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Have Rating Agencies Become More Conservative? Implications for Capital Structure and Debt Pricing

RAMIN P. BAGHAI, HENRI SERVAES, and ANE TAMAYO*

ABSTRACT

Rating agencies have become more conservative in assigning corporate credit ratings over the period 1985 to 2009; holding firm characteristics constant, average ratings have dropped by three notches. This change does not appear to be fully warranted because defaults have declined over this period. Firms affected more by conservatism issue less debt, have lower leverage, hold more cash, are less likely to obtain a debt rating, and experience lower growth. Their debt spreads are lower than those of unaffected firms with the same rating, which implies that the market partly undoes the impact of conservatism on debt prices. This evidence suggests that firms and capital markets do not perceive the increase in conservatism to be fully warranted.

In the wake of the financial crisis, rating agencies have come under increased scrutiny. They have been accused of peddling to the companies and institutions that issue the securities they rate, because the issuers pay their fees in most instances. According to some observers, this conflict of interest led the agencies to relax their standards, leading to ratings that were too generous relative to the default risk of the securities.[1] Given that many financial institutions made

*Baghai is at the Stockholm School of Economics. Servaes is at the London Business School. Tamayo is at the London School of Economics. Servaes is also affiliated with CEPR and ECGI. We would like to thank two anonymous referees, an anonymous Associate Editor, Aysun Alp, João Cocco, Paolo Colla, David Gillmor, Cam Harvey, Craig MacKinlay, Igor Makarov, Paolo Pasquariello, Stephen Schaefer, Denis Sosyura, Ilya Strebulaev, Yili Zhang, and seminar participants at Aalto University, the 2010 Australasian Banking and Finance Conference, Bocconi University, Instituto de Empresa, London Business School, the NBER 2010 Corporate Finance Summer Institute, the University of Bristol, the University of Lausanne/EPFL, the University of Michigan, and Sabanci University for useful comments and discussions. We would also like to thank Stefano Cascino and Brandon Julio for their help with the data. Raja Patnaik provided excellent research assistance.

[1] A paper articulating this theme is Mason and Rosner (2007), who argue that conflicts of interest may have led to lax rating standards for structured finance products in the years leading up to the recent financial crisis. In fact, Griffin and Tang (2012) report that one of the top rating agencies frequently made positive adjustments to ratings beyond its main quantitative model. In related work, Becker and Milbourn (2011) argue that increased competition led rating agencies to adopt more issuer-friendly ratings over time. Empirical support for the alternative view that reputational concerns of bond rating agencies motivate them to issue "accurate" ratings is provided in Covitz and Harrison (2003).

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capital allocation decisions based on these ratings, and ultimately failed, rating agencies have even been accused of causing the crisis (see, e.g., Partnoy (2009)).

In this paper, we study the changes in the standards applied by rating agencies over time, and the consequences of these changes for corporate behavior and debt pricing. We examine corporate debt ratings, not the ratings of mortgage-backed securities or collateralized debt obligations. For corporate debt ratings, we find no evidence that rating agencies have reduced their standards. On the contrary, we find that rating agencies have become more conservative over time. This phenomenon was first documented by Blume, Lim, and MacKinlay (1998) for the period 1978 to 1995. We show that this trend has continued until at least 2009. This increased conservatism is not only important statistically, but is also large economically. For example, a firm with a AAA rating in 1985 would only qualify for a AA− rating by 2009, holding all the determinants of the rating constant, while a firm with a BBB rating in 1985 would have lost its investment grade rating 20 years later.

After establishing that rating standards have tightened over time, we study the implications of this increased conservatism. It is entirely possible that the increased stringency applied by rating agencies is warranted given changes in the macroeconomic environment and their effects on default risk. If this were the case, we should not observe a change in default rates over time for firms with the same credit rating. On the other hand, if the increased conservatism is unwarranted and does not represent increased default risk, we should see a decline in defaults by rating category. This is indeed what we observe; studying default rates across Moody's rating categories, we find a significant decline in defaults over our sample period for both investment grade and noninvestment grade issuers.[2]

Next, we investigate the impact of this increased ratings conservatism on corporate behavior. In particular, we focus on (i) capital structure, (ii) the decision to access the public bond market, and (iii) cash holdings, growth, and investment.

With respect to capital structure, we argue that, if the change in rating standards over time is deemed unwarranted by companies, then those companies that suffered the most from increased conservatism should issue less debt and have lower leverage over time. To test this conjecture, we employ the ratings model estimated over the period 1985 to 1996 to predict ratings over the period 1997 to 2009, and compute the difference between the firm's actual and predicted ratings as our measure of conservatism. We find that this difference explains capital structure decisions: if actual ratings are one notch below predicted ratings (where a notch is a one-step change in the rating, say from BBB to BBB−), firms' debt issuances as a fraction of assets decrease by 8% relative to the sample average of 2.6%. Such firms then end up with lower leverage. This, to our knowledge, previously undocumented impact of increased ratings

[2] Of course, a third possibility is that rating agencies were too lenient to start with, and that defaults declined as this leniency was rectified. We address this alternative in our investigation of debt pricing.

stringency on firms' capital structure choices adds to our understanding of why a considerable number of firms appear to have insufficient leverage, given the large tax benefits of debt (see, e.g., Graham (2000)).

Turning to the decision to access the public bond market, we first show that, holding firm characteristics constant, the likelihood of obtaining a bond rating has declined over time. Of course, this observation in and of itself does not establish that conservatism is causing firms to opt out of the bond market. To provide more direct evidence that conservatism impacts firms' decisions to obtain a rating, we examine whether firms that would have suffered the most from ratings conservatism are less likely to access the public bond market. We find strong evidence that this is the case.

We also report that firms affected more by conservatism hold more cash and experience slower growth. The impact on various measures of investment is modest, except for the level of cash acquisitions, for which we find a substantial negative impact of conservatism.

In the final set of analyses, we turn our attention to the impact of conservatism on debt pricing. If conservatism is deemed unwarranted, we would expect it to be reflected in debt spreads. To test this hypothesis, we estimate regression models of debt yield spreads for our sample firms over the period 1997 to 2009. Not surprisingly, debt yields increase as actual bond ratings worsen. Interestingly, however, our measure of conservatism (the difference between actual and predicted issuer ratings using the 1985–1996 model) also matters for bond yields: firms whose ratings were affected more by increased ratings conservatism have lower spreads, holding the actual rating constant. Of course, if capital markets completely undid the ratings conservatism effect, firms would have little need to take it into account in their financing decisions. We find that this is not the case; capital markets only *partially* internalize the increased ratings stringency. Our spread results are also inconsistent with the interpretation that ratings were too lenient to begin with and that this leniency was rectified over time; if this were the case, then the predicted rating based on the old, supposedly lenient, model should not affect debt pricing once the actual bond rating has been controlled for.

Overall, our evidence is consistent with the view that the increased conservatism of rating agencies is not deemed to be fully warranted, as reflected in default rates, capital structure decisions, and debt pricing. These findings are in sharp contrast to work on the ratings of asset-backed securities, which suggests that the ratings have become more inflated over time (see, e.g., Pagano and Volpin (2010)). Both the work on ratings inflation and our work on conservatism suggest that there may be problems in the way credit ratings are assigned, which requires further investigation. This theme is also discussed by Bolton, Freixas, and Shapiro (2012), who show theoretically how various conflicts of interest between issuers, rating agencies, and investors can lead to distortions in the assignment of ratings. Opp, Opp, and Harris (2013) demonstrate that differences in regulatory reliance on ratings across various instruments and differences in the complexity of instruments can explain why there was ratings inflation in structured products but not in corporate ratings. Thus, while their model cannot explain the increased conservatism reported in this paper, it can explain why some securities are more subject to ratings inflation than traditional corporate bonds.

Our paper contributes to the growing empirical evidence on the time-series variation in rating standards. Jorion, Shi, and Zhang (2008), and Alp (2010) also show that rating standards have tightened over time. However, they do not explore the consequences of this result for default rates, capital structure, growth, and debt spreads. Becker and Milbourn (2011) find that Standard and Poor's and Moody's relaxed their rating standards as Fitch gained market share over the period 1995 to 2006. While this finding may appear at odds with our results, this is not the case because Becker and Milbourn include year dummies in all specifications, thereby eliminating the effect of conservatism from their findings. Thus, their findings are complementary to ours. Finally, Jiang, Stanford, and Xie (2012) find that Standard and Poor's assigned better ratings in 1974 after it switched from the investor-pay to the issuer-pay model.

Our results do not imply that the role of credit rating agencies as intermediaries in financial markets is unimportant. The literature has highlighted three important functions for agencies: (1) efficient aggregation and dissemination of information (e.g., Millon and Thakor (1985)); (2) certification, employed mainly for capital allocation and regulatory purposes (e.g., Bank for International Settlements (2000) and Securities and Exchange Commission (2003)); and (3) monitoring (e.g., Boot, Milbourn, and Schmeits (2006)). Extant research indicates that ratings are useful in debt pricing and that changes in ratings convey information to capital markets (e.g., Hand, Holthausen, and Leftwich (1992), Kliger and Sarig (2000)). However, other work also suggests that debt yields are influenced by factors other than ratings (e.g., Campbell and Taksler (2003)), and that rating agencies make infrequent changes to their ratings, often only after some relevant information regarding the change in credit quality has been released to the public (e.g., Pinches and Singleton (1978)). Our findings indicate that market participants view conservatism as an additional factor to take into account when pricing debt, although firms behave as if these adjustments to yields are insufficient.[3] Thus, while investors deem ratings to be conservative, ratings do have information content.

The remainder of this paper is organized as follows. In Section I, we discuss the ratings data employed in this study. In Section II, we estimate our ratings regression models, and document that ratings have become more conservative over time. Sections III, IV, V, and VI study the impact of this increased conservatism on default rates, firms' capital structure decisions, growth and investment, and debt spreads, respectively. In Section VII, we present robustness tests based on a decomposition of our measure of conservatism. Section VIII concludes.

[3] The notion that rating agencies are becoming more conservative was also discussed in a report distributed by J.P. Morgan to investment banking clients (Zenner et al. (2008)) in which the authors argue that "Rating agencies appear to have become more conservative over time, [. . .] As a result, firms may have to improve credit metrics merely to maintain their current ratings" (p. 8).

I. Data

From the Compustat Ratings File, we gather monthly data on debt ratings issued by Standard & Poor's over the period 1985 to 2009 for all rated firms. We employ the domestic long-term issuer credit rating, which is the rating typically used in prior work (see, e.g., Kisgen (2006)). We remove financials (SIC 6000–6999), utilities (SIC 4900–4999), and governmental and quasi-governmental enterprises (SIC 9000 and above) from the sample. We have also repeated our analyses using Moody's and Fitch's senior unsecured bond ratings obtained from the Mergent FISD database and our findings persist. This is not surprising given the high correlation between the bond ratings assigned by different agencies; across the three sets of agencies, the correlations are 0.94 over the period 1995 to 2009. Moreover, the correlations remain very high throughout the sample period, and the incidence of so-called split ratings, where the agencies issue different ratings, is relatively modest (see also Jewell and Livingston (1998) and Bongaerts, Cremers, and Goetzmann (2012)).

S&P's ratings fall into 21 categories: AAA, AA+, AA, AA−, A+, A, A−, BBB+, BBB, BBB−, BB+, BB, BB−, B+, B, B−, CCC+, CCC, CCC−, CC, and C. The lower the rating, the higher the expected default risk. Firms rated BBB− and above are often called investment grade firms, while firms rated below BBB− are called noninvestment grade or junk-rated firms.

We match the ratings data with annual financial statement data from Compustat. To make sure that these data are available to the rating agencies at the time the rating is issued, we match the rating with financial statement data lagged by three months (our findings are unaffected if we apply different lags or match with contemporaneous accounting data). We keep one observation per firm-year, namely the one that corresponds to the first rating available three months after the fiscal year-end. Table I contains the distribution of ratings in our sample on an annual basis. For ease of presentation, we combine all the "+" and "−" ratings with the middle rating; for example, the AA category contains firms rated AA+, AA, and AA−. Note that there has been a substantial decline in the fraction of firms with AAA, AA, or A ratings, while the fraction of firms with BBB and BB ratings has increased. This trend appears to suggest that the credit quality of U.S. corporate debt issuers has worsened over time. As we propose in this paper, a complementary explanation for this trend is that rating agencies have become more conservative.

To estimate regression models, we translate the alphanumeric ratings into a numerical scale by adding one for each rating notch. Thus, a AAA rating becomes 1, AA+ becomes 2, AA becomes 3, etc., up to a score of 21 for a rating of C.

II. Ratings Results

A. Variables Employed in the Ratings Model

The first step in our analysis is to estimate a ratings model. In selecting the explanatory variables, we rely on prior literature as well as industry practice

Table I

Number of Companies by Year and S&P Rating Category

This table contains the distribution of ratings for our sample firms over time. The ratings have been obtained from the Compustat Ratings File.

	Rating									
Year	AAA	AA	A	BBB	BB	B	CCC	CC	C	Total
1985	26	98	166	104	100	129	5	1	0	629
1986	30	110	201	150	165	253	42	0	0	951
1987	32	111	194	142	183	284	44	1	0	991
1988	35	88	208	146	167	293	32	0	0	969
1989	36	84	199	149	166	273	33	0	1	941
1990	34	86	194	158	151	206	38	3	1	871
1991	33	87	200	163	158	171	34	10	0	856
1992	32	85	200	193	183	170	27	8	0	898
1993	29	84	204	207	232	195	14	1	0	966
1994	28	83	200	227	254	216	17	0	1	1,026
1995	30	75	225	241	269	234	18	0	0	1,092
1996	28	86	227	279	296	267	16	3	0	1,202
1997	26	84	232	319	334	323	12	2	0	1,332
1998	25	82	240	351	379	368	30	7	0	1,482
1999	18	69	216	374	385	421	36	9	0	1,528
2000	14	51	237	378	374	422	45	7	0	1,528
2001	13	47	221	389	375	375	61	12	0	1,493
2002	11	41	214	381	390	337	72	16	0	1,462
2003	11	38	201	376	407	382	60	6	0	1,481
2004	9	37	198	371	431	376	42	4	0	1,468
2005	9	34	197	355	416	363	46	2	0	1,422
2006	9	34	170	342	391	393	36	2	0	1,377
2007	7	32	162	321	363	359	25	4	0	1,273
2008	7	31	152	314	324	328	50	12	0	1,218
2009	5	32	147	316	303	330	43	4	0	1,180
Total	537	1,689	5,005	6,746	7,196	7,468	878	114	3	29,636

(see the description of the variables employed in the rating process followed by Standard and Poor's (2008)). In our base-case model, we employ the following explanatory variables: (1) long- and short-term debt divided by total assets (*Book_Lev*), (2) convertible debt divided by total assets (*ConvDe/Assets*), (3) rental payments divided by total assets (*Rent/Assets*), (4) cash and marketable securities divided by total assets (*Cash/Assets*), (5) long- and short-term debt divided by EBITDA (*Debt/EBITDA*), (6) EBITDA to interest payments (*Int-Cov*), (7) profitability, measured as EBITDA divided by sales (*Profit*), (8) the volatility of profitability (*Vol*), (9) the log of the book value of assets, in constant 2005 dollars (*Size*), (10) tangibility, measured as net property, plant, and equipment divided by total assets *(PPE / Assets)*, (11) capital expenditures divided by total assets *(CAPEX/Assets)*, (12) the firm's beta (*Beta*), which is the stock's Dimson beta computed using a market-model regression with daily returns estimated annually using the CRSP value-weighted index, and (13) the firm's idiosyncratic risk, computed annually as the root mean squared error from a regression of daily stock returns on the CRSP value-weighted index returns. As in Blume, Lim, and MacKinlay (1998), we standardize beta and idiosyncratic risk each year by dividing them annually by their sample averages.[4]

When the ratio of long- and short-term debt to EBITDA is negative, we set it equal to zero, but include a dummy variable equal to one if this ratio is negative, and zero otherwise (*Neg. Debt/EBITDA*). We follow this approach because large ratios of debt to EBITDA increase default risk while small ratios decrease default risk. When EBITDA is negative, the ratio becomes negative, while default risk actually increases further. It is therefore important to take this discontinuity at zero into account. Some firms with zero interest payments do have a debt rating and are included in our analysis. For these firms, we set the ratio of EBITDA to interest payments equal to the 99th percentile of the distribution. Finally, the volatility of profitability is computed using the current year's data as well as the four previous years' data. It is set equal to missing if fewer than two observations are available.

All explanatory variables are winsorized at the 99th percentile; profitability, interest coverage, the volatility of profitability, beta, and idiosyncratic risk are also winsorized at the 1st percentile (the minimum of the other explanatory variables is zero). Beta and idiosyncratic risk are winsorized prior to standardizing to mitigate the impact of outliers. Table II contains the annual equally weighted means of the rating variable and our explanatory variables over the sample period for firms with available ratings data (the patterns are similar when we value weight by sales as reported in the Internet Appendix or by market capitalization).[5] We do not include beta or idiosyncratic risk in this table as they are both standardized to average 1 for each year in our sample. Average ratings worsen over the sample period, increasing from 8.66 (close to BBB) in 1985 to 11.31 (close to BB+) in 2009. In terms of the explanatory variables, we find an increase in interest coverage and cash holdings over time (see also Bates, Kahle, and Stulz (2009)), and a decline in asset tangibility, capital expenditures, and convertible debt.

B. Estimation of Ratings Models

Panel A of Table III contains the base-case regression models estimated over the entire 1985 to 2009 sample period. In addition to the explanatory variables described, in some specifications we include industry dummies defined at the three-digit SIC code level. These are the historical SIC codes as reported in

[4] Our results are very similar if we do not standardize beta and idiosyncratic risk, except that we observe a modest decline in conservatism at the end of our sample period. This is due to the increase in share price volatility around the financial crisis. All other findings reported in the paper continue to hold using these alternative measures of beta and volatility. Note that, as in Blume, Lim, and MacKinlay (1998), we do not subtract the mean and then divide by the cross-sectional standard deviation when standardizing idiosyncratic risk and beta. Our results are similar if we do standardize in this way.

[5] The Internet Appendix may be found in the online version of this article.

Table II
Summary Statistics: Ratings Regressions

This table presents annual averages of the variables employed in the ratings regressions. *Rating*, the dependent variable, is the numerical equivalent of the rating where AAA is 1, AA+ is 2, AA is 3, etc. *IntCov* is EBITDA/Interest Expenses, *Profit* is EBITDA divided by sales, *Book_Lev* is long- and short-term debt divided by total assets, *Size* is the log of the book value of assets in constant 2005 dollars, *Debt/EBITDA* is long- and short-term debt divided by EBITDA, *Neg. Debt/EBITDA* is an indicator variable set equal to one if EBITDA is negative and zero otherwise, *Vol* is the volatility of profitability, computed using the current year's data as well as the four previous years' (at least two years of data are required in its computation), *Cash/Assets* is cash and marketable securities divided by total assets, *ConvDe/Assets* is convertible debt divided by total assets, *Rent/Assets* is rental payments divided by total assets, *PPE/Assets* is net property, plant, and equipment divided by total assets, and *CAPEX/Assets* is capital expenditures divided by total assets. When the ratio of long-term debt and short-term debt to EBITDA is negative, we set it equal to zero. For firms with zero interest payments we set *IntCov* equal to the 99th percentile of its distribution. All explanatory variables except for *Size* and *Neg. Debt / EBITDA* are winsorized at the 99th percentile; profitability, interest coverage, and the volatility of profitability are also winsorized at the 1st percentile.

Year	*Rating*	*IntCov*	*Profit*	*Book_Lev*	*Size*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*Vol*	*Cash/ Assets*	*ConvDe/ Assets*	*Rent/ Assets*	*PPE/ Assets*	*CAPEX/ Assets*
1985	8.658	7.328	0.172	0.326	7.469	3.611	0.034	0.036	0.077	0.043	0.018	0.475	0.087
1986	9.830	6.865	0.151	0.366	7.177	3.825	0.057	0.049	0.088	0.057	0.020	0.422	0.080
1987	10.085	6.594	0.165	0.387	7.224	3.773	0.045	0.046	0.088	0.062	0.020	0.406	0.075
1988	10.029	6.124	0.169	0.400	7.387	4.004	0.031	0.045	0.075	0.053	0.021	0.406	0.077
1989	10.020	5.684	0.165	0.417	7.500	3.827	0.039	0.047	0.069	0.047	0.021	0.413	0.075
1990	9.742	5.735	0.167	0.411	7.629	3.792	0.030	0.040	0.064	0.042	0.021	0.420	0.076
1991	9.586	5.690	0.162	0.399	7.649	3.995	0.030	0.036	0.064	0.041	0.022	0.430	0.070
1992	9.561	6.769	0.160	0.389	7.632	3.893	0.027	0.033	0.064	0.043	0.023	0.435	0.069
1993	9.637	7.607	0.165	0.378	7.621	3.698	0.025	0.037	0.070	0.045	0.022	0.433	0.072
1994	9.844	8.144	0.169	0.381	7.605	3.675	0.031	0.041	0.064	0.040	0.021	0.425	0.075
1995	9.864	7.998	0.177	0.386	7.624	3.429	0.030	0.046	0.066	0.033	0.021	0.414	0.078

(*Continued*)

Table II—*Continued*

Year	*Rating*	*IntCov*	*Profit*	*Book_Lev*	*Size*	*Debt/ EBITDA*	*Neg. Debt/ EBITDA*	*Vol*	*Cash/ Assets*	*ConvDe/ Assets*	*Rent/ Assets*	*PPE/ Assets*	*CAPEX/ Assets*
1996	10.010	8.183	0.172	0.386	7.626	3.545	0.039	0.047	0.066	0.031	0.020	0.413	0.080
1997	10.232	8.585	0.178	0.404	7.605	3.646	0.047	0.057	0.072	0.035	0.019	0.404	0.085
1998	10.489	7.666	0.159	0.437	7.636	4.018	0.052	0.060	0.068	0.031	0.020	0.392	0.084
1999	10.837	6.713	0.162	0.451	7.629	4.391	0.062	0.066	0.070	0.032	0.020	0.375	0.072
2000	10.923	7.252	0.164	0.431	7.752	3.826	0.076	0.072	0.073	0.034	0.020	0.366	0.071
2001	10.967	7.700	0.163	0.423	7.799	4.166	0.060	0.060	0.075	0.032	0.021	0.368	0.066
2002	11.060	8.390	0.169	0.414	7.822	3.950	0.043	0.053	0.081	0.030	0.022	0.366	0.054
2003	11.158	9.616	0.174	0.397	7.879	3.963	0.029	0.049	0.089	0.032	0.022	0.359	0.050
2004	11.103	12.158	0.185	0.375	7.980	3.370	0.012	0.045	0.096	0.031	0.021	0.341	0.052
2005	11.127	13.000	0.187	0.358	8.029	3.306	0.016	0.042	0.096	0.027	0.020	0.326	0.057
2006	11.250	13.062	0.191	0.355	8.095	3.159	0.015	0.038	0.091	0.025	0.019	0.328	0.063
2007	11.186	11.717	0.191	0.362	8.250	3.285	0.023	0.038	0.086	0.024	0.018	0.330	0.065
2008	11.363	11.867	0.175	0.383	8.303	3.388	0.049	0.045	0.086	0.024	0.020	0.338	0.067
2009	11.305	10.457	0.171	0.366	8.322	3.761	0.048	0.049	0.106	0.022	0.020	0.344	0.051
Mean	10.526	8.688	0.171	0.394	7.762	3.733	0.039	0.048	0.079	0.035	0.020	0.382	0.069
N	29,636	29,046	29,274	29,352	29,447	29,206	29,206	28,911	29,419	29,446	29,447	29,361	29,000

Table III

Ratings Models

Panel A reports the coefficients for regression models of credit ratings. Models (1) and (3) are OLS regressions with industry dummies based on three-digit SIC codes; models (2) and (4) are ordered logit regressions with industry dummies; and models (5) to (8) are OLS regressions with firm dummies. *Beta* is the stock's Dimson-adjusted beta (one lead and one lag term) computed with daily returns; *Idio. Risk* is the root mean squared error from a regression of daily stock returns on CRSP value weighted index returns. These two variables are standardized by dividing them by their annual cross-sectional means. *Beta* and *Idio. Risk* are winsorized at their 1st and 99th percentiles prior to standardization. *Infl. Rate* is the inflation rate (in %) from the Bureau of Labor Statistics Consumer Price Index (All Urban Consumers); *GDP Growth* is the real GDP growth (in %) from the Bureau of Economic Analysis; *TS Slope* is the slope of the term structure (in %), computed as the yield on the constant maturity 10-year Treasury bond minus the yield on the constant-maturity three-month T-bill, both from the Fed; *TED spread* (in %) is computed as the three-month LIBOR (from Bank of England) minus the three-month constant-maturity T-bill rate; *P/E* is the aggregate price-to-earnings ratio based on the previous year's earnings (from Shiller); and *VIX* is the annual average of the market volatility index, from CBOE (available from 1986). *Linear Trend* takes the value of 0 in 1986, 1 in 1987, 2 in 1988, 3 in 1989, etc. All other variables are described in Table II. The sample in columns (1) to (6) is from 1985 to 2009, while in columns (7) and (8) it is from 1986 to 2009. Standard errors are clustered at the firm level in columns (1) to (6) and clustered at the year level in columns (7) and (8), and are robust to heteroskedasticity and autocorrelation. p-values are reported in parentheses next to the coefficients. Panel B reports the marginal effects for the ordered logit regression in specification (4) of Panel A. We compute the probability that a firm obtains various ratings in 1985 and in 2009, setting all its characteristics equal to the sample mean.

Panel A: Ratings Regressions

	(1) OLS	(2) Ord. Logit	(3) OLS	(4) Ord. Logit	(5) OLS	(6) OLS	(7) OLS	(8) OLS
IntCov	−0.034 (<0.01)	−0.024 (<0.01)	−0.032 (<0.01)	−0.026 (<0.01)	−0.017 (<0.01)	−0.017 (<0.01)	−0.016 (<0.01)	−0.017 (<0.01)
Profit	−1.620 (<0.01)	−1.655 (<0.01)	−0.635 (0.07)	−0.962 (<0.01)	−0.617 (0.05)	−0.672 (0.05)	−0.776 (0.01)	−0.735 (0.01)
Book_Lev	3.548 (<0.01)	3.409 (<0.01)	2.538 (<0.01)	2.706 (<0.01)	2.965 (<0.01)	2.685 (<0.01)	2.505 (<0.01)	2.531 (<0.01)
Size	−1.246 (<0.01)	−1.058 (<0.01)	−1.144 (<0.01)	−1.055 (<0.01)	−1.028 (<0.01)	−0.976 (<0.01)	−0.949 (<0.01)	−0.958 (<0.01)
Debt / EBITDA	0.131 (<0.01)	0.132 (<0.01)	0.090 (<0.01)	0.105 (<0.01)	0.058 (<0.01)	0.040 (<0.01)	0.039 (<0.01)	0.041 (<0.01)
Neg. Debt / EBITDA	1.255 (<0.01)	1.473 (<0.01)	0.617 (<0.01)	0.983 (<0.01)	0.901 (<0.01)	0.469 (<0.01)	0.450 (<0.01)	0.468 (<0.01)
Vol	2.385 (<0.01)	2.597 (<0.01)	1.392 (<0.01)	1.920 (<0.01)	0.803 (0.05)	0.635 (0.14)	0.569 (0.04)	0.673 (0.01)
Cash/Assets	0.664 (0.06)	0.556 (0.06)	0.189 (0.58)	0.307 (0.32)	−0.198 (0.50)	−0.028 (0.93)	0.242 (0.30)	0.177 (0.33)
ConvDe/Assets	1.778 (<0.01)	1.236 (<0.01)	1.648 (<0.01)	1.619 (<0.01)	0.672 (0.06)	0.505 (0.13)	0.650 (<0.01)	0.559 (<0.01)
Rent/Assets	5.131 (<0.01)	5.666 (<0.01)	4.330 (<0.01)	5.278 (<0.01)	2.568 (0.18)	1.832 (0.34)	1.596 (0.08)	1.296 (0.15)
PPE/Assets	−1.718 (<0.01)	−1.288 (<0.01)	−0.500 (0.06)	−0.420 (0.09)	−0.768 (0.02)	−0.944 (0.01)	−1.037 (<0.01)	−0.980 (<0.01)
CAPEX/Assets	−2.538 (<0.01)	−2.816 (<0.01)	−3.189 (<0.01)	−3.456 (<0.01)	−4.804 (<0.01)	−3.910 (<0.01)	−3.960 (<0.01)	−4.042 (<0.01)
Beta			0.362 (<0.01)	0.243 (<0.01)		0.079 (<0.01)	0.084 (0.01)	0.083 (0.01)

(Continued)

Table III—*Continued*

Panel A: Ratings Regressions								
	(1) OLS	(2) Ord. Logit	(3) OLS	(4) Ord. Logit	(5) OLS	(6) OLS	(7) OLS	(8) OLS
Idio. Risk			1.806 (<0.01)	2.203 (<0.01)		1.165 (<0.01)	1.199 (<0.01)	1.172 (<0.01)
Linear Trend							0.129 (<0.01)	0.137 (<0.01)
Infl. Rate								0.071 (0.11)
GDP Growth								−0.010 (0.57)
TS Slope								0.036 (0.24)
TED Spread								0.011 (0.64)
P/E								−0.006 (0.36)
VIX								0.001 (0.90)
1986	0.334 (<0.01)	0.232 (<0.01)	0.345 (<0.01)	0.357 (<0.01)	0.163 (0.02)	0.228 (<0.01)		
1987	0.565 (<0.01)	0.416 (<0.01)	0.539 (<0.01)	0.536 (<0.01)	0.368 (<0.01)	0.437 (<0.01)		
1988	0.614 (<0.01)	0.485 (<0.01)	0.427 (<0.01)	0.462 (<0.01)	0.521 (<0.01)	0.474 (<0.01)		
1989	0.728 (<0.01)	0.557 (<0.01)	0.495 (<0.01)	0.509 (<0.01)	0.597 (<0.01)	0.497 (<0.01)		
1990	0.760 (<0.01)	0.591 (<0.01)	0.482 (<0.01)	0.476 (<0.01)	0.703 (<0.01)	0.619 (<0.01)		
1991	0.705 (<0.01)	0.509 (<0.01)	0.385 (<0.01)	0.322 (<0.01)	0.712 (<0.01)	0.638 (<0.01)		
1992	0.736 (<0.01)	0.540 (<0.01)	0.492 (<0.01)	0.456 (<0.01)	0.694 (<0.01)	0.656 (<0.01)		
1993	0.841 (<0.01)	0.648 (<0.01)	0.693 (<0.01)	0.643 (<0.01)	0.685 (<0.01)	0.730 (<0.01)		
1994	1.047 (<0.01)	0.818 (<0.01)	0.927 (<0.01)	0.855 (<0.01)	0.802 (<0.01)	0.876 (<0.01)		
1995	1.101 (<0.01)	0.875 (<0.01)	1.027 (<0.01)	0.959 (<0.01)	0.900 (<0.01)	0.983 (<0.01)		
1996	1.242 (<0.01)	0.986 (<0.01)	1.150 (<0.01)	1.097 (<0.01)	0.989 (<0.01)	1.084 (<0.01)		
1997	1.378 (<0.01)	1.069 (<0.01)	1.347 (<0.01)	1.255 (<0.01)	1.024 (<0.01)	1.159 (<0.01)		
1998	1.379 (<0.01)	1.045 (<0.01)	1.435 (<0.01)	1.308 (<0.01)	1.062 (<0.01)	1.209 (<0.01)		
1999	1.570 (<0.01)	1.204 (<0.01)	1.605 (<0.01)	1.446 (<0.01)	1.220 (<0.01)	1.347 (<0.01)		
2000	1.938 (<0.01)	1.517 (<0.01)	1.976 (<0.01)	1.801 (<0.01)	1.547 (<0.01)	1.687 (<0.01)		
2001	2.092 (<0.01)	1.621 (<0.01)	2.058 (<0.01)	1.849 (<0.01)	1.788 (<0.01)	1.875 (<0.01)		
2002	2.303 (<0.01)	1.783 (<0.01)	2.194 (<0.01)	1.980 (<0.01)	2.005 (<0.01)	2.060 (<0.01)		
2003	2.574 (<0.01)	2.037 (<0.01)	2.436 (<0.01)	2.230 (<0.01)	2.197 (<0.01)	2.233 (<0.01)		
2004	2.912 (<0.01)	2.342 (<0.01)	2.712 (<0.01)	2.479 (<0.01)	2.429 (<0.01)	2.449 (<0.01)		
2005	3.097 (<0.01)	2.520 (<0.01)	2.878 (<0.01)	2.645 (<0.01)	2.624 (<0.01)	2.609 (<0.01)		
2006	3.341 (<0.01)	2.749 (<0.01)	3.117 (<0.01)	2.892 (<0.01)	2.822 (<0.01)	2.798 (<0.01)		

(Continued)

Table III—*Continued*

Panel A: Ratings Regressions

	(1) OLS	(2) Ord. Logit	(3) OLS	(4) Ord. Logit	(5) OLS	(6) OLS	(7) OLS	(8) OLS
2007	3.409 (<0.01)	2.811 (<0.01)	3.155 (<0.01)	2.944 (<0.01)	2.889 (<0.01)	2.841 (<0.01)		
2008	3.486 (<0.01)	2.860 (<0.01)	3.288 (<0.01)	3.091 (<0.01)	3.039 (<0.01)	3.002 (<0.01)		
2009	3.354 (<0.01)	2.791 (<0.01)	3.124 (<0.01)	2.967 (<0.01)	2.927 (<0.01)	2.869 (<0.01)		
Industry dummies	Y	Y	Y	Y	N	N	N	N
Firm dummies	N	N	N	N	Y	Y	Y	Y
Observations	28,092	28,092	22,705	22,705	28,092	22,705	22,228	22,228
Number of firms	3,612	3,612	2,906	2,906	3,612	2,906	2,869	2,869
Adj. R^2	0.704	–	0.741	–	0.902	0.903	0.903	0.904
Pseudo R^2	–	0.235	–	0.269	–	–	–	–

Panel B: Marginal Effects of Ordered Logit Model

Rating	Probability in 1985	Probability in 2009
AAA	0.24%	0.01%
AA+	0.14%	0.01%
AA	0.79%	0.04%
AA−	1.18%	0.06%
A+	3.38%	0.19%
A	9.61%	0.61%
A−	11.54%	0.93%
BBB+	17.42%	2.08%
BBB	22.64%	5.51%
BBB−	14.66%	9.15%
BB+	7.47%	10.98%
BB	6.39%	22.46%
BB−	3.29%	28.33%
B+	1.06%	16.16%
B	0.15%	2.74%
B−	0.03%	0.59%
CCC+	0.01%	0.10%
CCC	0.00%	0.03%
CCC−	0.00%	0.01%
CC	0.00%	0.00%
C	0.00%	0.00%

Compustat. When historical SIC codes are not available, we backfill the data with the first available SIC code. The standard errors in models (1) through (6) are clustered at the firm level and are robust to heteroskedasticity and autocorrelation.

We first estimate models using only the explanatory variables obtained from Compustat to maximize the number of observations available for estimation. Model (1) is estimated using OLS, while model (2) is estimated using ordered logit. The benefit of ordered logit is that it does not assume that each rating notch represents the same increase in a firm's rating; higher numbers are considered worse ratings, but the exact magnitude of the ratings number is irrelevant. We also report OLS models, however, because some of our subsequent models employ firm fixed effects to control for unobservable firm-specific heterogeneity, and estimating ordered response models with firm fixed effects would result in biased and inconsistent point estimates (due to the incidental parameter problem). In addition, it is more straightforward to study economic significance based on OLS models.

All the explanatory variables are statistically significant and have the expected sign, with the exception of the cash ratio. Firms have worse credit ratings when they have more debt of various kinds, pay higher rents, have lower interest cover, are less profitable, have more volatile profits, are smaller, hold more cash, have fewer tangible assets, have lower capital expenditures, and have negative debt to EBITDA ratios. These findings are broadly consistent with the prior literature. While the impact of cash holdings on debt ratings appears counterintuitive, it is consistent with the theoretical and empirical work in Acharya, Davydenko, and Strebulaev (2012), who argue that firms with higher default risk in the long run are more likely to save cash.[6]

From our perspective, the key variables are the year dummies. We have removed the indicator for 1985 from the analysis, so the year dummies measure the increase in the rating variable (the decline in ratings quality) with respect to that year. All the year dummies are positive, and statistically significant, and they increase over time, implying tougher credit rating standards over our sample period.

In models (3) and (4), we add beta and idiosyncratic risk as explanatory variables. Because not all Compustat firms are covered by CRSP, we lose approximately 5,000 firm-years in this estimation. Both sources of risk have a positive and significant coefficient, implying that higher levels of risk lead to lower credit ratings. However, their inclusion has little impact on the magnitude of the year dummies: the year dummies remain statistically significant and economically large. Based on model (3), there is an immediate decline in credit ratings in 1986, when ratings worsen by 0.35 notches compared to 1985. The effect generally increases over time to approximately one notch by 1995, two notches by 2001, three by 2006, and 3.12 by 2009, the final year in our sample period. Thus, holding a firm's characteristics constant, a AAA firm in

[6] In addition, the impact of cash becomes insignificant when we control for beta and idiosyncratic risk as well as in models estimated with firm fixed effects (discussed subsequently).

1985 would be rated AA− by 2009, and a BBB-rated firm in 1985 would have lost its investment grade rating by 2009. For the ordered logit regression in model (4), we illustrate the economic significance by computing the probability that a firm whose characteristics are at the sample means obtains various ratings in 1985 and in 2009. These numbers are reported in Panel B of Table III. There is a dramatic shift in the distribution of predicted ratings. For example, the probability that an average firm receives an A rating declines from 9.6% in 1985 to only 0.6% in 2009. On the other hand, while the same firm only had an 18.4% chance of being noninvestment grade in 1985 (computed by summing all noninvestment grade probabilities), by 2009 the likelihood of being noninvestment grade increased to 81.4% for the average firm.[7]

While the explanatory variables employed in models (1) through (4) are quite comprehensive, rating agencies stress the fact that ratings are also based on qualitative criteria, which we are unable to observe. One way to assess whether omitted firm-specific variables are driving our findings is to include firm fixed effects in our models. Such a specification assumes that any unobserved firm-specific factors are constant over the sample period. We report two specifications (models (5) and (6) in Panel A of Table III), both estimated using OLS with firm fixed effects. Model (5) excludes beta and idiosyncratic risk as explanatory variables while model (6) includes both measures of risk. In general, the explanatory variables have the same sign as in the models estimated with industry fixed effects, although the magnitude and statistical significance of some of the coefficients is reduced. Interestingly, the magnitude of the coefficients on the year dummies is very similar in the firm fixed effects models compared to the models with industry dummies. We continue to find that the debt ratings have become more conservative over time for the average firm. In 2009, ratings are more than three notches worse than in 1985, holding everything else constant.

Figure 1 plots the coefficients on the year dummies from our OLS model specifications (1), (3), (5), and (6). The upward trend in the coefficients on the annual intercepts, implying more stringent rating standards over the sample period, is strikingly evident.

In recent papers, Jorion, Shi, and Zhang (2008) and Alp (2010) also show that rating standards have tightened over time. However, Jorion, Shi, and Zhang (2008) find that this phenomenon is only present for investment grade firms, while Alp (2010) finds that the tightening of standards for noninvestment grade firms occurs after 2001. When we estimate separate models for noninvestment grade firms *without* firm fixed effects, we find results similar to Alp. However, for models estimated *with* firm fixed effects, ratings become significantly stricter for noninvestment grade firms starting in 1986, the same year as for

[7] These probabilities are computed by setting all the explanatory variables, including the industry dummies, equal to their sample means over the entire sample period. As such, they refer to the average firm over the sample period. Such characteristics were obviously unknown in 1985. Using the characteristics of the average firm in 1985 yields similar insights.

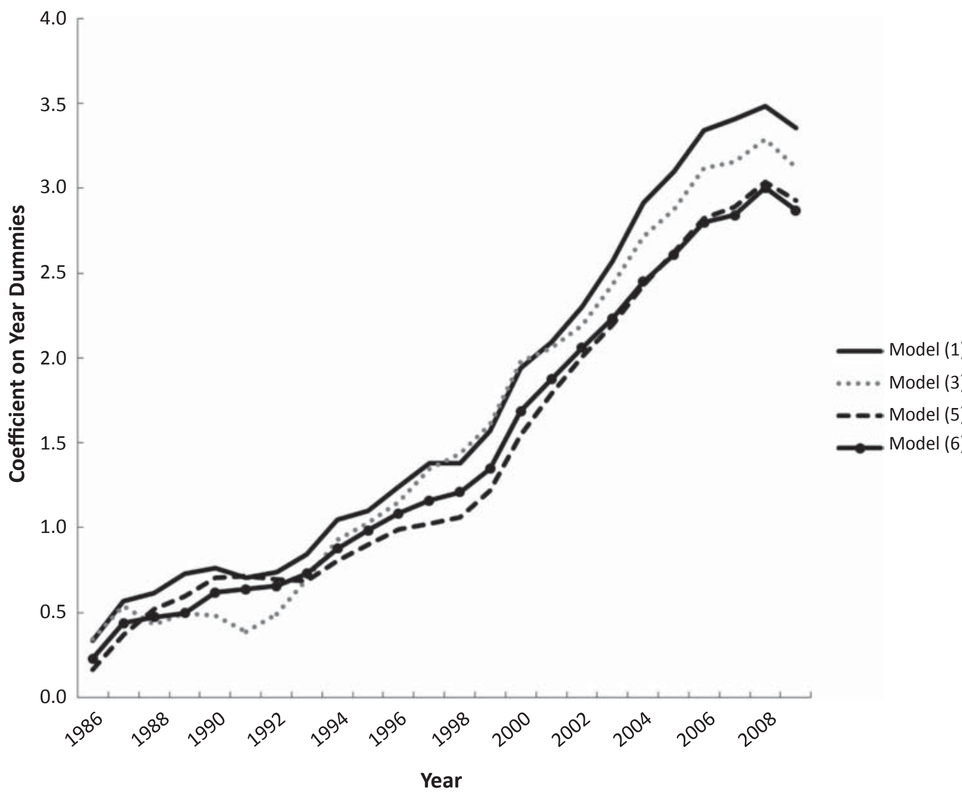


Figure 1. Plot of coefficients on year dummies in ratings model. This figure plots over time the coefficients of the year dummies from models (1), (3), (5), and (6) of Panel A of Table III. These models are estimated using OLS. Models (1) and (3) are estimated with industry fixed effects (three-digit SIC codes) and models (5) and (6) are estimated with firm fixed effects; *Beta* and *Idiosyncratic Risk* are excluded as explanatory variables in models (1) and (5), and included in models (3) and (6).

investment grade firms. Hence, increased ratings conservatism applies to firms throughout the ratings spectrum.[8]

C. Robustness of the Ratings Model

We next estimate a variety of additional specifications of the basic ratings model. None of these alternative specifications materially affect the economic and statistical significance of the findings that show a time trend in the ratings. In this section, we briefly describe some of the alternative specifications. For the sake of brevity, these findings are not tabulated in the paper, except when

[8] All the other findings reported later in the paper continue to hold when we split the sample into investment grade and noninvestment grade rated firms.

we study the impact of macroeconomic variables, but they are included in the Internet Appendix.

First, we employ only the variables used by Blume, Lim, and MacKinlay (1998): (1) the operating margin, computed as operating income to sales, (2) long-term debt to assets, (3) total debt to assets, (4) the log of the inflation-adjusted market value of the firm, (5) the firm's beta, (6) the standard error from the market model, and (7) the firm's interest coverage ratio, computed as EBIT divided by interest expenses. The year dummies based on this model are very similar to those reported in Table III.

Second, we include a dummy for the first observation of each firm in the time series to identify newly rated firms. We find that, although newly rated firms' ratings are, on average, 0.3 notches worse (based on model specification (3)) than those of other firms, the inclusion of this variable has little effect on the year dummies.

Third, we study whether the effect persists if we focus only on those firms present in the sample in 1985, or whether our findings are due to the entry of new firms. Our results persist if we eliminate new entrants, and also if we study only those firms that enter the sample after 1985.

Fourth, Gu and Zhao (2006) show that debt ratings are significantly better for firms with more earnings management. As in Gu and Zhao (2006), we follow Jones (1991) in constructing a time-varying, firm-level discretionary accruals component that serves as a proxy for earnings management. Although we find that more discretionary accruals are correlated with better ratings in some of our specifications, the increased ratings conservatism persists.

Fifth, we verify that our findings hold after controlling for pension liabilities. In particular, we include the projected pension benefit obligations as a fraction of assets in the ratings regressions (see Shivdasani and Stefanescu (2010)). Firms with higher pension obligations have worse ratings in the firm fixed effects specifications, but this result does not affect any of our other findings.

Sixth, we include the square and cube terms of all explanatory variables to allow for nonlinearities. The improvement in explanatory power of the ratings model relative to the base case is minor. For example, the adjusted R^2 of the model with all explanatory variables and firm fixed effects (model (6) of Panel A of Table III) increases by only 0.01 when squares and cubes are added. More importantly, the magnitudes of the year dummies remain virtually unchanged.

Seventh, we include market leverage (total interest-bearing debt divided by the sum of the market value of equity and total interest-bearing debt) and the market value of the firm's equity instead of book leverage and the book value of the firm, again with very similar results. Our results are also robust to the inclusion of the average spread across all of the firm's bonds as an additional explanatory variable in the ratings model.[9]

Eighth, we study whether our results hold when we standardize all the explanatory variables by subtracting the cross-sectional mean and dividing by

[9] The sample period for this test is 1997 to 2009, the period for which we have data on credit spreads.

the cross-sectional standard deviation on an annual basis. This adjustment corrects for any time-series patterns in the explanatory variables, allowing us to focus on how firms compare to each other annually. Again, our findings persist.

Ninth, we include several macroeconomic variables in our regression specifications: (1) the rate of inflation, (2) GDP growth, (3) the slope of the term structure, computed as the yield on the constant-maturity 10-year Treasury bond minus the yield on the constant-maturity three-month T-bill, (4) the TED spread, computed as the three-month LIBOR minus the three-month T-bill rate, (5) the aggregate price-to-earnings ratio, and (6) the market volatility index (VIX). As the year dummies absorb the variation in the macro variables, several of the coefficients on the year dummies are no longer identified. As such, it becomes impossible to interpret the coefficients on the remaining year dummies. To address this problem, we include a linear time trend instead of year dummies. We first report a model with a time trend and without the macro variables (model (7) of Panel A of Table III) and then include the variables described earlier in model (8). Because the macroeconomic variables are constant within each year (and we are primarily interested in the significance of the trend and macro variables in these tests), we cluster standard errors by year in these specifications. In column (7) the coefficient on the trend variable is 0.129, indicating an annual ratings decline of 0.129 notches, which is consistent with the magnitude of the annual dummies reported in the previous columns. When we add the macroeconomic variables in column (8), the time trend actually increases to 0.137, while the macroeconomic variables are not significantly different from zero. The lack of significance on the macro variables is not entirely surprising because rating agencies claim that they rate "through the cycle" (Standard and Poor's (2008)).

In sum, our finding that debt ratings have become more conservative over time appears to be robust to the inclusion of additional explanatory variables in our ratings model or to the exclusion of variables not employed in earlier work.

Before proceeding to the implications of increased ratings conservatism for default rates, a final note on the ratings model: one could argue that rating agencies are relying more on soft information over time, which is not captured by our explanatory variables. While we cannot fully dismiss this possibility, the fact that the explanatory power of the model does not decline over time when estimated annually (reported in the Internet Appendix) alleviates this concern.[10] Moreover, the soft information would need to be mainly of a negative nature to explain the documented increase in conservatism.

[10] While the explanatory power of the model remains virtually constant over time at around 75%, we find a decreased emphasis on the level of debt relative to assets and an increased emphasis on negative profitability.

III. Implications for Default Rates

As we pointed out, our findings of increased conservatism are consistent with two nonmutually exclusive interpretations. One possibility is that rating agencies have simply adjusted their criteria over time to respond to changes in the macroeconomic environment. It is entirely possible that, holding financial characteristics constant, default risk has increased over time, for example, because of increased product market competition or deregulation in certain industries. The alternative is that the more stringent rating criteria are not reflected in increased default probabilities, which implies that firms obtain ratings that are worse than they merit based on historical standards.

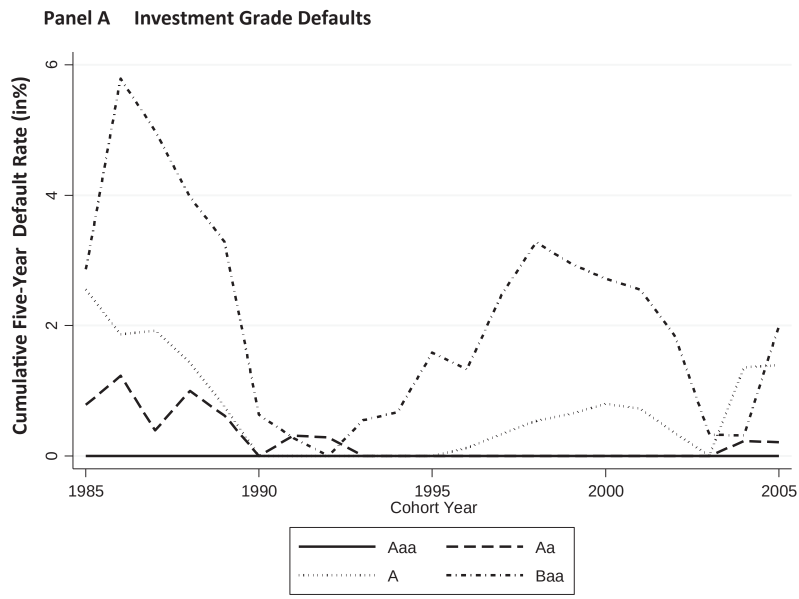
One way to distinguish between these two interpretations is to examine default rates by rating category over time. If firms obtain worse ratings than implied by their default risk, we expect default rates to decline over time. We report such an analysis in this section.

To investigate defaults, we obtain data on corporate default rates by rating category from Moody's (2010).[11] Moody's computes cumulative issuer-weighted default rates over various periods for annual cohorts. For example, for all bonds rated A at the start of 2000, Moody's reports defaults over the following one year, two years, etc. We employ five-year defaults as a base case—this allows sufficient time for the bonds to season, but also allows us to follow bonds issued up to 2005. Figure 2 shows default rates for the following rating categories over our sample period: Aaa, Aa, A, Baa, Ba, B, and Caa through C. Panel A shows investment grade defaults and Panel B shows noninvestment grade defaults. If the ratings conservatism were unwarranted, we would expect to observe a downward trend in the data. While much of the variation in defaults over time is due to the business cycle, there appears to be a decline in default rates for the weaker investment grade categories and for the stronger noninvestment grade categories. We do not see a decline in defaults for the worst credits (Caa through C), however. This could be the case because many firms in this category were poor credits even at the start of the sample period so that the addition of newly downgraded firms over time is not sufficient for us to observe a decline in default rates.

To determine whether the observed decline in default rates is statistically significant, we estimate a time-series regression of five-year default rates over our sample period (1985 to 2005)[12] against a linear time trend variable. To account for the fact that bond defaults are higher in recessions, we control for the fraction of recession months that a given bond cohort is exposed to, based

[11] We use Moody's data (rather than Standard and Poor's as in the main analyses of the paper) because Standard and Poor's does not publish default rates in as much detail as Moody's. Both agencies have similar ratings, as discussed previously, but Moody's employs slightly different categorizations; instead of "+" and "−" signs to further refine ratings within a category, Moody's employs a 1, 2, and 3. In addition, the second letter in the Moody's rating categories is always an "a." For example, BBB+ in Standard and Poor's corresponds to Baa1 for Moody's, BBB corresponds to Baa2, and BBB− to Baa3.

[12] The analysis ends in 2005 so that we can observe defaults for that year and the subsequent four years.



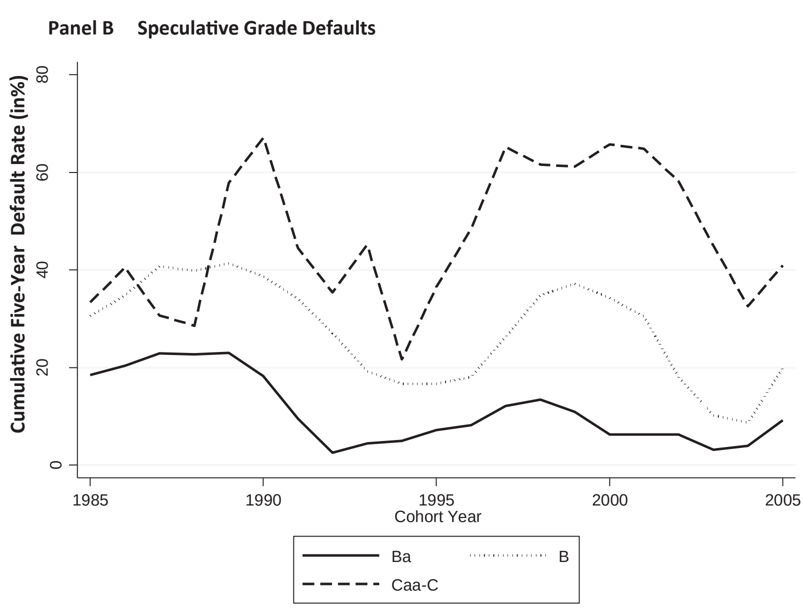


Figure 2. Plot of five-year cumulative default rates by rating category. This figure plots cumulative five-year issuer-weighted default rates by annual cohort and Moody's rating category. We start the sample with cohorts formed in 1985, the first available year of data in the ratings regressions, and we end the sample with the last available observation of the five-year default rate, which is for the 2005 cohort. The data are from the Moody's Investors Services report "Corporate Default and Recovery Rates, 1920–2009." Panel A: Investment grade defaults; Panel B: Speculative grade defaults.

on business cycle information published by the National Bureau of Economic Research (NBER).[13] Because default rates for subsequent cohorts are overlapping, we report Newey-West standard errors for four lags. We do not estimate regressions for Aaa firms because the five-year default rate for these bonds is zero over our sample period. Panel A of Table IV contains the results for the other rating categories. The results confirm the conclusions from Figure 2. The linear trend specification shows declines in default rates for all but the worst rating categories, and the effect is significant for firms rated Aa, Baa, Ba, and B, and marginally significant for firms rated A (p-value of 0.14). Economically, the effects are also substantial. For example, the coefficient of −1.26 on the time trend for B firms indicates that five-year defaults have declined by 1.26 percentage points per year over the period 1985 to 2005. Not surprisingly, the effects are smaller for the higher rating categories.[14] Also, as expected, defaults are higher for cohorts with a longer exposure to recessions.

The above evidence indicates that a given rating category does not imply the same default risk over time, which suggests that the increased conservatism in ratings is not fully warranted. Rating agencies would argue, however, that their goal is to provide guidance not on absolute default rates, but rather on relative default rates; that is, they are concerned with assessing whether one firm is more likely to default than another, but not whether the default likelihoods are 1% and 0.1% or 10% and 1% (see, e.g., Standard and Poor's (2013)). If firms and market participants understand this, then simply lowering all firms' ratings over time by several notches may be totally innocuous. However, as we illustrate in the next section, not all firms are equally affected by increased ratings conservatism, and these changes impact capital structure, cash holdings, growth, and debt pricing. In addition, prior research illustrates that a firm's absolute rating matters, especially when firms lose their investment grade status. For example, Kisgen (2006) shows that firms pay close attention to credit ratings in their capital structure decisions; those firms close to a downgrade or upgrade issue less debt than firms not near a change in rating. Chernenko and Sunderam (2012) find that investment and financing decisions of firms with noninvestment grade debt outstanding are much more affected by flows into high-yield bond funds compared to similar firms that have an investment grade rating.

Another possibility is that the decline in default rates has been accompanied by a decline in recovery rates, such that investor losses across rating categories have remained constant over time. To investigate this possibility, we gather data on recovery rates for all defaulted bond issues globally from Moody's

[13] To this end, we define the control variable *Recession*, which measures the fraction of recession months experienced by a given bond cohort over the five-year period for which default rates are measured. For example, the 1985 bond cohort experiences no recession months over the five-year period so *Recession* takes the value of zero for 1985, the 1986 bond cohort experiences six recession months so *Recession* is 0.1 (= 6/60) for the 1986 cohort, the 1987 cohort experiences eight recession months and thus *Recession* is 0.1333 (= 8/60), and so on.

[14] We have also repeated our analysis for four-year and three-year default rates and our findings are similar (results reported in the Internet Appendix).

Table IV

Default and Recovery Rate Regressions

In Panel A, the dependent variable is the cumulative issuer-weighted five-year default rate by annual cohort and Moody's rating category. The data are from the Moody's Investors Services report "Corporate Default and Recovery Rates, 1920–2009." *Linear Trend* takes the value of 0 in 1985, 1 in 1986, 2 in 1987, 3 in 1988, etc. *Recession* is the fraction of NBER recession months that a given bond cohort is exposed to over the five-year period. The sample covers bond cohorts from 1985 to 2005. The *p*-values reported below the coefficients are based on Newey-West standard errors estimated with four lags, which we use to account for the overlap in five-year default rates. In Panel B, the dependent variable is the annual issuer-weighted corporate bond recovery rate, based on postdefault trading prices of all corporate bonds. The data are from the Moody's Investors Services report "Corporate Default and Recovery Rates, 1920–2011." *Linear Trend* takes the value of 0 in 1985, 1 in 1986, 2 in 1987, 3 in 1988, etc. The sample covers the years 1985 to 2009. The *p*-values reported in parentheses below the coefficients are based on OLS standard errors.

Panel A: Multiyear Default Rates by Moody's Rating

	(1) Aa	(2) A	(3) Baa	(4) Ba	(5) B	(6) Caa-C
	Cumulative Five-Year Default Rate (in %)					
Linear Trend	−0.046	−0.060	−0.141	−0.989	−1.259	0.657
	(<0.01)	(0.14)	(0.05)	(<0.01)	(<0.01)	(0.23)
Recession	1.508	5.103	9.319	45.751	60.708	21.053
	(<0.01)	(<0.01)	(0.03)	(0.02)	(0.03)	(0.69)
Constant	0.567	0.852	2.692	16.913	34.628	38.425
	(<0.01)	(0.15)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Observations	21	21	21	21	21	21
Adjusted R^2	0.508	0.314	0.300	0.750	0.536	0.022

Panel B: Annual Defaulted Corporate Bond Recoveries

	Recovery Rate (in %)
Linear Trend	0.091
	(0.75)
Constant	39.872
	(<0.01)
Observations	25
Adjusted R^2	−0.039

(2012) and estimate a time-series regression of recovery rates over our sample period against a linear trend variable. As illustrated in Panel B of Table IV, recovery rates do not exhibit a trend.

Overall, these findings are consistent with the view that the increased conservatism in debt ratings documented in Table III is not fully warranted.[15] In

[15] As we point out earlier, a plausible alternative interpretation is that ratings were too lenient at the start of the sample period and have become more accurate over time, which would also lead to a decline in default rates over time. This interpretation is rejected when we examine debt spreads in Section VI.

the following sections, we study the impact of ratings conservatism on capital structure, cash holdings, growth, investment, and debt spreads.

IV. Implications for Capital Structure Decisions and Cash Holdings

If ratings are not a fair representation of the true default risk of a firm, this could have implications for firms' capital structure decisions. Given that ratings are an important determinant of the cost of debt, we would expect firms that are disadvantaged by this ratings conservatism to use less debt than predicted by models that ignore this factor. These firms may also decide to hold more cash and/or opt out of the bond market altogether. We investigate these possibilities in this section of the paper.

To measure ratings conservatism, we estimate the ratings model over the period 1985 to 1996, henceforth referred to as the old model; for each year in the period 1997 to 2009 we use the firms' characteristics to predict their debt ratings based on the estimated coefficients of the old model. Predicted ratings smaller than 1 (AAA) are set equal to 1 and predicted ratings larger than 21 (C) are set equal to 21. Within that range, predicted ratings are *not* rounded, but instead are included as a continuous variable. Conservatism is defined as the difference between the firm's actual rating and its predicted rating. Thus, for each firm i and each year t, starting in 1997, we compute

$$Rat\_Diff_{i,t} = Actual\ Firm\ Rating_{i,t} - Predicted\ Firm\ Rating_{i,t,85-96}. \quad (1)$$

We employ two models to estimate the predicted rating, one based on industry fixed effects (model (3) of Table III, Panel A, without the year dummies) and one based on firm fixed effects (model (6) of Table III, Panel A, without the year dummies), resulting in two measures of conservatism: *Rat_Diff_Ind* and *Rat_Diff_Firm*.[16]

To determine whether firms take ratings conservatism into account in their capital structure decisions, we estimate two sets of regression models. In the first set we study firms' debt issuance decisions. We estimate models of new debt issues to assets as a function of a number of variables that have been employed in the prior literature (see, e.g., Titman and Wessels (1988), and Berger, Ofek, and Yermack (1997)), as well as the firm's actual rating and our measure of ratings conservatism. In the second set, we estimate models of leverage as a function of ratings conservatism and control variables.

Summary statistics on the variables employed in this part of the analysis are presented in Table V (we do not report data on book leverage because this information was included in Table II, or on investment tax credits to assets because its average is very close to zero for all years). The sample period for the capital structure regressions is 1997 to 2009. The dependent variables are net debt issues divided by total assets, book leverage (*Book_Lev*), the ratio of

[16] In the reported specifications, we split the sample period in half; the period 1985 to 1996 is employed to compute the ratings model while the period 1997 to 2009 is employed to compute conservatism. We have employed alternative cutoff years from 1994 to 2000 with similar findings.

Table V

Summary Statistics for Capital Structure and Real Effects Regressions

This table presents annual averages of the variables employed in the capital structure and real effects regressions (variables not reported here are described in Table II). *Rat_Diff_Firm* is the difference between the actual Standard and Poor's rating and the rating predicted by regression model (6) in Panel A of Table III (excluding the year dummies); the credit ratings regression is estimated using data from 1985 to 1996, and the predicted rating is obtained for 1997 to 2009. *Rat_Diff_Ind* is based on ratings regression (3) in Panel A of Table III, and is computed analogously. *Net Debt Issues* are long-term debt issues minus long-term debt reductions, scaled by total assets. *Ltde/Assets* is long-term debt divided by assets. *Mkt_Lev* is total interest-bearing debt divided by the sum of total interest bearing debt and market equity. *Market-to-Book* is the ratio of (book value of assets plus market value of equity minus book value of common equity minus balance sheet deferred taxes) to book value of assets. *Carryforwards/Assets* is tax loss carryforwards divided by total assets; missing values of carryforward tax losses are replaced by zero. *R&D/Sales* is the ratio of R&D expenditures to total sales; missing values of R&D are replaced by zero. *Sales Growth* is the difference in sales between t and $t-1$, divided by sales in year $t-1$. *CAPEX/Sales* is capital expenditures divided by sales. *Acq./Sales* is cash acquisitions divided by sales. *NWC/Assets* is net working capital less cash divided by assets. *Div. Dummy* equals one in years in which a firm pays a common dividend, zero otherwise. All explanatory variables (except *Rat_Diff_Firm, Rat_Diff_Ind, and Div. Dummy*) are winsorized at the 99th percentile; *Net Debt Issues, Market-to-Book*, *Sales Growth*, and *NWC/Assets* are also winsorized at the 1st percentile.

Year	*Rat_Diff_ Firm*	*Rat_Diff_ Ind*	*Net Debt Issues*	*Ltde/ Assets*	*Mkt_ Lev*	*Market- to-Book*	*Carryfor- wards/ Assets*	*R&D/ Sales*	*Sales Growth*	*CAPEX/ Sales*	*Acq./ Sales*	*NWC/ Assets*	*Div. Dummy*
1997	0.183	0.661	0.059	0.361	0.332	1.772	0.029	0.017	0.148	0.171	0.071	0.057	0.513
1998	0.177	0.648	0.067	0.387	0.378	1.708	0.032	0.016	0.141	0.169	0.090	0.048	0.493
1999	0.248	0.847	0.042	0.400	0.380	1.793	0.037	0.015	0.140	0.145	0.067	0.042	0.455
2000	0.525	1.238	0.026	0.375	0.401	1.688	0.041	0.018	0.206	0.147	0.066	0.034	0.442
2001	0.781	1.338	0.025	0.373	0.383	1.590	0.045	0.020	0.060	0.127	0.051	0.033	0.449
2002	0.941	1.500	0.003	0.366	0.391	1.458	0.055	0.021	0.042	0.092	0.034	0.029	0.444
2003	1.101	1.797	0.008	0.358	0.333	1.596	0.061	0.021	0.101	0.087	0.034	0.031	0.450
2004	1.351	2.128	0.013	0.338	0.289	1.669	0.063	0.019	0.161	0.085	0.048	0.035	0.516
2005	1.511	2.289	0.013	0.321	0.280	1.697	0.069	0.019	0.132	0.092	0.052	0.033	0.548
2006	1.720	2.480	0.024	0.321	0.275	1.725	0.075	0.019	0.128	0.105	0.062	0.037	0.570
2007	1.728	2.493	0.034	0.325	0.293	1.737	0.067	0.019	0.121	0.116	0.072	0.031	0.573
2008	1.861	2.552	0.025	0.340	0.419	1.327	0.073	0.020	0.112	0.112	0.047	0.027	0.560
2009	1.825	2.429	−0.006	0.335	0.355	1.436	0.080	0.020	−0.090	0.103	0.021	0.030	0.530
Mean	0.937	1.695	0.026	0.355	0.347	1.634	0.055	0.019	0.109	0.119	0.055	0.036	0.500
N	7,574	14,238	16,767	18,146	15,890	14,659	18,152	18,122	16,188	17,922	16,772	17,428	17,959

long-term debt to assets (*Ltde/Assets*), and market leverage (*Mkt_Lev*). Book leverage is computed as total interest-bearing debt divided by total assets, and market leverage is computed as total interest-bearing debt divided by the sum of total interest-bearing debt and market equity. From 1997 to 2009, net debt issues (net of debt retired) average 2.6%. Book and market leverage average 39.8% and 34.7%, respectively, and long-term debt to assets averages 35.5%.

The key explanatory variables are *Rat_Diff_Ind* and *Rat_Diff_Firm*, the measures of conservatism. As illustrated in Table V, their means are both positive and increasing over time. The average difference between the actual and predicted ratings is 0.937 when the ratings model is estimated with firm fixed effects and 1.695 when it is estimated with industry fixed effects. By 2009, these differences increase to 1.825 and 2.429, respectively. Moreover, 70% to 80% of the observations are positive over the 1997 to 2009 period (reported in the Internet Appendix).

The control variables are: (1) the asset market-to-book ratio, as a proxy for growth opportunities, (2) net PPE divided by total assets, as a proxy for asset tangibility, (3) EBITDA to sales, as a proxy for profitability, (4) investment tax credits to assets, as a proxy for nondebt tax shields, (5) net operating loss carryforwards to assets, as a proxy for tax-paying status, (6) R&D to sales, as a proxy for asset uniqueness, growth opportunities, and asymmetric information, and (7) firm size, measured as the log of the book value of assets in constant 2005 dollars.[17]

In addition, we include the level of the rating variable itself as a control variable. This allows us to ascertain the impact of ratings conservatism on capital structure, *holding the firm's actual rating constant*. Including the actual rating also addresses the concern that our measure of conservatism could proxy for an omitted variable in the ratings model (since the firm's actual rating reflects *all* the information employed by the rating agencies).

In the models in which we study changes in debt, we also control for the level of debt, and we lag all explanatory variables one year,[18] except for the difference between the actual and predicted ratings, which is lagged two years to alleviate endogeneity concerns. In the models in which we study debt levels, all explanatory variables are measured contemporaneously, except for the difference between the actual and the predicted ratings, which is lagged by one year to again attenuate endogeneity concerns. In our context, endogeneity may arise from the fact that the firm's rating is affected by the company's leverage, while the rating is also employed to compute conservatism. If we measure both conservatism and leverage contemporaneously, the direction of causality

[17] Titman and Wessels (1988) and Berger, Ofek, and Yermack (1997) also include selling, general, and administrative expenses, divided by assets, as an additional measure of asset uniqueness. Our results continue to hold when we include this measure as a control variable; we did not include it in our base-case specification because it is missing for a substantial fraction of the firms in our sample.

[18] We lag the explanatory variables because we expect changes during year t to be mainly a function of characteristics observed at the end of year $t-1$, and not the characteristics at the end of year t. However, our findings continue to hold if we do not lag the variables.

is not clear. Lagging addresses this concern as long as there is no feedback effect between the firm's current level of debt and future conservatism. We find no evidence of such an effect: in a regression model of conservatism (measured using the ratings model with firm fixed effects) as a function of lagged leverage, the coefficient on leverage is insignificant.

Tables VI and VII contain the findings. In Table VI, we study debt issuance decisions. In column (1) we present results based on ratings predicted using models with industry fixed effects (*Rat_Diff_Ind*), while in column (2) we present results based on ratings predicted using models with firm fixed effects (*Rat_Diff_Firm*). We have fewer observations in column (2) because we cannot estimate firm fixed effects in the ratings model for firms that were not in the sample during the 1985 to 1996 estimation period.

Our findings suggest that ratings conservatism affects capital structure decisions. Firms generally issue less debt when their ratings are worse than predicted (Table VI). The effect is also large economically. For instance, based on the coefficient estimate from column (1), increasing the ratings disadvantage by one notch reduces net debt issues by 0.2% of total assets. Since average net debt issues over the sample period are 2.6% of assets, this implies a decline in issuance of close to 8%.

In terms of the control variables, we find that firms issue more debt when they have higher market-to-book ratios, more tangible assets, fewer nondebt tax shields, and lower R&D expenses, and when they are more profitable and smaller. These findings are broadly consistent with the prior literature.

In models (3) and (4), we reexamine the debt issuance regressions using changes in conservatism as well as levels. While firms may initially react to the tightening of rating standards, if there is no further tightening over time, debt issuance may not be affected in future periods. Thus, we include the change in the level of conservatism (lagged two periods to alleviate endogeneity concerns) and control for the level of conservatism in the prior year. Both elements of conservatism have a significant influence on debt issuance and their effects are of equal magnitude, suggesting that both the level of and change in conservatism matter.[19]

In Table VII, we show that the ratings disadvantage also influences the level of debt: the larger the (lagged) difference between the actual and predicted ratings, the lower the level of debt is. For every notch of difference between the actual and predicted ratings, firms reduce their leverage as a fraction of the book value of assets by between 0.5 and 6 percentage points, depending on the specification. This effect is large compared to the average ratio of total debt to assets of 39.8%.[20]

[19] We have also estimated these models with the inclusion of both levels and changes in the control variables without affecting our inferences.

[20] All the leverage models are estimated with industry fixed effects (Tables VI and VII). The results in Table VII continue to hold when we estimate these models with firm fixed effects (see Internet Appendix), which suggests that our results are not driven by unobserved time-invariant firm characteristics or persistent components in leverage and conservatism. Estimating the lever-

Table VI

Capital Structure Regressions: Leverage Changes

This table reports the coefficients for regression models of leverage changes. L.(.) denotes the lag operator. Standard errors are clustered at the firm level and adjusted for heteroskedasticity and autocorrelation. *p*-values are reported in parentheses below the coefficients. *Taxshield* is computed as investment tax credits divided by assets. The other variables are defined in Tables II and V.

	Net Debt Issues			
	(1)	(2)	(3)	(4)
L2.(*Rat_Diff_Ind*)	−0.002			
	(<0.01)			
L2.(*Rat_Diff_Firm*)		−0.003		
		(<0.01)		
L2.(*Rat_Diff_Ind*) – L3.(*Rat_Diff_Ind*)			−0.002	
			(0.05)	
L3.(*Rat_Diff_Ind*)			−0.002	
			(0.03)	
L2.(*Rat_Diff_Firm*) – L3.(*Rat_Diff_Firm*)				−0.003
				(0.03)
L3.(*Rat_Diff_Firm*)				−0.002
				(<0.01)
L. *Rating*	0.002	0.001	0.002	0.001
	(0.01)	(0.07)	(0.07)	(0.20)
L. *Book_Lev*	−0.073	−0.066	−0.065	−0.064
	(<0.01)	(<0.01)	(<0.01)	(<0.01)
L.(*Market-to-Book*)	0.013	0.011	0.013	0.011
	(<0.01)	(<0.01)	(<0.01)	(<0.01)
L.(*PPE/Assets*)	0.014	0.004	0.015	0.001
	(0.09)	(0.71)	(0.08)	(0.95)
L.*Profit*	0.030	0.031	0.043	0.036
	(0.02)	(0.08)	(<0.01)	(0.05)
L.*Size*	−0.003	−0.005	−0.003	−0.005
	(0.02)	(<0.01)	(0.04)	(<0.01)
L.*Taxshield*	−5.842	−4.634	−4.368	−3.103
	(<0.01)	(<0.01)	(0.01)	(0.10)
L.(*Carryforwards/Assets*)	−0.013	−0.002	−0.017	−0.0002
	(0.19)	(0.87)	(0.07)	(0.99)
L.(*R&D/Sales*)	−0.042	−0.046	−0.062	−0.070
	(0.27)	(0.44)	(0.12)	(0.21)
Industry dummies	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y
Observations	9,769	6,001	8,606	5,635
Number of firms	1,754	887	1,554	829
Adjusted R^2	0.070	0.072	0.065	0.066

These findings indicate that the increased ratings stringency has had a substantial impact on firms' capital structure decisions. They may also add to our understanding of why a considerable number of firms seem to be underlev-

age change regressions (Table VI) with firm fixed effects is not economically meaningful because the change already captures the difference between two consecutive years for the same firm.

Table VII

Capital Structure Regressions: Leverage Levels

This table reports the coefficients for regression models of leverage levels. L.(.) denotes the lag operator. Standard errors are clustered at the firm level and adjusted for heteroskedasticity and autocorrelation. *p*-values are reported in parentheses below the coefficients. *Taxshield* is computed as investment tax credits divided by assets. The other variables are defined in Tables II and V.

	(1) *Ltde / Assets*	(2) *Book_Lev*	(3) *Mkt_Lev*	(4) *Ltde/Assets*	(5) *Book_Lev*	(6) *Mkt_Lev*
L.(*Rat_Diff_Ind*)	−0.052	−0.059	−0.040			
	(<0.01)	(<0.01)	(<0.01)			
L.(*Rat_Diff_Firm*)				−0.012	−0.011	−0.005
				(<0.01)	(<0.01)	(0.03)
Rating	0.053	0.059	0.057	0.030	0.032	0.039
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Market-to-Book	0.014	0.016	−0.093	0.005	0.008	−0.083
	(<0.01)	(<0.01)	(<0.01)	(0.47)	(0.28)	(<0.01)
PPE / Assets	0.137	0.142	0.101	0.026	0.018	−0.003
	(<0.01)	(<0.01)	(<0.01)	(0.43)	(0.61)	(0.92)
Profit	0.129	0.141	0.055	0.001	0.005	−0.074
	(<0.01)	(<0.01)	(<0.01)	(0.98)	(0.92)	(0.03)
Size	0.034	0.050	0.059	−0.002	0.008	0.032
	(<0.01)	(<0.01)	(<0.01)	(0.59)	(0.11)	(<0.01)
Taxshield	−0.894	1.974	7.617	−2.205	1.041	8.532
	(0.88)	(0.73)	(0.03)	(0.77)	(0.89)	(0.07)
Carryforwards/Assets	0.047	0.064	0.070	0.072	0.108	0.110
	(0.08)	(0.01)	(<0.01)	(0.23)	(0.06)	(<0.01)
R&D/Sales	−0.290	−0.305	−0.351	−0.201	−0.209	−0.299
	(<0.01)	(<0.01)	(<0.01)	(0.21)	(0.22)	(0.02)
Industry dummies	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y
Observations	11,832	11,831	11,831	6,730	6,729	6,729
Number of firms	1,999	1,999	1,999	935	935	935
Adjusted R^2	0.588	0.627	0.696	0.544	0.529	0.672

ered despite the tax benefits of debt (see, e.g., Graham (2000)). Of course, our findings can neither explain the zero leverage puzzle (see, e.g., Strebulaev and Yang (2013)), nor can they explain why firms had low leverage at the start of our sample period when rating agencies were not as strict compared to later years.[21]

Next, we examine whether the increase in conservatism has affected firms' decisions to access the bond market altogether. We borrow Faulkender and Petersen's (2006) model of bond market access and, using all firms in the Compustat database with sufficient information available to compute the explanatory variables, we estimate a logit model of the likelihood of having a rating

[21] The effect of conservatism on debt issuance and leverage is also more pronounced for small firms than for large firms (reported in the Internet Appendix), consistent with the view that ratings matter more for companies with fewer sources of information.

as a function of firm characteristics and year dummies.[22] Holding firm characteristics constant, increased conservatism would imply that the likelihood of obtaining a bond rating declines over time. The results are presented in model (1) of Table VIII. Compared to the omitted year, 1985, there is actually an increase in the likelihood of obtaining a debt rating in 1986 through 1988, which coincides with the emergence of the junk bond market; the year dummy for 1989 is insignificant, while all dummies from 1990 onwards are negative, becoming significant from 1996 onwards. The dummies also become more negative over time. In terms of economic significance, the likelihood of obtaining a rating in 1989 is 10.7% for the average firm, declining to 3.6% in 2009. This evidence suggests that firms are less likely to access the public bond market over time.

To ascertain more precisely whether this time-series decline is related to increased conservatism, we also employ an alternative approach. In particular, for the 1997 to 2009 period, we examine whether the likelihood of obtaining a rating is related to the difference between a firm's predicted rating using the old model (estimated over the period 1985 to 1996) and the predicted rating using the new model (estimated over the period 1997 to 2009), given the firm characteristics at the start of each year.[23] The idea is that increased conservatism would disadvantage more those firms whose ratings based on the old model are much better than the ratings based on the new model. Thus, the key explanatory variable is

$$\begin{aligned} \textit{Rat\_Diff\_Predictions}_{i,t} &= \textit{Predicted Firm Rating}_{i,t,97-09} \\ &\quad - \textit{Predicted Firm Rating}_{i,t,85-96}. \end{aligned} \tag{2}$$

The higher this number, the more negatively the firm is affected by conservatism. We report the results of the model that includes this variable in column (2) of Table VIII. Consistent with the view that conservatism leads firms to opt out of the public debt market, the coefficient on *Rat_Diff_Predictions* is negative and highly significant. In terms of economic significance, if we set all explanatory variables equal to the sample average and increase *Rat_Diff_Predictions*

[22] As in Faulkender and Petersen (2006), the sample includes only firm-years with assets and sales exceeding $1 million, and only firm-years with nonzero debt. The explanatory variables are: (1) whether the firm is in the S&P500 or not (0/1 dummy); (2) whether the firm's equity trades on the NYSE (0/1 dummy); (3) the log of (one plus the percentage of firms in the same three-digit SIC industry that have a bond rating); (4) whether the firm is three years old or less (0/1 dummy); (5) the log of the market value of assets (computed as book value of assets − book value of equity + market value of equity); (6) the log of (one plus the number of years the firm has been included in the Compustat database); (7) profitability, computed as operating income divided by sales; (8) tangibility, computed as PP&E divided by assets; (9) investment opportunities, computed as market value of assets divided by book value assets; (10) advertising intensity, computed as advertising expenses divided by sales; (11) asset volatility, computed as annualized volatility of monthly equity returns over the past year, multiplied by (market value equity/market value of assets); (12) asset uniqueness, computed as R&D expenses divided by sales; and (13) annual stock return over the previous year.

[23] By focusing on predictions, we can estimate a measure of conservatism for firms without a debt rating.

Table VIII

Determinants of Bond Market Access

This table reports the coefficients for logit regression models of bond market access. The dependent variable is a dummy variable set equal to one if the firm has a Standard and Poor's long-term issuer rating in a given year. *S&P500* is a dummy for S&P500 index firms. *NYSE* is a dummy for firms traded on the NYSE. *Ln(MVA)* is the log of market value of assets (computed as book value of assets − book value of equity + market value of equity). *Ln(Age +1)* is the log of one plus the number of years the firm has been included in the Compustat database. *Ln(%Rated +1)* is the log of one plus the percentage of firms in the same three-digit SIC industry that have a bond rating. *Young Firm* indicates whether the firm is three years old or less (0/1 dummy). *Market-to-Book* is market value of assets divided by book value assets. *Advertising/Sales* is advertising expenses divided by sales. *Asset_Vol* is annualized volatility of monthly equity returns over the past year, multiplied by (market value equity/market value of assets). *Ann. Ret.* is the annual stock return over the previous year. *Rat_Diff_Predictions* is the firm's predicted rating using regression model (1) in Panel A of Table III, excluding year dummies and estimated over the period 1997 to 2009, minus the predicted rating using the same model estimated over the period 1985 to 1996. The other variables are defined in Tables II and V. The sample spans 1985 to 2009 in column (1), and 1997 to 2009 in column (2). Standard errors are clustered at the firm level and adjusted for heteroskedasticity and autocorrelation. *p*-values are reported in parentheses next to the coefficients.

	Rating Dummy	
	(1)	(2)
S&P500	0.769 (<0.01)	1.372 (<0.01)
NYSE	0.366 (<0.01)	0.267 (<0.01)
Ln(MVA)	0.976 (<0.01)	1.065 (<0.01)
Ln(Age +1)	0.218 (<0.01)	0.307 (<0.01)
Ln(%Rated +1)	1.435 (<0.01)	1.211 (<0.01)
Young Firm	−0.260 (<0.01)	0.010 (0.93)
Profit	−0.194 (<0.01)	0.526 (<0.01)
PPE/Assets	−0.675 (<0.01)	−0.025 (0.91)
Market-to-Book	−0.425 (<0.01)	−0.434 (<0.01)
Advertising/Sales	0.088 (0.94)	−1.741 (0.34)
Asset_Vol	−1.838 (<0.01)	0.431 (<0.01)
R&D/Sales	−0.378 (0.05)	−0.777 (<0.01)
Ann. Ret.	0.091 (<0.01)	0.054 (0.06)
1986	0.428 (<0.01)	
1987	0.457 (<0.01)	
1988	0.206 (0.03)	
1989	−0.077 (0.44)	
1990	−0.174 (0.08)	
1991	−0.171 (0.09)	
1992	−0.169 (0.10)	
1993	−0.107 (0.28)	
1994	−0.179 (0.08)	
1995	−0.151 (0.14)	
1996	−0.194 (0.06)	
1997	−0.206 (0.05)	
1998	−0.202 (0.07)	
1999	−0.232 (0.04)	
2000	−0.319 (<0.01)	
2001	−0.413 (<0.01)	
2002	−0.565 (<0.01)	

(Continued)

Table VIII—*Continued*

	Rating Dummy	
	(1)	(2)
2003	−0.792 (<0.01)	
2004	−1.021 (<0.01)	
2005	−1.117 (<0.01)	
2006	−1.217 (<0.01)	
2007	−1.360 (<0.01)	
2008	−1.224 (<0.01)	
2009	−1.234 (<0.01)	
Rat_Diff_Predictions		−1.141 (<0.01)
Industry dummies	Y	Y
Observations	90,726	43,168
Number of firms	12,212	7,877
Pseudo R^2	0.507	0.554

by one notch, the likelihood of having a bond rating declines by nine percentage points.

Finally, we investigate whether conservatism has affected cash holdings. Firms that suffer more from conservatism may decide to hold more cash to cover their financing needs. To study this question, we follow a similar approach as in the capital structure models and estimate regressions of cash holdings relative to assets as a function of conservatism, after controlling for the firm's actual rating as well as the control variables employed in our capital structure models and in the prior literature on cash holdings (Opler et al. (1999) and Bates, Kahle, and Stulz (2009)). Summary statistics on the control variables are reported in Table V (unless previously reported in Table II). The regression models are reported in Table IX. As before, we measure conservatism using ratings models estimated with industry fixed effects (model (1)) and firm fixed effects (model (2)).

The results support the notion that cash holdings increase with conservatism, albeit the magnitude of the effect is smaller than for debt levels. Cash levels increase between 0.2 (model (2)) and 0.6 (model (1)) percentage points for every notch difference between actual and predicted ratings. Given the average cash ratio of 8.3% over the sample period, this effect is considerable. This result also suggests that increased conservatism could be one of the factors contributing to the overall increase in liquidity of U.S. firms over time (see, e.g., Bates, Kahle, and Stulz (2009)).

In sum, the evidence reported in this section indicates that conservatism affects firms in three ways. First, they are less likely to issue debt, leading to a decline in leverage; second, they are less likely to seek a debt rating; and third, they increase their cash holdings.

Table IX
Cash Regressions

This table reports the coefficients for regression models of cash holdings. L.(.) denotes the lag operator. Standard errors are clustered at the firm level and adjusted for heteroskedasticity and autocorrelation. p-values are reported in parentheses below the coefficients. *Taxshield* is computed as investment tax credits divided by assets. The other variables are defined in Tables II and V.

	Cash / Assets	
	(1)	(2)
L.(*Rat_Diff_Ind*)	0.006	
	(<0.01)	
L.(*Rat_Diff_Firm*)		0.002
		(0.04)
Rating	−0.004	−0.001
	(<0.01)	(0.14)
Acq. / Sales	−0.068	−0.053
	(<0.01)	(<0.01)
Div. Dummy	−0.002	−0.006
	(0.54)	(0.19)
CAPEX / Sales	0.034	0.001
	(<0.01)	(0.93)
NWC / Assets	−0.172	−0.173
	(<0.01)	(<0.01)
Vol	0.098	0.115
	(<0.01)	(<0.01)
Market-to-Book	0.023	0.016
	(<0.01)	(<0.01)
PPE / Assets	−0.150	−0.140
	(<0.01)	(<0.01)
Profit	−0.047	−0.005
	(<0.01)	(0.79)
Size	−0.014	−0.012
	(<0.01)	(<0.01)
Taxshield	−1.501	−0.559
	(0.29)	(0.54)
Carryforwards / Assets	−0.003	−0.021
	(0.82)	(0.26)
R&D / Sales	0.522	0.520
	(<0.01)	(<0.01)
Industry dummies	Y	Y
Year dummies	Y	Y
Observations	10,468	5,877
Number of firms	1,881	871
Adjusted R^2	0.462	0.479

V. Implications for Growth and Investment

In this section, we study whether the increased stringency of the rating agencies has had real effects. We focus on firm growth as well as various investment decisions: capital expenditures, acquisitions, and R&D. Our approach is similar to the approach we followed when studying capital structure decisions. We estimate models of growth and investment and include our measure of conservatism as an additional explanatory variable. The control variables are standard in the literature: investment opportunities, size, profitability, and leverage (see, e.g., Lang, Ofek, and Stulz (1996) and Gala and Gomes (2012)). As in the capital structure regressions, we also control for the firm's actual rating. Summary statistics for the variables employed in these models are reported in Tables II and V and the regression results are presented in Table X. In models (1) and (2), we employ the growth rate in sales as the dependent variable (winsorized at the 1^{st} and 99^{th} percentiles). Conservatism is measured based on a ratings model estimated with industry fixed effects in model (1) and firm fixed effects in model (2). According to both specifications, conservatism leads to a decline in the growth rate of 0.4% to 0.8% for every ratings notch difference between actual and predicted ratings. This is substantial, compared to the average (median) growth rate of 10.9% (6.9%) during the sample period.

Next, we study various investment decisions: capital expenditures to sales in models (3) and (4), cash acquisitions to sales in models (5) and (6), and R&D to sales in models (7) and (8), all winsorized at the 99^{th} percentile (the 1^{st} percentile is zero). We also control for lagged investment in these models (see Lang, Ofek, and Stulz (1996)). All coefficients on the conservatism measures are negative, but only the impact on acquisitions is significant in one of the specifications. Thus, the impact of conservatism on investment manifests itself mainly in a reduction in acquisition activity: firms whose ratings are worse than predicted are less willing to make cash acquisitions, possibly because they find that the cost of funding those acquisitions with debt is too high. Given that the sample average acquisition rate is 5.5%, the decline in acquisitions by 0.2% of sales for each notch of conservatism is substantial.[24]

Overall, the evidence presented in this section suggests that firms affected more by conservatism experience lower growth rates and spend less money on acquisitions. The effect on other investment decisions is modest, at best.

VI. Implications for Debt Spreads

In this section we study the impact of the increased ratings stringency on debt spreads. The goal of this analysis is to determine whether capital markets take into account the increase in conservatism over time when determining the cost of debt. To this end, we estimate models of debt spreads as a function of a number of control variables, the firm's bond rating, as well as our measure of ratings conservatism (i.e., the difference between the actual and predicted ratings based on the old model). If capital markets take the increased strictness of the ratings into account, we would expect debt spreads to narrow for firms with debt ratings that are deemed to be *too* strict.

[24] We have also repeated these analyses after removing the period 2006 to 2009, coinciding with the end of the credit boom and the start of the credit crisis. Our findings generally persist (reported in the Internet Appendix).

Table X

Real Effects Regressions

This table reports the coefficients for regression models of real effects. L.(.) denotes the lag operator. Standard errors are clustered at the firm level and adjusted for heteroskedasticity and autocorrelation. p-values are reported in parentheses below the coefficients. The variables are defined in Tables II and V.

	Sales Growth		*CAPEX / Sales*		*Acq. / Sales*		*R&D / Sales*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L2.(*Rat_Diff_Ind*)	−0.004		−0.001		−0.002		−0.0001	
	(0.08)		(0.16)		(0.11)		(0.28)	
L2.(*Rat_Diff_Firm*)		−0.008		−0.001		−0.002		−0.0001
		(<0.01)		(0.19)		(0.02)		(0.20)
L.*Rating*	0.011	0.007	0.004	0.003	0.002	0.002	0.0003	0.0004
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.05)	(0.04)	(<0.01)	(<0.01)
L.(*Market-to-Book*)	0.051	0.048	0.009	0.006	0.006	0.005	0.002	0.002
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.01)	(0.09)	(<0.01)	(<0.01)
L.*Book_Lev*	−0.058	−0.041	−0.045	−0.040	−0.047	−0.042	−0.008	−0.007
	(0.01)	(0.15)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
L.*Profit*	−0.007	−0.078	0.105	0.128	0.108	0.099	0.003	0.004
	(0.87)	(0.26)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.03)	(0.10)
L.*Size*	0.006	0.001	0.002	0.001	−0.005	−0.005	0.0003	0.0003
	(0.14)	(0.87)	(0.08)	(0.36)	(<0.01)	(0.01)	(0.06)	(0.17)
L.(*CAPEX / Sales*)			0.653	0.628				
			(<0.01)	(<0.01)				
L.(*Acq. / Sales*)					0.146	0.171		
					(<0.01)	(<0.01)		
L.(*R&D / Sales*)							0.875	0.850
							(<0.01)	(<0.01)
Industry dummies	Y	Y	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,559	6,461	10,514	6,435	9,460	5,745	10,558	6,460
Number of firms	1,794	904	1,790	903	1,717	868	1,794	904
Adjusted R^2	0.155	0.140	0.767	0.773	0.089	0.098	0.913	0.920

We obtain data on debt yields and maturities for all bonds included in the Merrill Lynch Corporate Master Index or the Merrill Lynch Corporate High Yield Index over the period 1997 to June 2009.[25] These indices contain the majority of rated U.S. public corporate bond issues. For the firms in our sample, we have monthly data on 6,632 bonds. We merge this data set with our measure of conservatism for the month for which we have the S&P issuer rating; the conservatism measure is then held constant for one year until next year's observation is available. For the sake of brevity, we focus on the measure based on the ratings model estimated with firm fixed effects, which also has the highest explanatory power (model (6) of Table III, Panel A, estimated without year dummies), but our results are similar if we use the ratings model estimated with industry fixed effects (reported in the Internet Appendix). The resulting data set yields approximately 200,000 observations, covering 4,864 bonds issued by 701 companies. Table XI contains summary statistics for this sample.

We subtract the yield on the five-year U.S. government bond from the yield of each bond to calculate the debt spreads.[26] To remove the influence of outliers, we winsorize bond yields at the 99th percentile. We then estimate the following regression model for the entire panel:

$$\begin{aligned} Spread_{j,i,t} &= \text{ß}_1(Actual\ Bond\ Rating_{j,i,t}) + \text{ß}_2(Rat\_Diff\_Firm_{i,t}) \\ &\quad + \text{ß}_3(Control\ Variables_{j,i,t}) + \varepsilon_{j,i,t}, \end{aligned} \tag{3}$$

where j refers to the bond issue, i to the issuer (company), and t to the month, and *Rat_Diff_Firm*, our measure of conservatism, is defined in equation (1). The following control variables are included in consecutive specifications: (1) the natural logarithm of the number of days to maturity, (2) equity volatility (*Equity_Vol*), computed as the daily stock price volatility over the previous 12 months (see Campbell and Taksler (2003)) (winsorized at the 1st and 99th percentiles), (3) the expected default frequency (EDF) (see Bharath and Shumway (2008)),[27] (4) the annualized stock return computed over the previous 12 months (see Bharath and Shumway (2008)), (5) profitability, asset tangibility, and book leverage as defined previously (see Ortiz-Molina (2006) and Bharath and Shumway (2008)). We include dummies for each bond to control for time-invariant bond-specific characteristics such as the size of the issue,

[25] We are grateful to Ilya Strebulaev and Stephen Schaefer for giving us access to these data.

[26] Our results are essentially unchanged if we employ 10-year U.S. Treasury bonds instead.

[27] The variable EDF is defined as: $EDF = N(-DD)$ where $N(\cdot)$ is the cumulative standard normal distribution and DD is the distance to default, which is given by $DD = \frac{\ln[\frac{E+F}{F}]+(r_{it-1}-0.5\sigma_V^2)T}{\sigma_V\sqrt{T}}$ with E representing the market value of firm i's equity in \$ million (product of share price times number of shares outstanding, from CRSP), F the face value of debt in \$ million (debt in current liabilities plus one-half of long-term debt, from quarterly Compustat), r_{it-1} the firm's stock return over the previous year, estimated by cumulating monthly returns (from CRSP), σ_V the asset volatility, estimated as $\sigma_V = \frac{E}{E+F}\sigma_E + \frac{F}{E+F}(0.05 + 0.25\sigma_E)$, σ_E the annualized volatility estimated over the prior year from stock return data for each month, and T equal to 1. We winsorize E, F, σ_E, r_{it-1}, and DD at the 1st and 99th percentiles.

Table XI

Summary Statistics for Credit Spread Regressions

This table presents annual averages of the variables employed in the credit spread regressions. The sample consists of 701 unique issuers and 4,864 unique bonds over the sample period January 1997 to June 2009. *Issue Rating* is the issue-specific rating from Standard and Poor's. *Rat_Diff_Firm* is the difference between the actual Standard and Poor's rating and the rating predicted by regression model (6) in Panel A of Table III (excluding year dummies); the credit ratings regression is estimated using data from 1985 to 1996, and the predicted rating is obtained for 1997 to 2009. *Bond Yield* is the yield-to-maturity on the corporate bond (based on Merrill Lynch calculations). *Treasury Yield* is the yield on the five-year U.S. Treasury bond. *Yield Spread* is the difference between *Bond Yield* and *Treasury Yield*. *Ln(Days to Maturity)* is the natural logarithm of the number of days to maturity of a given bond. *Equity_Vol* is the standard deviation of daily stock returns computed over the past 12 months. *EDF* is the expected default frequency estimated following Bharath and Shumway (2008). *Ann. Ret.* is the firm's stock return over the previous year, calculated using CRSP monthly data. *Profit* is operating income before depreciation divided by sales (from quarterly Compustat). *Book_Lev* is the sum of debt in current liabilities and long-term debt divided by assets (from quarterly Compustat). *PPE/Assets* is net property, plant, and equipment divided by assets (from quarterly Compustat). *Bond Yield*, *Equity_Vol, Ann. Ret., Profit, Book_Lev,* and *PPE/Assets* are winsorized at the 99th percentile, while *Equity_Vol, Ann. Ret.,* and *Profit* are additionally winsorized at the 1st percentile.

Year	*Issue Rating*	*Rat_Diff_ Firm*	*Bond Yield*	*Treasury Yield*	*Yield Spread*	*Ln(Days to Maturity)*	*Equity_ Vol*	*EDF*	*Ann. Ret.*	*Profit*	*Book_ Lev*	*PPE/ Assets*
1997	8.260	0.500	7.351	6.123	1.228	8.107	0.019	1.705	25.055	0.187	0.350	0.445
1998	8.119	0.519	6.869	5.074	1.796	8.103	0.021	2.103	20.203	0.190	0.361	0.426
1999	8.177	0.558	7.646	5.559	2.087	8.098	0.027	4.323	9.169	0.185	0.368	0.411
2000	8.532	0.666	8.956	6.084	2.872	8.054	0.030	8.457	−1.885	0.188	0.381	0.390
2001	8.723	0.857	7.990	4.432	3.558	7.982	0.030	8.373	10.218	0.178	0.376	0.391
2002	8.974	1.160	7.304	3.659	3.645	7.946	0.027	8.247	1.349	0.167	0.376	0.396
2003	9.170	1.340	5.942	2.922	3.019	7.910	0.027	8.378	−1.007	0.172	0.374	0.389
2004	9.340	1.624	5.645	3.419	2.226	7.862	0.018	2.603	34.046	0.180	0.360	0.383
2005	9.291	1.959	5.856	4.047	1.809	7.811	0.016	3.276	17.518	0.191	0.350	0.364
2006	9.306	2.022	6.450	4.732	1.718	7.838	0.016	2.153	16.180	0.198	0.340	0.356
2007	9.236	2.026	6.403	4.347	2.057	7.839	0.016	0.702	20.938	0.195	0.319	0.356
2008	8.997	1.955	7.919	2.753	5.166	7.895	0.025	8.122	−11.861	0.185	0.320	0.356
2009	9.200	2.064	8.729	2.081	6.648	7.845	0.043	22.557	−40.830	0.179	0.333	0.376
Mean	8.841	1.258	7.072	4.334	2.738	7.955	0.024	5.561	10.022	0.184	0.357	0.389
N	197,838	197,838	197,662	197,838	197,662	197,837	197,838	196,171	196,791	194,703	196,987	197,080

Table XII

Credit Spread Regressions with Ratings Difference Based on Firm Dummies

This table reports the coefficients for panel regression models of credit spreads (dependent variable in all specifications: *Yield Spread*). The explanatory variables are defined in Table XI. *p*-values (based on standard errors clustered by bond and adjusted for heteroskedasticity and autocorrelation) are reported in parentheses below the coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rat_Diff_Firm	−0.095	−0.201	−0.115	−0.198	−0.148	−0.074	−0.187	−0.116
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Issue Rating	0.741	0.848	0.750	0.846	0.559	0.507	0.593	0.544
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Ln(Days to Maturity)			0.626	0.646	0.630	0.722	0.630	0.726
			(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Equity_Vol					69.551	71.933	68.910	70.515
					(<0.01)	(<0.01)	(<0.01)	(<0.01)
EDF					0.055	0.055	0.056	0.055
					(<0.01)	(<0.01)	(<0.01)	(<0.01)
Ann. Ret.					−0.004	−0.003	−0.004	−0.003
					(<0.01)	(<0.01)	(<0.01)	(<0.01)
Profit							−0.446	−0.633
							(<0.01)	(<0.01)
Book_Lev							−1.753	−1.420
							(<0.01)	(<0.01)
PPE/Assets							1.554	1.430
							(<0.01)	(<0.01)
Firm dummies	Y	N	Y	N	Y	N	Y	N
Bond dummies	N	Y	N	Y	N	Y	N	Y
Year-Month dummies	Y	Y	Y	Y	Y	Y	Y	Y
Observations	197,662	197,662	197,662	197,662	195,995	195,995	193,625	193,625
Number of firms	701	701	701	701	698	698	694	694
Number of bonds	4,864	4,864	4,864	4,864	4,836	4,836	4,795	4,795
Adjusted R^2	0.637	0.728	0.663	0.730	0.775	0.816	0.776	0.816

its covenants, and imbedded options[28]; we also include monthly time dummies to control for any macroeconomic factors. All standard errors are clustered at the bond level and adjusted for heteroskedasticity and autocorrelation.

Table XII contains the results. As expected, debt spreads increase as ratings worsen. In model (1), which only includes the bond's actual rating and the difference between the actual and predicted ratings, spreads increase by 74 basis points for each one-notch decline in rating. However, the difference between the actual and predicted issuer ratings (our measure of conservatism)

[28] In some specifications, we include firm instead of bond dummies.

also matters. Holding the actual rating constant, firms whose actual rating is one notch worse than predicted have spreads that are 9.5 basis points lower than firms for which the predicted and actual ratings coincide.[29] Based on this specification, capital markets undo over 12% (9.5/74) of the ratings conservatism. The effect of conservatism nearly doubles in model (2) where we replace the firm dummies with dummies for each bond. In particular, spreads tighten by more than 20 basis points when predicted ratings exceed actual ratings by one notch.

In subsequent models we add debt maturity (models (3) and (4)), equity volatility, EDF, and returns (models (5) and (6)), and accounting variables (models (7) and (8)) as additional control variables. The effect of conservatism persists in all these specifications, ranging from 7.4 basis points to 19.8 basis points per notch. Based on model (8), which includes bond dummies and all controls, we find that capital markets undo more than one-fifth of the increased ratings conservatism.[30] The fact that the impact is not completely offset justifies our findings in the previous sections that ratings conservatism affects capital structure, growth, and investment decisions.

The above evidence also allows us to reject an alternative interpretation of our findings, namely, that rating agencies were too lenient at the start of the sample period but became more accurate subsequently. Such an interpretation is consistent with the results on capital structure and the real effects documented in the previous section. However, under this interpretation, the difference between the firm's current rating and the rating based on the old model that was supposedly too lenient and therefore incorrect (i.e., our measure of conservatism) should not matter for debt pricing, after controlling for the bond's actual rating. The evidence reported in Table XII suggests that it does.

In sum, the findings reported in this section indicate that ratings conservatism impacts debt spreads. Holding a firm's actual rating constant, we find that an increase in conservatism leads to a considerable tightening of its spreads.

VII. A Decomposition of the Conservatism Measure

In the previous three sections, we show that ratings conservatism, captured by the difference between a firm's actual rating during the period 1997 to 2009 and its predicted rating using a model estimated over the period 1985 to 1996, affects capital structure, cash holdings, growth, and debt spreads.

[29] It is possible that the increase in spreads is a nonlinear function of the rating. As an alternative specification, we include dummies for each rating category instead of the rating. Our findings generally persist; that is, the difference between the actual and predicted ratings (*Rat_Diff_Firm*) continues to be negatively related to debt spreads in these models, and the magnitude of the coefficients is virtually unaffected.

[30] These results persist when we replace equity volatility by a measure of asset volatility, computed as the product of equity volatility and market leverage.

In this section, we consider an alternative explanation for our findings. Firms whose ratings are worse than predicted by the old model may, in fact, also have worse ratings compared to the ratings predicted by the new model; that is, the prediction errors are correlated over time. If these firms do not deem their current ratings to be a fair reflection of their underlying risk, they may issue less debt, make fewer debt-financed acquisitions, and grow less as a result. If capital markets have a similar view, such firms may also have narrower spreads. These phenomena are not necessarily related to changes in conservatism over time, and might exist even without conservatism.

To make sure that this alternative explanation is not driving our results, we decompose our measure of ratings conservatism defined in equation (1) into two parts: (i) the residual from the ratings model estimated over the 1997–2009 period and (ii) the difference between the predicted rating based on the 1997 to 2009 model and the predicted rating based on the 1985–1996 model, that is,

$$Rat\_Diff_{i,t} = (Actual\ Firm\ Rating_{i,t} - Predicted\ Firm\ Rating_{i,t,97-09}) + (Predicted\ Firm\ Rating_{i,t,97-09} - Predicted\ Firm\ Rating_{i,t,85-96}). \quad (4)$$

The first part, which we call *Rat_Diff_New*, captures the difference between the actual debt rating and the predicted rating based on the (new) model estimated over the 1997 to 2009 period. The second part, which we call *Rat_Diff_Predictions*, captures the change in the predicted debt rating due to increased conservatism over time (this measure was previously defined in equation (2) when we studied debt market access). If increased conservatism is responsible for the capital structure and debt spread results documented previously, then the coefficient on the second component should be significant. On the other hand, if deviations from the current model drive the results, we should observe a significant coefficient on the first component only.[31]

The following simple example helps illustrate our point. Suppose that a firm has a debt rating of BBB− in 2005. Based on the ratings model estimated over the period 1985 to 1996, its predicted rating is A−. Hence, *Rat_Diff*, our measure of conservatism, is equal to three notches. However, suppose that, based on the ratings model estimated over the period 1997 to 2009, the firm's predicted rating is BBB+. In that case, the difference between the two predicted ratings, *Rat_Diff_Predictions*, is one notch (from A− to BBB+) and the residual from the current model, *Rat_Diff_New*, is two notches (from BBB+ to BBB−). In the models estimated in this section, we include both *Rat_Diff_Predictions* and *Rat_Diff_New* as explanatory variables.

The above procedure also addresses another concern with our measure of conservatism, arising from the coarseness of the firm's actual rating.[32] A firm's assigned rating is restricted to 21 specific categories, but there is likely to be

[31] We are especially grateful to Craig MacKinlay for suggesting these tests.

[32] We would like to thank an anonymous referee for drawing our attention to this issue.

variation in the credit quality of firms within each category. As previously discussed, the predicted rating is a continuous variable (restricted to be between 1 and 21). Hence, it is possible that the firm's predicted rating contains information about credit quality not contained in the firm's actual rating. Our measure of conservatism may be picking up this effect. Thus, when we find that firms respond to conservatism, they may actually be responding to variations in credit quality within a specific rating bin. For example, firms whose actual rating is worse than the predicted rating may be firms at the top of their rating bin; compared to other firms with the same rating, these firms may issue less debt, have lower leverage, and have lower debt spreads, all effects documented previously. The subdivision of our measure as outlined in equation (4) allows us to investigate this possibility. The concern with rating coarseness is captured by *Rat_Diff_New*, the residual from the current model, while the effect of conservatism is captured by *Rat_Diff_Predictions*, the difference between the predictions of the old and the new models.[33,34]

Table XIII contains regression models that include both of these variables. As in Table XII, we only show the results for the ratings model estimated with firm fixed effects given that this model has the highest explanatory power. Hence, the explanatory variables of interest are *Rat_Diff_Predictions_Firm* and *Rat_Diff_New_Firm*.

In Panel A of Table XIII, we report the debt issuance regression. Both components of the prediction error are negative and significant. This suggests that firms issue less debt not only when their ratings are worse than predicted by the current model, but also when the current model appears conservative relative to the old model. In Panel B of Table XIII, we perform the same analysis for leverage levels. Both the difference between predictions and the residual from the current model affect leverage. Overall, the findings of Table XIII, Panels A and B, support the view that increased ratings conservatism has had a negative effect on firms' debt issuance decisions and leverage ratios.[35]

Finally, in Panel C of Table XIII, we reestimate our main regression model for debt spreads. Both the difference between the predictions as well as the residual from the current (1997 to 2009) model are significant in the models that include all control variables. Based on model (2), for every notch difference between the two predictions, debt spreads are 26.8 basis points lower. In addition, if the firm's current rating is one notch worse than predicted by the

[33] Because both predictions are continuous variables, this difference does not suffer from the coarseness problem that arises when the firm's actual rating is employed. Thus, the difference in predictions cannot proxy for unobserved credit quality within a ratings bin.

[34] We have repeated our analyses for the subset of firms for which the prediction error from the current model is less than 0.5. These are firms for which coarseness is less likely to be an issue given that the predicted rating using the current model contains little additional information relative to the actual rating. Our measure of conservatism remains important for these firms' capital structure decisions and debt spreads, which suggests that the predictions based on the old model are relevant for firms today, consistent with our interpretation.

[35] We have also verified that the results on cash holdings, growth, and investment continue to hold when this alternative measure of conservatism is employed (reported in the Internet Appendix).

Table XIII

Robustness Tests: Alternative Measure of Conservatism

This table reports robustness tests for the capital structure and credit spread regression using an alternative measure of conservatism. *Rat_Diff_New_Firm* is the difference between the actual Standard and Poor's rating and the rating predicted by regression model (6) in Panel A of Table III (excluding year dummies); the credit ratings regression is estimated using data from 1997 to 2009, and the predicted rating is obtained for 1997 to 2009. *Rat_Diff_New_Firm* is the difference between the predicted rating based on estimating the ratings model over 1997 to 2009 and the predicted rating based on estimating the ratings model over 1985 to 1996; the ratings model employed is based on regression (6) in Panel A of Table III. Panel A reports regression models of leverage changes. The control variables are the same as in Table VI. Panel B reports regression models of leverage levels.The control variables are the same as in Table VII. Standard errors in Panels A and B are clustered at the firm level and adjusted for heteroskedasticity and autocorrelation. Panel C reports regression models of credit spreads. The control variables are the same as in Table XII. Standard errors are clustered at the bond level and adjusted for heteroskedasticity and autocorrelation. L.(.) denotes the lage operator in all panels. p-values in all panels are reported in parentheses below the coefficients.

Panel A: Debt Issuance: Robustness

	Net Debt Issues
L2.(*Rat_Diff_Predictions_Firm*)	−0.002
	(0.02)
L2.(*Rat_Diff_New_Firm*)	−0.005
	(<0.01)
L.*Rating*	0.002
	(0.02)
L.*Book_Lev*	−0.067
	(<0.01)
L.(*Market-to-Book*)	0.011
	(<0.01)
L.(*PPE/Assets*)	0.004
	(0.70)
L.*Profit*	0.033
	(0.06)
L.*Size*	−0.005
	(<0.01)
L.*Taxshield*	−4.574
	(0.01)
L.(*Carryforwards/Assets*)	−0.004
	(0.77)
L.(*R&D/Sales*)	−0.047
	(0.43)
Industry and Year dummies	Y
Observations	5,994
Number of firms	881
Adjusted R^2	0.073

(Continued)

Table XIII—*Continued*

Panel B: Debt Levels: Robustness

	(1) *Ltde/Assets*	(2) *Book_Lev*	(3) *Mkt_Lev*
L.(*Rat_Diff_Predictions_Firm*)	−0.011	−0.009	−0.002
	(<0.01)	(<0.01)	(0.53)
L.(*Rat_Diff_New_Firm*)	−0.014	−0.017	−0.012
	(<0.01)	(<0.01)	(<0.01)
Rating	0.030	0.032	0.040
	(<0.01)	(<0.01)	(<0.01)
Market-to-Book	0.005	0.009	−0.082
	(0.44)	(0.23)	(<0.01)
PPE/Assets	0.027	0.019	−0.001
	(0.43)	(0.59)	(0.97)
Profit	0.003	0.009	−0.067
	(0.95)	(0.85)	(0.05)
Size	−0.003	0.008	0.032
	(0.55)	(0.12)	(<0.01)
Taxshield	−1.879	1.691	9.459
	(0.80)	(0.83)	(0.05)
Carryforwards/Assets	0.071	0.105	0.104
	(0.24)	(0.07)	(<0.01)
R&D/Sales	−0.202	−0.211	−0.302
	(0.21)	(0.21)	(0.02)
Industry and Year dummies	Y	Y	Y
Observations	6,725	6,724	6,724
Number of firms	930	930	930
Adjusted R^2	0.544	0.530	0.673

Panel C: Credit Spreads: Robustness

	Yield Spread	
	(1)	(2)
Rat_Diff_Predictions_Firm	−0.278	−0.268
	(<0.01)	(<0.01)
Rat_Diff_New_Firm	−0.183	−0.111
	(<0.01)	(<0.01)
Issue Rating	0.593	0.545
	(<0.01)	(<0.01)
Ln(Days to Maturity)	0.630	0.725
	(<0.01)	(<0.01)
Equity_Vol	70.002	71.914
	(<0.01)	(<0.01)
EDF	0.056	0.055
	(<0.01)	(<0.01)
Ann. Ret.	−0.004	−0.003
	(<0.01)	(<0.01)
Profit	−0.483	−0.680
	(<0.01)	(<0.01)

(Continued)

Table XIII—*Continued*

Panel C: Credit Spreads: Robustness

	Yield Spread (1)	(2)
Book_Lev	−1.868	−1.588
	(<0.01)	(<0.01)
PPE/Assets	1.455	1.261
	(<0.01)	(<0.01)
Firm dummies	Y	N
Bond dummies	N	Y
Year-Month dummies	Y	Y
Observations	193,492	193,492
Number of firms	679	679
Number of bonds	4,772	4,772
Adjusted R^2	0.777	0.817

current model, spreads also decline by 11.1 basis points. This compares to an increase in spreads of 54.5 basis points per rating notch decline. According to this specification, the market undoes 49% (26.8/54.5) of the effect of ratings conservatism on debt spreads.

In sum, using an alternative measure of ratings conservatism based on the difference between the predictions of the ratings models estimated over the periods 1985 to 1996 and 1997 to 2009, we continue to find that firms that have experienced a tightening of rating standards issue less debt, have lower leverage, and have lower debt spreads.

VIII. Conclusion

Over the period 1985 to 2009, we find that debt ratings have become more conservative: holding firm characteristics constant, the rating of the average firm declined by three notches. We next explore whether this increased conservatism is warranted. We start by documenting a decline in default rates over time for both investment grade and noninvestment grade bonds, which suggests that ratings have become more stringent over time. Next, we find that firms take the increased conservatism into account when determining capital structure. In particular, firms that obtain a rating worse than predicted by our ratings model issue less debt and have lower leverage than other companies. This may partially explain why some firms appear to have less debt than is optimal given the tax savings that can be obtained from increasing leverage. In addition, we find that firms are less likely to obtain a bond rating over time and that this is particularly the case for firms more affected by conservatism. We also find evidence that increased conservatism has a positive impact on cash holdings, and a negative impact on growth and investments in acquisitions, while the impact on other investment expenditures is modest, at best.

Interestingly, capital markets also take this increased stringency into account: firms more affected by conservatism have lower spreads than unaffected firms with the same rating. However, their spreads remain above those that would have prevailed without conservatism, suggesting that capital markets only partially offset the increased interest cost. The fact that managers still shy away from issuing debt when their ratings seem too conservative also suggests that, *in their view*, the adjustment to interest costs is insufficient, perhaps because (i) some investors are not fully rational and take ratings at face value (the *trusting* investors in Bolton, Freixas, and Shapiro (2012)), and/or (ii) rational investors are learning about the time-variation in conservatism.

Our findings also imply that the conflict of interest argument that has been proposed to explain what appeared to be inflated ratings for mortgage-backed securities may not apply to corporate bonds. This does not mean that conflicts of interest are not present, but the argument has to be more involved; it needs to explain alleged leniency in the mortgage-backed securities market and conservatism in the corporate market (see Opp, Opp, and Harris (2013) for a possible explanation).

What remains unexplored in our study is *why* rating agencies have become more conservative and *why* some firms have been more affected by conservatism than others. It may be the case that pressure on rating agencies increased after some well-known defaults at the start of the century (e.g., Enron), and that companies that were more similar to those that defaulted were downgraded more than others. However, this cannot be the whole explanation because the effect dates back to at least 1986. Alternatively, conservatism may just be the outcome of rating agencies learning about the correct model over time. As such, conservatism is not unwarranted, but rather a correction of previous leniency. However, although this interpretation can explain firms' capital structure decisions, it cannot explain the results on debt spreads; if the old model is not useful anymore, it should not predict debt spreads, yet we find that it does. To be consistent with our results, the correction of leniency story would imply that firms (through their capital structure decisions) and capital markets (through the pricing of debt securities) are making a mistake. This would require the market to be fixated on the old ratings model, implying that debt spreads are too low, while firms fail to take advantage of this and instead act as if spreads are too high. While plausible, we believe it is less likely than the scenario we propose. Exploring the exact cause of the conservatism is therefore an important avenue for future research.

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REFERENCES

Acharya, Viral V., Sergei A. Davydenko, and Ilya A. Strebulaev, 2012, Cash holdings and credit risk, *Review of Financial Studies* 25, 3572–3609.

Alp, Aysun, 2010, Structural shifts in credit rating standards, Working paper, University of Maryland.

Bank for International Settlements, 2000, Credit ratings and complementary sources of credit quality information, Basel Committee on Banking Supervision Working Papers, No. 3.

Bates, Thomas W., Kathleen M. Kahle, and René M. Stulz, 2009, Why do U.S. firms hold so much more cash than they used to? *Journal of Finance* 64, 1985–2021.

Becker, Bo, and Todd T. Milbourn, 2011, How did increased competition affect credit ratings? *Journal of Financial Economics* 101, 493–514.

Berger, Philip G., Eli Ofek, and David L. Yermack, 1997, Managerial entrenchment and capital structure decisions, *Journal of Finance* 52, 1411–1438.

Bharath, Sreedhar T., and Tyler Shumway, 2008, Forecasting default with the Merton distance to default model, *Review of Financial Studies* 21, 1339–1369.

Blume, Marshall E., Felix Lim, and A. Craig MacKinlay, 1998, The declining credit quality of U.S. corporate debt: Myth or reality? *Journal of Finance* 53, 1389–1413.

Bolton, Patrick, Xavier Freixas, and Joel Shapiro, 2012, The credit ratings game, *Journal of Finance* 67, 85–111.

Bongaerts, Dion, K. J. Martijn Cremers, and William N. Goetzmann, 2012, Tiebreaker: Certification and multiple credit ratings, *Journal of Finance* 67, 113–152.

Boot, Arnoud W. A., Todd T. Milbourn, and Anjolein Schmeits, 2006, Credit ratings as coordination mechanisms, *Review of Financial Studies* 19, 81–118.

Campbell, John Y., and Glen B. Taksler, 2003, Equity volatility and corporate bond yield, *Journal of Finance* 58, 2321–2349.

Chernenko, Sergey, and Adi Sunderam, 2012, The real consequences of market segmentation, *Review of Financial Studies* 25, 2041–2069.

Covitz, Daniel M., and Paul Harrison, 2003, Testing conflicts of interest at bond rating agencies with market anticipation: Evidence that reputation incentives dominate, FEDS Working Paper No. 2003–68.

Faulkender, Michael, and Mitchell A. Petersen, 2006, Does the source of capital affect capital structure? *Review of Financial Studies* 19, 45–79.

Gala, Vito D., and Joao F. Gomes, 2012, Beyond Q: Estimating investment without asset prices, Working paper, London Business School and University of Pennsylvania.

Graham, John R., 2000, How big are the tax benefits of debt? *Journal of Finance* 55, 1901–1942.

Griffin, John M., and Dragon Y. Tang, 2012, Did subjectivity play a role in CDO credit ratings? *Journal of Finance* 67, 1293–1328.

Gu, Zhaoyang, and Yingqing Zhao, 2006, Accruals, income smoothing and bond ratings, Working paper, Tepper School of Business.

Hand, John R. M., Robert W. Holthausen, and Richard W. Leftwich, 1992, The effect of bond rating agency announcements on bond and stock prices, *Journal of Finance* 47, 733–752.

Jewell, Jeff, and Miles Livingston, 1998, Split ratings, bond yields, and underwriter spreads, *Journal of Financial Research* 21, 185–204.

Jiang, John X., Mary H. Stanford, and Yuan Xie, 2012, Does it matter who pays for bond ratings? Historical evidence, *Journal of Financial Economics* 105, 607–621.

Jones, Jennifer J., 1991, Earnings management during import relief investigations, *Journal of Accounting Research* 29, 193–228.

Jorion, Philippe, Charles Shi, and Sanjian B. Zhang, 2008, Tightening credit standards: The role of accounting quality, *Review of Accounting Studies* 14, 123–160.

Kisgen, Darren J., 2006, Credit ratings and capital structure, *Journal of Finance* 61, 1035–1072.

Kliger, Doron, and Oded Sarig, 2000, The information value of bond ratings, *Journal of Finance* 55, 2879–2902.

Lang, Larry, Eli Ofek, and René M. Stulz, 1996, Leverage, investment, and firm growth, *Journal of Financial Economics* 40, 3–29.

Mason, Joseph R., and Josh Rosner, 2007, Where did the risk go? How misapplied bond ratings cause mortgage backed securities and collateralized debt obligation market disruptions, Working paper, Drexel University LeBow College of Business.

Millon, Marcia H., and Anjan V. Thakor, 1985, Moral hazard and information sharing: A model of financial information gathering agencies, *Journal of Finance* 40, 1403–1422.

Moody's Investor Service, 2010, *Corporate Default and Recovery Rates*, 1920–2009 (New York, NY).

Moody's Investor Service, 2012, *Annual Default Study: Corporate Default and Recovery Rates*, 1920–2011 (New York, NY).

Opler, Tim, Lee Pinkowitz, René M. Stulz, and Rohan Williamson, 1999, The determinants and implications of corporate cash holdings, *Journal of Financial Economics* 52, 3–46.

Opp, Christian C., Marcus M. Opp, and Milton Harris, 2013, Rating agencies in the face of regulation, *Journal of Financial Economics* 108, 46–61.

Ortiz-Molina, Hernan, 2006, Top management incentives and the pricing of corporate public debt, *Journal of Financial and Quantitative Analysis* 41, 317–340.

Pagano, Marco, and Paolo F. Volpin, 2010, Credit ratings failures and policy options, *Economic Policy* 25, 401–431.

Partnoy, Frank, 2009, Overdependence on credit ratings was a primary cause of the crisis, Working paper, University of San Diego School of Law.

Pinches, George E., and J. Clay Singleton, 1978, The adjustment of stock prices to bond rating changes, *Journal of Finance* 33, 29–44.

Securities and Exchange Commission, 2003, Report on the role and function of credit rating agencies in the operation of the securities markets as required by Section 702(b) of the Sarbanes-Oxley Act of 2002, Washington, D.C.

Shivdasani, Anil, and Irina Stefanescu, 2010, How do pensions affect corporate capital structure decisions? *Review of Financial Studies* 23, 1287–1323.

Standard and Poor's, 2008, *Corporate Ratings Criteria* (New York, NY).

Standard and Poor's, 2013, About credit ratings, Available at: http://www.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html, last accessed January 9, 2013.

Strebulaev, Ilya A., and Baozhong Yang, 2013, The mystery of zero-leverage firms, *Journal of Financial Economics* 109, 1–23.

Titman, Sheridan, and Roberto Wessels, 1988, The determinants of capital structure choice, *Journal of Finance* 43, 1–19.

Zenner, Marc, Ramaswamy S. Variankaval, Tomer Berkovitz, and Nishant Mago, 2008, *Conservative Capital Structures: Reclaiming the Throne* (J.P. Morgan Capital Structure Advisory & Solutions, New York, NY).

Supporting Information

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Appendix S1: Internet Appendix