bond and equity analysts' reports is about changes in the economic asset value of firms (e.g., changes in expected future levels of operating performance), then the differential bond market reaction between bond and equity analysts should be small. This prediction is further supported by increased cooperation between debt and equity analysts in recent years (Ronan 2006; Lee 2002). In contrast, if the news requires a debt-specific interpretation (e.g., perhaps due to the bondholder-stockholder conflicts of interest as discussed

[5] Studies show that equity analysts' disclosures produce short-window abnormal returns consistent with the direction and magnitude of the forecast or recommendation revision (e.g., Lys and Sohn 1990; Stickel 1995; Womack 1996; Francis and Soffer 1997; Francis, Schipper, and Vincent 2002; Asquith, Mikhail, and Au 2005). Other studies show that equity analysts' disclosures affect volume. For example, Irvine (2001, 2004) shows that a broker's trading volume is significantly higher in stocks covered by the equity analysts it employs, and is specifically higher in the weeks following analysts' forecasts and recommendations.

above) or if bond analysts are more timely, then we expect the market to react more strongly to reports by bond analysts than to equity analysts.

The flipside, however, is that the resources available to equity analysts are greater and the number of firms they cover is less than for bond analysts. For example, Lee (2002) reports that the average equity analyst might cover a dozen firms while the bond analyst will cover 30 to 40 issuers. Given that extant research, by Clement (1999) among others, shows that the number of firms covered is negatively related to analyst's performance, such as accuracy, this differential in the number of firms followed could lead equity analysts to produce reports with superior informational value relative to bond analysts. This effect leads to a prediction that the bond market will react more strongly to equity analysts. The net effect of these different forces leads to an ambiguous prediction about whether the bond market reacts more strongly to bond or equity analysts' reports.

The degree to which bond analysts produce market reactions relative to other significant information-providing events is also unclear. We discuss two other major sources of information: rating agencies and firm disclosures.

Rating agencies. Major events by rating agencies include the announcements of rating changes, watchlist additions, or outlooks on bond issuers. On the one hand, certified rating agencies such as Moody's, Standard & Poor's (S&P), or Fitch, continue to have access to private information from management following Reg FD because these agencies are exempt from the regulation. For example, Jorion, Liu, and Shi (2005) document that the equity market reaction to rating downgrades and upgrades is much greater in the post-Reg FD period. This finding suggests that agencies have access to information that is not available to analysts or other market participants. This private information advantage could result in a higher market reaction to rating changes than to bond analysts' recommendations.

On the other hand, the incentives of bond analysts are geared towards providing advice to their institutional clients, which leads to an expectation that bond analysts issue more timely information about debt security values. While rating agencies have incentives to issue timely information, they also have the additional goal of rating stability, partly because their ratings are used for contracting. This latter objective could lead to less timely information, and hence less of a bond market reaction to the information provided by rating agencies.[6] An alternative explanation for less-timely information by rating agencies is that given their small number, certified agencies have an effective oligopoly in the market for ratings, which reduces their incentive to be responsive to investors. Beaver, Shakespeare, and Soliman (2006) make similar arguments when comparing certified versus uncertified rating agencies. They find that equity prices respond more to rating changes issued by non-certified than by certified rating agencies. We argue that the incentives of bond analysts are analogous to those of uncertified agencies.

An alternative mechanism by which rating agencies can deliver more timely information without sacrificing rating stability is by adding companies to their watchlists (which is when a rating change is likely), or to change their long-term outlook on a firm. Hand, Holthausen, and Leftwich (1992) show that unexpected watchlist additions affect both bond and equity markets. Whether these alternative credit news events subsume the information in bond analysts' reports is unclear.

Firm disclosures. Our analysis also includes mandatory and voluntary firm disclosures – earnings announcements, management forecasts, and conference calls. The literature shows that these events are an important source of news for equity markets.[7] While the effect of earnings announcements on credit markets have been studied (e.g., Easton, Monahan, and Vasvari 2008), the credit-market effect of management forecasts, and conference calls is unstudied. We make no prediction about the difference in bond market reaction between firm disclosures and bond analyst reports.

In summary, by including a broad and comprehensive set of information events in our bond market reaction tests we provide an important set of benchmarks to evaluate the reactions to bond analysts' reports. Further, by including these events we mitigate an alternative explanation that the market reaction and bond analyst report are both caused by another event.

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[6] Examples of research that studies the timeliness of rating agency disclosures include Warga and Welch (1993), Hite and Warga (1997), Warga (2004), and Ball, Bushman, and Vasvari (2008).

[7] See, e.g., Beaver, Lambert, and Morse (1980), Ajinkya and Gift (1984), Waymire (1984), Tasker (1998), Frankel, Johnson, and Skinner (1999), Kothari (2001), and Bowen, Davis, and Matsumoto (2002).

2.3.2. Bond market reaction conditional on cross-sectional characteristics

We provide predictions regarding the bond market reactions with respect to the recommendation levels in analysts' reports and the credit quality of the firms covered by analysts. We also discuss the effect that analyst affiliation can have on the bond market.

Recommendation levels. All else equal (i.e., no analyst bias), we expect that the market will respond greater to analysts' buys and sells than to holds, because the former provide more clear signals as to what analysts recommend investors do. In addition, given the concavity in the relation between bond prices and the firm's asset value, we expect that for a given magnitude of change in firms' asset value, the bond reaction is greater for negative news (sells) than for positive news (buys). Easton, Monahan, and Vasvari (2008) provide support for this latter idea in the case of earnings news. These two notions apply to both bond and equity analysts.

To the extent that analysts strategically add bias and investors anticipate this strategic bias, then we expect to see a market response to the recommendations that is systematically related to the expected direction of the bias. For example, given our prediction that equity analysts strategically add more positive bias to their recommendations than bond analysts, all else equal, we expect to see more discounting of buy recommendations for equity analysts relative to bond analysts.

Credit quality. The concavity in the relation between bond prices and asset value leads to another prediction. For very low-risk bonds, the bond price is practically constant (i.e., flat) for a given change in firm value. For extremely high-risk securities, changes in bond prices should be positively related to changes in firm values. Hence, the market reaction to the information in analysts' reports should be lower for bonds with superior ratings (i.e., low risk) and higher for high-yield bonds (i.e., high risk). We make no distinction here between bond and equity analysts' market reaction.

Affiliation. If affiliated analysts issue more positive recommendations due to strategic bias, then we expect some relative discounting of the recommendations. For example, Lee (2002) discusses that bond analyst research immediately following a new bond issue is "designed to flatter the issuing company" and that only few investors will actually read it. Further, to the extent that bond analysts act less strategically than equity analysts, this would lead to more discounting of, and hence a more muted reaction to, affiliated equity analyst's reports than to affiliated bond analysts' reports. In contrast, if affiliation does not equate with strategic behavior, as in Kolasinski and Kothari (2008), then there will be no discount in the market reaction to affiliated analysts. Further, affiliated analysts likely know the firm and the firm's management better, which could lead affiliated analysts to produce more informative reports than non-affiliated analysts. As it is not clear which effect will dominate, we make no prediction about the effect of analyst affiliation in general on the market reaction and no differential prediction between affiliated bond and equity analysts.

3. Data and sample

Bond analysts' report data are discussed in Section 3.1. Section 3.2 describes our bond trading volume and price data. Section 3.3 presents descriptive statistics about our firms and bond issues.

3.1. Collecting and coding of bond analyst reports

We obtain bond analysts' reports from First Call Thomson ONE Analytics. For each report we code the name of the analyst and brokerage firm who issues the report, report date, and name of the company the report is about. When possible, we code the following bond issue-specific information: coupon rate, principal value, maturity date, and seniority. Analysts typically provide a bond recommendation for each firm, and in some cases, by issue. If not already done so by the broker, we standardize the analyst recommendations into three categories: buy, hold, or sell.[8] Current rating information (Moody's or S&P) is also collected from the report.[9]

[8] The tabulated analyses in this study are based on recommendation *levels*. The extant literature (e.g., Womack, 1996; Francis and Soffer, 1997) also studies changes in equity recommendations. For the sub sample of reports with data available to determine recommendation changes (approximately 70%), we conduct sensitivity analysis of most of our tests when feasible. The untabulated results are consistent with the recommendation-level analyses.

[9] Research assistants (RAs) assist us by reviewing, identifying, and recording this information from the reports. To ensure high-quality coding of the reports, about 20% of the reports were randomly selected and coded more than once by different RAs. Based on this double-coding, 97% of reports were coded completely correct the first time. The 3% of reports with errors identified during this checking process were corrected before our final sample was selected.

We obtain reports for the years 2002-2006 because this period generally aligns with the availability of bond trading data from the TRACE (Trade Reporting and Compliance Engine) database. Our focus is on reports about U.S. corporate firms with bond securities. We exclude reports on Real Estate Investment Trusts (REITs), financial institutions, such as banks or insurance companies, as well as reports about companies domiciled in non-U.S. countries. We also exclude reports about macro economic variables, reports that review how specific indices at the industry or country level performed, and reports that are aggregated either by industry or time. This last type of report often simply repeats information published in previous reports.[10] Reports missing a recommendation are excluded from the analysis.

3.2. Bond volume and price data

We analyze secondary market corporate bond trades retrieved from the National Association of Securities Dealers' (NASD) TRACE system. TRACE data are relatively new. On July 2002, the NASD began to report some bond transactions through TRACE, and by February 2005, essentially all corporate bond trades were reported through TRACE. Based on studies by Bessembinder, Maxwell, and Venkataram (2006), Edwards, Harris, and Piwowar (2007), and Goldstein, Hotchkiss, and Sirri (2007), bond investors have benefited from the increased transparency of TRACE, via reductions in the bid-ask spreads that they pay to bond dealers when trading, particularly for smaller-size trades. TRACE provides the date, price, and size of bond trades.[11]

Prior studies of bond transactions often used the Mergent Fixed Income Securities Database (FISD). This database is smaller in terms of coverage and contains bond trades reported by property and life insurers as well as state insurance departments. Schultz (2001), Hong and Warga (2000), and Campbell and Taksler (2003) estimate that insurance companies hold between 30% and 40% of corporate bonds.

[10] For example, Stickel (1995) finds that periodic end-of-month equity reports are associated with weaker market reactions. De Franco (2007) finds that industry-associated equity analysts' notes are more likely to review or summarize the past week's or month's activities, and often repeat information and opinions from previously-issued firm-specific notes.

[11] For investment grade bonds, if the par value of the transaction is greater than $5 million, the quantity field in TRACE contains the value of "5MM+," in which case we set the transaction value to $5 million. For high-yield and unrated bonds, TRACE codes trades of above $1 million as "1MM+." We set these transaction values to $1 million.

Because TRACE coverage of firms is not complete until February 2005, we augment our TRACE bond data with that of FISD. If on a certain day a bond issue does not have any trades reported in TRACE but FISD indicates that a trade occurred, we include the FISD trade information in our tests. A missing trade in TRACE is almost always due to the fact that TRACE does not cover that specific issue at the time. The terms and conditions of bond issues from Mergent provide bond-specific information such as issue size, maturity, coupon rates, coupon frequency and other bond-issue-specific characteristics.

We match the bond report data with the combined TRACE-Mergent data at two levels – the firm level and the firm-issue level. At the firm level, we manually merge the bond reports using the issuer's firm name and successfully match about 82% of our bond report data. At the firm-issue-level, we manually merge the bond issues listed in each analyst's report using the borrower's firm name, and issue-specific information such as issue size, coupon rate, and maturity date. We match only about 55% of our bond report sample because analysts often provide insufficient information to identify the bond issue and allow for a reliable match. Further, in those cases in which analysts provide debt-issue-specific recommendations per firm, these recommendations are rarely different from each other. Given this context, we perform the empirical analysis using the firm-level sample. Untabulated sensitivity analyses using firm-issue-level tests produce qualitatively similar results.

We then match the borrowers with bond reports and bond trading information in the merged TRACE-Mergent FISD dataset with Compustat. Last, we limit the sample to firms with publicly-traded equity to facilitate the comparison between the effect of bond analysts to that of equity analysts. Untabulated analysis shows that if we exclude this public-equity restriction the results are similar to the tabulated test results.

Panel A of Table 1 provides a summary of the number of reports we collect and code. Our final sample consists of 15,918 reports. This translates into 15,025 report days because on some days more than one bond analyst issues a report for the same firm. Tests analyzing the number of reports or the distribution of recommendation buys, holds, and sells (i.e., Tables 3 and 7) are conducted at the report level. We use observations at the firm-day level for our bond trading volume and price return tests (i.e., Tables 4 to 6). Panel B of Table 1 provides a breakdown of the reports for each of the ten brokers included in our sample. Four of the brokers are included in the top ten broker fixed income research departments as determined in *Institutional Investor*'s September 2006 issue.

3.3. Descriptive statistics

Table 2 presents selected descriptive statistics about our sample. The definitions of variables are presented in detail in Appendix 1. Panel A shows that bonds discussed most often in analysts' reports range in size from $200 to $400 million and have a remaining time to maturity of 7.5 to 10 years. Following prior research (Harris and Piwowar 2006; Edwards et al. 2007), we compute a complexity index based on bond characteristics that cause bonds to be more difficult to value. The complexity index is the sum of the bond complexity features, where each feature has a value of one. Panel B presents characteristics of the firms in our sample. These firms are large compared to firms in the Compustat universe. Median total assets is $7.3 billion. Median leverage is 0.35. The first quartile of profitability is positive indicating that over three quarters of the firms are profitable. Median interest coverage is 3.8. The median market-to-book value of equity is 2.0. Untabulated analysis using the Fama-French industry classification indicates that no industry has undue influence.

3.4. Timing of other events relative to bond analysts' reports

Bond analysts exercise discretion in their decision to issue reports. Panel C of Table 2 shows the frequency of other events around bond analyst reports. For example, for 22.5% of bond analyst reports, an equity analyst report is issued in the five-trading-day window prior (day -7 to -3) to the bond analyst report (on day 0), 31.6% of the bond analysts reports are contemporaneous (day -2 to +2) with an equity analyst report, and for 22.0% of bond analyst reports, an equity analyst report is issued in the five-trading-day window after (day +3 to +7) the bond analyst report. In general, there is some clustering of other events around the time a bond analyst report is issued. This pattern is similar to that found in the equity literature. For example, Stickel (1989), Jennings (1987), and Bowen, Davis and Matsumoto (2002) document that equity analysts' forecast revisions are more likely to occur on the days around earnings announcements, management forecasts, and conference calls, respectively. From reading a subset of the reports, we know that bond analysts will often interpret and predict credit and other firm events and discuss firm disclosures. We are not aware of any examples of bond analysts responding to equity analyst reports (or vice versa), so the clustering of equity and bond analyst reports is consistent with both bond and equity analysts responding to or anticipating the same event. This clustering supports our use of these other events as controls in our tests. In untabulated analysis, we have also replicated our tests excluding the subsample of bond analyst reports that are contemporaneous with any other event. These tests produce similar results and inferences to the tabulated analyses.

4. Empirical analysis of bond analysts' recommendations

In this section, we examine the distribution of bond analysts' buy, hold, and sell recommendations. Table 3, Panel A presents this analysis.[12] For comparison, Panel B presents the analogous tests to those in Panel A for equity analysts. The number of equity recommendations is much larger than that of bond analysts because we draw on the full sample of brokers from the IBES equity recommendation database. We discuss the unconditional distribution, the distribution by credit rating, and the distribution by affiliation in turn.

Unconditional distribution. The first column of Panel A in Table 3 shows that the unconditional distribution of bond analysts' recommendations is skewed positive. Of the total recommendations issued by bond analysts, 39.1% (13.6%) are buys (sells). This positive skewness raises the question of whether analysts inject a positive strategic bias to their recommendations, perhaps to improve access to management, to expand the number of potential investors, or to gain investment-banking business. While it is possible that there is an asymmetric demand for negative information, this is clearly not the dominant effect. Untabulated analysis indicates that the number of reports is spread fairly evenly across years and

[12] This analysis is conducted at the report level. In untabulated sensitivity analysis, we also aggregate reports to create a consensus recommendation by all analysts that issue a report for the firm on the same day. All inferences are similar to the tabulated results.

that all years display a positive skewness. The unconditional distribution of equity analysts' recommendations in Column 1 of Panel B shows that the percentage of equity buys (sells) is 44.0% (11.1%). Consistent with our prediction, this distribution is skewed more positively than that of bond analysts, and the difference in the distribution is significant. (See Panel C for chi-square tests of differences in distributions between bond and equity analysts.)

Distribution by credit rating. In Columns 2 to 4, we partition the recommendations into three groups by their rating. Superior-rated firms consist of those with a rating of AA and up (according to firm's S&P senior debt rating). The second group includes investment-grade firms that are rated BBB to A. High-yield firms (rated below BBB) are included in the third group. Panel A shows that bond analysts issue only a small number of reports for superior rated firms (approximately 2% of all reports). The majority of reports (63.2%) are about firms with high-yield bonds outstanding. This difference in the number of reports is partly due to less coverage of superior-rated firms versus high-yield firms, 27 firms versus 416 firms, respectively. Of note, bond analysts issue fewer reports per superior-rated firm (12.2) than per high-yield firm (24.2) during our sample period. This difference is consistent with the statement by the Bond Market Association (2004) that "there is greater potential for research to affect high-yield and distressed corporate bonds." It is also consistent with high-yield bonds attracting an investor clientele that is motivated to speculate on the security rather than to passively buy and hold it (Warga 2004). Adding credence to this inference, Panel B shows that the number of equity analyst reports per firm displays the opposite pattern to bond analysts. Equity analysts issue far more reports about high grade firms than for high-yield firms.

Returning back to Panel A, the bond analyst distribution for superior-rated firms is skewed negative. The percentage of sells (37.6%) is more than double the percentage of buys (14.2%). The distribution becomes more positive as the firms become riskier. The percentage of buys increases to 28.2% and then to 46.0%, and the percentage of sells decreases to 20.4% and then to 9.1% when we examine the other investment grade, and then the high-yield firms, respectively. Chi-square tests of differences in the distributions by rating group are statistically significant. These patterns are consistent with the prediction that asymmetric demand for negative information is higher when bonds have higher credit quality.[13]

As additional evidence of this prediction, if asymmetric demand for negative news is a factor explaining recommendation skewness, then we would expect to see more of a skewness difference between bond and equity analysts for investment-grade firms because the asymmetric demand should be greatest for these firms. This is exactly what we find. From Panel B, for investment-grade firms (Columns 2 and 3), the equity-recommendation distributions are *more* positively skewed than the corresponding bond-recommendation distributions. For high-yield firms the opposite pattern holds. The equity-recommendation distribution in Column 4 is *less* positively skewed than the corresponding bond-recommendation distribution.

Distribution by affiliation. Columns 5 and 6 in Panel A provide the distribution of affiliated and unaffiliated bond analysts, respectively. Bond analysts are classified as affiliated if the broker employing the analyst is the lead underwriter for a bond or, is the lead arranger of a syndicated loan, issued by the borrowing firm in the 12 months prior to the report. About 21% of our reports are issued by affiliated analysts. Affiliated analysts are more likely to issue buys (45.6%) than sells (10.5%) and their distribution is skewed more positive than that of unaffiliated analysts, whose buys (sells) represent 37.4% (14.4%). The difference in the distribution is statistically significant. Untabulated analysis indicates that the distribution patterns across ratings and affiliation that we document do not subsume each other.

The corresponding Columns 5 and 6 in Panel B present the results for affiliated and unaffiliated equity analysts, respectively. Equity analysts are classified as affiliated if the broker employing the analyst is the lead manager of the syndicate underwriting the initial public or secondary offering issued by

[13] In untabulated analysis, as an alternative way to partition firms based on risk, we categorize each firm by whether its bonds are distressed, which is defined as bonds that trade 10% percent below face value and are rated below BB- (it is important to also consider the credit rating to avoid classifying bonds issued at a discount as distressed). We also used alternative discount thresholds such as 30% and 20%. All inferences are similar to those in the Panel A analysis.

the firm during the sample period.[14] Affiliated equity analysts' recommendations are more positive than those of unaffiliated equity analysts, consistent with the pattern found by prior research (e.g., Lin and McNichols 1998; Malmendier and Shanthikumar 2007), although the difference in our sample is modest. While the distribution of recommendations is about the same for affiliated bond and affiliated equity analysts, the distribution for unaffiliated bond analysts is less positively skewed than the distribution for unaffiliated equity analysts. As mentioned above, it is difficult to make predictions, and hence make inferences, about the patterns we document about affiliated analysts. For example, we cannot conclude based on this evidence that affiliated bond analysts are more likely to strategically add positive bias to their recommendations to appease management because of the alternative explanation that firms choose bond analysts who truly have positive views on the bonds.

5. Empirical analysis of market reaction to bond analysts' reports

This section describes our bond market reaction tests and results. Before proceeding to the tests we highlight that corporate bonds trade infrequently relative to equity securities. For example, for our sample of firms and bond issues, untabulated analysis indicates that trading occurs on 20% (46%) of days per bond issue (per firm), and the average number of trades per day conditional on trading is 4.2 (5.1). This low frequency of bond trade data makes it difficult to conduct short-window tests in bond markets (see, e.g., Goodhart and O'Hara 1997; Hotchkiss and Ronen 2002).

The majority of event studies examining bond-related announcements actually use equity returns to measure investor reaction. These studies implicitly assume that the news affects bond and equity holders similarly. This, however, may not be the case. Alexander, Edwards, and Ferri (2000a) find that events associated with conflicts between bondholders and stockholders (e.g., adoption of a risky project, stock issuance or repurchase, changes in dividend payments) lead to bond and equity returns that move in

[14] We also restrict the sample of equity analysts defined as affiliated to those whose brokers lead a security in the last 12 months prior to the report, a window resembling that for affiliated bond analysts. Untabulated analysis indicates that using this definition of equity analysts' affiliation leads to a much smaller sample of affiliated analysts because equity issuance for our sample firms is less frequent than bond issuance. The results, however, are similar to the tabulated analysis.

opposite directions. Goh and Ederington (1993) show that rating downgrades due to changes in firms' leverage do not convey negative information for stock holders because these latter announcements likely lead to a wealth transfer from bondholders to stockholders. Parrino and Weisbach (1999) show that the bondholder-stockholder conflict leads to substantial distortion in investments. Further, while bond and stock returns are correlated at the aggregate level, measured for example using portfolios of firms, or using monthly or annual observations, the correlation at the individual firm level is weak (Kwan 1996; Alexander et al. 2000a; Collin-Dufresne, Goldstein, and Martin 2001; Hotchkiss and Ronen 2002). When bond price reactions are used, often the sample is small (e.g., Alexander, Edwards and Ferri (2000a) study 139 events across 39 bonds; Hotchkiss and Ronen (2002) study 99 events for 36 bonds) or the event window is coarse (e.g., Hite and Warga (1997) examine monthly returns). Hand et al. (1992) is an exception, studying bond price reactions using a larger sample and short-event windows. We now turn to the univariate and multivariate analyses, presented in Sections 5.1 and 5.2, respectively.

5.1. Univariate analysis

Our analysis starts with a figure that plots the daily average trading volume (measured on the vertical axis) in event time (measured on the horizontal axis). The graphs include the 30 trading days before and 30 trading days after the event, where Day 0 is the date of the event. A single aggregate volume measure for each event day is created by taking each bond's dollar volume of principal traded on the event day scaled by the bond issue size, and then averaging this measure over all firms and bond issues. Figure 1, Panels A and B plots the volume reaction to reports by bond analysts and equity analysts, respectively, partitioned by buys, holds, and sells. The two figures show that, in general, volume spikes on Day 1 and that the volume on the days immediately around Day 1 is also higher than normal, consistent with the bond market reacting to both bond and equity analysts' reports. The reaction between bond and equity analysts, however, differs conditional on the recommendation level. Bond analysts' sell and buy recommendations are more informative events than their hold recommendations. For equity analysts, while there is a spike upwards around the date of a sell or a hold, the bond market reaction to equity analysts' buy recommendations is muted.

Table 4, Columns 1 to 4 present summary statistics of abnormal volume tests for bond analyst, equity analyst, rating changes, and rating watchlist additions events. *Abnormal Volume* is the average daily firm volume (scaled by the bond issue size) during the five-day event window centered on Day 0 (the date of the event) less the average daily volume for the non-event 30-day period before and 30-day period after the event window.[15] The sample for these events is slightly smaller than that reported above because only events in which the bond traded in either the event or non-event periods are included.

Because our next analysis is an analogous multivariate version of the univariate trading volume tests, we refrain from making inferences using the univariate results. We do offer a few comments. The reaction to negative news for each type of event is stronger than for positive news. Further, for all events, the mean reaction is greater than the median reaction, indicating positive skewness in the distribution of the individual events. We highlight that bond analysts' reports have a positive median reaction, and hence that the percentage of positive reactions is greater than the percentage of negative reactions (difference is statistically significant based on untabulated sign test). The patterns of market reactions in the multivariate analysis are generally similar to those in the univariate tests.

Columns 5 to 8 of Table 4 present the univariate market reaction test results using bond returns instead of abnormal volume. Appendix 2 outlines how we calculate bond returns. The sample of observations per type of event is slightly smaller because it is limited to firms that have trade data available to calculate the bond returns. We do not expect this bias towards more heavily-traded firms to affect our inferences, because we lose a similar amount of observations across the various events. While we adjust our realized bond returns for changes in the risk-free rate, we do not adjust the realized returns for an expected rate of return. Since our definition of bond returns includes coupon payments, we expect

[15] If the non-event period contains a similar type of event to the type of observation event, (e.g., if calculating bond analysts' events and the non-event period contains another bond analyst event), any trading in the five-day window centered on this other similar-type event is excluded from the calculation of the non-event average daily volume. Untabulated analysis indicates that results are similar if we delete the trading around any type of event that occurs in the non-event window.

bond returns to be positive on average. When making inferences, we thus focus on the difference in returns between positive and negative events. The Table 4 bond return results generally parallel the trading volume results albeit at lower levels of statistical significance. For instance, the difference in returns between bond analysts' buys less sells is about 0.5%, while the difference in returns between buys less sells for equity analysts is 0.1%, considerably less than that for bond analysts.

5.2. Multivariate analysis

Our first multivariate analysis uses bond trading volume to compare the market reaction by type of event. We then present a cross-sectional analysis of the market reaction to analyst reports for both bond trading volume and returns.

5.2.1. Multivariate analysis of bond trading volume by type of event

Our empirical analysis includes observations for all trading days during the five-year period studied for each of the 633 sample firms. Within this framework, we have the flexibility to model all the events in the same test, and to compare the magnitude of the reactions across events. For each event, we assign the news to the day of, and to each of the two days immediately before and after, the announcement day (i.e., we use a five-day event window). We estimate:

$$\begin{aligned} \mathit{Volume}_{it} = {} & \beta_0 + \beta_1 \mathit{Bond\ Report}_{it} + \beta_2 \mathit{Equity\ Report}_{it} + \beta_3 \mathit{Rating\ Change}_{it} + \beta_4 \mathit{Watch\ List}_{it} \\ & + \beta_5 \mathit{Outlook}_{it} + \beta_6 \mathit{Earnings}_{it} + \beta_7 \mathit{Conference\ Call}_{it} + \beta_8 \mathit{Management\ Forecasts}_{it} \\ & + \beta_9 \mathit{Fed\ Change}_{it} + \beta_{10} \mathit{TB\ Change}_{it} + \mathit{Year\ Effects} + \eta_{it}. \end{aligned} \tag{1}$$

Bond Report is an indicator variable that equals one if there is a bond analyst's report issued about firm *i*'s bonds in the five-day period centered on day *t*, zero otherwise. Other event indicator variables are defined in the same way (see Appendix 1). The intercept captures the trading volume on days that are at least three days distant from any event (i.e., non-event days), and therefore represents "normal" (or non-event) trading volume. We expect the coefficient on each of the event indicator variables to be positive, consistent with incremental trading volume incurring around each event. To control for macro-economic news, we include variables that denote announcements of federal funds rate changes (*Fed Change*) and extreme daily changes in T-bill prices (*TB Change*). For all the multivariate analyses, we estimate *t*-

statistics based on standard errors clustered at the firm level. Untabulated sensitivity tests indicate that all inferences remain the same if we include firm fixed effects.

The results of estimating Equation 1 are presented in Column 1 of Table 5. The coefficient on *Bond Report* is 0.180 (t-statistic = 10.25). Over the five-day event window an incremental 0.90% (5 days × 0.180% per day) of the bonds' principal is traded around a bond analyst's report. This result is consistent with bond investors reacting to bond analysts' reports, and these reports not being subsumed by the information contained in equity analysts' reports, rating agency announcements, firm disclosures, and macro-economic news as measured by our other explanatory variables. The results also show that the reaction to bond analysts' reports is greater than that for equity analysts' reports. The coefficient on *Equity Report* is 0.112. An untabulated test confirms that this difference in coefficients is significantly different than zero (p-value<0.001). This result is consistent with new bond-market information requiring a debt-specific interpretation. If resources available to equity analysts are indeed greater compared to bond analysts, this effect is not predominant.

Given that rating changes are established as important economic events, we use rating change events to gauge the relative economic importance of bond analyst reports.[16] The coefficient on *Rating Change* is 0.438, which translates into an incremental 2.19% of the bonds' principal being traded around the five days of a rating change. While the coefficient on bond reports is about two fifths the coefficient for rating changes, the frequency of bond analysts' reports is much higher (about ten times as frequent according to our data), implying that bond analysts' reports are also economically important. Watchlist additions also provide a strong market reaction, which is not surprising given their purpose of providing timely credit news. The coefficient on outlook changes is not statistically significant.

Last, bond analysts' reports seem to illicit more of a reaction than earnings announcements,

[16] The total amount of incremental information associated with information events is modest as reviewed by Ball and Shivakumar (2007), who for example find that the average quarterly earnings announcement is associated with about one percent of total annual information. Our inference that bond analysts' reports are economically significant is focused mainly on reports' market reaction relative to the bond market reaction to other types of announcements established as economically important.

conference calls, and management forecasts.[17] Changes in the Federal Funds rate are associated with abnormal volume, while changes in the T-bill rate are not (in this specification but are associated for other specifications in this table). Untabulated analysis indicates that our results are also robust to controls for SEC 10-K, 10-Q and 8-K filings, which researchers have shown to illicit a stock market reaction (see, e.g., Griffin 2003).

We also estimate Equation 1 using two alternative dependent variables: the number of trades per day and a dichotomous variable indicating whether a trade occurred (similar to that used by Easton et al. 2008). The latter test is estimated using a logistic regression. Because more trading is associated with larger issues sizes, we augment the model with the variable *Issue Size*. The results, presented in Columns 2 and 3, respectively, are similar to those using *Volume* as the dependent variable. In untabulated analysis, we also re-estimate the regressions where volume is the dependent variable using a Tobit model because volume is truncated at zero. All inferences are unchanged.

Next we test a specification that augments Equation 1 with additional indicator variables that allows us to distinguish between positive and negative news for each type of event. For example, we include in the regression *Bond Report Buy (Sell)*, which is an indicator variable that equals one if there is a report issued about firm *i*'s bonds in the five-day period centered on day *t* and the report includes a buy (sell) recommendation, zero otherwise. In this specification, the coefficient on *Bond Report* captures the incremental volume associated with a bond analyst's hold recommendation, and the coefficients on *Bond Report Buy* and *Bond Report Sell* capture the incremental volume associated with a bond analyst's buy and sell recommendation, respectively, relative to a hold recommendation. Other variables are defined analogously (see Appendix 1).

Column 4 presents these results. The coefficient on *Bond Report Sell* is 0.208 (*t*-statistic = 4.21), indicating that the volume reaction for bond analysts' sell recommendations is stronger than that for hold

[17] The coefficient on *Earnings* is negative, which is the opposite of what we expect. Untabulated analysis indicates that this is due to the high positive correlations with the other firm disclosures. Pearson correlations between *Earnings* and *Conference Call*, and *Management Forecast* are 0.72, and 0.49, respectively. If we exclude these other disclosures from the regression, the coefficient on *Earnings* is positive.

recommendations. In contrast, the coefficient on *Bond Report Buy* is not significantly different from zero, consistent with the market reaction to bond analysts' buy recommendations being about the same as hold recommendations. We compare these results to that of equity analysts. The coefficient on *Equity Report Buy* is negative and significantly different from zero, while the coefficient on *Equity Report Sell* is not significantly different from zero. Hence, for equity analysts, the bond market reaction for buys is lower than for holds, while the market reaction for sells are not different from holds. These patterns correspond with those documented in Panels A and B of Figure 1, discussed above. Combined with the fact that equity analysts have a more positive distribution of recommendations than bond analysts, this result is consistent with the presence of more strategic optimism by equity analysts, and hence more discounting of equity analysts' buy reports. Another potential explanation is that the news and arguments underlying the equity analysts' recommendation (targeted to equity investors), particularly buys, are less relevant for bond investors. As a sensitivity test, we re-estimate these tests using only TRACE data for the period February 2005 to December 2006 (the period over which TRACE covers the entire bond universe in the U.S.). The results, which are presented in the last column of Table 5, are similar.

5.2.2. Cross-sectional analysis of bond trading volume reaction to bond analysts' reports

In this section we examine whether rating levels, bond analysts' affiliation, and other bond characteristics can explain variation in the bond market reaction to bond analysts' reports. We start by estimating the following equation:

$$\begin{aligned} \textit{Abnormal Volume}_{ik} = {} & \alpha_0 + \alpha_1 \textit{Buy}_{ik} + \alpha_2 \textit{Sell}_{ik} + \alpha_3 \textit{BBB-A Rating}_{ik} + \alpha_4 \textit{Below BBB Rating}_{ik} \\ & + \alpha_5 \textit{Affiliated}_{ik} + \alpha_6 \textit{Time to Maturity}_{ik} + \alpha_7 \textit{Highly Traded}_{ik} \\ & + \alpha_8 \textit{Complexity}_{ik} + \alpha_9 \textit{On Watch Neg}_{ik} + \alpha_{10} \textit{On Watch Pos}_{ik} \\ & + \alpha_{11} \textit{Return on TB}_{ik} + \textit{Year Effects} + \varepsilon_{ik}. \end{aligned} \quad (2)$$

See Appendix 1 for variable definitions. Abnormal volume and continuous variables are winsorized at the 1% and 99% levels for this analysis.

Our tests control for several bond characteristics. In the case of bond's time to maturity, on the one hand, the literature suggests that corporate bonds are more actively traded following issuance and tend to become less liquid with age (Nunn et al. 1986; Sarig and Warga 1989; Alexander et al. 2000b; Hong and

Warga 2000; Chakravarty and Sarkar 2003). Hence, analysts likely generate higher trading volume when they issue recommendations for "young" bond securities. On the other hand, because these young bonds are actively traded and their prices are publicly available (at least after the introduction of TRACE), there is more information available to investors obtained from historical prices regarding these securities. This information could substitute for the information contained in bond analysts' reports, leading to smaller market reactions for young bonds. The forces affecting the predicted relation between highly-traded securities and trading volume reactions to analysts' reports are similar to those affecting the time-to-maturity relation. On the one hand, bond reports are more valuable for actively-traded securities. On the other hand, bond reports could provide more valuable new information for non-actively-traded securities. Bonds with complex features are more difficult to value by bond investors, providing more opportunity for bond analysts to distinguish themselves. Of course the implications of some economic news will translate directly into expected bond prices and be unaffected by the presence of complex features in the bond contract. To control for macro-economic news, we include the daily T-bill return.

The results of estimating Equation 2 are presented in Column 1 of Table 6. The *Buy* and *Sell* coefficients are positive and significantly different from zero, consistent with the Table 5 results. The market reaction is stronger for *BBB-A Rating* and *Below BBB Rating* firms, implying less of a trading-volume reaction to bond analysts' reports about superior-rated bonds as expected. While there seems to be more trading in general for *BBB-A Rating* than for *Below BBB Rating* firms, this difference is not significant. The coefficient on affiliation is not significantly different from zero. If affiliated analysts systematically add bias to their reports, we would expect the market reaction to their reports to be lower. This result of no difference in reaction combined with the fact that affiliated analysts' recommendations are skewed relatively more positive is more consistent with firms choosing analysts who truly have positive views of the firm. An alternative explanation is that affiliated analysts are adding positive bias but their superior knowledge of the firm offsets the bias, resulting in no difference in reaction. We also find that the coefficients on the *Time to Maturity* and *Highly Traded* variables are positive and statistically significant. This finding suggests that bond investors react more to bond analysts' reports about younger, more actively-traded bonds. The significantly positive coefficient on the *On Watch Neg* variables suggests that the market reaction is stronger when a firm and its bonds are likely to be downgraded. The tests do not provide any evidence that the market reaction is greater for more complex bonds.

As a benchmark, we estimate the same specification but use the sample of equity analysts' reports (Column 2 of Table 6). That is, we test for cross-sectional variation in abnormal volume measured around the date of equity analysts' reports. Consistent with the Table 5 analysis, the coefficient on *Buy* is negative and statistically significant. Of note, there is no evidence of increased reaction to equity reports for high-yield firms (i.e., the coefficient on *Below BBB Rating* is not significantly different than zero). This result is consistent with bond analysts providing a debt-specific interpretation targeted to high-yield bond investors. Similar to affiliated bond analysts, there is no evidence of a difference in bond market reaction between affiliated and unaffiliated equity analysts. The effects of bond-issue characteristics are similar to those in Column 1.

Next, we present similar tests to those of Equation 2; but using adjusted bond returns as the dependent variable instead of abnormal volume. Column 3 shows that bond analysts' buys are associated with a statistically significant incremental positive return versus hold reports. The difference between bond analysts' buy and sell recommendations is 0.5% and an untabulated test indicates the difference is statistically significant (p-value <0.001). This corroborates the abnormal volume results. Because returns are signed, to measure the cross-sectional differences in reaction we also present results in Columns 4 and 5, in which we use only the buy reports and only the sell reports, respectively. For example, while we expect the returns to be *more* positive (negative) for buys (sells) about higher risk firms, we have no signed prediction about the short-window returns for higher-risk firms for the full (i.e., pooled) sample of reports. For the buys-only and sells-only sample, the coefficients on *Below BBB Rating* are positive and negative, respectively, and are significantly different from zero. This result is consistent with the bond price reactions being greater in magnitude for high-yield bonds compared to superior (AAA and AA) rated bonds, as expected. Almost all the other coefficients on the explanatory variables are not significantly different from zero.

As a benchmark, Column 6 shows the results for the full sample of equity analysts' reports. As in the univariate bond return analysis, the difference in *Buy* and *Sell* coefficients for equity analysts is less than the difference in *Buy* and *Sell* coefficients (from Column 3) for bond analysts (p-value <0.022 based on untabulated test). This is consistent with bond analysts providing more information about bond values than do equity analysts. We also estimate but do not tabulate tests using the equity analyst buys only and sells only sample. Inferences from these regressions are similar to those using the full sample of equity analysts' reports.

6. The timeliness of bond analysts' reports around credit rating announcements

This section presents some additional analysis in which we examine whether bond analysts' reports lead the information provided by credit rating agencies (rating changes and watch list additions). This question investigates an important bond-market specific setting in which bond analysts are expected to demonstrate their ability to produce timely information. More timely information should translate into stronger market reactions to bond analysts' reports, and hence would provide corroborating evidence that bond analysts do offer relevant information to bond investors. If bond analysts anticipate, and hence lead, rating agencies, then we expect them to more likely issue negative (positive) recommendations before negative (positive) rating agency announcements.

We test for Granger causality by estimating multivariate logistic models that predict rating changes and watchlist additions using lagged values of bond analyst recommendations and credit rating events as independent variables. These tests allow us to better control for the joint effects of rating changes and watchlist additions on the timeliness of bond analysts' recommendations. As a benchmark, we also include lagged values of equity analyst recommendations. These tests are in the spirit of Beaver, Shakespeare, and Soliman (2006), who find that non-certified rating changes lead certified rating changes.

We create a panel dataset of calendar months starting from January 2002 to December 2006 for all firms in the sample that have at least one rating change over this period. We construct indicator variables that take the value one if an analyst report or credit-related event has occurred during the calendar month, and zero otherwise. For example, the downgrade indicator will be equal to one in the month when a downgrade occurred for the firm, and zero in the months with no downgrade. We create similar indicators for upgrades, negative and positive watchlist additions, as well as bond and equity analysts' buy and sell recommendations. For a given firm-month observation we could have several analyst recommendations. In this case, we take the median recommendation level for that month to determine whether the monthly recommendation is a buy, hold or sell. We estimate:

$$\begin{aligned} Event_{i,t} = \alpha &+ \Sigma_{j=1}^{3}\, \beta_j\, Bond\ Analyst\ Buy_{i,t-j} + \Sigma_{j=1}^{3}\, \delta_j\, Bond\ Analyst\ Sell_{i,t-j} + \Sigma_{j=1}^{3}\, \gamma_j\, Equity\ Analyst\ Buy_{i,t-j} \\ &+ \Sigma_{j=1}^{3}\, \chi_j\, Equity\ Analyst\ Sell_{i,t-j} + \Sigma_{j=1}^{3}\, \lambda_j\, Upgrade_{i,t-j} + \Sigma_{j=1}^{3}\, \theta_j\, Downgrade_{i,t-j} \\ &+ \Sigma_{j=1}^{3}\, \pi_j\, Pos\ Watch\ List_{i,t-j} + \Sigma_{j=1}^{3}\, \kappa_j\, Neg\ Watch\ List_{i,t-j} + Year\ Effects + \varepsilon_{i,t}. \end{aligned} \tag{3}$$

Our logistic prediction model includes three lags of each event indicator. Untabulated analysis indicates that all inferences remain the same if we use one or five lags, or when we exclude year fixed effects. In additional untabulated analysis, we partition the sample into investment-grade and high-yield firms, and re-estimate Equation 3. Results and inferences are similar between the two groups and to the tabulated analysis.

Table 7, Panel A presents the results of estimating four logistic models, each with a different dependent variable, where *Event* is *Upgrade*, *Downgrade*, *Pos Watch List*, and *Neg Watch List*, respectively. To ease interpretation, Panel B presents the average coefficient for the three lags of each variable, and a p-value from a Wald Chi-Square test that the average coefficient is different from zero. Our discussion focuses on the parsimonious Panel B results. First, there is evidence of general autocorrelation across all four credit rating events. For example, when predicting downgrades, lagged downgrades and lagged negative watchlist additions have positive coefficients while lagged upgrades have a negative coefficient. Second, lagged bond analyst buys are positively related to upgrades and positive watchlist additions. Similarly, lagged bond analyst sells are positively related to downgrades and negative watchlist additions. Lagged bond analyst sells are also negatively related to upgrades. These results provide evidence that bond analysts' recommendations lead credit rating announcements for not only rating changes but also for watchlist additions. This finding also corroborates and helps explain why the bond capital markets react to the news in bond analysts' reports.

Third, the results for lagged equity analysts' buys and sells show a similar pattern to those of bond analysts, and hence also lead credit rating announcements. This result is consistent with the analysis of Ederington and Goh (1998), who document a similar finding. Untabulated tests indicate the differences between coefficients on lagged bond and equity analyst recommendations are not generally significant. Hence, the stronger bond market reactions we observe for bond analysts compared to equity analysts is not due to bond analysts issuing more timely recommendations than equity analysts. Instead, the differential market reaction we observe must be due to the different information in bond analysts' reports accompanying the recommendations. For example, as mentioned previously, bond analysts often highlight and analyze event risks such as share repurchases, divestments of assets, spin-offs, leveraged buyouts and debt-funded acquisitions. These events likely require debt-specific interpretation provided by bond analysts.

7. Conclusion

This study uses a large sample of sell-side bond analysts' reports to examine the effectiveness of bond analysts as information intermediaries in the U.S. corporate bond market. We find that similarities and differences between the bond and equity markets lead to systematic similarities and differences in the patterns of bond analysts' recommendations and bond investor reactions to bond analysts' reports.

We document that the distribution of bond analysts' buy, hold, and sell recommendations is skewed positive. Similar to equity analysts, bond analysts need access to management, want to expand the set of potential traders, and must compete for investment banking business, all of which can compel bond analysts to issue positive recommendations. This positive skewness increases for riskier bonds, which is consistent with low-rated bonds (below BBB) having both significant downside risk and upside potential, just like equity securities. The recommendations of bond analysts are skewed *less* positive than those of equity analysts. This result is consistent with bond analysts acting less strategically than equity analysts. This finding is explained by differences in recommendation skewness for investment-grade bonds, consistent with the presence of asymmetric demand for negative information by bond investors, but not by equity investors. In fact, for high-yield firms, the recommendation distribution for bond analysts is actually more positively skewed compared to that of equity analysts.

Bond analysts' reports generate significant reactions in terms of bond trading volume and bond price changes, after controlling for other sources of information. This reaction is stronger than that produced by equity analysts, due to the greater strategic bias of equity analysts or the fact that equity reports are less relevant to bond investors. Comparisons of bond market reactions and frequencies across different types of events suggest that bond analysts' reports are economically important. In cross-sectional analysis, we find that the market reaction to bond analysts' reports is higher when credit ratings are worse, consistent with bond price sensitivities to news increasing when the firm is closer to default.

In addition, while the recommendations of affiliated bond analysts are more positive than that for unaffiliated analysts, there is no difference in market reaction between these analysts. This result is consistent with bond analysts not acting strategically. It is also possible that affiliated analysts are adding positive bias but their superior knowledge of the firm offsets the strategic bias, resulting in a net no difference in investor reaction. Last, we find evidence consistent with both bond and equity analysts leading rating changes and watchlist additions. Overall, the results of our study suggest that sell-side bond analysts provide relevant and timely information to bond investors, and hence play an active role in supporting the informational efficiency of the bond capital market.

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APPENDIX 1
Variable Definitions

Variable	Definition
Abnormal Volume	= Abnormal volume is the average daily firm volume (scaled by the bond issue size) during the five-day event window centered on Day 0 less the average daily volume for the non-event 30-day periods before and after the event window.
Adjusted Return	= Raw return on a bond issue around an event window minus the return on a treasury bill with similar maturity and coupon. The estimation is restricted for bonds trading within 10 trading days around the event.
Affiliated	= Indicator variable that equals one if the analyst's recommendation is issued by an affiliated analyst, zero otherwise. Bond analysts are classified as affiliated if the broker employing the analyst is the lead underwriter for a bond or, is the lead arranger of a syndicated loan, issued by the borrowing firm in the 12 months prior to the report. Underwriter data are from Mergent. Equity analysts are classified as affiliated if the broker employing the analyst is part of syndicate underwriting the initial public or secondary offering issued by the firm during the sample period. Underwriter data are from Thompson Financial (SDC).
BBB-A Rating	= Indicator variable that equals one if the firm's senior debt rating ranges from BBB to A, zero otherwise.
Below BBB Rating	= Indicator variable that equals one if the firm's senior debt rating is below BBB, zero otherwise.
Bond Report	= Indicator variable that equals one in the five-day period centered on the date of a bond analyst's recommendation, zero otherwise.
Bond Report Buy	= Indicator variable that equals one in the five-day period centered on the date of a bond analyst's buy recommendation, zero otherwise.
Bond Report Sell	= Indicator variable that equals one in the five-day period centered on the date of a bond analyst's sell recommendation, zero otherwise.
Buy	= Indicator variable that equals one if the bond or equity analyst's recommendation is a buy, zero otherwise.
Complexity	= Indicator variable that equals one if a firm's complexity index is above the sample's median, zero otherwise. Complexity index is based on the following bond characteristics: callable, convertible, credit enhancement, putable, foreign currency, floating rate coupon, variable rate coupon, combination of floating/fixed coupon, non-standard payment frequency, non-standard accrual frequency, pay-in-kind, sinking fund. The complexity index is estimated as the sum of the bond complexity characteristics, where each characteristic is assigned the value of one. The index is based on the average complexity of a firm's bonds. Definitions of the characteristics incorporated in the complexity index are as follows: *Callable* bonds are redeemable by the issuer (in whole, or in part) before the scheduled maturity under specific conditions, at specified times, and at a stated price. *Convertible* bonds may be converted into shares of another security under stated terms. The security is often the issuing company's common stock. *Credit enhancement* occurs when an issuer improves the credit rating of a bond by purchasing the financial guarantee (e.g., insurance, letter of credit) of a large financial intermediary, such as an insurance company or bank. *Putable* bonds give the holder the right to sell, or put, his or her bond to the issuer prior to the bond's maturity date. *Foreign currency* bonds are issues

(Appendix 1 continues on next page)

APPENDIX 1 (Continued)
Variable Definitions

Variable	Definition
Complexity (Continued)	= denominated in a foreign currency. *Floating coupon* bonds have a variable coupon, equal to a money market reference rate, like LIBOR or federal funds rate, plus a spread. *Variable rate coupon* bonds have a variable coupon that adjusts according to some schedule or index. *Floating/fixed combination coupon* bonds have a combination of fixed and floating coupons. *Non-standard payment* frequency bonds pay interest at frequencies other than semi annual. *Non-standard interest accrual frequency* bonds do not accrue interest on a 30/360 capital-appreciation basis. *Pay-in-kind* bonds allow the issuer the option of paying the bondholder interest either in additional securities or in cash. *Sinking fund* bonds have a sinking fund provision, which requires a bond issuer to retire a certain number of bonds periodically (typically accomplished through purchases in the open market).
Conference Call	= Indicator variable that equals one in the five-day period centered on the date of a conference call, zero otherwise. Data are from Best Calls.
Earnings	= Indicator variable that equals one in the five-day period centered on the date of a firm's earnings announcement, zero otherwise. Data are from Compustat.
Earnings Neg	= Indicator variable that equals one in the five-day period centered on the date of a firm's earnings announcement if earnings before extraordinary items are negative, zero otherwise.
Equity Report	= Indicator variable that equals one in the five-day period centered on the date of an equity analyst's recommendation, zero otherwise. Data are from IBES.
Equity Report Buy	= Indicator variable that equals one in the five-day period centered on the date of an equity analyst's buy recommendation, zero otherwise.
Equity Report Sell	= Indicator variable that equals one in the five-day period centered on the date of an equity analyst's sell recommendation, zero otherwise.
Fed Change	= Indicator variable that equals one in the five-day period centered on the date of the federal funds rate changes, zero otherwise.
Highly Traded	= Indicator variable equal to one if the firm's bonds are traded on average more than the median bond in the sample, zero otherwise.
Interest-coverage	= Ratio of EBITDA to interest expense.
Issue Size	= Logarithm of the average principal of the firm's bonds.
Leverage	= Ratio of long-term debt to total assets.
Management Forecast	= Indicator variable that equals one in the five-day period centered on the date of a (any type of) management forecast, zero otherwise. Data are from First Call.
Market-to-book	= Ratio of market value to book value of common equity.
No. of Trades	= Number of bond trades per day, averaged across all of the firm's bond issues.
On Watch Neg	= Indicator variable that equals one if the firm is on a negative or developing S&P Watch-list when the analysts' recommendation is issued, zero otherwise.
On Watch Pos	= Indicator variable that equals one if the firm is on a positive S&P Watch-list when the analysts' recommendation is issued, zero otherwise.
Outlook	= Indicator variable that equals one in the five-day period centered on the date of a firm's change in the S&P Outlook, zero otherwise.

(Appendix 1 continues on next page)

APPENDIX 1 (Continued)
Variable Definitions

Variable	Definition
Outlook Neg	= Indicator variable that equals one in the five-day period centered on the date of a firm's addition to the negative S&P Outlook, zero otherwise.
Outlook Pos	= Indicator variable that equals one in the five-day period centered on the date of a firm's addition to the positive S&P Outlook, zero otherwise.
Profitability	= Ratio of EBITDA to total assets.
Rating Change	= Indicator variable that equals one in the five-day period centered on the date of a rating change, zero otherwise. Senior bond ratings are at the firm level from Moody's and S&P historical databases. If missing, rating is from bond analyst's report. When the firm has ratings available from both Moody's and S&P, we take the first rating change announced by Moody's or S&P. Rating agencies typically move in tandem, usually with one moving first, and the other following soon after. If one rating agency changes its rating of the firm and the other agency changes its rating in the next 30 days, we ignore the second rating change.
Rating Change Downgrade	= Indicator variable that equals one in the five-day period centered on the date of a rating change, if the rating change is a downgrade, zero otherwise.
Return on TB	= The daily T-bill return from the CRSP database. T-bills are chosen to match bond issues based on remaining time to maturity (in years) at the beginning of the accumulation period and on coupon rate.
Sell	= Indicator variable that equals one if the bond or equity analyst's recommendation is a sell, zero otherwise.
TB Change	= Indicator variable that equals to one in the five day period centered on the price changes of T-bills that are in either the top or bottom 10% of the price change distribution, zero otherwise. T-bills with an eight-year maturity and coupon rates close to 6% are chosen to be consistent with the average maturity and coupon size of the bonds in our sample. T-bill returns are retrieved from the CRSP daily treasury file.
Time to Maturity	= Logarithm of the time to maturity of a firm's largest bond outstanding. Time to maturity is estimated as the number of years between the analyst report date and the bond's maturity date.
Total assets	= Dollar value of a firm's total assets (in millions).
Trade	= Indicator variable that equals one if any of a firm's bonds are traded on a given day, zero otherwise.
Volume	= Dollar volume of principal traded on a given day, scaled by the size of the bond on the issue date, averaged over all the firm's bonds.
Watch List	= Indicator variable that equals one in the five-day period centered on the date of a firm's addition to the S&P Watch list, zero otherwise.
Watch List Neg	= Indicator variable that equals one in the five-day period centered on the date of a firm's addition to the negative or developing S&P Watchlist, zero otherwise. Additions to watch lists that are "developing" are classified as negative. These represent a small number of events and are ex post more likely to be associated with a rating downgrade than with a rating upgrade.

APPENDIX 2
Computation of Adjusted Bond Returns

We calculate treasury-adjusted bond returns over periods around bond reports dates. Our return measurement method is similar in spirit to that of Hand et al. (1992) and Easton et al. (2008). We first compute the buy-and-hold raw bond returns (*BR*) as follows:

$$BR_t = (BP_t + C_t + BP_{t-1})/\ BP_{t-1} \tag{A1}$$

BP_t is the invoice bond price (flat price plus accrued interest, defined below) of the first transaction that occurs on or after Day 3, and must occur on or before Day 10, where the Day 0 is the event day. BP_{t-1} is defined symmetrically, and is the invoice bond price of the last transaction that occurs on or before Day -3, and must occur on or after Day -10. C_t is the sum of all coupon payments between the two periods (as a percentage of book value). Given the short accumulation interval over which we compute returns [-10, 10], the coupon payments are infrequent.

Invoice bond prices are computed as the quoted price reported by the database (also called flat price) plus the accrued interest (*AI*) from the last coupon payment. If the combined TRACE-Mergent database reports more than one trade on a given day we take the average flat price for that day. We compute the accrued interest based on the coupon size, frequency and initial coupon payment date reported in the terms and conditions database from Mergent. The accrued interest is computed as:

$$AI_t = \mathrm{c}\ (t\text{-}t_c)/\ 360 \tag{A2}$$

where c is the bond coupon rate and t-t_c is the period in days between the date of the trade and the date when the last coupon payment occurred. The dates of coupon payments are determined based on the coupon frequency and the date of the first coupon payment (both reported by the Mergent FISD terms and conditions database).

We then adjust the raw bond return by subtracting daily U.S. Treasury returns to remove the effect of the interest rate environment:

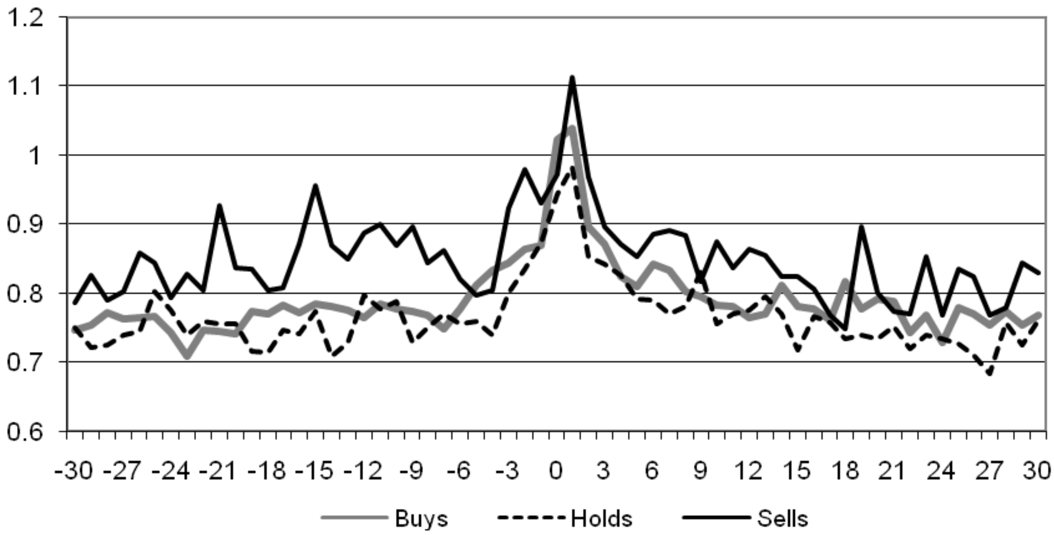
$$AdjBR_t = BR_t - TR_t \tag{A3}$$

where *TR* is the daily Treasury buy and hold return cumulated over the exact time period as the bond returns. We match each bond issue in our sample with the Treasury bond that has the same remaining time to maturity (in years) at the beginning of the accumulation period and has the closest coupon rate. We download these data from the CRSP Daily Treasuries database.

FIGURE 1
Plot of Bond Volume around Analysts' Reports by Recommendation Level

This figure plots the average daily trading bond volume for buy, hold, and sell analysts' reports from 30 trading days before to 30 trading days after Day 0. Day 0 is the date the analyst report was published. Panel A presents the figure for bond analysts and Panel B presents the figure for equity analysts. See Appendix 1 for variable definitions.

Panel A: Bond Analysts



Panel B: Equity Analysts

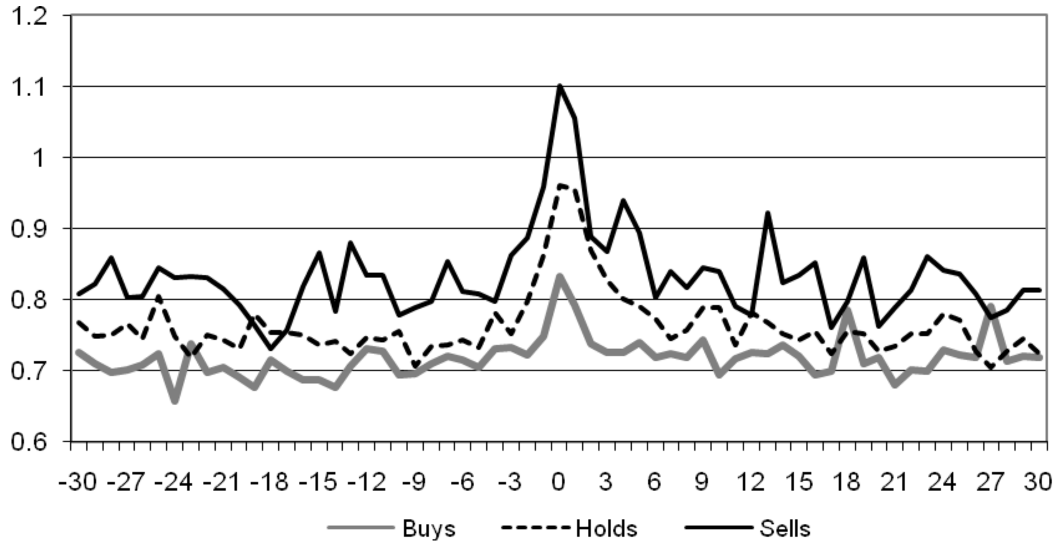


TABLE 1
Sample Selection

This table summarizes the sample selection process (Panel A), and the breakdown of bond analysts' reports by the ten brokers included in the sample (Panel B). In Panel B, an * immediately following the broker name indicates that the broker's fixed income research department is ranked as one of the ten best as determined in *Institutional Investor*'s September 2006 issue.

Panel A: Sample Selection Process

	Reports		Report-Bond-Issues	
Filters	Number	Percent	Number	Percent
Reports with recommendations collected and coded from First Call	28,378	100.0	60,065	100.0
Intersection with TRACE/Mergent FISD	23,335	82.2	33,105	55.1
Intersection with Compustat	19,931	70.2	29,992	49.9
After eliminating observations without data	19,103	67.3	27,393	45.6
After eliminating observations of private firms	15,918	56.1	23,261	38.7
Report observations at the firm-day level	15,025		22,442	

Panel B: Sample Partitioned By Broker

	Reports		Report-Bond-Issues	
Broker Name	Number	Percent	Number	Percent
BNP Paribas	298	1.9	83	0.4
Banc of America*	2,272	14.3	3,455	14.9
Bank One Capital Markets	438	2.8	360	1.6
Bear Stearns*	2,326	14.6	4,506	19.4
CIBC World Markets	450	2.8	628	2.7
Deutsche Bank	2,031	12.8	2,875	12.4
Morgan Keegan	99	0.6	71	0.3
Merrill Lynch*	3,939	24.7	3,079	13.2
Scotia Capital	658	4.1	1,151	5.0
UBS*	3,407	21.4	7,053	30.3
Total	15,918		23,261	

TABLE 2
Descriptive Statistics on Sample Firms and Bonds

This table provides descriptive statistics for the 15,025 reports at the firm-day level (see Table 1 for sample selection procedure). Panels A and B describe the characteristics of bonds and firms, respectively, in our sample. Panel C shows the number of other events around the issue date of bond analyst reports. The percentage reported in parentheses is the number of reports scaled by the total number of bond analyst reports. For example, for 22.5% of bond analyst reports, an equity analyst report is issued in the five-trading-day window prior (day -7 to -3) to the bond analyst report (on day 0), 31.6% of the bond analysts reports are contemporaneous (day -2 to +2) with an equity analyst report, and for 22.0% of bond analyst reports, an equity analyst report is issued in the five-trading-day window after (day +3 to +7) the bond analyst report. Variables are defined in Appendix 1.

Panel A: Bond Characteristics

Feature	Number	Percent	Feature	Number	Percent
Issue size			**Years to maturity**		
Less than $200M	2,818	18.8	Less than one year	205	1.4
From $200M to $400M	7,068	47.0	From 1 year to 5 years	2,485	16.5
From $400M to $600M	2,672	17.8	From 5 years to 7.5 years	3,977	26.5
From $600M to $800M	1,129	7.5	From 7.5 years to 10 years	4,476	29.8
More than $800M	1,338	8.9	More than 10 years	3,882	25.8
Complexity index					
Less than 1	2,936	19.5			
From 1 to 2	9,515	63.3			
More than 2	2,574	17.1			

Panel B: Firm Characteristics

	Mean	Std. Dev.	Q1	Median	Q3	No. of Obs.
Total assets ($M)	23,663	58,914	2,398	7,289	20,545	14,456
Leverage	0.39	0.22	0.25	0.35	0.49	14,456
Profitability	0.12	0.06	0.08	0.11	0.15	14,397
Interest coverage	6.13	15.26	2.24	3.76	6.65	14,177
Market-to-book	3.28	6.77	1.38	1.98	3.15	12,788

Panel C: Timing of Other Events Around Bond Analyst Reports

	5-Day Periods (Day 0 = Date of Bond Analyst Report)		
	Before Report (Day -7 to -3)	At Time of Report (Day -2 to +2)	After Report (Day +3 to +7)
Equity analyst reports	3,378 (22.5%)	4,742 (31.6%)	3,301 (22.0%)
Rating changes	195 (1.3%)	335 (2.2%)	218 (1.5%)
Watchlist additions	131 (0.9%)	278 (1.9%)	86 (0.6%)
Outlook additions	101 (0.7%)	182 (1.2%)	117 (0.8%)
Earnings announcements	1,755 (11.7%)	4,331 (28.8%)	931 (6.2%)
Conference calls	1,884 (12.5%)	4,591 (30.6%)	1,337 (8.9%)
Management forecasts	989 (6.6%)	2,165 (14.4%)	569 (3.8%)
Any event	5,236 (34.8%)	8,080 (53.8%)	4,558 (30.3%)

TABLE 3
Distribution of Bond Analysts' Buy, Hold, and Sell Recommendations
(Table description follows)

Panel A: Distribution of Bond Analysts' Recommendations

		By Credit Rating			By Affiliation	
	All	AA and Up	BBB-A	Below BBB	Affiliated	Unaffiliated
	(1)	(2)	(3)	(4)	(5)	(6)
Buys	6,229	47	1,559	4,623	1,507	4,722
(% of Total)	(39.1%)	(14.2%)	(28.2%)	(46.0%)	(45.6%)	(37.4%)
Holds	7,529	159	2,845	4,525	1,454	6,075
(% of Total)	(47.3%)	(48.2%)	(51.5%)	(45.0%)	(44.0%)	(48.2%)
Sells	2,160	124	1,126	910	346	1.814
(% of Total)	(13.6%)	(37.6%)	(20.4%)	(9.1%)	(10.5%)	(14.4%)
Total	15,918	330	5,530	10,058	3,307	12,611
(% of All)		(2.1%)	(34.7%)	(63.2%)	(20.8%)	(79.2%)
Chi-square tests of difference in distribution (*p*-value)						
AA and Up (2) vs. BBB-A (3)		66.0*** (<0.001)				
BBB-A (3) vs. Below BBB (4)		665.3*** (<0.001)				
Affiliated (5) vs. Unaffiliated (6)		83.7*** (<0.001)				
Report-issuance intensity						
Reports per firm		12.2	18.6	24.2		

Panel B: Distribution of Equity Analysts' Recommendations

		By Credit Rating			By Affiliation	
	All	AA and Up	BBB-A	Below BBB	Affiliated	Unaffiliated
	(1)	(2)	(3)	(4)	(5)	(6)
Buys	15,861	1,111	8,942	5,808	2,129	13,732
(% of Total)	(44.0%)	(44.7%)	(44.3%)	(43.3%)	(45.6%)	(43.7%)
Holds	16,228	1,119	9,213	5,896	2,054	14,174
(% of Total)	(45.0%)	(45.0%)	(45.7%)	(43.9%)	(44.0%)	(45.1%)
Sells	4,000	255	2,024	1,721	483	3,517
(% of Total)	(11.1%)	(10.3%)	(10.0%)	(12.8%)	(10.4%)	(11.2%)
Total	36,089	2,485	20,179	13,425	4,666	31,423
(% of All)		(6.9%)	(55.9%)	(37.2%)	(12.9%)	(87.1%)
Chi-square tests of difference in distribution (*p*-value)						
AA and Up (2) vs. BBB-A (3)		0.4 (0.824)				
BBB-A (3) vs. Below BBB (4)		63.7*** (<0.001)				
Affiliated (5) vs. Unaffiliated (6)		7.1*** (0.029)				
Report-issuance intensity						
Reports per firm		92.0	67.7	32.3		

(Table continues on next page)

TABLE 3 (Continued)
Descriptive Statistics on Bond Analyst Report Recommendations

Panel C: Difference in distribution between bond analysts (Panel A) and equity analysts (Panel B)

		By Credit Rating			By Affiliation	
	All	AA and Up	BBB-A	Below BBB	Affiliated	Unaffiliated
	(1)	(2)	(3)	(4)	(5)	(6)
Chi-square tests	131.1***	227.8***	685.3***	83.9***	0.3	178.2***
(*p*-value)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.99)	(<0.001)

This table provides an analysis of analysts' recommendation levels. Panel A provides the analysis for bond analysts, while Panel B replicates this analysis for equity analysts. In each panel, Column 1 shows the unconditional distribution of analysts' buy, hold and sell recommendations. Columns 2 to 4 partitions the distribution by credit rating categories and provides the number of reports issued per firm by category. Columns 5 and 6 partition the distribution by whether the analyst is affiliated or not. The top number in each cell is the number of reports. The number in parenthesis is the percentage of total recommendations for that column. The bottom number in each column is the total number of reports for the column. The bottom number in parenthesis is the percentage of all recommendations. Each panel presents chi-square statistics from tests of whether two distributions *within* the panel are different from each other. The number in parenthesis is the chi-square statistic *p*-value. For example, in Panel A the first test statistic provides evidence whether the distribution of bond analysts' reports about firms with ratings of AA and up differs from the distribution of bond analysts' reports about firms with ratings of BBB to A. Panel C presents chi-square statistics from tests of whether two distributions *across* panels A and B are different from each other. For example, Column 1 of Panel C provides the test statistic whether the unconditional distribution of bond analysts' recommendations in Column 1 of Panel A is different from the unconditional distribution of equity analysts' recommendations in Column 1 of Panel B. ***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix 1.

TABLE 4
Univariate Bond Market Reaction by Type of Event

This table presents a univariate analysis of bond market reactions to bond-related events. The first set of columns presents the mean, median, *t*-statistic, and number of observations of abnormal daily trading volume averaged over a 5-trading-day period centered on the event date. The second set of columns presents the mean, median, *t*-statistic, and number of observations of T-bill-adjusted bond returns calculated over a 5-trading-day period centered on the event date. *T*-statistics test whether the mean value is different from zero. ***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix 1.

	Daily Abnormal Bond Trading Volume				Adjusted Bond Returns			
	Mean (1)	Median (2)	*t*-stat. (3)	No. Obs. (4)	Mean (5)	Median (6)	*t*-stat. (7)	No. Obs. (8)
Bond analysts' reports								
All	0.233***	0.044	45.82	14,686	0.003***	0.002	7.44	7,430
Buys	0.241***	0.050	31.55	5,891	0.005***	0.003	8.00	2,716
Holds	0.202***	0.017	27.73	6,828	0.002***	0.002	3.56	3,551
Sells	0.317***	0.119	19.15	1,967	0.000	0.001	-0.36	1,163
Buys–Sells	-0.076***		-4.65		0.005***		4.83	
Equity analysts' reports								
All	0.214***	0.002	53.87	30,886	0.002***	0.002	7.78	13,811
Buys	0.192***	-0.001	34.39	14,085	0.002***	0.002	8.07	6,071
Holds	0.236***	0.009	37.70	13,659	0.001***	0.002	3.31	6,303
Sells	0.218***	0.012	17.31	3,142	0.001	0.002	1.45	1,437
Buys–Sells	-0.026*		-1.97		0.001*		1.76	
Rating changes								
All	0.373***	-0.003	9.91	1,279	-0.008***	0.000	-2.69	645
Upgrades	0.178***	-0.007	3.69	394	0.006***	0.003	2.66	193
Downgrades	0.460***	-0.001	9.25	885	-0.014***	-0.003	-3.44	452
Upgrades–Downgrades	-0.282***		-3.47		0.020***		3.15	
Watchlist additions								
All	0.470***	0.100	11.20	690	-0.011***	-0.003	-3.89	391
Positive	0.321***	0.082	3.99	119	0.012***	0.007	3.39	72
Negative	0.501***	0.101	10.49	571	-0.016***	-0.006	-4.97	319
Positive–Negative	-0.180		-1.62		0.028***		4.06	

TABLE 5
Multivariate Analysis of Bond Trading Volume by Type of Event

(Table description follows)

	Dependent Variable				
	Volume (1)	No. of Trades (2)	Trade (3)	Volume (4)	Volume (5)
Bond Report	0.180*** (10.25)	1.824*** (3.74)	0.287*** (10.42)	0.157*** (8.37)	0.170*** (4.73)
Bond Report Buy				-0.017 (-0.60)	0.016 (0.37)
Bond Report Sell				0.208*** (4.21)	0.282*** (2.94)
Equity Report	0.112*** (12.86)	0.652*** (5.74)	0.243*** (12.25)	0.135*** (12.08)	0.112*** (6.17)
Equity Report Buy				-0.054*** (-4.34)	-0.041** (-2.17)
Equity Report Sell				0.025 (1.17)	0.060* (1.69)
Rating Change	0.438*** (5.73)	2.549*** (3.46)	0.099*** (3.03)	0.125** (2.22)	0.256** (2.34)
Rating Change Downgrade				0.453*** (4.49)	1.042*** (3.96)
Watch List	0.436*** (7.24)	1.691*** (4.18)	0.082* (1.94)	0.190* (2.04)	0.264* (2.01)
Watch List Neg				0.274** (2.43)	0.395** (2.39)
Outlook	0.023 (0.64)	-0.055 (-0.16)	0.037 (1.29)	-0.057 (-1.34)	-0.267** (-2.29)
Outlook Pos				0.069 (0.87)	0.237** (2.03)
Outlook Neg				0.243*** (4.00)	0.405*** (3.15)
Earnings	-0.022 (-1.19)	-0.796 (-1.63)	-0.194*** (-6.61)	-0.047*** (-2.64)	0.002 (0.08)
Earnings Neg				0.094*** (2.85)	0.211*** (3.07)
Conference Call	0.065*** (3.90)	0.950* (1.71)	0.182*** (6.26)	0.068*** (4.19)	0.069** (2.86)
Management Forecast	0.042** (2.18)	0.076 (0.41)	0.144*** (3.98)	0.049** (2.59)	0.005 (0.16)
Issue Size		3.188*** (7.49)	0.823*** (14.58)		
Fed Change	0.026*** (4.20)	0.163*** (4.67)	0.068*** (12.04)	0.026*** (4.19)	0.015* (1.81)
TB Change	-0.001 (-0.27)	0.087*** (3.80)	0.000 (0.04)	-0.001 (-0.29)	0.029*** (4.27)
Year Effects	Yes	Yes	Yes	Yes	Yes
No. of Obs.	716,979	716,979	716,979	716,979	295,399
Adj./Pseudo R^2	0.7%	10.5%	17.5%	0.7%	1.3%

(Table continues on next page)

TABLE 5 (Continued)
Multivariate Analysis of Bond Trading Volume by Type of Event

This table presents a multivariate analysis of bond market reactions to bond-related events using trading-volume-based measures. We regress bond trading volume measures (see column headings) on a set of variables indicating whether an event occurred on the trading day. The estimated coefficient on the indicator variables measures the market reaction to each event, while controlling for the other events. The underlying sample includes observations for *all* trading days during the 2002-2006 period studied for each of the 633 sample firms. The analyses in Columns 1, 4, and 5 are based on a daily trading volume. Columns 2 and 3 present alternative tests using the same explanatory variables, but using the number of trades and whether a trade occurred, respectively. The Column 3 results are estimated using a logistic regression. The Column 5 regression includes only trading days for the period February 2005 to December 2006 (the TRACE full-coverage period). We estimate each model as a panel with year fixed effects and cluster the standard errors at the firm level. Coefficient *t*-statistics are in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix 1.

TABLE 6
Cross-Sectional Analysis of Bond Market Reaction to Bond Analysts' Reports

This table examines the effect of credit rating levels and analysts' affiliation on bond trading volume and returns around bond and equity analysts' reports. In the first two columns, we regress abnormal trading volume around bond and equity analysts' reports, respectively, on variables that indicate the recommendation level, indicate the credit rating category, indicate whether the analyst is affiliated, and control for several bond characteristics. In the last four columns, we estimate similar regressions using adjusted bond returns as the dependent variable. The sample for these tests is limited to observations with available data to calculate the variables. Columns 1, 3, 4, and 5 focus exclusively on bond-analyst report events. Columns 2 and 6 focus exclusively on equity-analyst report events. For these two regressions, explanatory variables are adjusted and defined as appropriate for the sample of equity analyst reports. Columns 1, 2, 3 and 6 use the full sample of available observations, while Columns 4 and 5 are restricted to the sample of bond analysts' buy and sell recommendations, respectively. We estimate each model as a panel with year fixed effects and cluster the standard errors at the firm level. Coefficient *t*-statistics are in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests. Variables are defined in Appendix 1.

	Abnormal Trading Volume		Adjusted Bond Returns			
	Bond Analyst Full Sample (1)	Equity Analyst Full Sample (2)	Bond Analyst Full Sample (3)	Bond Analyst Buys Only (4)	Bond Analyst Sells Only (5)	Equity Analyst Full Sample (6)
Buy	0.044**	-0.045***	0.003***			0.001***
	(2.43)	(-4.55)	(2.69)			(2.93)
Sell	0.073***	-0.022	-0.002			-0.000
	(2.94)	(-1.46)	(-1.45)			(-0.01)
BBB-A Rating	0.187***	0.103***	-0.000	0.003	-0.005***	-0.000
	(4.49)	(3.94)	(-0.14)	(0.80)	(-2.91)	(-0.17)
Below BBB Rating	0.143***	0.032	0.000	0.008**	-0.007**	-0.001
	(3.69)	(1.11)	(0.34)	(2.34)	(-2.55)	(0.74)
Affiliated	0.009	0.029	0.000	-0.000	0.000	-0.001
	(0.44)	(1.40)	(0.17)	(-0.26)	(0.24)	(-1.02)
Time to Maturity	0.033***	0.024***	-0.000	0.000	-0.001	0.000
	(2.91)	(2.74)	(-0.59)	(0.34)	(-0.45)	(0.02)
Highly Traded	0.158***	0.149***	0.000	0.002	-0.000	-0.000
	(8.33)	(9.31)	(0.28)	(1.29)	(-0.11)	(-0.04)
Complexity	-0.019	0.034*	0.001	0.002	0.002	-0.000
	(-0.83)	(2.05)	(1.48)	(1.05)	(0.76)	(-0.49)
On Watch Neg	0.232***	0.291***	-0.003**	-0.003	-0.005	-0.001
	(4.67)	(8.12)	(-2.18)	(-0.99)	(-1.10)	(-1.03)
On Watch Pos	0.014	0.065	0.003	0.003	0.005*	0.007
	(0.32)	(1.20)	(1.04)	(0.59)	(1.65)	(2.54)
Return on TB	0.018	0.010				
	(1.63)	(1.08)				
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	14,477	28,127	7,325	2,651	1,156	13,178
Adj. R^2	4.5%	3.0%	0.9%	1.5%	1.3%	0.3%

TABLE 7

Analysis of Bond Analysts' Recommendation Timeliness vis-à-vis Credit Events

This table examines the lead and lag relation between bond and equity analysts' recommendations and credit events. In Panel A, we test for Granger causality by estimating multivariate logistic models that predict rating changes and watchlist additions (as indicated in each column) using lagged values of bond and equity analyst recommendation and credit rating events as independent variables. The sample consists of calendar month observations during 2002 to 2006 for all firms that have bond and equity recommendations and at least one rating change. We construct indicator variables that take the value one if a credit-related or analyst report (e.g., rating change, watchlist addition, bond or equity analyst recommendation) has occurred during the calendar month, and zero otherwise. For example, the *Downgrade* indicator equals one in the month when a downgrade occurred for the firm, and zero otherwise. We create similar indicators for an *Upgrade*, negative watchlist addition (*Neg Watch List*), positive watchlist addition (*Pos Watch List*) and *Bond* or *Equity Analyst Buy* or *Sell* recommendation. Coefficient *z*-statistics are in parentheses. We estimate each model as a panel with year fixed effects and cluster the standard errors at the firm level. Panel B presents the average coefficient for the three lags of each variable and, in parenthesis, a *p*-value from a Wald Chi-Square test that the average coefficient is different from zero. ***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Panel A: Logistic Model Results

	$Upgrade_t$		$Downgrade_t$		$Pos\ Watch\ List_t$		$Neg\ Watch\ List_t$	
	Coef.	*z*-stat.	Coef.	*z*-stat.	Coef.	*z*-stat.	Coef.	*z*-stat.
$Bond\ Analyst\ Buy_{t-1}$	0.069	(0.39)	-0.005	(-0.03)	0.845***	(3.08)	0.200	(1.25)
$Bond\ Analyst\ Buy_{t-2}$	0.164	(0.90)	-0.019	(-0.14)	0.414	(1.29)	-0.013	(-0.08)
$Bond\ Analyst\ Buy_{t-3}$	0.507***	(2.99)	-0.055	(-0.40)	0.118	(0.43)	0.063	(0.36)
$Bond\ Analyst\ Sell_{t-1}$	-1.010**	(-2.24)	0.537***	(3.73)	-0.680	(-0.99)	0.265	(1.41)
$Bond\ Analyst\ Sell_{t-2}$	-0.371	(-1.03)	0.169	(1.07)	-0.247	(-0.42)	0.273	(1.42)
$Bond\ Analyst\ Sell_{t-3}$	-0.735*	(-1.88)	0.113	(0.66)	0.047	(0.09)	0.430**	(2.28)
$Equity\ Analyst\ Buy_{t-1}$	0.480***	(3.91)	-0.495***	(-3.79)	0.023	(0.09)	-0.198	(-1.35)
$Equity\ Analyst\ Buy_{t-2}$	0.336***	(2.65)	-0.351***	(-2.97)	0.310	(1.45)	-0.165	(-1.15)
$Equity\ Analyst\ Buy_{t-3}$	0.201	(1.50)	-0.164	(-1.47)	0.301	(1.28)	-0.078	(-0.56)
$Equity\ Analyst\ Sell_{t-1}$	-0.347	(-1.41)	0.419***	(4.21)	-0.344	(-0.77)	0.521***	(4.01)
$Equity\ Analyst\ Sell_{t-2}$	-0.169	(-0.78)	0.146	(1.41)	-0.455	(-0.94)	0.199	(1.36)
$Equity\ Analyst\ Sell_{t-3}$	-0.113	(-0.56)	0.312***	(3.07)	0.383	(1.19)	0.031	(0.20)
$Pos\ Watch\ List_{t-1}$	0.601	(0.40)	0.237	(0.63)	0.826	(1.19)	-1.018*	(-1.95)
$Pos\ Watch\ List_{t-2}$	1.181	(1.27)	-0.377	(-1.63)	-0.428	(-0.92)	0.514	(1.07)
$Pos\ Watch\ List_{t-3}$	-0.751	(-0.41)	-0.221	(-0.91)	-0.543	(-1.13)	0.107	(0.22)
$Neg\ Watch\ List_{t-1}$	-0.289	(-0.95)	1.074***	(5.54)	-0.891	(-1.18)	-1.124***	(-2.75)
$Neg\ Watch\ List_{t-2}$	-0.201	(-0.42)	1.640***	(10.20)	-0.366	(-0.36)	-0.637	(-1.50)
$Neg\ Watch\ List_{t-3}$	-0.341	(-1.15)	0.538***	(2.65)	-0.786	(-1.03)	-0.578*	(-1.83)
$Upgrade_{t-1}$	-0.772	(-1.33)	-2.160**	(-2.13)	0.125	(0.18)	-0.301	(-0.59)
$Upgrade_{t-2}$	0.510	(1.59)	-0.974*	(-1.74)	-0.517	(-0.52)	-1.040	(-1.46)
$Upgrade_{t-3}$	0.590*	(1.86)	-1.433**	(-2.16)	0.584	(1.00)	-1.032	(-1.47)
$Downgrade_{t-1}$	-0.264	(-0.68)	0.102	(0.64)	-0.749	(-0.73)	0.260	(1.03)
$Downgrade_{t-2}$	-0.324	(-0.83)	0.803***	(5.78)	-0.844	(-0.83)	0.372*	(1.71)
$Downgrade_{t-3}$	0.067	(0.21)	0.965***	(7.04)	-0.948	(-0.93)	0.312	(1.31)
Year Effects	Yes		Yes		Yes		Yes	
No. of Obs.	32,889		32,889		32,889		32,889	
Pseudo R^2	3.1%		8.3%		3.3%		1.6%	

(Table continues on next page)

TABLE 7 (Continued)
Analysis of Bond Analysts' Recommendation Timeliness vis-à-vis Credit Events

Panel B: Summary of Logistic Model Coefficients

	Upgrade$_t$		*Downgrade$_t$*		*Pos Watch List$_t$*		*Neg Watch List$_t$*	
	Avg. Coef.	*p*-value	Avg. Coef.	*p*-value	Avg. Coef.	*p*-value	Avg. Coef.	*p*-value
Lag bond analyst buys	0.247	(<0.001)	-0.026	(0.675)	0.459	(<0.001)	0.083	(0.272)
Lag bond analyst sells	-0.705	(<0.001)	0.273	(<0.001)	-0.293	(0.336)	0.323	(<0.001)
Lag equity analyst buys	0.339	(<0.001)	-0.337	(<0.001)	0.211	(0.093)	-0.147	(0.050)
Lag equity analyst sells	-0.210	(0.064)	0.292	(<0.001)	-0.139	(0.489)	0.250	(<0.001)
Lag positive watchlists	0.344	(<0.001)	-0.120	(0.3527)	-0.048	(0.851)	-0.132	(0.360)
Lag negative watchlists	-0.277	(0.210)	1.084	(<0.001)	-0.681	(0.204)	-0.780	(<0.001)
Lag upgrades	0.109	(0.660)	-1.522	(<0.001)	0.064	(0.889)	-0.791	(0.036)
Lag downgrades	-0.174	(0.433)	0.623	(<0.001)	-0.847	(0.141)	0.315	(0.015)