EUGENE W. ANDERSON and SATTAR A. MANSI*

This article examines whether customer satisfaction is associated with key metrics from corporate bond markets—namely, credit ratings and cost of debt financing. The authors draw on theory in marketing and finance to predict how customer satisfaction should be associated with both measures. To test the hypotheses, they employ the American Customer Satisfaction Index (ACSI) database of more than 150 publicly traded firms during the period from 1994 to 2004. The empirical work controls for factors that are known to influence the bond market, such as firm profitability and risk, as well as potential unobservable factors. The findings indicate that firms with lower customer satisfaction exhibit lower credit ratings and higher debt costs—financial consequences of customer satisfaction not previously observed. The results also suggest that the association between ACSI and cost of debt is attenuated by the inherent level of risk faced by the firm.

Keywords: customer satisfaction, financial performance, bonds, cost of debt, yield spread

Does Customer Satisfaction Matter to Investors? Findings from the Bond Market

Does customer satisfaction provide useful information to bondholders? This article investigates whether customer satisfaction is associated with key bond market metrics—namely, credit ratings and the cost of debt financing—as well as the degree of any observed association between these key marketing and financial metrics.

A growing body of research has examined the association between marketing activities and financial performance (Ambler 2000). Understanding how marketing is associated with financial outcomes is important for both researchers and practitioners. In particular, senior management requires a way to assess whether marketing efforts provide acceptable return for the inherent risk undertaken. In the absence of such knowledge, management and investor ambivalence toward marketing may increase.

*Eugene W. Anderson is D. Maynard Phelps Professor of Marketing, Stephen M. Ross School of Business, University of Michigan (e-mail: genea@umich.edu). Sattar A. Mansi is Associate Professor of Finance, Department of Finance, Insurance, and Law, Pamplin College of Business, Virginia Polytechnic Institute and State University (e-mail: smansi@vt.edu). Order of authorship is alphabetical and does not reflect the relative contribution of each author. The authors gratefully acknowledge the National Quality Research Center at the Stephen M. Ross School of Business for providing customer satisfaction data and Lehman Brothers for providing debt data. They also thank Mary Sullivan for her valuable comments and suggestions during the early stages of the research. Any remaining errors are their own. Sunil Gupta served as associated editor for this article.

The bond market represents the single largest source of external financing for most firms. Issues of new corporate bonds in the United States totaled $845 billion in 2003, outstripping funds obtained through equity markets by a wide margin. Yet potential links between customer satisfaction and the corporate bond market have not been previously examined. Although studies employing accounting information and stock prices add significantly to the knowledge of how customer satisfaction is related to business performance, a comprehensive understanding of the association between customer satisfaction and financial markets requires examining whether and the degree to which customer satisfaction also provides important information to bondholders.

We begin by developing predictions about why and how customer satisfaction should be associated with credit ratings and cost of debt financing. To test the hypotheses, we employ the American Customer Satisfaction Index (ACSI) database of more than 150 publicly traded *Fortune* 500 firms over a ten-year span. We conclude with a general discussion of the findings and the implications for academics, managers, and public policy makers.

CUSTOMER SATISFACTION AND THE CORPORATE BOND MARKET

The logic linking customer satisfaction to the corporate bond market is grounded in the chain of effects leading from marketing-mix activity to customer response to future

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net cash flow and, ultimately, to economic performance as manifest in the financial markets. The first link in this chain of effects, the relationship between customer satisfaction and subsequent customer behavior, now appears widely accepted and credibly established. Customer satisfaction positively influences customer retention (Bearden and Teel 1983; Bolton and Drew 1991), word of mouth (Fornell 1992), willingness to pay (Homburg and Hoyer 2005), usage (Bolton and Lemon 1999), and cross-selling opportunities (Bolton 1998), while reducing behaviors with negative economic consequences for the firm, such as complaints (Fornell 1992), payment defaults (Bolton 1998), and search (Ratchford and Srinivasan 1993).

Through its influence on customer behavior, customer satisfaction is predicted to increase future revenues and reduce the cost of associated customer transactions (Reichheld and Sasser 1990). Customer retention ensures more stable future sales and lowers associated costs. Positive word of mouth leads to greater growth in sales and more efficient acquisition of new customers. Anticipated future net cash flows should also increase as a result of greater willingness to pay, increased usage, and cross-selling. Empirical research related to this second link in the satisfaction–profit chain has proved more challenging, but a growing number of recent studies have reported findings of the predicted positive association among customer satisfaction, the aforementioned consequences of customer satisfaction, and greater net cash flow and profitability (Bolton 1998; Gruca and Rego 2005; Mittal and Kamakura 2001; Rust, Zahorik, and Keiningham 1994).

However, empirical findings related to the final link in the satisfaction–profit chain—the association between customer satisfaction and financial market behavior—are more mixed. Two studies find support for a significant, positive association. Anderson, Fornell, and Mazvancheryl (2004) find a positive association between customer satisfaction and shareholder value as measured by Tobin's q, and Fornell and colleagues (2006) show that customer satisfaction helps explain changes in equity prices. Yet other research suggests that the association is either insignificant or limited in scope. In separate event studies, Ittner and Larcker (1998) and Fornell and colleagues (2006) find no impact of customer satisfaction announcements on stock prices. More recently, Jacobson and Mizik (2009) find that customer satisfaction does not provide incremental information over accounting measures in predicting equity prices. There is no certainty that bondholders will value customer satisfaction information over such measures either. Whether bondholders or equity holders are influenced by customer satisfaction remains an open question.

This article attempts to add to the knowledge of the nature and degree of association between customer satisfaction and financial market valuation by examining the corporate bond market—a context that is qualitatively different from equity markets and has not been previously addressed. Corporate bondholders differ significantly from equity holders. Whereas shareholders are residual claimants earning what is left after a firm's expenses are paid, bondholders exert fixed claims on the firm. The well-defined nature of bond prices and maturity dates makes bondholders particularly sensitive to the stability of anticipated future profits (Berlin and Loeys 1988; Kalay 1982; Smith and Warner 1979).

Customer satisfaction should influence corporate bondholders through its positive influence on customer behaviors that determine the stability of future profits for the firm. In particular, greater customer retention, greater share of wallet, positive recommendations, and reduced complaint handling are all well-established consequences of customer satisfaction and should help ensure the stability of future profitability and lower the risk of default.

Thus, we expect bondholders to value customer satisfaction as an important, forward-looking indicator of the degree and stability of future profit streams. Firms that have large and/or stable net cash flows that ensure payment should be viewed as less risky borrowers; that is, they should receive high credit ratings and enjoy lower cost of debt in return. Although the underlying theory posited here relies on positing a chain of effects from customer satisfaction to bond metrics through customer behaviors, it should be recognized that our proposed hypotheses and empirical work must necessarily be correlational rather than causal in nature. Accordingly, we predict the following:

H_1: Customer satisfaction is positively associated with firm credit rating.

H_2: Customer satisfaction is negatively associated with cost of debt financing.

Finally, we expect to observe significant differences across firms in the association between the ACSI and both bond market measures. In particular, bondholders are especially sensitive to variation in risk across issuers. Risk to future net cash flows may come from many sources. In the context of customer satisfaction, risk may manifest in a weakening of the chain of effects linking customer satisfaction to subsequent behaviors of financial benefit to the firm. For example, customer retention is more likely to be uncertain in industries that are characterized by volatile market forces, such as rapid technological change or greater competition. Thus, we expect the predicted effects to be attenuated by increasing risk levels. In effect, we posit that as risk levels rise, bondholders will place less weight on the ACSI. The association between the ACSI and credit rating should be less positive when risk is greater. Conversely, the observed association between the ACSI and the cost of debt should be less negative as risk levels increase. Formally, we predict the following:

H_3: The association between customer satisfaction and firm credit rating is less positive as risk increases.

H_4: The association between customer satisfaction and firm cost of debt financing is less negative as risk increases.

DATA

To test our hypotheses, we require data on customer satisfaction, credit ratings, and the cost of debt financing, as well as an appropriate estimation approach and set of control variables. In this section, we describe the data sources we draw from to construct the unique database required for the empirical portion of the study. Table 1 contains a brief summary of the variable definitions and how they are denoted in the empirical analysis.

Data Sources

We use three databases in our analysis: (1) the University of Michigan's Ross School of Business database on customer satisfaction, (2) the Lehman Brothers Fixed

Table 1
DEFINITION OF VARIABLE MEASURES

Variable	*Symbol*	*Definition/Measured*
ACSI	ACSI	A measure of customer satisfaction generated by the ACSI project at the University of Michigan's Ross School of Business. The ACSI measurement system gauges satisfaction from a broad cross-section of firms operating in industries with total sales in excess of 40% of the U.S. gross domestic product (for a complete description, see Fornell et al. 1996).
Cost of debt financing	Cost of Debt	Difference between the firm's cost of debt less the cost of debt on a U.S. Treasury security with similar effective maturity (or duration).
Firm size	Size	Natural log of the firm's total assets.
Profitability	Profitability	Ratio of earnings before interest, taxes, depreciation, and amortization divided by total assets.
Leverage	Leverage	Ratio of long-term debt to total assets.
Market to book	MTB	The difference between the book value of assets less the book value of equity plus market value of equity all divided by the book value of assets.
Advertising ratio	Advertising	Ratio of advertising expenditures divided by sales.
Firm risk	Risk	Firm's standard deviation of the cash flow ratio for the past five years.
Firm credit ratings	Rating	Average of both Moody's and S&P bond ratings based on a numerical conversion process in which AAA-rated bonds are assigned a value of 22 and D-rated bonds are assigned a value of 1.
Firm credit ratings orthogonal to ACSI	Rating_e	The portion of the rating variable unexplained by ACSI.
Debt duration	Duration	A linear combination of the weighted durations of each bond for each firm, where duration refers to Macaulay duration and represents a security's effective maturity.
Debt age	Age	Weighted average difference between the observation year date and the date of the original bond issue.

Income (LBFI) and Mergent's databases for debt data, and (3) the COMPUSTAT database for financial information. For our debt-related data series, the LBFI database provides observations from 1990 to 1998, and the Mergent database covers the remaining years (1999–2004).

The LBFI database provides month-end security specific information, such as bid price; accrued interest; coupon; yield; credit ratings from Standard & Poor's (S&P) and Moody's; duration; and quote, issue, and maturity dates on nonconvertible bonds that are included in the Lehman Brothers bond indexes. Bonds are included in the database according to firm size, liquidity, credit ratings, maturity, and trading frequency. The database contains data on more than 10,000 traded bonds from 1990 to 1998 and is commonly used in the fixed-income literature (see Anderson, Mansi, and Reeb 2003; Billett, King, and Mauer 2004; Maxwell and Stephens 2003). Although the database does not contain the full universe of traded debt, we have no reason to suspect any systematic bias within the sample.[1]

The COMPUSTAT database offers comprehensive financial profiles for more than 24,000 U.S. firms. These profiles include operating summaries, annual balance sheets and income statements, sources and uses of funds, growth rates, financial ratios, summary stock data, and accounting practices. Data in most categories go back more than 20 years. Market capitalization, common equity, net income, sales, and asset figures for all companies are provided in U.S. dollars.

Merging these databases and applying these requirements yield a data set covering 166 firms for the years 1994 to 2004 for a total of 2574 usable observations. This final number for total observations is the result of many firms issuing multiple bonds.[2]

Measuring Customer Satisfaction

We obtained data regarding customer satisfaction from the ACSI project conducted by the National Quality Research Center at the University of Michigan's Stephen M. Ross School of Business. The ACSI is a unique national system of customer satisfaction measurement that covers more than 200 corporate and government organizations. It was established in 1994, and data are collected on an annual basis. The index is the only uniform and independent measurement system on customers' satisfaction and future intentions regarding the products and services they consume. The ACSI data have been used broadly in research published in a variety of academic journals since its debut.

Fornell and colleagues (1996) describe the methodology underlying the ACSI in detail. Briefly, the ACSI is a latent-variable index estimated from telephone and Internet survey responses. Each organization's index is based on more than 200 individual respondents. Respondents are identified and data are collected in a manner that is completely independent of any of the organizations measured by the ACSI. The methodology produces a single overall customer satisfaction score for each organization. The ACSI scores range from 0 to 100; higher numbers represent higher levels of customer satisfaction. Data are collected throughout the year, but data for each industry are collected at the same time during each year.

Measuring Credit Rating

We measure firm credit rating by averaging Moody's and S&P bond ratings at the date of the yield observation (i.e., credit ratings as the bond seasons). Mansi and Reeb (2002) suggest that using the average of both Moody's and S&P provides the most efficient measure of the default risk pre-

[1] Although the difficulty with finding accurate bond data is well known, Elton and colleagues (2001) analyze bond price information in the Lehman Brothers bond database and conclude that the LBFI is comparable in accuracy to Center for Research in Security Prices data.

[2] To minimize survivorship bias, we allow firms to exit and reenter the data set.

mium. Bond ratings are computed using a conversion process in which AAA-rated bonds are assigned a value of 22 and D-rated bonds receive a value of 1. For example, a firm with an A1 rating from Moody's and an A+ rating from S&P would receive an average score of 18. The conversion numbers for both Moody's and S&P firm bond ratings appear in the Appendix.

Although this approach is standard in the literature, an alternative methodology allows for the possibility that the credit rating variable incorporates part or all of customer satisfaction (i.e., whether rating agencies incorporate customer satisfaction in their analyses of firms). As such, we estimate credit rating without the impact of customer satisfaction. That is, we regress the credit rating variable on the customer satisfaction index, and the error term in this case incorporates the credit rating information without the influence or impact of customer satisfaction. We label the error term from this regression as Rating_e and use it as our primary measure of credit ratings in the multivariate analysis.

We also allow for a nonlinear relationship between bond yield spreads and credit ratings. When examining the entire bond data set, we find that as firm credit rating moves from investment (debt with rating greater than 12) to noninvestment-grade debt (debt with rating less than 13), the increase in yield spread for the noninvestment categories becomes nonlinear. Therefore, we use a binary variable (HighYield) that takes a value of 1 when the debt is noninvestment-grade and 0 if otherwise.

Measuring Cost of Debt Financing

We measure the cost of debt financing for a corporate debt instrument using the yield spread or risk premium (i.e., the return in excess of the risk free rate). In the bond market, U.S. Treasury securities are the least risky debt investment available to investors and thus provide the lowest return to the holder. The yield spread on a corporate bond is measured as the difference between the firm's cost of debt financing less the cost of debt financing on a U.S. Treasury security with a similar effective maturity (duration).[3] That is,

$$(1)\quad \text{YieldSpread}_t = \text{YTM(CorpBond)}_t - \text{YTM(TreasuryDebt)}_t,$$

where YTM(CorpBond) is the yield to maturity on a corporate debt instrument and YTM (TreasuryDebt) is the yield to maturity on a Treasury debt obligation with similar duration. For firms with multiple observations, we use all available outstanding debt in the multivariate analysis. By differencing each firm's cost of debt financing with that of an equivalent duration U.S. Treasury security, we obtain a measure of the additional return a bondholder earns for bearing risk beyond that of a U.S. Treasury return. The differencing results reduce concerns about serial correlation and economywide changes in interest rates, and therefore differencing is often used in the finance literature (Anderson, Mansi, and Reeb 2003).

METHODOLOGY

As we described in the preceding section, the resultant data set takes the form of cross-sectional time series. When such data are employed to test hypotheses, care must be taken to address potential estimation bias due to both observable and unobservable sources of heterogeneity. Accordingly, we draw on the literature to specify firm, security, and industry controls. We also employ appropriate estimation methods to control for potential unobserved heterogeneity.

Controlling for Observable and Unobservable Heterogeneity

As is the case for studies of equity prices, it is critical to test whether the ACSI provides incremental information over accounting measures that the market typically considers. In particular, any specification must control for well-known covariates, such as firm size, profitability, leverage, market-to-book ratio, advertising ratio, and risk. We measure firm size, a proxy for takeover deterrent and scale economies, as the natural log of total assets. We measure firm profitability, a proxy for current performance, as the ratio of earnings before interest, taxes, depreciation, and amortization divided by assets. We measure firm leverage, a proxy for financial health, as the ratio of long-term debt to assets. We measure market-to-book ratio, a proxy for growth opportunity, following the standard approach of dividing the difference between the book value of assets less the book value of equity plus market value of equity by the book value of assets. We measure advertising ratio, a proxy for consumer-oriented companies, as the ratio of advertising expenditures divided by sales. We compute firm risk using the firm's standard deviation of the cash flow ratio for the past five years. Given a small number of extreme observations and to ensure that outliers are not driving any of our results, we Winsorize the variables' size, leverage, market to book, profitability, advertising, and firm risk at the 1% level.

In addition, it is important to control for potential influence of the type of security on our estimates. Security-specific variables include debt duration, liquidity, and a high-yield indicator, as mentioned previously. For an individual security, duration (DUR) refers to Macaulay duration and represents a security's effective maturity used to capture maturity differences among the bonds in our sample. We define DUR as the discounted time-weighted cash flow of the security divided by its price. That is,

$$(2)\quad \text{DUR} = \sum_{t=1}^{k} \frac{t \times \text{CF}_t}{\text{P}(1+\text{Y})^t},$$

where CF_t is the security cash flows at time t, t is the number of periods until the cash flow, P is the security price, Y is the yield to maturity, and K is the number of cash flows. Overall, duration measures the linearities in the price–yield relationship and represents the securities' systematic risk.[4]

For liquidity, we use the log of debt age (Age), where the age of the bond is the length of time (in years) that a bond has been outstanding. Beim (1992) finds that liquidity is positively priced in the debt market because more recently issued bonds are more liquid than older bonds. Beim also find that debt securities lose about a third of

[3]We define duration as the weighted average time to full recovery of principal and interest payments.

[4]We also examined the results using debt convexity (Convexity), which accounts for the nonlinearities present in the term structure of interest rates and found similar results.

their liquidity in the first three years of issuance. Therefore, we use the log of bond age (Age) for each firm for each year as a measure of debt liquidity.

In addition, we must consider that our variables are potentially sensitive to both time and industry effects. In the specifications described subsequently, we employ annual indicator variables and a combination of industry dummy variables and estimated industry effects to control for these important factors.

Finally, despite this extensive effort to control for known sources of heterogeneity, our findings may still be affected by unobserved sources of heterogeneity, such as the quality of management, firm efficiencies, or luck. We present three approaches to controlling for these potential unobserved firm-level fixed effects: (1) first differencing, (2) random effects, and (3) hierarchical Bayesian (HB) effects.

Specification

The baseline specification for testing the association between customer satisfaction and firm credit rating is as follows:

$$(3)\quad \text{Rating}_{i,t} = A_0 + A_1(\text{ACSI}_{i,t}) + A_2(\text{FirmSpecific}_{i,t}) + A_3(\text{DebtSpecific}_{i,t}) + \text{Time\_Dum} + \text{Ind\_Dum} + \varepsilon_{I,t},$$

where i represents the ith firm at time t for the variables. The dependent variable, Rating, is the average of both Moody's and S&P bond ratings. Other independent variables include vectors of firm-specific and security-specific control variables that potentially affect the cost of debt financing for firm i at time t. The remaining variables are the time (Time_Dum) and industry (Ind_Dum) controls. Our principal concern is the coefficient estimate, A1, of the ACSI. If customer satisfaction reduces the agency conflict between security claimants, we expect a positive association between credit ratings and the ACSI.

Our general specification testing the predicted association between the ACSI and the cost of debt is as follows:

$$(4)\quad \text{Log(Spread)}_{i,t} = A_0 + A_1(\text{ACSI}_{i,t}) + A_2(\text{FirmSpecific}_{i,t}) + A_3(\text{DebtSpecific}_{i,t}) + \text{Time\_Dum} + \text{Ind\_Dum} + \varepsilon_{I,t},$$

where Log(Spread) is the natural log of the yield spread. Independent variables are similar to those we reported previously. As discussed, we also include year and industry dummy variables to control for industry and time effects. In this specification, we use the residual from regressing the credit rating on the ACSI variable rather than the raw credit rating to capture the impact of customer satisfaction. That is, we are interested in the overall effect of customer satisfaction on yield spreads beyond that incorporated in credit ratings. Our principal concern in the analysis is the ACSI coefficient, A_1. A significant coefficient of the ACSI variable allows us to reject our null hypothesis. We expect the ACSI coefficient to be negative, evidence consistent with lower costs for firms with good customer satisfaction programs.[5]

To control for unobservable fixed effects, we employ the three methods mentioned previously. First, we difference both sides of the specified equations by subtracting the observed value of each variable at t – 1 from its value at t. This standard approach to controlling for unobserved fixed effects provides a straightforward comparison with the baseline regression approach without such controls. Second, we estimate both specifications using a random-effects model to control for potential unobserved fixed effects. As for panel data, the random-effects model assumes that unobserved fixed effects are distributed normally for each unit. Third, we employ an HB approach to model both potential unobserved industry- and firm-level factors separately and simultaneously (Bryk and Raudenbush 1992).

There are several important features of the latter approach worth highlighting. The HB approach allows for a richer distribution of potential fixed effects, effectively estimating a different distribution of such effects for each industry rather than forcing all firms into a single distribution across all units as in a random-effects model. In the process, HB provides a method of separating variance associated with industry-level differences from variance within industries or within firms. In addition to affording estimation of fixed effects, the HB approach provides a means of estimating industry- and firm-level differences in independent variable coefficients. Thus, HB provides a rich set of estimates that will provide greater insight into questions such as how much the effect of the ACSI on credit rating and cost of debt varies across industries, as well as the relative size of the effect in different contexts.

FINDINGS

Descriptive Statistics

Table 2 provides descriptive information for our sample. Panel A shows means, medians, standard deviations, and 25th percentile and 75th percentile values for the variables used in the analyses. The firms in our sample have a mean and median ACSI rating of 76 and minimum and maximum values of 56 and 90, respectively. The yield spread in our sample has a mean of 162 basis points (100 basis points = 1%), a median of 118 basis points, and a standard deviation of 173 basis points.

Because the majority of the firms in the sample are *Fortune* 500, they tend to be larger in size with significant liabilities in their capital structure. As such, the average firm in the sample has total assets of $85 billion, a standard deviation of $174 billion, and 25th and 75th percentile values of $11.6 billion and $56.2 billion, respectively. The median leverage ratio is 29% with a standard deviation of 13%. On average, firms are profitable, with mean and median profitability ratios of approximately 14%, median advertising expenditures to sales of 1.42%, a median market-to-book ratio of 1.42, and a median cash flow volatility (Firm Risk) of 1.55%.

In terms of security-specific variables, the mean and median bond rating variable roughly equates to S&P ratings of BBB+ and A–, respectively, which indicates that a large portion of the sample has adequate quality debt. We expected this because of the large size of firms in the sample. However, the range of values for the ratings variable is broad, spanning from a minimum of 2 (C rating) to a maximum of 22 (AAA rating). The average high-yield indicator suggests that approximately 16% of the sample has non-investment-grade debt. The mean traded debt has a duration of 6.63 years and, on average, has been outstanding for 4.1 years.

[5]We also performed the same analysis using the raw credit rating score and found a similar result.

Table 2
SAMPLE STATISTICS

A: Descriptive Statistics

Variable	*M*	*Mdn*	*SD*	*25th Percentile*	*75th Percentile*
Spread	162.192	118.824	173.301	76.442	186.783
ACSI	75.824	75.500	5.644	72.000	80.000
Assets	85,226.71	20,184.00	173,515.70	11,655.83	56,203.00
Profitability (%)	13.942	14.420	6.983	9.065	19.333
Leverage (%)	28.676	28.586	13.148	19.215	37.065
MTB	1.790	1.415	1.024	1.117	2.096
Advertising	2.345	1.415	2.907	.000	3.658
Rating	BBB+	A–	A+/BB+	BBB–	A
FirmRisk (%)	2.821	1.553	4.262	.764	4.183
Duration	6.634	6.064	3.826	3.472	10.139
High yield	.158	.000	.365	.000	.000
Age	4.078	3.309	3.670	1.529	5.729

B: Industry Segmentation Data

Standard Industrial Classification Code	*Titles of Industries*	*Firm-Year Observations*	*Observations (%)*
1	Mining and construction	33	1.04
2	Manufacturing (food–petroleum)	597	18.76
3	Manufacturing (plastics–electronics)	329	10.34
4	Transportation and communication (excluding utilities)	781	24.54
5	Wholesale trade and retail trade	1060	33.31
6	Retail trade	321	10.09
7	Services (hotels–recreation)	55	1.73
9	Public administration	6	.19

Panel B of Table 2 provides a breakdown of the number of firm-year observations based on Standard Industrial Classification single-digit codes. Industries in the sample include mining, manufacturing, transportation, wholesale trade, retail trade, and services. Most of the firms in the sample are in wholesale trade (33%), manufacturing (29%), transportation (25%), and retail trade (10%). The fewest observations are in public administration (<1%).

Table 3 provides the correlation coefficients among the variables ACSI, credit rating, yield spread, and control variables. As we expected, there is a positive correlation between ACSI and credit rating and a negative correlation between ACSI and yield spread. The analyses of the correlation coefficients of control variables with spread and debt indicate that the relationships among most of these variables agree with those reported in the related empirical literature (Anderson, Mansi, and Reeb 2003). Firm size, market-to-book ratio, and bond ratings are negatively correlated with yield spread, while firm leverage, debt duration, and firm risk are positively correlated with spreads.

Table 3
CORRELATIONS FOR VARIABLES USED IN THE ANALYSIS

	Spread	*ACSI*	*Size*	*Leverage*	*MTB*	*Ratings*	*Duration*
ACSI	–.160						
Size	–.057	–.097					
Leverage	.293	**.001**	–.367				
MTB	–.240	.283	–.242	–.640			
Rating	–.547	.217	–.226	–.470	.383		
Duration	.057	.065	**.298**	.047	**–.002**	.095	
Firm risk	.240	–.137	.173	.049	–.180	–.230	–.038

Notes: Correlations that are not statistically significant at a minimum of 5% level are presented in bold.

Customer Satisfaction and Credit Rating

Table 4 summarizes the findings pertaining to H_1 and H_3, namely, that the ACSI should be positively associated with credit rating, but less so when risk is high. Model 1 provides the estimates for the baseline specification employing ordinary least squares, which is a parsimonious and robust method of estimation with easily understandable coefficients. Model 2 shows the estimates when first differences of the dependent and independent variables are used. First differences is a transformation that is often employed to minimize potential bias from unobservable fixed effects. Model 3 gives the results of a random-effects estimation. A random-effects approach addresses the potential presence of unobservable fixed effects by estimating firm-level fixed effects as though drawn from a normal distribution. Models 4–6 are the estimates using HB with the ACSI coefficient held constant, allowed to vary unconditionally across industries and firms, and conditional on the level of inherent risk as measured by cash flow volatility. As such, HB enables us to account for potential bias from industry- and firm-level effects. It also enables us to estimate industry-level coefficients for ACSI and to estimate potential industry-level moderating effects separate from the variance associated with the firm level.

In each of the six models, we find a positive, significant association between customer satisfaction and firm credit rating. That is, larger values of ACSI are associated with a significantly higher credit rating. The coefficient for ACSI ranges from 5.9 to 7.6. Thus, a 1% change in the ACSI is associated with an approximately 6% increase in credit ratings (i.e., for a firm with a credit rating of 18 or A+ S&P ratings, an increase in ACSI of 1% is associated with an increase in credit rating for the security from A+ to AA–). Overall, the results suggest that firms with high customer

Table 4
CREDIT RATINGS AND ACSI

	Baseline Specification	*Changes Regression*	*Random Effects*	*HB Effects*	*HB Effects with ACSI Coefficient Varying Unconditionally*	*HB Effects with ACSI Coefficient Varying Conditionally*
Model	*1*	*2*	*3*	*4*	*5*	*6*
Constant	3.430*	.167	−1.501	16.505*	16.271***	16.177***
	(1.81)	(.26)	(−1.26)	(62.63)	(53.60)	(53.62)
ACSI	7.445***	6.113***	7.669***	7.596***	7.249**	5.941*
	(7.62)	(5.61)	(7.75)	(7.94)	(2.27)	(1.83)
Size	1.247***	.645***	1.265***	1.220***	1.228***	1.229***
	(15.38)	(6.35)	(14.86)	(15.65)	(15.60)	(15.72)
Profitability	8.596***	1.637***	8.648***	8.457***	10.294***	10.241***
	(10.53)	(2.58)	(10.44)	(10.51)	(13.33)	(13.29)
Leverage	−5.242***	−3.019***	−5.221***	−5.307***	−3.499***	−3.507***
	(−18.26)	(−8.14)	(−18.10)	(−18.80)	(−12.60)	(−12.65)
Advertising	5.647***	11.621***	5.429***	5.443***	1.32	1.261
	(2.80)	(4.56)	(2.64)	(2.808)	(.70)	(.66)
MTB	−.309***	.139***	−.319***	−.306***	−.330***	−.330***
	(−7.07)	(2.22)	(−7.26)	(−7.06)	(−8.08)	(−8.10)
Coverage	.503***	.603***	.531***	.514***	.017	.017
	(6.27)	(11.57)	(6.60)	(6.45)	(.19)	(.19)
Firm risk	−4.130***	−8.636***	−4.026***	−4.244***	−7.220***	−7.228***
	(−7.69)	(−15.08)	(−7.48)	(−8.013)	(−11.67)	(−11.66)
ACSI × firm risk						−1.171
						(−1.47)
Sources of Variation						
Within-firm σ^2				.70412	.54642	.54646
Within-industry						
τ_0				3.04189***	3.95282***	2.96968***
τ_1					.04351***	.04298***
Across-industries						
τ_{00}				.33920	.55860***	.86856***
τ_{10}					.00500***	.00589***
Industry dummies	Yes	Yes	No	Yes	No	Yes
Year dummies	Yes	Yes	No	Yes	No	Yes
R-square	.688	.216	.481			
Likelihood				−3354.94	−3122.52	−3116.34
Firm-year observations	2555	2192	2555	2555	2555	2555

*$p < .10$.
**$p < .05$.
***$p < .01$.

satisfaction have better credit ratings than those with low customer satisfaction.

The remaining control variables have their expected sign. Firm leverage, market-to-book ratio, and risk are negatively associated with credit rating. As firms increase their leverage and growth opportunities, their degree of business uncertainty increases, leading to higher probability of default, which in turn leads to lower credit ratings. Firm risk is also associated with higher default probability and, therefore, lower credit rating. Conversely, firm size, profitability, and coverage are positively associated with credit rating. All these variables contribute to better business conditions (and firm liquidity) and lower default rates.

The estimates of the partitioned variance for industry- versus firm-level effects are also noteworthy, especially with respect to those observed for yield spreads in the previous subsection. Model 5 indicates that slightly more than 10% of the variation in the ACSI coefficient is across industries {10.3% = 100 × [.005/(.04351 + .005)]}. This suggests that the effects of ACSI on ratings are more dependent on firm positions and conduct than on industry structural factors.

Finally, Column 6 of Table 4 shows the findings when we allow the ACSI coefficient to be estimated conditional on the level of firm risk. As we expected, the estimated interaction coefficient is negative, indicating that increased risk levels may attenuate the association between customer satisfaction and credit ratings. However, the statistical significance of this estimate is not sufficient to reject a null hypothesis of no effect. Rather, this finding should only be viewed as suggesting directional support.

Customer Satisfaction and Cost of Debt

Table 5 summarizes the findings pertaining to Equation 3 and provides insight regarding whether we should accept or reject H_2 and H_4, namely, that the ACSI should be negatively associated with cost of debt, but less so when risk is high. We organize the presentation of the estimates in the same way as Table 4 with cost of debt taking on the role of the dependent variable and the appropriate set of control variables as discussed in the development of Equation 4.

Similar to the previous analysis, Model 1 provides the estimates for the baseline specification employing ordinary least squares. Model 2 shows the estimates when we use

Table 5
YIELD SPREAD AND ACSI

	Baseline Specification	*Changes Regression*	*Random Effects*	*HB Effects*	*HB Effects with ACSI Coefficient Varying Unconditionally*	*HB Effects with ACSI Coefficient Varying Conditionally*
Model	*1*	*2*	*3*	*4*	*5*	*6*
Constant	9.336**	−.005	10.344**	4.737**	4.761**	4.801**
	(15.59)	(−.07)	(16.59)	(67.26)	(62.52)	(62.98)
ACSI	−1.841**	−1.637*	−2.124**	−2.112**	−2.085**	−2.390**
	(−4.33)	(1.96)	(−4.19)	(−5.30)	(−5.89)	(−2.95)
Size	−.202**	−.063	−.432**	−.178**	−.161**	−.161**
	(−7.13)	(−.71)	(−9.63)	(−6.65)	(−5.90)	(−5.90)
Profitability	−2.230**	−1.974**	−3.292**	−2.520**	−2.085**	−2.136**
	(−6.45)	(−3.44)	(−8.01)	(−7.26)	(−5.89)	(−6.10)
Leverage	.677**	.087	.695**	.692**	.780**	.777**
	(5.13)	(.31)	(4.85)	(5.43)	(5.98)	(6.00)
Advertising	1.813*	−1.990	2.827**	2.616**	2.942**	3.01**
	(2.29)	(−.86)	(2.70)	(3.44)	(3.53)	(3.67)
High yield	.328**	.004	.290**	.324**	.263**	.257**
	(6.59)	(.01)	(5.34)	(6.53)	(5.22)	(5.14)
Rating_e	−.094**	−.039*	−.101**	−.101**	−.119**	−.117**
	(−8.97)	(−2.23)	(−8.42)	(−9.62)	(−10.81)	(−10.75)
Duration	.062**	.063**	.062**	.062**	.062**	.062**
	(24.40)	(28.33)	(24.45)	(24.71)	(25.02)	(25.00)
Age	.094**	.089**	.093**	.093**	.093**	.093**
	(10.19)	(10.31)	(9.88)	(10.15)	(10.19)	(10.21)
Firm risk	.129	1.420**	−.200	.108	.081	.242
	(.49)	(2.81)	(−.71)	(.41)	(.28)	(.81)
ACSI × firm risk						.381**
						(3.04)
Sources of Variation						
Within-firm σ^2				.18873	.18215	.18241
Within-industry						
τ_0				.03267**	.03551**	.03207**
τ_1					.00054**	.00031**
Across-industries						
τ_{00}				.02650**	.03664**	.03905**
τ_{10}					.00094**	.00103**
Industry dummies	Yes	Yes	No	Yes	No	Yes
Year dummies	Yes	Yes	No	Yes	No	Yes
R-square	.654	.267	.455			
Likelihood				−1.578.65	−1.559.23	−1.555.29
Firm-year observations	2574	2166	2574	2574	2574	2574

*$p < .05$.
**$p < .01$.

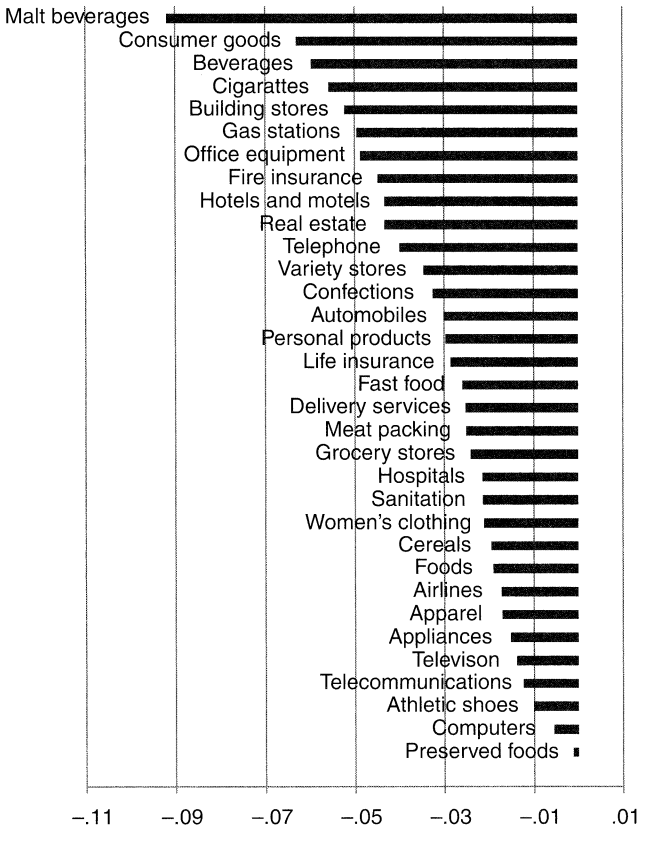
first differences of the dependent and independent variables. Model 3 gives the results of a random-effects estimation. Models 4–6 are the estimates using HB with the ACSI coefficient held constant, allowed to vary unconditionally across industries and firms, and conditional on the level of inherent risk as measured by cash flow volatility.

For all models, we find a negative, significant association between ACSI and the cost of debt financing, in general, at the 1% level. As in the case of credit rating, the coefficient for ACSI appears robust across all estimation methods. Using a median split, firms with high customer satisfaction have approximately a 2% lower cost of debt financing than those exhibiting low ACSI. Based on the average liabilities of firms in our sample, this translates into an economically significant savings of approximately $5 million for these firms.

The remaining estimates are coefficients for the control variables. All have the expected signs. Firm size, profitability, and the orthogonal credit rating variable (Rating_e) are negatively related to yield spread. Thus, firms with good economies of scale, high profitability, and lower default risk proxied by good credit ratings are associated with lower yield spread. Alternatively, we find that firm leverage, advertising expenditures, firm risk, debt duration, debt age, and non-investment-grade debt are associated with higher yield spreads. All these variables have the potential to decrease cash flow and therefore are associated with higher default risk and higher yield spreads.

The estimates of the partitioned variance for industry- versus firm-level effects provide insight into the sources of variation across firms. Model 5 indicates that more than 60% of the variation in the association between ACSI and yield spread is at the industry level [63.5% = 100 × .00094/(.00054 + .00094)]. This finding suggests that industry structural differences have a greater influence on the association between customer satisfaction and cost of debt than firm positions and conduct, which was observed for credit ratings.

Figure 1
EMPIRICAL BAYES ESTIMATES OF THE ASSOCIATION BETWEEN YIELD SPREAD AND ACSI BY INDUSTRY



Notes: Larger negative coefficients indicate that greater ACSI is more highly associated with lower yield spread.

The HB procedures also allow for individual estimates of coefficients for unit members. Figure 1 shows empirical Bayes estimates of the ACSI coefficient at the industry level. The estimates provide an indication of the degree of association between ACSI and yield spreads for each industry, indicating a much greater effect of ACSI in certain industries and others in which ACSI is not as strongly associated with yield spreads. Note that 90% confidence intervals for the highest industry estimates do not overlap with the lowest estimates, which suggests that these differences are significant.

The variance partitions and empirical Bayes estimates raise the question of what underlies the observed differences. For this study, we selected risk as a potential moderator given its role as the most widely studied and salient factor influencing corporate bondholders. The last column in Table 4 summarizes the estimates when specifying an interaction between ACSI and firm risk as measured by volatility of cash flows. As we expected, the estimated interaction coefficient is positive and significant, suggesting that increased risk levels attenuate the association between customer satisfaction and yields.

It is worth commenting on the substantial differences in cross-industry variation between the analysis for yield spreads and that for credit ratings. In the latter case, the proportion of variation due to industry factors appears to be considerably less (10.3% versus 63.5%), and the moderating coefficient of risk across industries is correspondingly insignificant, albeit in the right direction. A potential explanation is that these observed differences are due to the nature of the dependent variables themselves. Whereas yield spreads are the result of active trading by large numbers of decision makers actively participating in the bond markets, credit ratings are essentially expert judgments provided by financial analysts. It may be, for example, that analyst judgments accentuate within-industry differences and assimilate cross-industry differences relative to a metric based on active trading, leading to "overweighting" of within-industry factors in the generation of credit ratings.

Alternative Specifications

We performed various robustness checks on our findings. In particular, we investigated potential nonlinearity in the association between ACSI and each bond market measure. We also partitioned the data set in different ways to determine whether the central findings remain stable.[6]

We examined potential nonlinearity by segmenting the data on the basis of the ACSI, transforming the ACSI logarithmically, and adding a nonlinear term to our specifications. When segmenting the data into upper and lower quartiles of the ACSI, the findings are suggestive of nonlinearity but not overwhelmingly conclusive. Firms in the upper quartile of the ACSI have a statistically significant lower cost of debt financing (at the 5% level), while firms in the lower quartile have a statistically higher cost of debt financing (at the 10% level), with a difference of approximately 16% in the cost of debt between the two groups.

Directionally, these findings confirm the expectation that the bond market is strongly associated with customer satisfaction. However, the slope coefficient for the effect of the ACSI on yields or ratings is statistically the same for both high- and low-quartile firms. When we take the natural log of the ACSI, the coefficient for the index continues to be negative and significant with the expected signs and similar estimates on all other variables (coefficient estimate of −1.75 with a t-statistic of 4.49).

Adding nonlinear terms (e.g., squared ACSI) yields coefficient estimates that have the appropriate valence but lack statistical significance. Overall, the findings are suggestive of nonlinearity, as might be expected. However, statistical significance is not obtained. Perhaps further research conducted as the time series lengthens will find statistically significant evidence of nonlinearity.

Our approach to estimating the association between the ACSI and credit ratings relies on the assumption that differences between credit ratings can be treated as continuous and uniform. To explore whether this assumption is driving our results, we estimated a probit specification to capture information in the ordering imposed by ratings that may not be captured by a regression-like estimation method. The results are similar to those we report herein and suggest a positive association between customer satisfaction and credit rating. We also checked whether the results hold when we use raw credit ratings.

[6]The results on alternative specifications are available on request.

We also partitioned our data in several ways to assess robustness further. We divided the sample into quartiles according to firm size and found that the estimates for the ACSI remain significant and in the appropriate direction. Furthermore, to ensure that our results are robust to variations of different periods, we reran our specification model by year and segmented into two periods: 1994–1999 and 2000–2004. Again, the results corroborate our prior findings of a negative, significant relationship between the ACSI and the cost of debt financing. We also repeated the analyses after truncating outliers. Finally, we tested for lagged ACSI as a leading indicator of both bond metrics and checked all models for potential autocorrelation that might be affecting the observed estimates. As with our other robustness checks, this testing confirms the results reported in Tables 4 and 5.

DISCUSSION

This article provides the first examination of whether and how marketing activity, as measured by customer satisfaction, influences the corporate bond market. We explain why high levels of customer satisfaction should reduce the risk associated with anticipated future cash flows and therefore should be negatively associated with the cost of debt financing and positively associated with credit rating. We empirically test these predictions using data from the ACSI and the corporate bond market, finding that both predictions hold even after controlling for other potential factors that might explain our findings. We also find that the association is moderated in a predictable way by firm risk. Specifically, firm risk attenuates the association between customer satisfaction and yield spreads.

The findings indicate that firms that do a poor job of satisfying customers, as measured by ACSI, pay more for debt financing, while firms with higher customer satisfaction levels enjoy a lower cost of debt and higher credit rating. On average, firms with high levels of customer satisfaction are associated with a 2% reduction in the cost of debt financing—a magnitude similar to the spread between A- and AA-rated firms.[7] A 2% reduction in the cost of financing translates into an average savings of approximately $5 million per firm for our sample. This figure represents a significant savings to the firm and one that has not been previously quantified.

For managers, this result suggests that customer satisfaction not only is related to a firm's performance in the marketplace but also is associated with a firm's financing costs. Thus, marketing managers may want to go beyond calculating the financial impact of marketing activities from the estimated impact on customer behaviors of economic value to the firm, such as customer lifetime value. In addition to these customer-based benefits, managers should consider potential economic benefits of greater customer satisfaction that may result from corporate bondholders' willingness to provide lower financing costs. Moreover, the positive association between customer satisfaction and credit ratings means that firms with high customer satisfaction levels should find creditors significantly more willing to lend to them.

We emphasize that this new category of economic benefits of customer satisfaction represents the first empirical evidence of a "secondary" financial impact of customer satisfaction on the firm. That is, whereas previous research has identified financial benefits of customer satisfaction tied directly to specific customer behaviors (e.g., retention), the finding of reduced cost of debt financing is due to favorable behavior by an entirely different constituency—namely, corporate bondholders.

For investors, creditors, and financial analysts, our findings indicate that customer satisfaction, as measured by the ACSI, is a significant factor that has not been previously considered in models of yield spreads and credit rating. The ACSI appears to provide important information that is missing from these models and analyst predictions of bond market performance.

There may also be important corporate governance implications of our findings. To the extent that both shareholders and bondholders value customer satisfaction, high levels of customer satisfaction may help reduce the firm's agency conflicts, thus further lowering the costs of debt financing (Jensen 1986; Jensen and Meckling 1986). If customer satisfaction leads to higher and more stable cash flows, as the literature indicates, this reduces the probability of financial distress and, in turn, renders the bondholder–shareholder conflict less significant. To the extent that customer satisfaction may be used as a mechanism to align the interests of bondholders and stockholders, it may reduce agency conflicts between the two claimants (in which the agent of each group of claimants is a firm's management), which in turn should be associated with lower borrowing costs.[8]

Our findings with respect to cross-sectional variation in the influence of ACSI are also worth highlighting. Although variation across firms within an industry appears to dominate for credit rating, the association between ACSI and yield spreads appears to be more dependent on industry-level factors. It is possible that these differences in the relative importance of firm- and industry-level effects are partially driven by the nature of the dependent variables themselves. Yield spreads are continuous variables determined through an actively traded market mechanism. Credit ratings represent discrete analyst judgments, albeit strongly influenced by financial market activity, of the viability of a company relative to others against which it more directly competes.

Regardless, higher levels of customer satisfaction appear to be strongly associated with higher credit rating, and this should not be lost on any manager seeking funds from creditors. In other words, satisfying customers appears to be positively associated with greater creditor willingness to purchase debt issued by companies that perform well on this dimension.

The existence of significant variance in the association between the ACSI and bond market metrics should provide motivation for further research into potential firm- and

[7]This result is based on monthly intermediate and long-term corporate bond indexes obtained from the LBFI database for the period January 1994 through December 2004.

[8]However, the existence of customer satisfaction may not eliminate the shareholders preference for riskier projects. In addition, bondholders and shareholders will not necessarily have the same incentive to invest in customer satisfaction programs because these investments may yield benefits over a lengthy horizon.

industry-level factors that may underlie these observed differences. Our investigation of firm risk as a potential moderating factor is a first step in this direction. The finding that firm risk attenuates the impact of customer satisfaction is consistent with financial theory and also strengthens our theoretical arguments about the role of customer satisfaction by showing that a proposed relationship between constructs is moderated by another construct known to play an important role in the associated nomological network.

Further research could also examine cross-sectional variation in the moderating role of risk. We find that risk plays a significant moderating role in the case of ACSI and yield spreads, as well as directional (though not significant) support for ACSI and credit ratings. It is likely that factors related to future variation in the size and timing of financial returns may be relevant here, such as anticipated technological change or market growth.

Overall, the findings presented here add to the growing set of observations of a positive association between customer satisfaction and financial market outcomes. However, note that these types of studies necessarily treat investments aimed at increasing customer satisfaction as endogenous. All these findings are driven by observed positive changes in customer satisfaction and positive changes in financial performance. The size of investment required to increase customer satisfaction is inseparable from the financial data collected. Although these findings suggest a payoff for firms that are successful in increasing customer satisfaction, the data do not allow researchers to investigate directly the question whether it is worth investing in customer satisfaction. Given that financially oriented managers and companies need to be better able to assess whether such investments will provide an acceptable return, investigating more closely the mapping of satisfaction-related investments onto financial outcomes by way of customer behaviors should be a priority for further research.

Our findings contribute to the growing literature linking marketing metrics with financial performance. Recent research has found that customer satisfaction is positively associated with accounting-based measures of financial performance, such as operating margin (Bolton 1998; Rust, Zahorik, and Keiningham 1994), return on investment (Anderson, Fornell, and Lehmann 1994), and accounting returns (Gruca and Rego 2005; Ittner and Larcker 1998). Researchers are also examining the association between customer satisfaction and long-term financial measures based on equity markets. Anderson, Fornell, and Mazvancheryl (2004) find that customer satisfaction is positively associated with shareholder value as measured by Tobin's q. Fornell and colleagues (2006) further suggest that customer satisfaction helps explain changes in stock prices over time. The cumulative effect of this body of research is mounting empirical support for a positive association between customer satisfaction and financial performance, as measured by accounting returns, equity prices, and, now, bond market behaviors.

Perhaps the most significant aspect of our findings comes from viewing this study in the context of the research stream examining the association among customer satisfaction, accounting returns, and financial markets. Cumulative findings to date strongly suggest that customer satisfaction is positively associated with the size and timing of cash flows. The current work complements these prior studies by showing that high customer satisfaction levels are also associated with lower costs of debt financing. Combining this new finding with those related to accounting returns and equity prices extends what is known about the impact of satisfied customers on the firm's financial performance. As a result, academics, managers, and investors should have a more complete picture of how customer satisfaction influences financial markets and, by implication, the value of marketing activity for the firm as a whole.

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Appendix

BOND RATING NUMERICAL CONVERSIONS

Conversion Number	*Moody's Ratings*	*S&P Ratings*
22	Aaa	AAA
21	Aa1	AA+
20	Aa2	AA
19	Aa3	AA–
18	A1	A+
17	A2	A
16	A3	A–
15	Baa1	BBB+
14	Baa2	BBB
13	Baa3	BBB–
12	Ba1	BB+
11	Ba2	BB
10	Ba3	BB-
9	B1	B+
8	B2	B
7	B3	B–
6	Caa1	CCC+
5	Caa2	CCC
4	Caa3	CCC–
3	Ca	CC
2	C	C
1	D	D

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